



INDUSTRIAL HERITAGE
GLASSMAKING IN BOR – ŠENOV AREA

MIROSLAV KOLKA

INDUSTRIAL HERITAGE

GLASSMAKING IN BOR – ŠENOV AREA



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Photograph on the book jacket: Bratři Jílkové glassworks in Kamenický Šenov, Pavel Čech's collection.

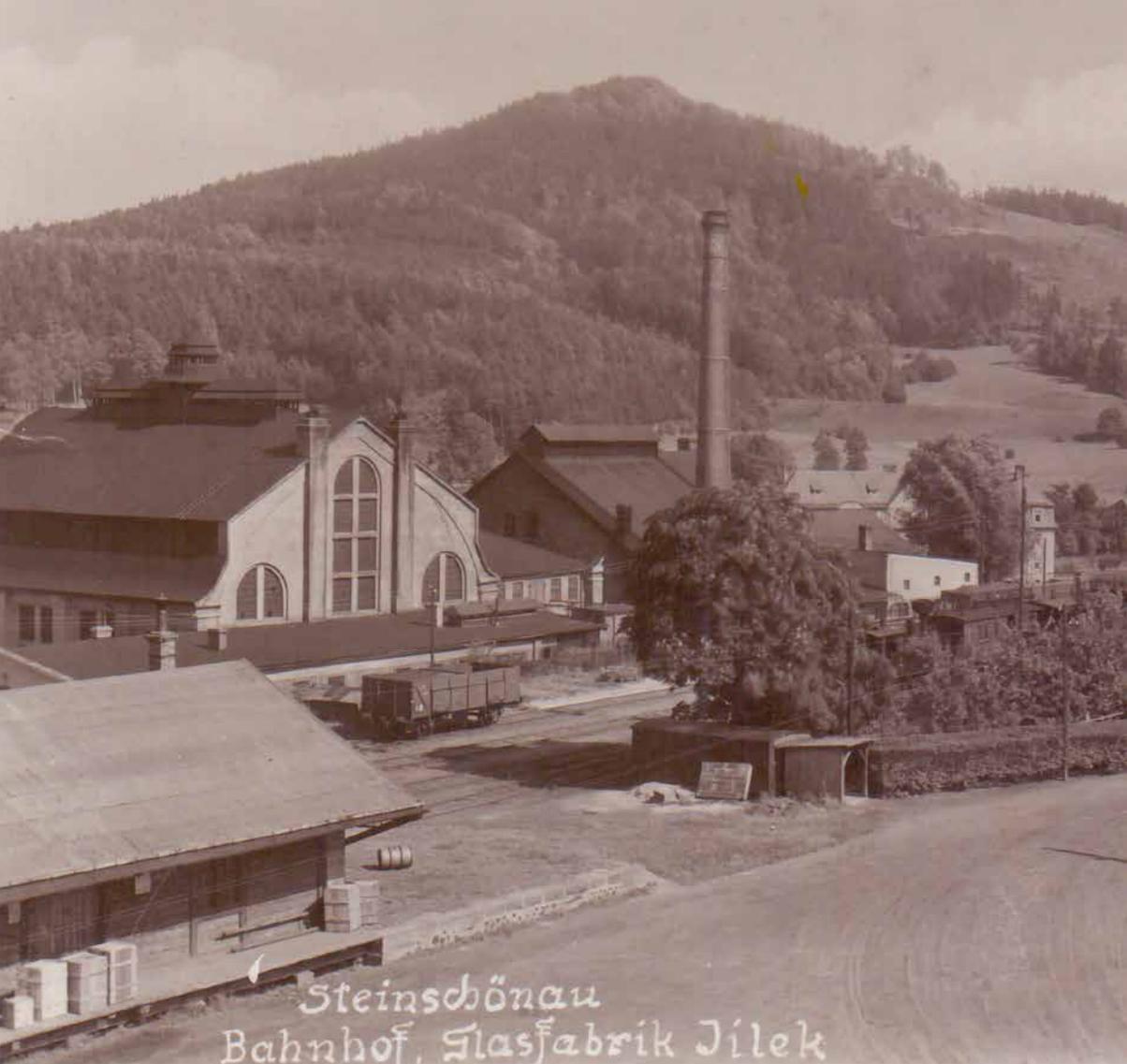
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Kamenický Šenov, view from the west across the railway station to the premises of the Bratři Jílkové glassworks, No. 687, second quarter of the 20th century, Pavel Čech's collection.



Okrouhlá, Karl Meltzer
glass painting works
sample house and church
window production,
house No. 84, restored
part of the premises.
Photo: author, 2022.

INTRODUCTION

The present publication is focused primarily on buildings and technological installations related to glassmaking. The process of glass production and finishing includes various operations ranging from the production of materials to glassworks halls and finishing works, some incorporating several finishing techniques, some only one of them. Within the study of the complex technological flow, attention is paid also to the procurement and transport of glassmaking materials, the energy background of the production buildings (hydraulic structures, water, electric energy and gas supplies), engineering companies focused on the production of glasswork machinery, as well as the production of components for the completion of the products (the production of frames, metal accessories, crates, wood wool, etc.). The history of glass companies, their property relationships, the art-history development of glass and other types of context are only mentioned to the extent necessary in relation to the production buildings themselves. Regionally, the work is delimited by the Bor – Šenov glassmaking area, one of the most important regions in this branch nationwide. It is situated in northern Bohemia near the towns of Nový Bor, Kamenický Šenov, Česká Kamenice and Chřibská in the territory of the present-day Česká Lípa District (Liberec Region) and Děčín District (Ústí Region). In terms of time, the work focuses above all on the period between the second half of the 18th century and the middle of the 20th century, which means the proto-industrial and industrial production. The temporal boundary of the research lies in 1945 and the subsequent nationalization of the individual companies.

The first chapter is focused on characterizing the area. It aims to offer an overview discussing the geological exceptionality of the Lusatian Mountains, their foothills and the adjacent regions of the Elbe Sandstone Mountains and the Central Bohemian Uplands, which predetermined the suitability of locating glassworks in local extensive forest areas. However, the rapid development of the glass industry was also influenced by the attitude of the owners of the local manors, the overall economic and demographic development of the settlements there and the fact that they are situated on numerous montane and submontane watercourses. The next chapter sums up the basic features of the historical development of glassmaking in the studied region, aiming to depict important milestones that affected the emergence and localization of glass production, finishing and trade. The important third chapter sums up the technical and building development of structures related to the complex technology flow of glass production. Synoptically, it presents the technologies and production facilities used, as well as the material, structural and layout characteristics of the individual buildings and complexes.

The subsequent chapter, the Register of Localities with Glassmaking Operations, offers brief basic information about the individual settlements in the studied glassmaking area. For each of them, it provides the specialization in a particular type of glass production, the impact of the concentration of these buildings on the urban development of the locality and the basic information about each operation. Attention is paid above all to complexes and buildings with a distinct production



Nový Bor, house No. 171 from the late 18th century under preservation care and the newly built so-called Glass House, the headquarters of the glassmaking company Lasvit. Photo: author, 2019.

or industrial character. The Register of Localities is ordered alphabetically according to cadastral areas and, within them, according to branches. A synoptic map with the localization of the buildings recorded by the survey is always included. The most valuable complexes are discussed in the Catalogue of Selected Glassmaking Objects and Complexes. The key parameters for the inclusion of the complexes in the catalogue include the authenticity of the buildings, the complexity of preservation of the production units and their structural and technological exceptionality. The discussed themes are illustrated by maps, schemes, reproductions of historical plan documentation, contemporary and present-day photographs. The most important complexes are presented also using synoptic drawing reconstructions that depict the situation approximately as of 1945, i.e. not yet disturbed by modern adaptations, additions and demolitions.

The glass industry has an important position in the Bor – Šenov area to this day. Despite partial losses, the extant glassworks remain an integral part of the local extraordinarily attractive landscape, with large finishing operations or small home workshops scattered in its towns and villages, continually following in centuries-long traditions. This means that in many areas, we study a living organism. Generally, we can state that the wider public perceives the undoubted value of the premises and buildings of glassmaking operations and the necessity of their preservation and suitable presentation. This means that local industrial heritage does not represent an endangered type of buildings unlike, for instance, larger textile industry factory complexes or historical bridges, which have been in essence systematically liquidated in recent decades, not only in northern Bohemia.¹ On the contrary, we can see many positive examples of the rescue of valuable buildings

1 FRAGNER – ZIKMUND 2009. FREIWILLIG – KOLKA 2015.

or complexes; as one example for all, let us name the well-known glass painting works and stained glass production plant sample room in Okrouhlá. Some complexes where glass production ended several decades or years ago have been successfully converted for other purposes, either within another branch of industry or into housing units. Regrettably, there are also cases of buildings that have suffered a different fate and were demolished. Fortunately, they are not very frequent yet. Great losses are unfortunately impending for complexes suffering from repeated property rights machinations in combination with a long-term lack of upkeep. Here, we need to mention above all the iconic building of the local glass industry, the Elias Palme chandelier factory in Kamenický Šenov, or the historically very important glassworks in Svor. It is the author's daring wish that the present publication might contribute to better knowledge and the rescue of glassmaking buildings in the region in the borderland of the Lusatian Mountains, the Elbe Sandstone Mountains and the Central Bohemian Uplands.



Kamenický Šenov, Elias Palme chandelier factory No. 686, view from the southwest into the main building's courtyard, continuing destruction of the buildings of the extraordinarily valuable premises. Photo: author, 2014.



Landscape on the boundary between the Lusatian Mountains, the Central Bohemian Uplands and the Elbe Sandstone Mountains; in the forefront, Dolní Pruský with buildings along the Pruský Stream. Photo: Jiří Vidman, 2021.

CHARACTERIZATION OF THE AREA

GEOMORPHOLOGY AND HYDROLOGY

The Bor – Šenov glassmaking area is not a firmly institutionally defined unit. In view of the historical context and links, the territory of research consists of the glassmaking towns of Nový Bor and Kamenický Šenov and the villages in their vicinity, as well as the neighbouring areas around Česká Kamenice and Chřibská. The perimeter of the studied area can be delimited in a very rough and loose manner with a line from Česká Lípa in the south, along the River Ploučnice up to Žandov, from there northward to Česká Kamenice, then to the southern edge of the Šluknov Spur, eastward to Varnsdorf, from it along the state border with Germany and southward along the River Svitávka up to Zákupy and westward back to Česká Lípa. From the geomorphological perspective, the core of the area (the centre and the northeast) falls into the Sudetes Subprovince and the geomorphological unit of the Lusatian Mountains, which is followed by the Šluknov Hilly land on the northern edge of the delimited territory. The southern and southeastern parts belong to the Ralsko Hilly land (a part of the Bohemian Tableland), while the southwestern and western parts belong to the České středohoří Mountains and the Děčín Upland (a part of the Krušné hory Subprovince).

The landscape relief is extraordinarily rugged here, with deeply carved watercourse canyons and waterless ravines. A typical feature of the local panorama is a line of dominant conical hills that rise distinctively above the surrounding landscape. A large part of the area is covered to this day by extensive forests. Agriculturally used areas are limited to settlements along the watercourses and small hamlets with pastures. The structure of the landscape did not differ considerably from the present-day situation, only a part of the field systems saw the advance of the forest towards the built-up areas of settlements from the mid-20th century due to the displacement of the original inhabitants and non-utilization of the land. The relief in the southern part of the area is less rugged, the floodplains of the watercourses are shallower here and, therefore, the agriculturally used areas are more extensive. A sufficient quantity of wood needed as fuel in glass furnaces and other necessary installations, for burning ash and the production of potash and also of timber for building was a necessary precondition for the existence of glassworks up to the middle of the 19th century.

The Lusatian Mountains are rich in smaller and rapid watercourses that mostly rise in the northern borderland strip and flow southward. They belong to the basin of the River Ploučnice (Polzen) that empties into the Labe (Elbe) in Děčín. The individual streams in the eastern edge of the studied territory are drained by the small River Svitávka (Zwitte) that empties into the Ploučnice south of Zákupy near Brenná.¹ The Dobranovský Stream (Dobernach) near Sloup v Čechách and the

1 KOLKA 2012.



Map of the Bor – Šenov glassmaking area with the geomorphological units, the landscape relief and the watercourses schematically marked. Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.

Šporka Stream (Rohnbach, Sporkabach) near Nový Bor and Skalice flow in a north-south direction, virtually parallel to the Svitávka, in the centre of the area. The western part of the area near Nový Oldřichov and Mistrovice is drained by the Bystrá Stream (Meistersdorfer Bach, Absbach), which empties into the Ploučnice in Benešov. The Ploučnice roughly frames the delimited area on the southern side. The northwestern part of the territory belongs to the water basin of the River Kamenice (Kamnitzbach), which flows into the Labe in Hřensko. The northern edge near Krásná Lípa, Kyjov and Vlčí Hora is drained by the small River Křinice (Kirnitzsch, Körntschbach, Körnsbach), which empties into the Elbe (Labe) already in the German territory near Bad Schandau. The last watercourse, close to Jiřetín pod Jedlovou and Dolní Podluží, is the Lužnička Stream (Lausur, Lausebach) flowing to the east to Germany and emptying into the Mandau (Mandava) near Großschönau. The above description makes it clear that there are many watercourses in the area offering suitable locations for technical devices driven by waterwheels and, in later periods, water turbines.

GEOLOGICAL SITUATION

The Bor – Šenov glassmaking area, situated on the northern edge of the Bohemian Cretaceous Basin, is characterized by a varied geological composition. It is comprised mostly of Upper Cretaceous quartz sandstones of the Březno Formation and in the Elbe Sandstone Mountains, on the northeastern edge near Krompach and Mařenice and in the southeastern part around Lindava, Svitava and Velenice, also by Upper Cretaceous quartz sandstones of the Jizera Formation. Calcareous claystones, marlstones and calcareous siltstones also occur to a smaller extent. The Lusatian massif, consisting of granodiorites and granites above all in this part, forms the distinctive northern boundary of the studied territory. The line dividing the two geological units is the Lusa-

tian Fault running in the northwest – southeast direction from the German border across Kopec, Brtníky, Vlčí Hora, Doubice, Jiřetín pod Jedlovou, Dolní Podluží, along the border with Germany and then across Křižany and Frýdštejn to Kozákov Hill. Dykes of the dark igneous rock polzenite penetrated the sediments of the Bohemian Cretaceous Basin at the very end of the Mesozoic and in the early Tertiary. They form lengthy ridges, e.g. near Hamr na Jezeře, whereas conic hills are the result of Tertiary volcanic activity. Basalt, phonolite and trachyte are typical igneous rocks there. Basaltic rocks reach from the České středohoří Mountains to the neighbourhood of Kamenický Šenov, whereas trachytes and phonolites are typical of the Lusatian Mountains. Various types of sediments (stony, stony-clayey, clayey-sandy or sandy-clayey) are deposited on the slopes of the conical hills and in shallow brook floodplains; sand, gravel, alluvial sediments or loess loams were deposited at lower altitudes.²

From the geological point of view, therefore, the oldest structure in the studied territory is the granitic Lusatian massif (Lusatian pluton) on its northern edge, categorized as early as the Proterozoic, with an overlap into the earliest Palaeozoic. In the Šluknov Hilly land, this rock was and is widely used as building stone and to produce high-quality pavers.³ The predominant Upper Cretaceous sandstones from the Mesozoic are categorized into the Turonian (Jizera Formation) and the Coniacian (Březno Formation). In the former case, they are quartz sandstones that form the typical “rock towns” in multiple places of northern Bohemia. Sandstone was used massively as building stone (ashlars or less worked stones called kopák), grinding stones or whetstones. Thanks to its good workability, various residential, farming and technical buildings (e.g., parts of hydraulic structures, forges, drying kilns) were situated in the bedrock, creating the region’s unmistakable atmosphere. In many places there are also deposits of high-quality glassmaking and foundry sand.⁴ Tertiary volcanic rocks (above all basalt and phonolite) were also massively used (and are partially to this day) in the construction industry, as quality building stone and as gravel for road construction projects. In contact with volcanic rock bodies, the sandstones were impregnated with siliceous (silicification) and ferrous (ferruginization) cement,⁵ which strengthened these rocks considerably. Polzenite dykes decomposed into a mixture of clay and iron oxides (so-called clayey ironstone, the term Toneisenstein is used in German) were mined as iron ore in many localities in the 16–18th centuries.⁶ Thanks to its better properties and higher strength, sandstone from these parts was suitable for mining for grinding stones or whetstones or possibly for other specialized production.⁷ Sandstone silicification took did locally occur also along major faults, such as the Lusatian Fault.

LUSATIAN FAULT

The current surface of the delimited territory is the result of Late Cretaceous and Tertiary movements and tectonic changes. The most important fault of this period is the Lusatian Fault; its course and fundamental importance in the divide of the geological structure of northern Bohemia has been mentioned above.⁸ It has the character of a reverse fault where older rocks of the crystalline basement, the Permian and the Jurassic were thrust over younger Cretaceous sediments.

2 Geological map 1 : 50 000 [cit. 14 April 2021]. Available from: https://mapy.geology.cz/geo/?z=13&x=1628473.8081261416&y=6576641.433770468&l=GEOCR50_mobil_9756!0!1!2.

3 VAŘILOVÁ et al. 2020, pp. 37, 41–47.

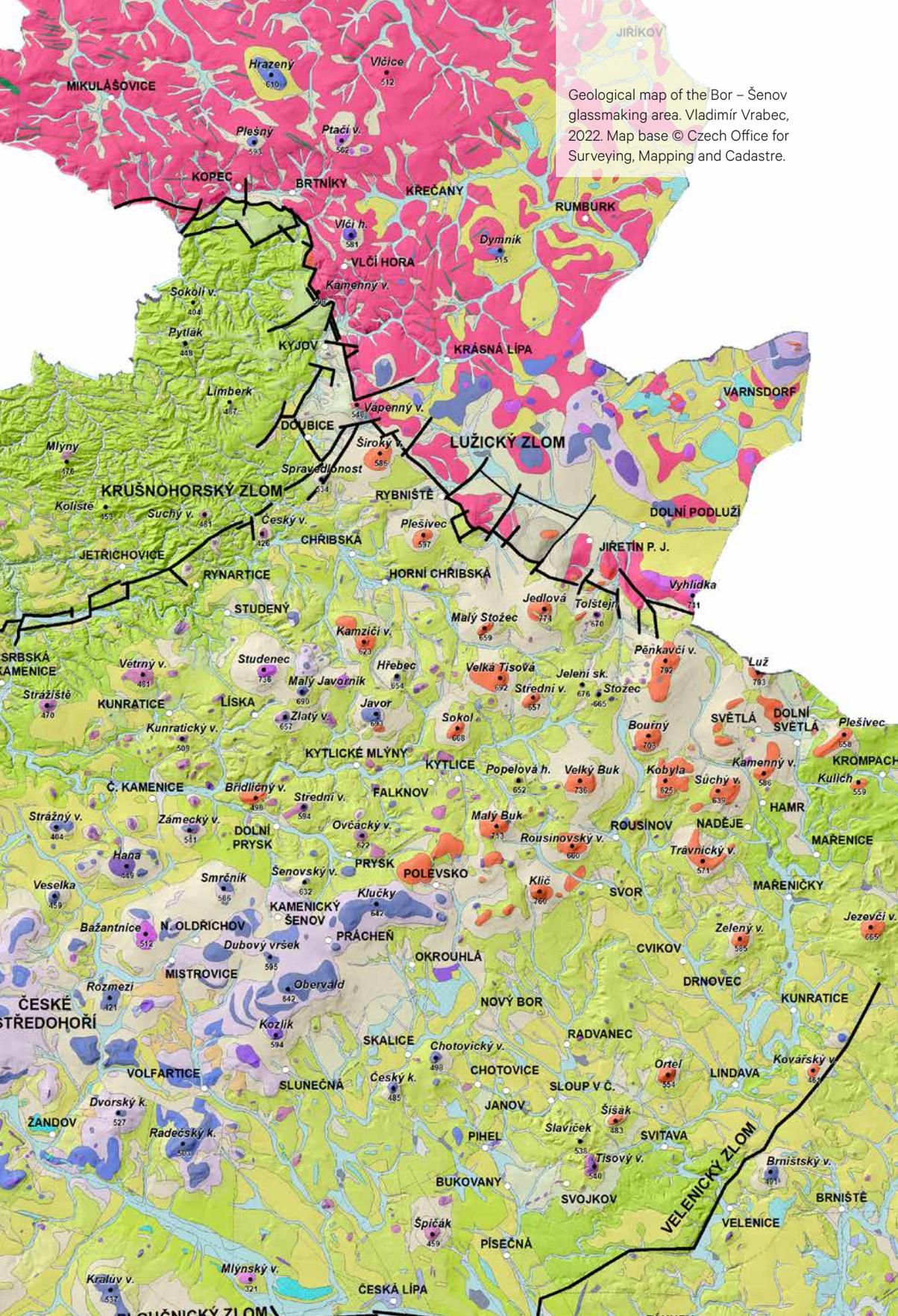
4 KÚHN 2006, p. 14. ADAMOVIČ – MIKULÁŠ – CÍLEK 2010.

5 ADAMOVIČ – CÍLEK 2002, pp. 56–72. HAVRÁNEK – ADAMOVIČ 2005, pp. 133–162.

6 KÚHN 1999, pp. 181–207.

7 ADAMOVIČ – MIKULÁŠ – CÍLEK 2010, pp. 258–261. More quarries in the territory of Bohemian Switzerland have been localized in the terrain and documented with data from archival sources by Natalie Belisová, see VAŘILOVÁ et al. 2020, pp. 339–349.

8 COUBAL – ADAMOVIČ – ŠŤASTNÝ (eds.) 2018.



JIRKOV

Geological map of the Bor – Šenov glassmaking area. Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.

MIKULÁŠOVICE

Hrazený
610

Vičice
512

Plešný
593

Ptačí v.
562

KOPEC

BRTNÍKY

KŘEČANY

RUMBURK

Sokolí v.
404

Pytlák
440

Vlčí h.
581

Dymník
515

Kamenný v.
506

Limberk
487

KYJOV

KRÁSNÁ LÍPA

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KRUŠNOHORSKÝ ZLOM

JETŘICHOVICE

RYBNÍŠTĚ

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Spravedlnost
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Plešivec
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RYNARTICE

CHŘIBSKÁ

HORNÍ CHŘIBSKÁ

JÍŘETÍN P. J.

Strážisté
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Vetřný v.
491

STUDENÝ

Kamzičí v.
623

Hřebec
654

Malý Stožec
659

Jedlová
771

Tolštejn
670

Pěnkavčí v.
792

Strážný v.
404

KUNRATICE

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Malý Javořík
690

Javor
693

Velká Tisoř
692

Jelení sk.
676

Stožec
665

Luž
793

Veselka
459

Č. KAMENICE

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498

Střední v.
594

FALKNOV

Popelová h.
652

Velký Buk
736

Kobyla
625

Súchý v.
639

Strážný v.
404

Zámecký v.
541

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Malý Buk
713

Rousínovský v.
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Klíč
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NOVÝ BOR

RAĐVANEČ

SVITAVA

BRMÍSTKÝ ZLOM

Veselka
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Bažantnice
512

N. OLDŘICHOV

Senovský v.
632

KAMENICKÝ ŠENOV

Klučky
647

PRYSK

POLEVSKO

SVOR

Strážný v.
404

Zámecký v.
541

DOLNÍ PRYSK

Ovčácký v.
672

Malý Buk
713

Rousínovský v.
660

Klíč
760

ROUSÍNOV

NADĚJE

Hana
449

Bažantnice
512

N. OLDŘICHOV

Senovský v.
632

KAMENICKÝ ŠENOV

Klučky
647

PRYSK

POLEVSKO

SVOR

Veselka
459

Rozmezi
421

Dubový vršek
595

PRÁCHEŇ

OKROUHLÁ

NOVÝ BOR

RAĐVANEČ

SVITAVA

BRMÍSTKÝ ZLOM

Strážný v.
404

Smrtník
585

MISTROVICE

Oberváld
842

ČHOTOVICKÝ V.

NOVÝ BOR

RAĐVANEČ

SVITAVA

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Zámecký v.

—	tectonic lines – faults, main and auxiliary	■	quartzose sandstone, siltstone / Mesozoic – Cretaceous – Březno Formation
■	fluvial sediments – sandy, clayey – silty Quaternary – Cenozoic	■	quartzose sandstone / Mesozoic – Cretaceous – Jizera Formation
■	loess and loess loam, sandy – clayey – stony sediments glacial sediments / Quaternary (Cenozoic)	■	limestone, dolomite, sandstone Mesozoic – Jurassic
■	basaltoids, basaltoid breccias, tuffs Tertiary – Cenozoic	■	sandstone, rhyolite / Permian – Upper Palaeozoic
■	phonolites and sodalite phonolites, trachytes and sodalite trachytes, trachytes generally (undifferentiated) / Tertiary – Cenozoic	■	phyllite, greywacke / Permian – Upper Palaeozoic
		■	granite, granodiorite – granitic rocks of the Lusatian pluton (Proterozoic) / Lower Palaeozoic – Proterozoic

Of other faults, it is also important to mention the Stráž and Okřešice Faults in the eastern and southeastern edge of the studied area. The Krušné hory Fault, which has the character of a normal fault, reaches into the Elbe Sandstone Mountains area from the west. It runs in the northeast – southwest direction and ends in the Lusatian Fault near Doubice.⁹ Thanks to the described movements on the Lusatian Fault, an occurrence of Jurassic limestones, the only one in Bohemia, can be documented in several not very large places. The most important locality is Vápenný (Maškův) Hill in the Kyjov cadastral area. Narrow blocks of Permian rocks were turned up at the same time – claystones, sandstones and acid volcanic rocks (so-called quartz porphyry). Outcrops of these rocks are documented near Vlčí Hora between the settlement of Teleneč and Plačtivé kameny and further near Brtníky, Kyjov and Doubice, including the above-mentioned Vápenný Hill.¹⁰

ADMINISTRATIVE DEVELOPMENT OF THE REGION¹¹

From the Middle Ages until 1848, the administrative and judicial power was concentrated in manors. Many of these units went through a very complex development in the High Middle Ages and Early Modern Period before their geographic area and the exercise of the administration gradually settled. The core of the studied territory consisted of the **Sloup manor**. The neighbourhood of Sloup was colonized in the late 13th or early 14th century at the latest by the Berka of Dubá family. A smaller estate with several villages near the administrative centre was gradually extended in the 15th and 16th centuries in the northwestern direction towards the Kamenice by adding more newly founded villages (Arnultovice, Falknov, Polevsko).¹² The crucial period for the economic development of the Sloup manor came after the Thirty Years' War under the dominion of the Kokořovský of Kokořov family and especially after the purchase of the property by the Kinský family in 1708. An especially exceptional figure was Josef Jan Maxmilián Kinský (1705–1780; he took over the manor in 1726), who turned the Sloup manor into a territory with an extraordinary concentration of proto-industrial production with a dominance of the textile and glass industry. In 1757, the development of glass trade and finishing led to the foundation of the town of Haida (later Bor, Bor

9 VAŘILOVÁ et al. 2020, pp. 119–122.

10 Ibid., p. 47.

11 The subchapter intentionally lists only the basic information necessary for the discussed theme; only fundamental titles are quoted from the extensive regional literature, especially monographs of larger units or individual important settlements.

12 BLAŽKOVÁ – HONCŮ – SMEJKAL – SOVADINA 1998, pp. 14–18. PANÁČEK 2004, pp. 26–27.

u České Lípy, present-day Nový Bor), which gradually developed into the economic and later also administrative centre of the area.¹³

Another crucial unit with a concentration of glass production was the **Česká Kamenice manor**. The colonization of this area proceeded from the first half of the 13th century under the Michalovic family from the then centre of the manor, Ostrý (Scharfenstein) Castle near Benešov nad Ploučnicí. In 1536, under the Vartenberk family, the area near Česká Kamenice and Chříbská separated from Benešov and was gradually consolidated into a territorial unit made complete by the addition of Krásná Lípa and its neighbourhood in 1573. The Kinský family held Česká Kamenice in 1614–1848. Like the Sloup manor, the area saw a stormy boom of proto-industrial production under the Kinský family in the second half of the 17th and the 18th centuries.¹⁴

Glassmaking was an important sector also in the Lusatian Mountains and their foothills, in the part falling under the administration of the **Zákupy manor**. The upper part of this unit near Cvikov was colonized from the first half of the 14th century at the latest by the Berka of Dubá family; at first, it belonged to the manor of Milštejn Castle. In the 1630s, the property went over to Duke of Saxe-Lauenburg Julius Henry and via the dukes of Tuscany and Bavaria in 1815 to the imperial chamber.¹⁵ The southern part of the property around the Zákupy residence participated marginally in glass production. The same can be said about the **Česká Lípa – Nový Zámek manor** that follows to the southwest, which was consolidated as an extensive and economically important unit in the second half of the 16th century thanks to the gradual unification of property by Jan of Vartenberk.¹⁶ The only more important glassmaking localities there were Okrouhlá, a village wedged between the Sloup and Česká Kamenice manors, and Slunečná. More evidence of glassmaking can be found in the neighbouring **Horní Libchava manor**, belonging to the order of the Knights Hospitaller. There also the property was gradually unified during the 15th and 16th centuries, a process that was completed in 1623.¹⁷ The crucial position in the studied branch belonged to the village of Skalice, which was divided into Sloup and Horní Libchava parts, and Slunečná, which was likewise divided into two parts belonging to the Horní Libchava and Nový Zámek manors. More traces of glassmaking crafts and trade can be found in Volfartice.

The northern edge of Bohemian Switzerland and the adjacent Šluknov Spur belonged to the **Lipová, Rumburk and Šluknov manors**. The colonization of the territory belonging to Hohnštejn Castle (Hohnstein, today in the territory of Saxony) began as early as in the second half of the 13th century.¹⁸ The area around Rumburk and Varnsdorf and a greater part of the Šluknov Spur gradually saw an extraordinary boom of manufactory and later industrial production in the 18–20th centuries; with a few exceptions, however, it was not oriented on glassmaking, the dominant branches being above all the textile and engineering production.¹⁹

After the constitution of state administration after 1848 and the formation of districts, a crucial part of the territory fell under the political district of Česká Lípa and the judicial district of Nový Bor (the former Sloup manor and some villages of the Česká Lípa – Nový Zámek and Horní Libchava manors); the southern part was part of the judicial district of Česká Lípa. The northeastern enclave of the mountainous part of the Zákupy manor became part of the judicial district of Cvikov,

13 BLAŽKOVÁ – HONCŮ – SMEJKAL – SOVADINA 1998, pp. 22–28. KLÍMA 1955, pp. 412–426.

14 KOLEKTIV 2002, pp. 31–35, 50, 61, 67, 75, 88–89, 160, 179. GABRIEL – VANĚK 2006, pp. 13–19.

15 PANÁČEK 2004, pp. 26, 35 and 39. PEŠA – PANÁČEK – SMEJKAL – VLČEK – HONCŮ – NOVÁK 2018, pp. 38–40, 44–48, 53–54, 57, 63, 107. ASCHENBRENNER 2020, pp. 12–26, 33–34, 43–44.

16 KOLEKTIV 2018, pp. 126, 494–495.

17 GAJDOŠÍK 2007, pp. 79–92.

18 KOLEKTIV 2003, pp. 42–46, 48–49, 68–69. SMETANA 1998. HOCKAUF 1885.

19 KOLEKTIV 2003, pp. 110–125, 221–235.

originally belonging to the Česká Lípa District and from 1868 to the political district of Jablonné v Podještědí.²⁰ The former Česká Kamenice manor was included in the political district of Děčín and the judicial district of Česká Kamenice. However, the northern edge belonged to the political district of Rumburk and the judicial districts of Rumburk and Varnsdorf. The judicial district of Rumburk included a part of the homonymous manor, the southern edge of the Lipová manor and, out of the Česká Kamenice manor, the neighbourhood of Krásná Lípa. A part of the former Rumburk manor near Varnsdorf and Jiřetín pod Jedlovou and the neighbourhood of Chřibská from the Česká Kamenice manor fell under the judicial district of Varnsdorf. A separate political district was formed in Varnsdorf in 1908.²¹ With small changes, this division functioned until 1948. New districts of Česká Lípa, Nový Bor, Rumburk and Děčín were formed in 1949–1960, to be later replaced by the large districts of Česká Lípa and Děčín. After the establishment of regions, the former became part of the Liberec Region, while the latter was included in the Ústí Region.²²

SETTLEMENT STRUCTURE (URBAN DEVELOPMENT OF SETTLEMENTS)

The earliest urban and rural settlements in the Lusatian Mountains, the Elbe Sandstone Mountains and the adjacent parts of the Central Bohemian Uplands are the result of a rather late colonization wave within which agriculturally less favourable submontane regions were settled. The colonization streams headed for the rugged, rocky and forested terrain from the second half of the 13th century and, for the most part, during the 14th century. The characteristic type of rural settlement is a long valley (forest) village (Waldhufendorf), situated along streams and roads parallel to them. The earliest villages from the 13th and 14th centuries are distinguished by extraordinarily long layouts. As examples, we can name Skalice, Sloup, Radvanec, Lindava, Velenice, Kunratice u Cvikova, Mařenice, Krompach, Dolní Světlá, Dolní Podluží, Dolní Chřibská, Líska, Horní and Dolní Kamenice, Pysk (later divided into Horní Pysk and Dolní Pysk), Kamenický Šenov, Mistrovice and Volfartice. Other villages also mentioned in the 14th century or in the early 15th century are smaller in extent and their urban development is not quite clear (Trávník, Drnovce, Mařeničky, Horní Světlá, Svojkov, Chotovice, Chomouty).²³ In the 15th and 16th centuries, the settlement continued into less favourable positions along smaller watercourses or in more steep-sided valleys that were not very suitable for agriculture. The structure of later villages with a relatively regular field structure does not fundamentally differ from the earlier villages; as time went, however, they grew smaller in scale, which is clearly visible especially in villages from the 16th century, which usually have very few large farmsteads or none. In this category, we can include Rozhled (before 1471), Polevsko (between 1471 and 1481), Svor (before 1502), Arnultovice (1502–1530), Okrouhlá (1502–1530), Svitava (before 1525), Falknov (before 1530), Doubice (before 1550), Slunečná (before 1606), Naděje and Rousínov (both before 1610), Šelty (before 1615) and Prácheň (c. 1630).

At least for Rozhled and Doubice, the origin of the villages can probably be linked to the operation of local glassworks, which was connected with the extensive clearing of forests. After the glasshouses ceased to exist, the space was used to found the mentioned villages.²⁴ On the contrary, for the most important glassworks estates in Horní Chřibská, Falknov and Krompach, the archival

20 SOVADINA 1998.

21 KOLEKTIV 2003, pp. 170–172.

22 SOVADINA 1998, pp. 125–167 and map supplements.

23 Some of the settlements might have vanished in the first half of the 15th century and the locality was resettled later.

24 LISSEK 2018, pp. 121–123. CHMELÍK 1999, pp. 22–24.



View of Polevsko from the southwest; the Lusatian Mountains in the background, the rightmost one is Klíč. An example of a village founded within the later colonization wave in the second half of the 15th century. Photo: Jiří Vidman, 2021.

sources and the situation of land possessions clearly show that earlier, already existing settlements were used when founding them.²⁵ These facts make it clear that even there, the preserved sources cannot evidence a direct relation between the origin of the villages and glass production; more likely, it can be ruled out. In view of the remote position of medieval glassworks in forest areas and the clear agricultural character of the villages, it is unlikely.²⁶

In contrast to that, the subsequent urban development of many villages and towns in the foothills of the Lusatian Mountains from the 17th to the 19th centuries was influenced fundamentally by glassmaking and, in many places, by the concurrent textile, woodworking and other production. The built-up areas became much denser there compared to ordinary agricultural localities, with the number of new homesteads exceeding the earlier cores several times. The new settlers were both craftsmen directly participating in glass production in the local glassworks as well as persons involved in glass finishing and trade. The localities with a great concentration of these activities experienced the stormiest development. However, many glass traders and glassmakers went on with farming activity, securing basic subsistence for their families; this was especially important at the time of crises in the glass industry. On the other hand, the background of cottages in which smaller craftsmen lived was minimal. These buildings occupied unfavourable plots in the floodplains of small streams, on the slopes or in isolated positions in the rocks surrounding the villages. Massive construction in these areas then formed continuous cottage localities that can be, with a slight overstatement, considered predecessors of worker colonies in a scattered form.

From the late 17th century, new settlements or new parts of earlier localities started to arise to satisfy the needs connected with glass finishing and trade. The first of them came into existence on the southwestern edge of the cadastral area of Arnultovice, where an area was singled out for a settlement called Haida (present-day Nový Bor). Twenty-two new homesteads came into existence gradually between 1692 and 1705. Haida was elevated to a town and received a privilege in

25 CHMELÍK, p. 93. SLAVÍČKOVÁ – CVRK 1993, p. 24. ZUMAN 1936, p. 2.

26 The use of areas cleared of forests by glassworks for the subsequent foundation of villages is presumed by Michal Gelnar also in the case of Horní and Dolní Světlá, Trávník, Drnovec, Falknov and Lesné pod Tolštejnem – see GELNAR 1996, p. 40.

1757. In 1759–1763, the central square was surrounded by newly built houses of the most important glass traders that were separated by vacant sites.²⁷ As more traders and craftsmen settled in the town, streets running out of the square were gradually built up, including additions to earlier houses along Poštovní Street (present-day T. G. Masaryka Street). In response to this development, the manorial lord of Sloup, Count Filip Kinský, founded a whole new quarter southwest of the earlier core of the town. Royal engineer Emanuel Kleinwächter was called to Haida in 1783 to prepare the plans. A regular checkerboard layout was designed around the rectangular New Square (Neuer Ring, present-day Palackého Square). The land plots were divided into three size categories. The houses were separated by vacant sites and surrounded with gardens. House construction was the most intensive in 1787–1810; it continued to a smaller extent in the following decades, but several land plots remained empty.²⁸ In the nationwide context, this was one of the most valuable urbanistic projects implemented in the second half of the 18th century and the first half of the 19th century. The concept of the new quarter follows the principles of a garden town.

Glassmaking can be linked considerably also to the foundation of Nový Oldřichov in the cadastral area of earlier Mistrovice in the 1750s and 1760s. There also, glass refiners and traders comprised a large part of the new settlers. A considerable concentration of glass engraver workshops is typical of both villages.²⁹ Kytlice was founded at the same time; its origin is linked to the parcelling out of the lands of a glassworks estate of the Falknov glassworks, which definitively ended operation around 1755. Two years later, Jan Josef Kittel, the owner of the glasshouse, asked the manorial lord in Sloup for consent to the construction of a new settlement.³⁰ The textile industry was the predominant occupation of the inhabitants of more new settlements and villages in the region, although glass craftsmen and traders could be found there as well. Like in the case of the Falknov glassworks, an old glassworks estate was considerably reduced in size in 1709 also in Horní Chřibská; a part of its land was parcelled out, giving rise to the village of Krásné Pole.³¹ Manorial courts of the Sloup manor were abolished during the first half of the 18th century; their land was used to found the villages and settlements of Janov (from 1751), Pihelská Staveniště (c. 1755), Josefov u Skalice (later Svobodná Ves, 1735, completed later under the Kinský family) and extend the built-up area of Svojkov (after 1765).³² The division of manorial land led also to the construction of Juliovka and Valy (17th century and 1732)³³, the settlements of Klučky and Jedličná u Polevska (1720 and 1752), Nové Domky u Svojkova (1712–1720)³⁴ and to the foundation of Lesná (before 1711), Jedlová (before 1787) and Rybníště (1715). One of the latest localities is Nová Chřibská, founded only before 1833.³⁵

The urban development of Kamenický Šenov, one of the centres of local glass production, was very gradual. The earlier Waldhufendorf-type village situated along the deeply cut Šenovský Stream only developed in the 17th and 18th centuries by means of a considerable densification of the built-up area by the small homesteads of local craftsmen. A more considerable extension of the built-up area did not come until the last quarter of the 18th and the first half of the 19th centuries. The centre of the locality was moved to the slopes above the right bank of the Šenovský Stream east of the earlier Waldhufendorf-type village. Present-day 9. května Street became the axis of new houses grouped along rather irregularly routed streets following the west-east direction of

27 SIEBER 1913, pp. 7–28. JINDRA 2006, pp. 29–34, 75–76, 84–86. RŮŽIČKOVÁ 1984.

28 SIEBER 1913, pp. 29–30, 32–34. ŠKABRADA – EBEL 1995, pp. 173–178.

29 KOLEKTIV 2013, pp. 43–44.

30 SLAVÍČKOVÁ – CVRK 1993, pp. 13–14, 41–45.

31 CHMELÍK 2001, p. 93.

32 HANTSCHER 1911, pp. 942, 977–978, 995. JINDRA 2006, pp. 58, 68–69.

33 KOCH 1923, pp. 142–146.

34 HANTSCHER 1911, pp. 929, 996.

35 HOCKAUF 1885, pp. 182–185.



View of Horní Prysk from the east; a typical example of a valley Waldhufendorf-type village in the relatively narrow steep-sided valley of the Pryský Stream. Photo: Jiří Vidman, 2021.



The area of present-day Kytlice is characterized by a complex urbanistic development; the figure shows the area of the original Falknov. Land plots of farmsteads of the Kytlice settlement were surveyed there after the glassworks ceased to exist in 1757. The boundary between Kytlice and Falknov was formed by the Hraniční Stream (Grenzbach) in the left part of the photograph. Photo: Jiří Vidman, 2021.

the road from Prácheň (and the parcelling out of the earlier field structure) and short perpendicular connecting alleys between them. The most impressive houses of local glass companies were built exclusively along the main street, whereas the smaller log houses of glass craftsmen in the side streets can be, once again with an overstatement, regarded as a scattered craftsman colony. A rather irregular lengthy square came into existence in the place of contact of the roads from Česká Kamenice (Osvobození Street) and from Nový Bor and Prácheň (9. května Street). Only in the second half of the 19th century did the residences of local glass companies spread also along Osvobození Street northwest of the square. The village was legally elevated to a small town in 1849 and to a town only in 1900.³⁶

Within earlier settlements, there are also parts of built-up areas influenced by the localization of later glassworks and the concentration of glassmaking operations. Typically, it manifests itself more considerably especially for new glass plants founded between 1873 and 1925 to which glassmakers, mostly people of Czech nationality, moved from other regions. Companies bought older houses and built new worker houses for them. Thus emerged smaller “Czech enclaves” in the traditionally German-speaking milieu. In some cases, residential buildings of the glassworks are spread on the cadastral area without any links. This is, for example, the case of Anton Rückl glassworks in Skalice where some houses were hundreds of metres or even more than 500 m distant

36 KUČA 1997, pp. 778–781.

from the glasshouse. A greater concentration of worker houses can be found in the lower part of Kamenický Šenov. Houses there are directly adjacent to Adolf Rückl and Bratří Jílkové glassworks, forming a smallish but very valuable industrial whole together with the complex of the so-called lower railway station. Another minor unit can be found in Horní Chříbská, where the glassworks are accompanied by a dominant master's house, followed by a torso of a farm court and two worker houses. The glassworks in Svor and Flora glassworks in Nový Bor near the railway station had worker houses situated directly opposite the glass plants or close to them.

The Nový Bor agglomeration grew considerably from the late 19th and early 20th century. New houses, mostly of villa character, were built on the left bank of the Šporka west of the town's core up to the railway station. During the first third of the 20th century, new built-up areas grew above all to the north, resulting in a smooth interconnection of Nový Bor and Arnultovice. The town grew similarly also towards the south and southeast, forming the so-called Nové Chotovice (Hřebenka).³⁷ A regionally unique deed was the construction of new cooperative houses on the eastern edge of the town south of the road to Sloup along present-day Česká, Boženy Němcové and Bratří Čapků Streets. The Czech cooperative Svornost was founded for the growing number of Czech glassmakers in 1919. With the help of state subsidies, almost twenty two-storey two-apartment houses were built in 1922–1925, dominated by the Czech Masaryk School designed by prominent architect Jaroslav Vondrák and built between 1925 and 1927. The construction of more residential buildings along present-day Svojsíkova and Jiráskova Streets and the former Evangelical church was organized by the German cooperative *Deutsche Baugenossenschaft*.³⁸ A smaller “Czech quarter” on the northwestern edge of Rousínov is also interesting. Older single-storey log houses of local cutters along the Rousínovský Stream were followed by a road perpendicular to the slope ending under a railway viaduct in the direction of the main road. A row of smaller bricked houses was located rather loosely along one side of the road. The construction was financed in the 1920s by the *Stráž severu* cooperative founded by local Czech glass cutters in 1925 or 1926. Land plots were originally bought for the construction of eleven houses.³⁹

Plan of the expansion of the town of Haida (present-day Nový Bor), Emanuel Kleinwächter, probably 1787. The earlier part of the town (after 1757) with the square and a new church on the right, followed by Poštovní Street (present-day T. G. Masaryka Street) with original village buildings from 1692–1705; south of this street are the land plots of a new quarter around present-day Palackého Square. The plots are of three size categories. Glass Museum Nový Bor, sign. NB 5353.



37 KUČA 2000, pp. 452–460.

38 JINDRA 2013, pp. 68–72, 103–107.

39 RIMPLER 2007, pp. 13–14. HAIS 2014a, p. 109. ASCHENBRENNER 2020, p. 98.



View of the town of Haida (present-day Nový Bor) from the north, 1781. The veduta depicts the town before its expansion and the construction of a new church. The square is in the middle, surrounded by glass trader houses. The Roman Catholic parish office – Nový Bor deanery, reproduction by the Glass Museum Nový Bor.

HISTORICAL DEVELOPMENT OF GLASS PRODUCTION IN BOR – ŠENOV AREA

BEGINNINGS OF GLASS PRODUCTION (13TH–15TH CENTURIES)

Glass production only saw a more considerable expansion in the Bohemian lands in the High Middle Ages. The current state of knowledge and the localization of archaeologically documented glassworks provide clear evidence of their localization in border regions with extensive dense forest areas. They were smaller and simpler operations that presumably migrated in the territory after depleting wood in their neighbourhood. Due to these characteristics, they are also called “forest glassworks”.¹ The best explored region in the Bohemian lands in this respect is the Ore Mountains (Krušné hory). As many as eighteen medieval glasshouses have been documented there archaeologically so far. Their localization in the mountain ridges is linked to long-distance routes connecting the Bohemian and the Saxon sides of the mountains. The individual objects found are concentrated into six production circuits. The discovered findings concerning the extent of the complexes and the technological equipment of the buildings suggest the existence of larger parent glassworks and subsidiary glassworks.² The second area with a considerable concentration of archaeologically documented medieval glassworks is the region studied in the present publication, the Lusatian Mountains and the Elbe Sandstone Mountains; it will be discussed in more detail below. Of a great number of glasswork relicts in the Bohemian Forest (Šumava), a medieval age has not been proved for any site yet.³ Written sources only document more glassworks in the Bohemian territory during the second half of the 14th century. Among the earliest are the mentions of glassworks near Nýrsko and Vimperk in the Bohemian Forest documented as of 1348 and 1359. The information is most numerous precisely from the Bohemian Forest.⁴ Besides the three mentioned regions, a smaller number of glassworks is registered also in eastern and central Bohemia. The mentions of glassworks become considerably more numerous during the 15th century.⁵

1 DRAHOTOVÁ et al. 2005, pp. 29–69, 76, 109–112.

2 ČERNÁ 2016, pp. 44, 193–209. A glasshouse has been newly discovered also in the cadastral area of Nové Město – see ČERNÁ – LISSEK – PLACHÝ 2018, pp. 83–103.

3 The existence of nineteen glassworks is presumed in the Bohemian Forest in the 13–15th centuries, documented by written sources and, in some cases, also movable finds. No buildings or melting furnaces of that age have been identified, however. See FRÖHLICH 2003, pp. 615–618.

4 ČERNÁ 2016, pp. 40–41. LNĚNIČKOVÁ 1996, pp. 6–7. FRÖHLICH 2003, pp. 615–618.

5 ČERNÁ 2000, pp. 29–36. For a supplemented list of localities for the Bohemian Forest, see FRÖHLICH 2003, pp. 615–618.

ARCHAEOLOGICALLY DOCUMENTED GLASSHOUSES IN THE LUSATIAN MOUNTAINS AND THE ELBE SANDSTONE MOUNTAINS

As stated above, long-term previous research has documented a relatively high number of glassworks in the interest area. Most localities were selected based on systematic research into this topic, and archaeological methods were used to confirm or rule out the existence of glassworks or specify their location and temporal categorization. The existence of altogether fifteen glassworks can be considered positively proved in the period from the second half of the 13th century to the middle of the 15th century. Besides that, we can presume the existence of several dozen more localities that are still waiting for their discovery or confirmation.⁶

The earliest evidence can be dated already to the middle of the 13th century or the time shortly after 1250. This is the dating of the finds from an archaeologically examined glassworks on the southern slopes of Bouřný Hill and on the right bank of the Rousínovský Stream north of Svor. No remnants of glass furnaces have been discovered in the complex, only stone destructions and glass waste. However, there was also a very rich archaeological assemblage of fragments of hollow glasshouse-shaped glass, glass casts and melts, fragments of glass pots, furnace aperture caps, torsos of metal tools (e.g. blowpipes) and settlement objects (a sandstone grinding stone or whetstone, clay whorls and ordinary pottery).⁷ A glasshouse in the Dolní Podluží cadastral area on the left bank of the Lesenský Stream and the west foot of Pěnkavčí Hill (denoted as I.) is dated to the late 13th century. A total excavation there detected torsos of the main melting furnace, auxiliary furnaces, smaller furnaces and postholes for the above-ground structure covering the glasshouse.⁸ Another glassworks, discovered southwest of Vlčí Hora near the source area of a left-bank tributary of the Vlčí Stream on the northwest slope of Kamenný Hill, is dated around 1300. An excavation revealed the main melting furnace, two smaller auxiliary furnaces and a waste heap there.⁹ A glasshouse in the Kyjov cadastral area (denoted as I., U Kapličky field) on the eastern foot of Široký Hill is also dated to the second half of the 13th century and the time around 1300.¹⁰ The existence of other localities and their dating to this period need to be confirmed by a future excavation. This concerns above all two sites in the northern part of the cadastral area of Svor on the eastern foot of Velký Buk¹¹ and a glasshouse in the cadastral area of Horní Světlá near the source area of a left-bank tributary of the Hamerský Stream above the artificial lake Naděje, where two places of a possible occurrence of furnaces were identified by a geophysical survey.¹²

Only three documented glasshouses are dated to the 14th century so far, namely the second locality in the Dolní Podluží cadastral area on the right bank of the Lesenský Stream¹³ and two sites in the cadastral area of Rozhled – the first in the centre of the present-day village,¹⁴ the other east of Rozhled and west of Lesná near a left-bank tributary of the Lesenský Stream.¹⁵ The existence of five more glassworks is concentrated in the late 14th and early 15th centuries. They include

6 ČERNÁ 2004. GELNAR 1996; GELNAR 1997a. GELNAR 1999. GELNAR 2000a.

7 ČERNÁ 2004, pp. 35–36. GELNAR 1997a, p. 49.

8 ČERNÁ 2004, pp. 9–10, 12–14, 17–18, 41. ČERNÁ 1992, pp. 3–16. GELNAR 1999, pp. 80–81.

9 ČERNÁ 2004, pp. 36–40. GELNAR 1999, pp. 54–55.

10 ČERNÁ 2004, pp. 22–40. GELNAR 1999, pp. 61–62.

11 GELNAR 2010b, pp. 217–224. GELNAR 2021, pp. 233–244.

12 ČERNÁ 2004, p. 21. GELNAR 2011, pp. 395–402. The dating of more localities in the cadastral areas of Horní and Dolní Světlá in the built-up areas of the two villages and their neighbourhood in this period cannot be regarded as safely proved. See GELNAR 1997a, pp. 42–46. GELNAR 2003b, pp. 393–399.

13 ČERNÁ 2004, pp. 11, 19. GELNAR 1999, pp. 81–82.

14 ČERNÁ 2004, p. 35. GELNAR 1999, pp. 71–73.

15 LISSEK 2018, pp. 115–129. The toponym Gläsendorf, listed in a now missing deed from 1539 for the newly founded town of Jiřetín pod Jedlovou relates to one of the vanished glassworks near Rozhled or Lesná. See GELNAR – PLEKANEC – ŠTIKA 2000, pp. 119–135 and SMETANA 1998, pp. 34, 64.



the third discovered locality in the Dolní Podluží cadastral area on the west foot of Pěnkavčí Hill close to the so-called Patzelt Spring. The site was disturbed by later mineral resource mining, which was probably the reason why the glass furnaces ceased to exist. Many finds were excavated from a waste heap, however.¹⁶ A glasshouse situated south of Mikulášovice near the source area of Černý Stream was also examined archaeologically. However, only a waste heap with numerous valuable finds was detected. The existence of an installation is apparently documented by the toponyms Glashüttenflösl and Hüttenflösl in Matyáš Oeder's map from the late 16th century.¹⁷ An extraordinary site is represented by a glasshouse situated northeast of Doubice near a tributary of the Doubický Stream in a saddle between Vápenný Hill and Široký Hill (Kyjov cadastral area). At a repeatedly sought locality near the so-called Doubice Lime Works, an excavation uncovered the main melting furnace, a smaller auxiliary furnace, a little furnace and a waste heap. The local furnaces are different in shape, having a lengthy, almost rectangular layout and higher-quality construction. The very rich find assemblage provided, among other things, fragments of finely made products with glassworks decoration of glass and many metal objects, including coins dated to 1378–1407.¹⁸

A glasshouse was discovered also on the northeastern slope of Kamenný Hill west of Dolní Světlá. In a place of stone destruction, a geophysical survey detected three barrow-shaped formations, possibly the remnants of furnaces and a waste heap.¹⁹ One barrow-shaped formation, probably the remnant of a glass furnace, was documented not far from there, in the source area of the right-bank tributary of the Hamerský Stream known under the toponym Jägerwiese (Hunter's Meadow, Naděje cadastral area).²⁰ More localities discussed in the literature cannot be regarded as positively documented. Presumably, however, the existence of glassmaking operations will be confirmed in several of these places, and the number of existing glassworks will thus increase. For the second half of the 15th century, there are no demonstrable archaeological finds of glassworks as yet.²¹

From the localization of documented glassworks, it is quite evident that they were all situated outside the built-up and agriculturally used areas of villages, in the forested parts of the Lusatian Mountains and the subsequent Elbe Sandstone Mountains. However, the earliest medieval glasshouses are not scattered across the region but markedly concentrated in a belt copying the course of the Lusatian Fault.²² The locations in the cadastral areas of Svor, Horní and Dolní Světlá and Naděje are the furthest from this line; their distance from the Lusatian Fault is 3–4.5 km. Therefore, the geological characteristics predetermined the suitability of the territory thanks to the sources of raw materials – quartz, silica sand, quality hard (silicified) sandstone (for the construction of furnaces) and possibly also lime. Extensive forest areas could be used to extract wood for heating in glass furnaces, auxiliary furnaces, for the construction of buildings and burning ash and, later, for the production of potash. In contrast to the Ore Mountains, the glassworks are not concentrated along major trade routes, and complexes with parent and subsidiary glassworks cannot be determined here, either. The primary factor seems rather to be the selection of the locality with regard to the sources of raw materials and abundance of wood, which glassworks consumed in high quantities. A watercourse source area is – or was – always situated nearby. The distribution of the localities and their closeness in selected areas indicates that the glassworks gradually moved after depleting the available wood. This also implies a relatively simple design of buildings.

16 ČERNÁ 2004, pp. 11, 15–16, 19–20.

17 ČERNÁ 2004, pp. 31–33, 41. GELNAR 1999, pp. 52–53.

18 ČERNÁ 2004, pp. 22–24, 26–30. GELNAR 2009, pp. 59–61.

19 ČERNÁ 2004, pp. 21, 25. GELNAR 2003b, pp. 393–399.

20 ČERNÁ 2004, pp. 25, 31, 34–35. GELNAR 2009, pp. 265–273.

21 A medieval glasshouse localized on the northwestern foot of Malý Stožec in the cadastral area of Rybníště and examined by Dr. Eva Černá has not been published yet. See KŘIVÁNEK 2011.

22 GELNAR 2000, pp. 63–69.

No stabler anchoring of the operations in the given region cannot be yet presumed in this period because they were probably not endowed with any considerable farming and residential background. Archaeological finds clearly document that the glassmakers managed the production of potassium-calcium glass at a very high level.

FIRST WRITTEN MENTIONS OF GLASSWORKS IN THE LUSATIAN MOUNTAINS

Glassworks in the Lusatian Mountains appear in the written sources much later. The list of the property of Falkenštejn Castle near Česká Kamenice owned by Jan Berka of Dubá (died 1426) and, after him, his brother Jindřich Berka of Dubá and Hohnštejn reportedly included also Horní and Dolní Chříbská and an unnamed glasshouse as of 1428. However, the deed containing this information has not been found trustworthy.²³ A mention of the origin of the glasswork in Falknov in 1443 can also be considered very unlikely since the information cannot be documented by any direct sources.²⁴ Therefore, the earliest information safely corroborated in the sources is a mention of a **glasshouse in Doubice Forest** in the Česká Kamenice and Tolštejn manor as of 1457. An ownership dispute that started at that time refers to the above-mentioned deed from 1428, among other things. Although this document is probably a later fake, it cannot be ruled out altogether that it might have had a real basis and that the glasshouse did exist already at that time. Based on the current knowledge, it cannot be decided whether the glassworks mentioned in the deeds concern the found and archaeologically examined locality near so-called Doubice Lime Works (Kyjov cadastral area), as the localization "in silva Taubnitz sita" undoubtedly covers a much wider territory along the Doubický Stream from its source between Vápenný Hill and Široký Hill to its confluence with the Chříbská Kamenice in Dolní Chříbská.²⁵ A mention of marauding knights moving in the direction from Česká Kamenice to a glasshouse and further on to Krásná Lípa comes from 1475. This information can be also linked to the glassworks in Doubice Forest, but it may also refer to the glasshouse in Horní Chříbská or any other glassworks in this region about which no other sources are preserved.²⁶ More written mentions positively concern the **glassworks in Horní Chříbská**. According to information in later privileges, the glasshouse received a privilege from the manorial lord Česká Kamenice as early as 1504. As of 1514, the transfer of the glassworks is documented from Veit Glaser, the reeve (Vogt) of Chříbská and a member of the well-known glassmaker Friedrich family, to his son Georg. The record in the town book says that the glasshouse is to have all rights and freedoms as a hundred years ago. This information undoubtedly cannot be taken literally, but only as a general formulation usually used at that time. The often cited information concerning the foundation of the glassworks in 1414 can be very probably ruled out because it is in discord with the above-mentioned deed from 1457 and with all other documents, which have the same order of localities in the list of the property of the Česká Kamenice manor – ..., small town of Chříbská, Horní and Dolní Chříbská, glassworks, village of Studený, rather than a glassworks in Horní Chříbská.²⁷ Therefore, the foundation of this glasshouse can be dated between 1457 and 1504.

23 KOLEKTIV 2002, p. 67. This and other mentions have been mistakenly linked to the Horní Chříbská glassworks; for doubts concerning the possibility that it might be Doubice, see MAREŠ 1893, pp. 11–12, annexe II., III. and IV. For an analysis of the sources and the assessment of the deed as untrustworthy, see CHMELÍK 1999, pp. 16–19.

24 SCHEBEK 1878, pp. 4, 13, 14. For an assessment of this information as unverifiable or unlikely, see SLAVÍČKOVÁ – CVRK 1993, p. 24 and GELNAR 1999, pp. 84–85.

25 CHMELÍK 1999, pp. 16–19.

26 *Ibid.*, p. 19.

27 *Ibid.*, pp. 18–20.

EARLY MODERN PERIOD (16–17TH CENTURIES)

The number of glassworks increased very much generally in the Bohemian lands in the 16th and 17th centuries. While most new glasshouses appeared once again in the border mountain range belt surrounding Bohemia, there were also more glassmaking regions in the interior in areas with enough woodland. It was advantageous for manorial business to make available the deposits of wood that could not be used and processed for other purposes. The dominant regions in terms of the number of glassworks included the Bohemian Forest (Šumava), the Upper Palatinate Forest (Český les), the Grätzen Mountains (Novohradské hory), the Český Krumlov and Jindřichův Hradec regions. Besides the production of hollow glass and glass beads, the first mirror glassworks appeared there in the second half of the 16th century. The Jizera Mountains and the Giant Mountains (Krkonoše) also gradually became a considerable glassmaking region; many new glassworks came into existence there as early as the second half of the 16th century. Other regions in Bohemia include the Eagle Mountains (Orlické hory) or, in the interior, the Rožmítal and Křivoklát regions.²⁸

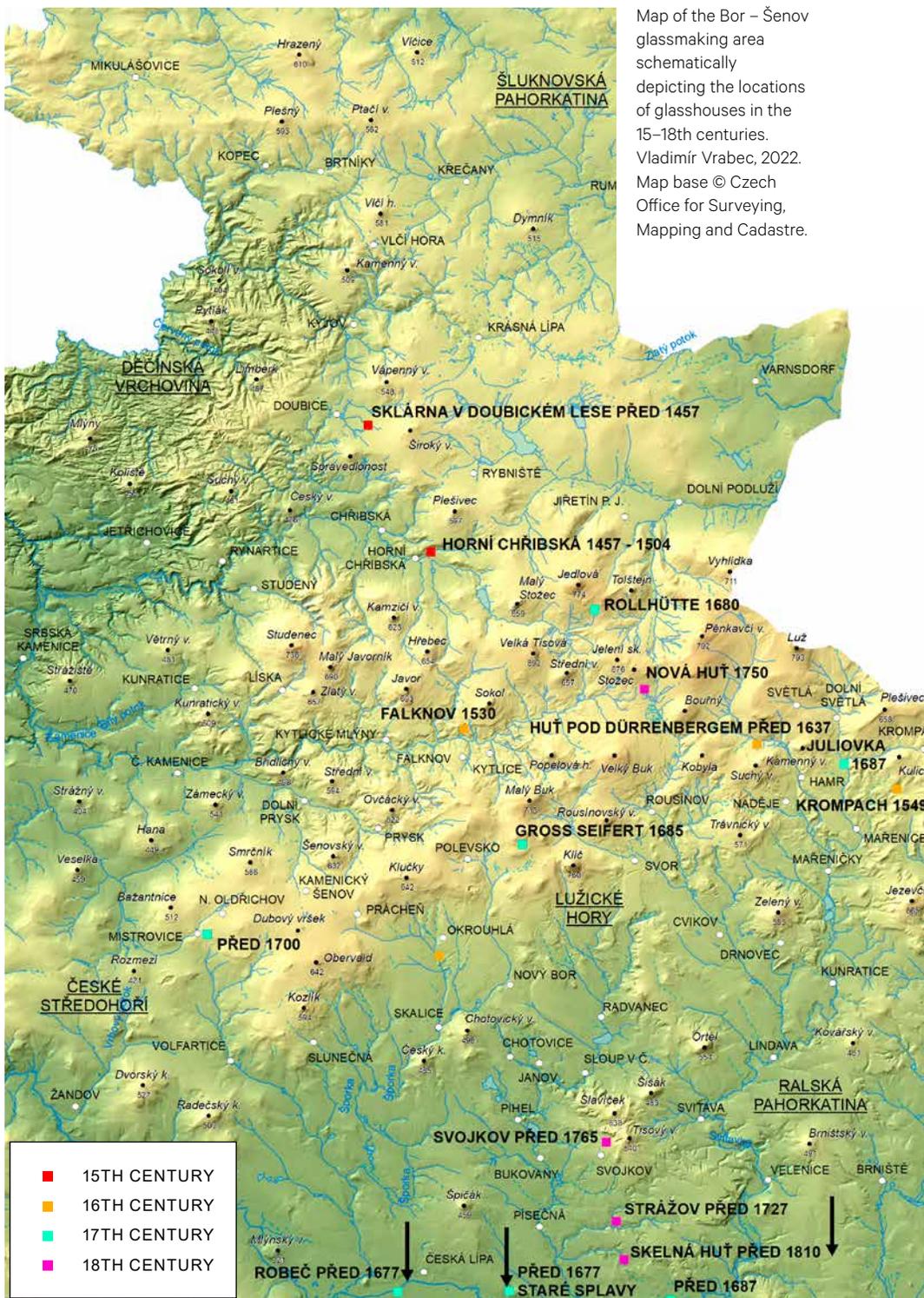
The production of potassium-calcium forest glass and coloured glass (especially blue, coloured by cobalt) and decoration by glassworks shaping techniques continued. New impulses were brought by an effort to achieve more perfect clear molten glass. New admixtures started to be used, such as refining agents (nitre, arsenic) and pyrolusite to decolourize glass. Quartz was worked more thoroughly by crushing and screening; clear potash started to be used instead of ash. Luxury Renaissance glass was, moreover, decorated with fired enamel paint, cold paint with resinous varnishes and oil colours, by gilding or welding and heat-sealing of coloured threads. In the late 16th century and especially during the 17th century, the technique of the production of potassium-calcium glass advanced enough to enable the production of perfectly clear molten glass; moreover, its hardness and high lustre made it suitable for working by engraving and grinding. Members of old glassmaker families from the Saxon side of the Ore Mountains, such as the Schürers, Preusslers, Friedrichs or Wanders, played an important part in the development of glassmaking in the Bohemian lands, having transferred their activities there after 1500 following a rapid increase in the price of wood in connection with the mining boom in Saxony.²⁹

The development of glassmaking technology all over Europe was undoubtedly partially slowed by the Thirty Years' War (1618–1648), and new impulses were thus only visible after the middle of the 17th century. Important milestones were the inventions of the technology of mirror production from cast glass by Bernard Perrot in the French glassworks in Orléans and, in the 1670s, the introduction of lead crystal production in coal-fired furnaces by George Ravenscroft in England. For further development in Bohemia in the last quarter of the 17th century, however, it was crucial to manage the production of quality crystal and more ordinary chalk glass. The focus of progressive glassworks primary production moved above all to the Nové Hradý and Vimperk regions in southern Bohemia, whereas glass finishing and trade concentrated primarily in northern Bohemia. The production of crystal glass was managed in the 1670s, probably by several glassworks concurrently. The highest-quality products came from the Buquoy crystal glassworks in Nové Hradý, which worked under the guidance of French experts. The invention of chalk glass and gold ruby glass is ascribed to Master Michael Müller of Helmbach Glassworks (also called Janoušek Glassworks) in the Eggenberg manor of Vimperk.³⁰

28 For a list of the individual localities by region, see MAREŠ 1893, pp. 18–126. About 35 glasshouses presumably existed in the Bohemian Forest (Šumava); about 25 of them were in operation before the Thirty Years' War – see LNĚNIČKOVÁ 1996, pp. 10–16. Thirteen glassworks are documented for this period in the Upper Palatinate Forest (Český les), see PROCHÁZKA 2005, pp. 711–716.

29 DRAHOTOVÁ et al. 2005, pp. 133–149. NOVÝ et al. 1974, pp. 473–478.

30 DRAHOTOVÁ et al. 2005, pp. 195–205. NOVÝ et al. 1974, pp. 478–489. LNĚNIČKOVÁ 1996, pp. 17–21.



GLASSWORKS IN THE LUSATIAN MOUNTAINS IN THE 16–17TH CENTURIES

The crucial place of primary glass production and related glass finishing in the Lusatian Mountains became the **glasshouse in Horní Chřibská**, whose foundation between 1457 and 1504 has been discussed above. Its glassworks privilege is dated 1504; however, it is only known from later deeds and the literature. The alleged recipient was Asmon or Amon Friedrich. The Friedrichs, a prominent glassmaker family, held the glassworks until 1689. In the second half of the 16th century and especially the early 17th century, the Horní Chřibská glassworks became also an important centre of glass finishing, especially enamel paint and cold paint. In 1689, widow Anna Kateřina Friedrich sold the glassworks estate to Eliáš Haencke, from whom the manorial lord of Česká Kamenice bought it in 1697.³¹

The second most important glassworks in the region was the **glasshouse in Falknov**. It was founded in 1530 by Paul Schürer, a member of a prominent glassmaker family that kept it until 1731. The rights and obligations of the master were stipulated by a contract between him and the manorial lord confirmed by Zdislav Berka of Dubá in 1546. The Schürer family originating in Aschberg (present-day Ansprung), Saxony, directly founded or owned many glassworks in the Bohemian lands and contributed considerably to the development of glassmaking in the 16th and 17th centuries. The Falknov glassworks became the cradle and one of the most important centres of glass finishing (especially enamel paint). The members of the family were ennobled for their merits and received the predicate of Waldheim.³² Georg Schürer, the brother of Paul Schürer mentioned above, founded another Lusatian Mountains **glassworks in Kropáč**. The precise date of its origin is unknown, but it was certainly before 1549 when it is mentioned for the first time in the written sources. The Kropáč glasshouse also received privileges from the manorial lord in Zákupy, in 1589 and 1637. The last master, Georg Schürer, eventually sold the glassworks to his brother-in-law, Johann Hertel, in 1652 and left with his family for Zittau. The glassworks' activity apparently ended shortly afterwards, since it is mentioned as desolate as of 1655.³³

The existence of several more glassworks can be presumed with certain caution in the late 16th century, but written sources say very little or nothing at all about them. The 1637 privilege for the Kropáč glassworks mentions the possibility of rebuilding the **glasshouse under Dürrenberg** (Lysá hora, present-day Suchý Hill).³⁴ As the privilege de facto only renews an earlier deed from 1589 destroyed by fire during the Thirty Years' War, it is likely that the Schürers operated another glasshouse northwest of Hamr near Naděje and west of Kropáč already during the second half of the 16th century or possibly in the early 17th century. Field prospection on the northwestern foot of Suchý Hill and the right bank of the Hamerský Stream discovered finds related to glassworks operations tentatively dated to the mentioned period.³⁵ Finds from the location of a vanished **glasshouse near Okrouhlá**, not far from former farmstead No. 4 (today No. 127), are also dated to the late 16th and the first half of the 17th centuries.³⁶ Earlier literature dates the first mention of **Rollhütte glassworks** near the so-called Jedlová Ponds on the south foot of Jedlová to 1596, but this information cannot be confirmed from direct sources.³⁷ The information that the glasshouse was founded by Jan Kašpar Kittel of Polevska in 1680 is more likely. Finds from the location of the vanished glassworks document the production of clear crystal glass, coloured and milk glass, advanced for that period, and from the 1720s also of chandelier pendants.³⁸

31 CHMELÍK 2001, pp. 86–96. SACHER 1964, unpagged.

32 SCHEBEK 1878, pp. 1–4, 25–60. SLAVÍČKOVÁ – CVRK 1993, pp. 60–62.

33 PANÁČEK – GELNAR 2018, pp. 249–274. ZUMAN 1936a, pp. 1–11.

34 ZUMAN 1936a, p. 4.

35 GELNAR 2002b, pp. 291–295 and GELNAR 2003a, pp. 95–97. GELNAR 2009, pp. 265–273.

36 GELNAR 2004, pp. 249–262.

37 SCHEBEK 1878, pp. 130–131.

38 GELNAR 2002a, pp. 9–17. GELNAR 2008b, pp. 84–93. SMETANA 1998, pp. 58–59. GELNAR 2007, pp. 225–234.

Votive painting of the family
of Martin Friedrich Jr,
master of the Horní
Chřibská glassworks, from
the church of St George in
Chřibská, late 16th century
(probably c. 1596).
Reproduction from
Urbancová 1989.



The possible existence of a glasshouse near Oslovce or the settlement called Babylon is also mentioned in the late 16th century in the territory south of the Bor – Šenov area. Its location has not been determined even approximately yet, however.³⁹ Another **glasshouse in the Nový Zámek manor**, most probably close to Robeč near Česká Lípa, has not been localized either, but its operating is beyond all doubt. First of all, it is described with much praise by Bohuslav Balbín in his work published between 1679–1687. According to Balbín, it surpasses other glassworks in Bohemia with its production of crystal clear glass and a large scale of coloured glass.⁴⁰ The glassworks near Nový Zámek (present-day Zahrádky near Česká Lípa) had undoubtedly functioned before 1677. As of that date, Christian Preissler, glass master and a burgher of Zittau, claims that he has operated it for four years. In the mentioned year, Christian Preissler sought the possibility of building a glasshouse in the Zákupy manor. He recommended building it somewhere near the Hamerský Stream, as there was good material, stone and sand, as well as water and wells; this means that suitable material for the construction, sand for the glass mixture, drinking water as well as water to drive the installations were all available.⁴¹

A new glasshouse in the Zákupy manor was eventually built only in 1687, not on the Hamerský Stream but not far from there, in **Juliovka near Krompach**. Archival sources document very well the local production of crystal and chalk glass, window panes, mirror sheets and chandeliers, the so-called crown light fittings (Kronleuchter), some of the earliest in Central Europe (one was intended for the duke and two for Moscow). To manage the technology of crystal glass production as much as possible, rationalize the operations and increase the level of production, the manorial lord called Johann Christoph Fiedler from Bavaria. However, a melting furnace of his adapted design did not prove useful for several reasons. The whole time, the operations were evidently limited by the professional and human quality of the personnel. Despite all care, therefore, the glassworks only worked until the end of the 17th century.⁴² Approximately at the same time, the manor operated also a **smaller glasshouse at Zákupy Castle**, which produced crystal glass and,

39 GELNAR 1997a, p. 52.

40 BALBÍN 1986, p. 106.

41 ZUMAN 1936a, p. 84.

42 Ibid., pp. 85–92, 137–140, 154–165.

experimentally, ruby glass.⁴³ Information about other glassworks is only available from the literature, neither verified in the direct sources nor found in the field yet. As of 1685, the Kittel family of Polevsko reportedly built a **glasshouse near Polevsko, Arnultovice cadastral area, in a locality called Groß Seifert** (or alternatively Schindelwald – Shingle Forest). It allegedly produced glass beads that were selling very well, which is why a second furnace was built. Hollow glass was also produced later. The glassworks reportedly ceased to exist in the second decade of the 18th century.⁴⁴ A **glasshouse in Mistrovce** is also mentioned as of 1700, but no information about it based on direct written sources has been published so far and its position is unknown.⁴⁵

Outside the Bor – Šenov enclave, another glassworks operated in the Doksy manor. The personnel of a **glasshouse in Staré Splavy near Doksy** is mentioned for the first time as of 1677. It was sometimes called “the Doksy glasshouse”, even though it was situated in Staré Splavy under the dam of the Velký rybník (present-day Máchovo jezero) pond. Circular window panes are named out of its assortment.⁴⁶ Glassworks scribe Jan Václav Biehan in Splavy near Doksy is also mentioned in the documents of the Juliovka glassworks. The last published information comes from 1726; it says that the glasshouse does not operate during the fish harvest, which indicates that it was located close to the pond’s outlet.⁴⁷ There is no further information about the glassworks from the following periods, but the precise time of its demise is unknown.



Krompach; the core of house No. 48 is the Renaissance house of a local glassworks master; a postcard from the mid-20th century. Tomáš Novák’s collection.

43 ZUMAN 1936a, pp. 88–92.

44 Regrettably, the information has not been checked from direct sources yet; it is only based on much later memories of F. S. Zahn, see SCHEBEK 1878, pp. 134–136. SIEBER 1924, p. 78. VOLF 1968, p. 205. The author dates the first mention to 1680, without specifying the source. See also GELNAR 1996, p. 50.

45 VOLF 1968, p. 205. GELNAR 1996, p. 50.

46 MAREŠ 1893, p. 43.

47 ZUMAN 1936a, pp. 89 and 90.

Krompach, house No. 48,
a detail of masonry with
remnants of Renaissance
sgraffito plaster on the rear
longitudinal façade.
Photo: author, 2019.



Krompach – Juliovka;
remnants of masonry and
spaces hewn out of the
sandstone rock massif are
preserved in the premises
of the vanished glassworks.
The photograph shows
a detail of an entrance
portal dated 1687,
the year of the foundation
of the glassworks.
Photo: author, 2012.



GLASSWORKS ESTATES AND PRIVILEGES

The stabilization of the location of glassworks and, especially for larger and more important operations, also of their legal status can be observed during the 16th century. Newly founded glassworks were already equipped with a glassworks estate (*Hüttengut*), which provided the necessary economic background for glassmaking operations. Legally, an important act was the issuance of privileges by the owners of the manor. In one case, we also register the conclusion of a contract between the glassworks master and the manorial lord. The crucial points of these documents concerned the supplies of wood and the delimitation of the glassworks forest, the source of firewood for glass furnaces, for the burning of ash and the subsequent production of potash, as well as timber for the construction and repairs of buildings or firewood for beer brewing. The existence of a glassworks estate with a forest and a substantial economic background distinguished 16th-century glasshouses considerably from later glassworks, which no longer had these advantages.⁴⁸ The glassworks in Horní Chříbská was assigned an extensive forest area between Chříbská, Jiřetín pod Jedlovou and the upper reaches of the River Kamenice. The forest earmarked for the Falknov glassworks stretched from the Kamenice to the south up to the later cadastral areas of Polevsko, Arnultovice and Radvanec and to the east almost as far as Cvikov.⁴⁹ The deed concerning the

48 TOMANDL 1968, pp. 7–33.

49 CHMELÍK 2001, pp. 89–99.

Kropach glassworks states only generally that logging was allowed in “Cvikov mountains”, with the addition that a látro (old Bohemian area unit, c. 5,600 sqm) “on Blitzenberg” (present-day Plešivec) and around Hvozd was designated for firewood.⁵⁰ The manorial lords were paid agreed sums for the wood. The restriction of the possibilities of logging in the glassworks forest and a considerable increase in the price caused great difficulties for the glassworks from the second half of the 17th century and eventually led to the extinction of most of them.

Other parts of glassworks privileges concerned the rights to brew and sell beer and possibly sell spirits and wine. The owner of the glassworks also had the right to fish in specified watercourses, catch birds or hares, bake bread, slaughter cattle or, in the case of Kropach, sell salt. Glassworks estates were among the largest farmsteads in the given settlements. In the case of Horní Chřibská, it was the only farmstead included in the estate category, and it was also the residence of the reeve (Vogt). For Falknov and Kropach, it is known that the glassworks estates came into existence in the place of three earlier farmsteads, and they also became the reeves’ residences. The estates included gardens, fields, meadows and forests. Grain mills and sawmills, founded near the glasshouses on suitable watercourses, were also important from the economic perspective. According to the privileges, all inhabitants of the respective settlements were obliged to grind their grain in the glasswork estates’ mills. A sawmill was necessary for each glassworks to process logs and make planks and other necessary components.⁵¹

BEGINNINGS OF GLASS FINISHING AND ITS SPREAD IN BOR – ŠENOV AREA

Important glass finishing centres were constituted around the Horní Chřibská and Falknov glassworks during the 16th century. At first, refining processes (painting, colour firing) took place directly in the glassworks complexes. During the 17th century, finishing works gradually spread in the neighbourhood of the glassworks and the adjacent villages. In the last quarter of the 17th century, the development of finishing in the individual villages and small towns advanced so much that these techniques were clearly separated from the primary production. Concurrently, specialization within glass finishing or trade developed in each of the localities. Both processes culminated in the 18th century, especially in its first half. This development is documented by the foundation and functioning of three glassmaking guilds intended exclusively for glass refiners.

The first dominant branches in the second half of the 16th century were enamel painting and cold painting with resinous varnishes and oils. The glassworks in Horní Chřibská and Falknov can be considered the cradles of these finishing techniques nationwide. The earliest information about the production of enamel-painted glass in the Falknov glasshouse comes already from the early 1560s (1561), and about cold painting in Horní Chřibská from the early 17th century (1602).⁵² Glass cutting (engraving) presumably has an earlier origin in northern Bohemia in the Jablonec region, near Hodkovice nad Mohelkou and Liberec, where an earlier stone cutting tradition had spread from Turnov. This technique did not expand more in the Bor – Šenov area until the last third of the 17th century; glass painting had dominated there before.⁵³ More impulses for the spread of this technique might have come from the Silesian side of the Giant Mountains (Krkonoše).⁵⁴

Characteristically, the tallage register (*berní rula*) closed in 1654 lists most persons connected with glassmaking in the Litoměřice Region in Horní Chřibská and in the small town of Chřibská. They include the personnel of the glassworks (masters, journeymen, glassmakers generally) and glass

50 ZUMAN 1936a, pp. 4–5.

51 CHMELÍK 2001, pp. 92–95. SLAVÍČKOVÁ – CVRK 1993, pp. 61–63. ZUMAN 1936a, pp. 2 and 5.

52 DRAHOTOVÁ et al. 2005, pp. 140–146.

53 Ibid., pp. 213–218.

54 MAREŠ 1893, pp. 13–14.

painters. In other municipalities, the craftsmen are listed under the general term glassmakers, and many are hidden under day labourers. Turners and manufacturers of wooden goods are frequent among day labourers; some of them were apparently later retrained as glass cutters.⁵⁵ The initial dominance of painters is implied also by data from the registers of inhabitants and from contemporary guild materials. First cutters (engravers) appear in Chřibská in 1669 and in Kamenický Šenov in 1679; in both cases, their numbers gradually grew in the following years, well exceeding the lists of painters. In Kamenický Šenov, there are about twice as many cutters compared to painters in the 1690s; however, their number increased fundamentally in the following two decades.⁵⁶ The glassmaker guild of the Sloup manor still registers rather balanced numbers of glass painters and cutters in Polevsko and Falknov as of 1691. Of the overall number of nineteen masters, seven were painters and eight cutters, with no specialization listed for four. Like in Kamenický Šenov, the number of glass cutters there grew considerably in the following decades.⁵⁷ Similar development can be presumed also for other municipalities of the Česká Kamenice and Sloup manors. Grinding was employed later than glass engraving, as documented by the memoirs G. F. Kreybich, a glass cutter (engraver) and trader from Šenov. The so-called bevelling (edge grinding) is not documented to a greater extent until the 1690s.⁵⁸ Glass cutters and grinders are listed in the 1680s also in the Zákupy manor in relation to the glassworks in Juliovka and Zákupy. Cutter (engraver) Kristián Kayl is listed by name.⁵⁹

GLASS GUILDS (CHŘIBSKÁ, POLEVSKO AND FALKNOV, KAMENICKÝ ŠENOV)

The rapid economic development of the local manors and the transition to new forms of production and trade were possible also thanks to the fact that the consequences of the Thirty Years' War there were not as drastic there as in other regions.⁶⁰ Building renovation of the settlements after the war was quick and extensive. The concentration of persons dealing with glass finishing and an increase in their number led to a considerable extension of the settlements in the Bor – Šenov area, the construction of new settlements and villages and also to the foundation of three glassmaking guilds in the second half of the 17th century. The guilds played an important role within the respective towns and manors, especially if they were focused on foreign markets and long-distance trade. They were usually an important factor in the transition to manufactory and factory production, which is clearly visible especially for the textile and glass industry.

Characteristically, the first glass painter and cutter (engraver) guild came into existence in Chřibská in 1661, with the consent of the manorial lord of Česká Kamenice. The guild associated and educated painters and cutters from the whole manor; in the first decades, however, they are only documented from Chřibská, Česká Kamenice and Kamenický Šenov. To be granted master's rights, the journeymen had to paint the imperial eagle with all its attributes and signs from memory in a day and a half. After an apprenticeship period of four years, the apprentices became journeymen and were obliged to work abroad for one year.⁶¹ In 1682, a glassmaker guild was founded also in the Sloup manor of Ferdinand Hroznata, Count of Kokořov. It was a guild of glass painters, glass cutters and stopper makers from Polevsko and Falknov. The development of other refining techniques is already reflected in the statues. Besides the mentioned craftsmen, they also mention grinders and gilders. The member list includes persons not only from Polevsko and Falknov but

55 VOLF 1968, pp. 202–205.

56 RYNEŠ 1966, pp. 121–126. The lists for Chřibská were published by HETTEŠ 1964, pp. 17–23.

57 ŠIMÁNKOVÁ 2008, pp. 58–72. ŠIMÁNKOVÁ 2006, p. 249.

58 DRAHOTOVÁ et al. 2005, p. 224. POLIŠENSKÝ et al. 1989, pp. 436–452.

59 ZUMAN 1936a, pp. 87–92.

60 SLAVÍČKOVÁ 2001, pp. 3–30.

61 ŠIMÁNKOVÁ 2008, pp. 50–51. SCHEBEK 1878, pp. 265–270. HETTEŠ 1964, p. 5.

also from the neighbouring municipalities of the Sloup manor and, somewhat surprisingly, also from Chřibská and Cvikov in the Zákupy manor and from Jiřetín pod Jedlovou in the Rumburk manor. The guild articles are similar to those from Chřibská.⁶² Last to emerge, in 1694, was the glass painter, cutter and stopper maker guild in Kamenický Šenov. Its foundation testifies quite clearly to the extraordinary development of glass finishing in this municipality. Local craftsmen were originally members of the Chřibská guild. Gradually, persons from the entire Česká Kamenice manor entered the new guild.⁶³

DEVELOPMENT OF GLASS TRADING IN THE SLOUP AND ČESKÁ KAMENICE MANORS

Sporadic written mentions and archaeological finds testify to glass trading in the Bohemian lands (both exports and imports) already in the Middle Ages. More information about glass exports – beads, circular window panes and hollow decorated glass – has survived from the second half of the 16th century.⁶⁴ To the growing importance of glass exports in the studied territory at that time testify the customs regulations of Georg of Schleinitz for the Rumburk and Šluknov manors from 1560, which set a duty of 2.5 groschen for a wagon of chests of glass.⁶⁵ Martin Hille of Chřibská was selling glass in Dresden around 1600. The trade gradually grew in importance during the following decades. However, more considerable development of glass trade only came in the last quarter of the 17th century, in connection with the success of crystal and chalk glass and the finishing of these products across the Bor – Šenov area. At that time, local traders and finishing works already procured semi-finished products from many glassworks in eastern, southern and central Bohemia. They made personal visits to the glasshouses and had products made according to the designs they supplied. Then they had the glass from the glasshouses decorated by craftsmen. The glass production thus assumed the form of a distributed manufactory. In the late 17th and early 18th centuries, they controlled a predominant part of exports of hollow glass and partially also of other types of glass (e.g., mirror glass) in Bohemia through a putting-out system. In foreign markets, they managed to force out the formerly dominant Venetian glass.⁶⁶

The first traders undoubtedly came from among glassmakers and refiners (especially cutters), but also from members of the farming population, who are usually listed under the note “wagoneer” in the 1654 tallage register. Characteristically, we encounter them in localities that later grew into glass trade centres.⁶⁷ The first of these traders, namely above all Georg Franz Kreybich of Kamenický Šenov and Johann Kaspar Kittel of Polevsko, undertook long journeys with glass in the 1680s. Their first means of transport, a wheelbarrow, was later replaced by horse-drawn wagons and partially also water transport, e.g. along the Labe/Elbe to Hamburg. The first journeys in the 1680s and 1690s were characterized by a combination of trade and finishing of the procured semi-finished products by grinding, engraving or painting directly on the spot, as the customer wished. Gradually, however, trade and finishing separated; at the turn of the 17th and 18th centuries, they were already constituted as independent branches of business.⁶⁸

62 ŠIMÁNKOVÁ 2008, pp. 51–53, 58–72. ŠIMÁNKOVÁ 2006, pp. 247–252. SCHEBEK 1878, pp. 271–277.

63 ŠIMÁNKOVÁ 2008, pp. 53–55, 66. SCHEBEK 1878, pp. 277–284.

64 ŠRÝTROVÁ 1966, pp. 29–38.

65 MAREŠ 1893, pp. 16, 31. PAUDLER 1885, p. 28.

66 KLÍMA 1955, pp. 153–161. DRAHOTOVÁ et al. 2005, pp. 155–156, 238–246. LNĚNIČKOVÁ 1999, pp. 243–247.

67 VOLF 1968, pp. 202–205.

68 POLIŠENSKÝ 1989, pp. 436–452. DRAHOTOVÁ et al. 2005, pp. 240–242. KLÍMA 1955, pp. 154–156. LNĚNIČKOVÁ 1999, pp. 243–247. ŠIMÁNKOVÁ 2008, pp. 44–45.



A section of Müller's map of Bohemia from 1720 depicting the studied area. A cup symbol labels the glassworks in Horní Chřibská (Ober Kreywitz) and Falknov (Falkenau). The courses of the main trade routes are also visible. The first one leads in the direction of Žandov (Sandau), Česká Kamenice (Kamnitz), Chřibská (Kreywitz) and further to Rumburk, the second from Česká Lípa to Sloup (Birkstein), Svor (Röhrsdorf), Jiřetín pod Jedlovou (Görgenthal) and again to Rumburk. Map collection of the Institute of History, CAS Prague.

GLASS PRODUCTION BOOM IN THE 18TH CENTURY

About fifty glassworks presumably existed in Bohemia in the first half of the 18th century. Müller's map of Bohemia from 1720 depicts only 38 glassworks; more than ten existing glasshouses were evidently not depicted. The number of registered glasshouses rose from 50 as of 1747 to 52 in 1752 and as many as 58 in 1753. Many operations, especially in central and north Bohemia, faced problems with a lack of firewood for glass furnaces. On the contrary, the number of glassworks in the Bohemian Forest (Šumava) and the Upper Palatinate Forest (Český les), regions with sufficient wood supplies, rose; 21 glasshouses are listed there as of 1766, and as many as 26 three years later.⁶⁹ The number of glassworks as of 1771 is slightly lower, probably due to a crisis. Fifty-four glassworks with almost 400 pots were in operation in Bohemia. Only the glassworks in Horní Chřibská, Litoměřice Region, and Nová Huť, Boleslav Region, are registered in the studied territory, the Bor – Šenov area. As some of the glassworks were temporarily out of operation as of

69 LUKÁŠ 1982, pp. 7–18. BROŽOVÁ 1979a, p. 49. DRAHOTOVÁ et al. 2005, pp. 206–207, 263–264. LNĚNÍČKOVÁ 1996, pp. 21–22. Data from various sources may slightly differ depending on whether they count also glassworks that were temporarily out of operation for various reasons.

that date, the overall number of glassworks was higher, approximately 57.⁷⁰ The number of glassworks reached 64 in the 1780s, 66 as of 1790, 70 as of 1790 and 79 as of 1799. Bohemian crystal glass, chalk glass and other kinds of glass dominated Europe in the first half of the 18th century, the heyday of Bohemian glassmaking. Most glassworks produced multiple kinds of products, besides hollow glass also beads, circular window panes, sheet glass and mirror glass. Traders from northern Bohemia., especially the Bor – Šenov area, gained almost complete control of the glass market. Glass pendants for candelabra and chandeliers became a new type of product from the 1720s. Chandelier production followed an earlier tradition from the 1680s from Juliovka near Krompach. The first specialized chandelier assemblage workshop is also documented in the Bor – Šenov area; it operated in Prácheň (Josef Palme) from 1724.⁷¹

Flat glass and mirror production expanded considerably. The new technology of pouring mercury on glass sheets with tin foil started to spread from Italy in the late 16th century. This new method of mirror production reached the Bohemian lands via Nuremberg during the 17th century. At the same time, the production improved under the pressure of Bavarian competition. The improvements concerned above all the quality of molten glass and the technique of blowing large sheets. Glassworks in the Bohemian Forest above all pursued this type of production in the 16th and 17th centuries. Many new mirror glassworks were founded in the Bohemian Forest and the Upper Palatinate Forest from the 1720s. At first, the semi-finished products often headed for finishing works – mirror grinding and polishing workshops – on the Bavarian side of the border. After the construction of refining businesses also on the Bohemian side, mirror making saw a great boom in the second half of the 18th century. Large mirror manufactories came into existence in the Sloup manor of the Kinský family (1756), in the Upper Palatinate Forest and in other regions of southern and western Bohemia.⁷²

The volume of production and exports of glass products increased continually throughout the 18th century until 1805. Smaller crises occurred in the course of time, at first connected above all with war conflicts. The first greater crisis affected Bohemian glassmaking in the second half of the 1760s and the early 1770s, when the volume of production slightly decreased temporarily. In the last quarter of that century, however, symptoms of a deeper decline in glassmaking started to appear. The growth of exports was due to an increasing share of lower-quality cheaper glass, one of the reasons being the focus on broader classes of customers. More important enterprises gradually got into conflict with this business policy, severed their relations with north Bohemian trading companies and reoriented on building their own representations and warehouses in important cities and towns.⁷³

GLASSWORKS IN THE LUSATIAN MOUNTAINS IN THE 18TH CENTURY

The production in **Horní Chřibská and Falknov** glassworks continued in the first half of the 18th century. From 1697, the former was operated directly by the Česká Kamenice manor, which considerably curtailed its glassworks estate. The glasshouse was leased from 1720. At that time, the business conditions and, above all, the securing of wood supplies were much more complicated than before 1697. Besides the reduction of the glassworks estate, the main negative factor was the cancellation of the possibility of logging according to earlier privileges. The manorial lords

70 LNĚNIČKOVÁ 1997, pp. 197–220.

71 DRAHOTOVÁ et al. 2005, pp. 206–210, 213, 218–227, 231–237. BROŽOVÁ 1979a, pp. 45–49. BROŽOVÁ 1979b, pp. 75–79. LNĚNIČKOVÁ 1996, pp. 21–30.

72 DRAHOTOVÁ et al. 2005, pp. 210–211. LNĚNIČKOVÁ 1996, pp. 22–26. KLÍMA 1955, pp. 419–423.

73 KLÍMA 1955, pp. 156–161, 429–434. LNĚNIČKOVÁ 1999, pp. 247–248.



View from the southeast of the location of the vanished Nová Hut glassworks near Svor. On the right is the highway following the route of the imperial highway from the late 18th century and a gamekeeper's premises from the late 19th century. The old trade route led closer to the glassworks; its position under the pond is identified by terrain edges that originated from the destruction of buildings and the piling up of a waste heap. Photo: Jiří Vidman, 2020.

newly concluded short-term contracts for 1–6 years with the tenants that included above all wood supplies for fixed prices. For most of the time from 1720, the glasshouse was operated by masters from the Kittel family, glass traders from Polevsko. Johann Josef Kittel bought it into hereditary possession in 1767.⁷⁴ The same glassmaker family acquired also the Falknov glassworks. The Sloup manor bought the glassworks estate with the glasshouse from Leopold Valentin, the last of the Schürer family, in 1731; however, the Kinský family sold it to Johann Kittel already the following year. Problems with wood supplies appeared increasingly often also in Falknov, however. The crucial glassworks definitively ceased operating around 1755.⁷⁵

Rollhütte under Jedlová closed down during the first half of the 18th century as well. It had also been operated by the Kittel family of Polevsko. Its demise was apparently related to a fire recorded as of 1739.⁷⁶ The glassworks in the **Gross Seifert locality in the cadastral area of Arnultovice** and a more distant glasshouse in **Staré Splavy** (Doksy manor, after 1726) also ceased to exist at that time.⁷⁷ In the Bor – Šenov area, an important role was played by **Nová Huť glassworks** on the so-called New Meadow (Nová louka), later also called Antonín Height (Antonínova výšina, Antonihöhe), on the northern edge of the cadastral area of Svor. Forests in this area belonged to the Zákupy manor and the glassworks master from Falknov had logging contracted there during the first half of the 18th century. The manorial lords of Zákupy arranged the foundation of the glassworks in 1750 with Johann Wenzel Müller of Okrouhlá, who had worked as a sheet glass master in Falknov for seventeen years. Local glassworks masters also struggled with the prices and with

74 CHMELÍK 2001, p. 93. SACHER 1964, unpagued.

75 SLAVÍČKOVÁ – CVRK 1993, pp. 62–63.

76 GELNAR 2002a, pp. 9–17.

77 GELNAR 1996, p. 50. MAREŠ 1893, p. 43.

ensuring the supplies of necessary wood; at the time of poor glass sales, they contracted debts and interrupted operations. After the builder, the glassworks were taken over by his widow and the guardians of his heirs. Anton Kittel bought it from them in 1800.⁷⁸ Of other glassworks, we only know a smaller **glasshouse in Svojkov** operated rather briefly by the Sloup manor around 1756; it is no longer listed in 1764. With the help of Italian specialists, Count Kinský unsuccessfully attempted to establish a manufactory producing Venetian-style beads (so-called *páteřík*) there.⁷⁹

Outside the Bor – Šenov enclave, two more glassworks were founded in the Bělá-Kuřívody manor. The reason for locating new glasshouses in the Wallenstein manors were evidently the closeness of glass finishing centres, along with sufficient wood supplies in large forest and, in places, boggy areas that very virtually unusable for the manorial lords, except for processing for iron mills, charcoal kilns or potash production. The first one, the **glasshouse in the settlement of Strážov**, was situated in the middle of large and dense forests east of Břežný Pond. The first information about it is dated 1727. In 1774, it was taken over by Johann Josef Kittel, the former glassworks master from Falknov we have mentioned several times before, and in 1786, by his son Johann Michel.⁸⁰ According to information from contemporary sources, it was possibly out of operation in the following years, but it apparently did not definitively cease to exist until 1812.⁸¹ The time of origin of a **glasshouse on the border of the Ploužnice and Kuřívody cadastral area**, in a secluded place called Skelná Huť today, is uncertain. It apparently operated to a very limited extent in the late 18th and/or early 19th centuries, since it is not registered in any earlier or later glassworks lists.⁸²

DEVELOPMENT OF GLASS FINISHING AND CONSTITUTION OF ITS FIRST CENTRES IN BOR – ŠENOV AREA

The increase in the number of inhabitants of the municipalities in the Česká Kamenice, Sloup and other neighbouring manors speeded up considerably in the late 17th century and the first decades of the 18th century. It is well documented by figures from the Česká Kamenice manor, where the population had increased by a full 60 % from 1676 according to a list from 1724–1727. The foundation of businesses was supported by the mercantilist policy of the government as well as by the manorial lords; the support had the form of an advantageous lease of land, liberation from *corvée* or the support of guilds, for instance. A rapid increase in the number of persons dealing with glass refining in the first half of the 18th century is also documented by preserved archival sources including guild documents. The lists confirm that like in the previous century, many craftsmen (almost 40 %) carried out their trade only seasonally and otherwise continued to make their living by farming.⁸³

The Chřibská guild had as many as 47 glassmakers already before 1700 (37 masters, 4 journeymen and 6 apprentices), with glass cutters predominant among them.⁸⁴ The register of inhabitants in Kamenický Šenov lists altogether 122 glassmakers between 1673–1723 (most of them after 1700); of them, there were only 14 painters and 5 glass traders, compared to as many as 104 glass cutters.⁸⁵ In 1723, the Kamenický Šenov guild had 92 masters, 37 journeymen and 6 apprentices; as

78 ZUMAN 1947, pp. 38–44, 69–72, 131–142, 166–168.

79 PAUDLER 1885, p. 27. KLÍMA 1955, pp. 419–421. GELNAR 2012, pp. 183–190.

80 MAREŠ 1893, pp. 43–44. The glasshouse was included neither in a production list from 1753 nor in a glassworks list from 1771, see LNĚNIČKOVÁ 1997, p. 201.

81 GELNAR 1997b, pp. 73–75.

82 *Ibid.*, p. 75.

83 SLAVÍČKOVÁ 2001, pp. 6–10, 16–17.

84 *Ibid.*, p. 8. HETTES 1964, p. 5 lists slightly different figures. The condition of the glassmaking crafts around the middle of the 18th century is summed up in a production list from 1752–1753, see BROŽOVÁ 1979b, pp. 75–79. MARTÍNEK 2000, pp. 79–84.

85 RYNEŠ 1966, pp. 121–126.



View from the southeast of the upper part of Polevsko with the church of the Holy Trinity. The built-up area is dominated by typical mansard and half-hipped roofs of the houses of local glass traders and refiners, especially painters. First quarter of the 20th century. Copy of a photograph from the author's collection.

of 1725, there were already 102 masters coming from all neighbouring municipalities of the Česká Kamenice manor. A similar increase can be seen for the guild in the Sloup manor. The highest increases in membership are recorded in the first half of the 18th century.⁸⁶ A general statistic of craftsmen, specialized manufacturers and traders was made at the Česká Kamenice manor in 1724. Altogether 389 people were categorized in glassmaking branches, comprising 36.5 % of all crafts of this type. Besides glaziers (146 people), the list is completely dominated by class cutters (engravers – 108). There were only fifteen cutting lathe operators (kulič), two grinders, eight painters, seven stopper makers and five glassworks glass makers.⁸⁷

Changes in glass finishing are visible in the specializations of the individual craftsmen within the guilds. The dominance of glass cutters increased in the Falknov-Polevsko guild in the mentioned period, while the number of painters and stopper makers was considerably lower. Glass grinders appeared for the first time in 1710, but their number started to increase more from 1750 when they already dominated among new members. Cutting lathe and disc grinder (hladinář) operators started to appear in smaller numbers from 1706, and glass gilders from 1750.⁸⁸ A boom of grinding mills including cutting lathes around the middle of the 18th century is related to the arrival of craftsmen from the Smržovka manor. Brothers Johann Wenzel and Josef Rösler of Jiřetín pod Bukovou built new water-driven grinding mills in Falknov. From the same manor (Brand – Ždár near Tanvald) came Christian Endler, who reportedly introduced glass gilding in Falknov between 1740 and 1750. His sons Johann and Franz and cousin Franz Endler brought bead grinding to the municipality, a specialization that later became widespread there.⁸⁹

86 SLAVÍČKOVÁ 2001, p. 8. ŠIMÁNKOVÁ 2008, pp. 63–67, 76–79.

87 SLAVÍČKOVÁ 2001, pp. 16–23.

88 ŠIMÁNKOVÁ 2008, pp. 58–72, 75–79, 82–89. ŠIMÁNKOVÁ 2006, p. 249.

89 MAREŠ 1893, p. 47. SCHEBEK 1878, pp. 15–23. The authors' data concerning the first occurrence of grinding mills in connection with the newcomers are not as precise as the text above says; grinders are mentioned much earlier in the manor, and water-driven grinding mills are also of an earlier origin. See also SLAVÍČKOVÁ – CVRK 1993, pp. 66–67. KOLKA 2012, pp. 37–39.



Sloup v Čechách, view from the southeast (probably from a vantage point called Na Stráži) of the so-called Rock Castle (Skalní hrad, hermitage); below it stands the old castle premises and an extensive farm court converted from the 1750s into the main company of the Kinský mirror works. First quarter of the 20th century. Česká Lípa National History Museum and Gallery, sign. ND 15409.

One of the most important glasswork companies founded in the Bohemian lands in the 18th century was mirror works founded in the Sloup manor by Count Jan Josef Maxmilián Kinský in 1756. As of that year, the construction of a mirror manufactory began directly in Sloup, not far from a tower with a hermitage (Einsiedlerstein, today called Skalní hrad). The other company was a hammer mirror grinding mill with a stamp battery producing tin foils in Lindava (No. 194, Dolnolindavská Street). The construction including a large hydraulic structure lasted until 1760 with a considerable cost of 99,000 guildens. Altogether 132 employees were listed for both operations in 1764, plus 52 joiners making wooden frames and three people in the foil production. Children worked for the company as well under adult supervision, cutting small pocket sliding-in mirrors. The operations were managed and professionally supervised by Christian Stöhr and his son Anton of Nuremberg. In 1777, Count Kinský bought mirror works in Prášily, from where semi-finished glass sheets were transported to the Sloup manor.⁹⁰ Although considerable use of home work of trained craftsmen, i.e. the form of a distributed manufactory, was typical of Count Kinský's business, the mirror works represent an example of a concentrated manufactory whose operation successfully developed and lasted until the 20th century. The extent of home work was much smaller in the mirror works; it rather concerned minor auxiliary activities. However, the method of management of the companies was very limiting for further progress towards industrial production.⁹¹

90 PAUDLER 1885, pp. 24–27, 49. KLÍMA 1955, p. 419.

91 KLÍMA 1955, pp. 412–426.

The existence of good roads was crucial for future development of glass finishing and especially glass trade. The construction of imperial highways faced considerable problems and often took decades. The so-called Rumburk Highway was especially important for the studied area. The preparation of the route of the new artificial road started in 1752. It was connected to the Vienna road from Kolín and led via Nymburk, Mladá Boleslav, Česká Lípa, Pihelská Staveniště, Nový Bor, Svor and around the Nová Huť glassworks towards Dolní Podluží and Rumburk. However, the work was interrupted by war conflicts, and further negotiations about the construction of the road, initiated by local traders and industrialists, did not take place until 1786. The construction itself only began in 1794–1797 in the section from Rumburk to the Nová Huť glassworks.⁹²

FIRST HALF OF THE 19TH CENTURY

The first third of the 19th century was the time of one of the greatest crises in the history of Czech glass production. Glassmaking, not only in northern Bohemia, was affected by events after 1805, i.e. the continuing Napoleonic Wars, the Continental Blockade (1806) with the loss of overseas markets and the national bankruptcy (1811). Negative phenomena from the last third of the previous century fully manifested themselves in this situation, namely the dominant export orientation of the production and the predominant concentration on mass, lower-quality production. Even after the opening of the markets, Bohemian glass was unable to compete with products from England and Ireland, Belgium or Holland on a greater scale. The development was progressive above all in the British Isles. Technically, the production there was on the highest level. Fundamental factors included the spread of coal-fired glass furnaces or the use of new materials (such as artificial soda). French glassworks, in their turn, dominated in mirror glass casting.⁹³

Attempts at using coal to fire furnaces were made also in the Bohemian lands. As neither the technology nor the adaptation of the melting furnaces for the new fuel was managed perfectly, most new glasshouses of this type did not last long. Despite various efforts aimed at improvement and modernization, the glass industry retained the form of a distributed manufactory even at the time of the ongoing industrial revolution. New or modernized enterprises of factory character did not appear until the 1830s (e.g., Lenora in the Bohemian Forest). This was due to a considerable extent to the specific characteristics of glassmaking and especially of the finishing operations, in which home work played an important part. The number of glassworks registered in Bohemia decreased from 78 at the beginning of the 19th century to 63 as of 1818 and 58 by 1825. A boom followed from the early 1830s, and the number of glasshouses rose to 75 as of 1835 and 85 as of 1845, including 12 mirror works. The concentration of glassworks in Bohemia did not fundamentally differ compared to the previous period. The location of glassworks was still based on the availability of the main material – wood as fuel for glass furnaces, as coal had not asserted itself considerably yet. Potash was already mostly supplied by specialized producers at that time.⁹⁴

Most glassworks faced economic difficulties due to worse sales conditions and frequent problems with the supplies of wood. Therefore, they focused on the production of the ordinary assortment. The crises were not continuous; periods of a deep decline were interspersed with years of relative prosperity (e.g. after 1815 or after 1820). Moreover, some companies and branches underwent new development, avoided the unfavourable trend and continued to assert themselves in the markets. Technologically and artistically progressive companies included the glassworks in Nový Svět (Har-

92 ROUBÍK 1938, pp. 63–65.

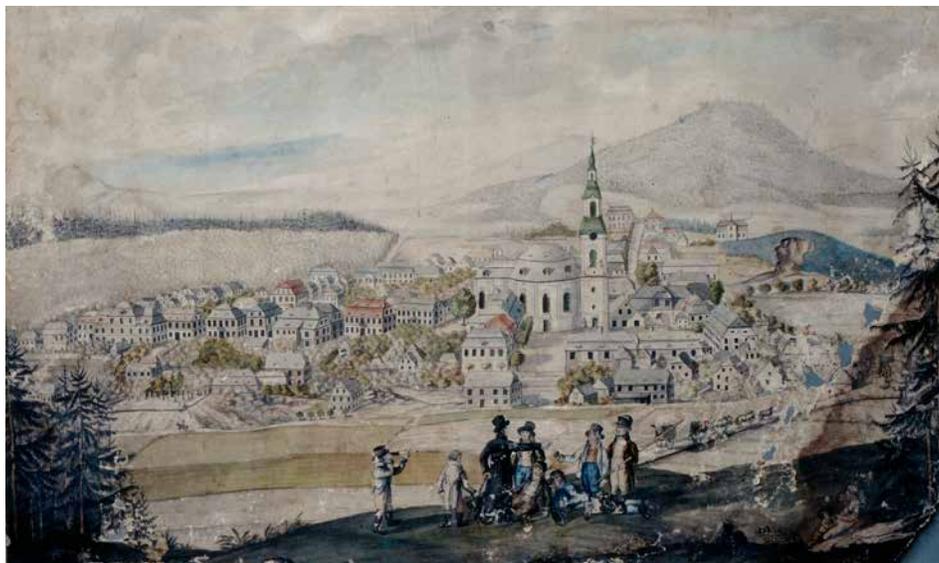
93 HETTEŠ 1985, pp. 62–68. DRAHOTOVÁ et al. 2005, pp. 284–286.

94 HETTEŠ 1985, pp. 66–82. DRAHOTOVÁ et al. 2005, pp. 261–264.

rachov) and Buquoy enterprises in southern Bohemia. More important companies had their own finishing operations, which were especially extensive in the two mentioned examples. The data for the late 18th and early 19th century list 324 active engravers, 792 edge grinders, 453 cutting lathe operators, 150 glass painters, 96 gilders, 50 stopper makers, 5 glass thread spinners and 161 bead manufacturers. This list shows the predominant refining techniques of that time very well.⁹⁵

In the Lusatian Mountains, only the glassworks in Horní Chřibská and Nová Huť near Svor survived the problems with wood supplies and the crises of the glass industry. Both companies were owned by Anton Kittel. After his death in 1820, both glasshouses were taken over by his sons-in-law, Horní Chřibská by Franz Weidlich and, from 1836, Franz Böse and Nová Huť by Anton Simchen, Anton Futschig and finally Moritz Imanuel Neubert. Both glassworks were managed in parallel up to 1846, including alternation of the personnel. Due to the lack of orders, the operation was alternating in 1821–1834, with one of the glasshouses extinguished. The size of the Nová Huť glassworks is well illustrated by data on the overall production, which amounted to 800,000 glassworks thousands (*hutní tisíc*) in 1820 and gradually decreased to 600,000 in 1831 and 558,000 in 1832. The Zákupy manor bought Nová Huť in 1857.⁹⁶ In Horní Chřibská, Franz Böse succeeded in reversing the negative development in the 1840s and the company underwent gradual modernization including the construction of a new glassworks hall.⁹⁷

Despite the development of finishing operations attached to major glassworks, the finishing of many semi-products continued especially in the Sloup and Česká Kamenice manors and in several municipalities of the neighbouring manors.⁹⁸ The development smoothly continued in the trend



View of the town of Haida (present-day Nový Bor) from the north, after 1804. On the right are earlier buildings around the square built mostly in the 1760s; on the left, the town's new quarter surrounding present-day Palackého Square built from 1790. Glass Museum Nový Bor, sign. 4762.

95 DRAHOTOVÁ et al. 2005, pp. 261–268.

96 ZUMAN 1947, pp. 133–142, 166–168.

97 SACHER 1964, unpagged.

98 HETTEŠ 1985, pp. 66–82. DRAHOTOVÁ et al. 2005, pp. 262–268, 278–309. BROŽOVÁ 1995, pp. 59–81. BROŽOVÁ 1997, pp. 61–79.



View of the northern part of the so-called Old Marketplace in Nový Bor from the first half of the 19th century. On the right next to the church is the Piarist monastery, followed to the left by glass trader houses; the houses in the rear front were owned by Friedrich Egermann. Glass Museum Nový Bor.

from the late 18th century, the most widespread technique being glass grinding (including the use of cutting lathes), followed by engraving, glass painting, gilding, silvering and other techniques. Friedrich Egermann was undoubtedly an engraver who exceeded the boundaries of the region.⁹⁹ The production of chandeliers also developed, making them a very important export article. The workshops concentrate in Prácheň, Šenov, Bor and Polevsko.¹⁰⁰

An overview of factories and the most important manufactories is preserved for the territory of the then Liberec Region as of 1840.¹⁰¹ It depicts rather illustratively also the condition of the local glass industry. A typical characteristic of this branch in the Bor – Šenov area is that no machinery equipment is listed for most companies; steam engines are lacking altogether. The only glass-house in the region's territory, Horní Chřibská, is no exception. Another important company was the Kinský mirror works, situated in the list in a simplified manner in Velenice, Sloup manor. The list of finishing works is extensive, with only the summary of companies recorded for some localities. Only Franz Anton Zahn's imperial-royal privileged factory from Chřibská is listed separately. Besides the above-mentioned mirror works, the only machinery equipment is ascribed to Franz Helmich's Venetian bead grinding mill in Volfartice, Horní Police manor; ten water-driven grinding machines worked there, operated by thirty to forty employees. Special types of companies were represented by Johann Zeh's metal glass forms production in Skalice and Elias Rückert's optical glass production in Maxov.

North Bohemian trading companies went through a considerable decline in the first half of the 19th century. After the Continental Blockade of 1806 and the loss of overseas markets, part of the Bohemian glass exports reoriented on the Balkan Peninsula, the Italian Peninsula and Turkey. This development led to the gradual abolishment of foreign representations and subsequently to the demise of many companies. Of the 48 representations of firms from Nový Bor at the beginning of

99 DRAHOTOVÁ et al. 2005, pp. 266, 278–309. HAIS – RIMPLER – HAUDUM 2015, pp. 79–94.

100 BROŽOVÁ 1985, pp. 16–19.

101 GRISA 2015, pp. 137–169.



Kamenický Šenov, view from the west of the central part of the village with the church of St John the Baptist; in the front is the imperial highway built in 1826–1829, along which goods were transported by wagons from local glass traders. Česká Lípa National History Museum and Gallery, sign. V-0698.

the 19th century, for example, only three large export houses survived until 1850. In Kamenický Šenov, only five companies remained out of several dozen. The trend from the end of the previous century, consisting in the separation of trade in major enterprises and the establishment of their own representations and warehouses in important cities and towns, deepened considerably in this period.¹⁰²

As we have stated above, the construction of the transport infrastructure was also of utmost importance. The construction of the backbone highway system falls precisely into the first half of the 19th century. In its beginning (1804–1805), only a section of the so-called Rumburk Highway from Nová Huť via Svor and Bor to Česká Lípa was built. The Litoměřice Highway was extended from Kravaře to Horní Police and Česká Kamenice in 1828–1831. The connection of the Rumburk and Zittau Highways was important for the glassmaking area; it was enabled by routing the so-called Litomyšl Highway from Mnichovo Hradiště via Kuřivody, Mimoň, Zákupy, Nový Bor, Česká Kamenice as far as Děčín. The section from Mimoň to Bor was built in 1817–1834 and from Bor to Česká Kamenice in 1826–1829. The construction of a highway via Děčín to Česká Kamenice, Chřibská and the Šluknov Spur was important for the transport of coal from the Chabařovice coalfield. Its construction was discussed already from 1798, but it was repeatedly postponed due to funding and other delays. The whole route as far as Rumburk was not built until 1816–1831.¹⁰³

GLASS INDUSTRY TRANSFORMATIONS IN THE SECOND HALF OF THE 19TH CENTURY

This period, and especially the last quarter of the 19th century, was the time of a fundamental transformation of the glass industry not only in the Bohemian lands that was determinative also in the first half of the following century. The transformation of glassmaking into a fully industrial branch was enabled by the social and economic changes in the lands of the Habsburg monarchy after 1850. The loosening of the subject relations, extensive administrative reforms (the transition of administration from manors to the regional and district authorities), the issuance of the trade regulations in 1859 (in effect as of 1 May 1860), the abolition of guilds or the issuance of the commercial code in 1862 enabled free enterprise and fundamentally supported the emergence of new companies and economic growth. The industrialization of the Bohemian lands speeded up considerably after the initial stages. The growth of industrial production and its share in the

102 LNĚNIČKOVÁ 1999, pp. 247–261. DRAHOTOVÁ et al. 2005, pp. 275–277. HETTES 1964, p. 9. LNĚNIČKOVÁ 1989, pp. 54–62. SLAVÍČKOVÁ 1999, pp. 18–28.

103 ROUBÍK 1938, pp. 64–67, 74–75, 77–78, 80–84, 104–106.

overall production of the population was enabled by the more massive use of a new fuel – coal, the increased utilization of steam engines in the individual branches of the economy and the construction of a backbone railway network. These three basic phenomena are characteristic of the industrial period.

The overall volume of production and exports of Bohemian glass gradually grew from 1850, but a decline followed in 1858–1859 due to an economic crisis (1857) and lagging behind the European trends in artistic development. A steep boom occurred during the so-called Age of the Founders (*Gründerzeit*) in 1867–1873, to be followed by another period of stagnation due to an economic crisis. Glass production and exports grew steadily from the early 1880s until 1900 in connection with a considerable alteration and modernization of the glass industry. The steepest boom can be observed from 1884 and, to an extraordinary extent, also from 1895. The Bohemian lands concentrated 60–70 % of primary glass production and 90 % of glass finishing within the Habsburg monarchy. At that time, the glassworks were divided into operations focused on luxury glass following contemporary artistic trends and larger mass-production enterprises. Companies focused on luxury goods were not under so much pressure from the necessity to modernize. Glass finishing mostly retained the form of a distributed manufactory, even though some production steps became more mechanized and concentrated in factory premises even in this branch.¹⁰⁴

The pressure on modernization of Bohemian glassmaking was oriented on reconstructions of melting furnaces and the transition from direct heating by wood to direct heating by brown or black coal and to regenerative and recuperative systems, i.e. the gasification of wood and, above all, coal using producers. There was a clear tendency to combine the primary production, the glass finishing operations and the related technologies into larger units that were already of a factory character. Of course, it was most visible in newly founded glass plants. The above implies the advantageousness of localizing glassworks in regions with coal mines or at least with a connection to the nascent railway network, which enabled problem-free transport of coal. All this means that the glassmaking regions of Bohemia were undergoing the greatest transformation since the transition period between the Late Middle Ages and the Early Modern Period. A new dominant glassmaking region was coming into existence in northwestern and western Bohemia (the Sokolov, Teplice, Duchcov, Plzeň and Radnice regions) throughout the second half of the 19th century. Attempts, as yet not very successful, at founding coal-fired glasshouses appeared already in the early 19th century; most ceased to exist, however, or reverted to direct wood heating. First loner-term working glassworks with direct heating by brown or black coal are documented in Duchcov (Adam Valley, hollow glass production) as of 1852 and Verneřice (Hrob, Teplice District, Georg Schlägl, sheet glass) as of 1854. They were followed by glassworks in Dolní Rychnov, Ovčárna and Leopoldovy Hamry in the Sokolov region, Vranov near Radnice in the Plzeň region, Košťany in the Teplice Region, Markoušovice in the Žacléř region and Čejč near Hodonín. The first examples of the use of producer gas also appeared in the 1850s (1852 – Čejč near Hodonín, before 1856 – Dolní Rychnov).¹⁰⁵

Altogether 97 glassworks were registered for the Bohemian lands in 1856. As of 1857, statistics registered 83 glassworks with 2,800 employees in Bohemia, which means a slight decline compared to 1845 (85 glassworks). At that time, about 25,000 people were employed in hundreds of finishing works. The number of companies decreased slightly by 1861. 89 glassworks operated within the Bohemian lands, the most (36) still in the Bohemian Forest and the Upper Palatinate Forest. Steam engines gradually became more numerous, used especially to drive grinding mill machinery. In the glassworks themselves, they found the most application in stamp mills, edge mills and other

104 DRAHOTOVÁ et al. 2005, pp. 319–326. LNĚNIČKOVÁ 1999, pp. 56–62.

105 Ibid. HETTEŠ 1985, pp. 82–90. HETTEŠ 1986, pp. 63–79. BROUL – GRISA – SMRČEK 2005, pp. 17–22, 47–48.

installations used in the preparation of materials. Their power rose from a mere 48 HP in 1863 to 403 HP in 1876. Glassworks in disadvantageous locations (above all Bohemian Forest, Upper Palatinate Forest) vanished during the 1860s. More bankruptcy waves followed the economic crises in 1873 and 1884. The overall number of businesses remained roughly stable, however. According to a statistic from 1870, there were 82 glassworks with 115 furnaces, 856 pots and 3,123 workers in Bohemia. However, the greatest concentration of finishing works belonged to the Liberec Chamber including the Bor – Šenov and Jablonec glassmaking areas. It lists 67 chandelier and glass cane factories, 2,255 smaller hollow glass finishing workshops, 160 glass pressing plants (especially in the Jablonec region), 268 glass jewellery and crystallery grinding plants (the same region), 76 wound glass workshops (the same region) and 87 glass bead production plants (the same region). The number of glassworks in Bohemia increased to 107 by 1879. The transformation of glassmaking areas ended around 1885; despite the demise of old glasshouses and the emergence of new glass plants, they did not change fundamentally in the following decades up to 1945. In 1886 there were as many as 127 glassworks with c. 14,000 workers in the Bohemian lands. According to an address book from 1887, the number rose to 139 glassworks including 118 in Bohemia, 18 in Moravia and three in Silesia. The closure of businesses in the Bohemian Forest and the Upper Palatinate Forest did not manifest itself more until 1895, when the address book registered 109 glassworks in the Bohemian lands; their number in Bohemia dropped to 89, while Moravia retained 18 glasshouses and Silesia only two. Around 1900, 100–101 glassworks operated in the Bohemian lands; about three-quarters of them used brown or black coal producer gas to heat melting furnaces with a regenerative or recuperative system. Wood gasification was used by about a third, especially in mountain regions, while direct heating only occurred in a few glasshouses.¹⁰⁶

NEW WAVE OF GLASSWORKS FOUNDING IN BOR – ŠENOV AREA FROM 1872

Primary glass production did not have a very significant position in the region after the middle of the 19th century. This is reflected in Anton Anshringer's album mapping industrial companies in the territory of the Liberec Chamber of Commerce and Trade. In the Bor – Šenov area, it only lists the Kinský mirror works.¹⁰⁷ However, local entrepreneurs participated also in the foundation of new glassworks in other regions. Johann Hermann Janke of Polevsko, for instance, became the founder of a glassworks in Adamovo údolí near Duchcov. Four of the eight glassworks newly founded in the Teplice area in 1852–1867 focused on utility glass production and supplied their products to finishing works in the Bor – Šenov area.¹⁰⁸ Nová Huť glassworks kept operating in the Lusatian Mountains; however, it gradually declined after its takeover by the Zákupy manor in 1857 and was definitively extinguished in 1875.¹⁰⁹ On the contrary, the new owner of the other local glassworks, Horní Chřibská, set about a fundamental modernization of the company. First of all, it went over from furnace heating with wood, which was in short supply, to a wood gasification recuperative system using a Nehse-type producer carried out in 1870. Subsequently, approximately from 1872, brown coal transported from about the three kilometres distant railway station was also used for the generation of producer gas. The transformation of the glassworks to a modern company was completed in 1882 along with its acquisition by the Michel & Mayer company. Even later, the melting furnaces were rebuilt to the optimal Siemens-Siebert type.¹¹⁰

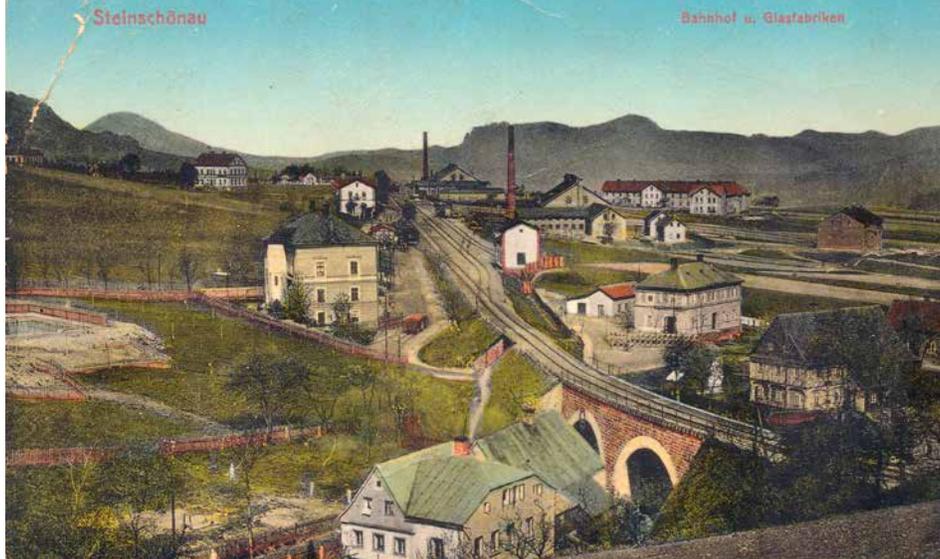
106 The numbers of glassworks in the available literature and address books slightly differ, depending on how up-to-date or delayed data was used. See DRAHOTOVÁ et al. 2005, pp. 324–326. HETTES 1985, pp. 82–90. BROUL – GRISA – SMRČEK 2005, pp. 20–23, 46–47. FAHDT 1887. *Adressbuch der Glas-Industrie in Deutschland und Oesterreich-Ungarn* 1895.

107 ANSCHIRINGER 1981.

108 GRISA 1982, pp. 113–122.

109 ZUMAN 1947, p. 166.

110 SACHER 1964, unpag. HAIS 2014b, pp. 247–256.



Kamenický Šenov; a railway station on the railway from Česká Kamenice, which was put into operation at the beginning of 1886, was situated in the lower part of the settlement. The Adolf Rückl glassworks (in the rear) was built there at the same time; the Jílek & Vetter (later Bratři Jílkové) glassworks was added later, in 1905. The railway was extended to Česká Lípa in 1903. A postcard from before 1920. Stanislav Kopecký's collection.

The glass industry boom and the so-called Age of the Founders in 1867–1873 were the impulse for the foundation of more new glassworks featuring modern furnace heating systems that offered fuel savings, a shorter melting process and higher quality of molten glass. Four new glassworks joined the modernized glass plant in Horní Chříbská in 1872–1874, and two more were founded during the next boom in 1885–1886. The construction of three more glassworks at once took place in 1893. This means that as many as ten glassworks operated in the Bor – Šenov area by the end of the 19th century, as documented by the following list enumerating the date of foundation (or reconstruction), locality, name and important owners.¹¹¹

1870, 1872 – Horní Chříbská, glassworks modernization, Franz Zahn, Michel & Mayer (1882), August Mayer & Sohn (1902).

1872 – Svor, Theresienhütte, Balle & Reim, Münzel & Palme (1880).

1873 – Falknov, Augustahütte, Buchberghütte, Vincenz Hrdlička, Augusta Klimtová, Münzel & Palme (1883).

1873 – Rybniště (Chříbská Nová Ves), Franz Zahn, Michel & Mayer (1882), E. Michel & Co. (1902).

1874 – Nový Bor, Helenenhütte, König, Werner & Co., Michel & Mayer (1884), E. Michel & Co. (1902).

1885 – Nový Oldřichov, Clemens Rasch.

1885/1886 – Kamenický Šenov, Adolf Rückl.

1893 – Skalice u České Lípy, Anton Rückl.

1893 – Falknov, Marienhütte, Münzel & Palme.

1893 – Mlýny (Hillův Mlýn), Theresienhütte, Raimund Knöspel, Raimund Knöspel & Söhne (1895).

The foundation of new glassworks continued smoothly especially during the first decade of the 20th century; eventually, altogether nineteen glassworks were in operation there. Some newly built

¹¹¹ The theme has not been paid much attention yet. For brief basic information, see also GELNAR 1996, pp. 52–57. HAIS – RIMPLER – HAUDUM 2015, pp. 20–25.

glassworks were still equipped with melting furnaces directly heated by brown coal. They were the Augusta glassworks in Falknov (under Buchberg, Malý Buk Hill) and the Tereza glassworks in Svor, both founded in the first wave, in 1872 and 1873. In other plants, melting furnaces heated by producer gas of Nehse, later Siebert, Siemens and finally mostly Siemens-Siebert types were installed in the 1870s–1890s.¹¹² None of local primary glass production companies grew into the form of a large industrial complex, however.¹¹³ Larger glass plants included above all the glassworks in Rybniště, Nový Bor (Helena) and Kamenický Šenov (Adolf Rückl), equipped with two melting furnaces with 16 and 20 pots. Theriesienhütte in Svor even had three furnaces with altogether 24 pots; however, they used direct brown coal heating until 1893. Other glasshouses only had one furnace. Some glassworks also included a grinding mill. Such information is noted in the 1887 address book for the Rasch glassworks in Nový Oldřichov and in the 1895 address book for the Münzel & Palme glassworks in Svor and Falknov (Marienhütte). A grinding mill and painting works were also attached to Raimund Knöspel's glassworks in Hillův Mlýn. Characteristically, the operations are situated close to railways. The glassworks in Rybniště, Kamenický Šenov (Adolf Rückl) and Skalice (Anton Rückl) were directly connected via an industrial railway. Most railways in the Bor – Šenov glassmaking area were built by the Bohemian North Railway (Česká severní dráha, Böhmische Nordbahn, BNB). The company was founded in 1865 and continued operating them until its nationalization as of 1 January 1908. The following railways were crucial: Bakov nad Jizerou – Česká Lípa – Rumburk (railway construction: autumn 1866 – early 1869, put into operation: 16 January 1869), Podmokly (Děčín, main railway station) – Varnsdorf (dtto), Česká Kamenice – Kamenický Šenov (railway construction: 1885–1886, put into operation: 10 February 1886), Svor – Cvikov (put into operation: 1 September 1886), Kamenický Šenov – Česká Lípa (Městský sad), local railway, joint stock company Localbahn Steinschönau – Leipa Stadtpark (operated by BNB, construction: 1902–1903, put into operation: 29 August 1903).¹¹⁴

GLASS FINISHING IN BOR – ŠENOV AREA

The neighbourhood of Nový Bor and Kamenický Šenov remained the most important glass finishing centre in the Bohemian lands also in this period, with 2,382 independent businesses of this kind registered around 1870. In the 1890s, an estimated 10,000 people were employed in glass finishing. The companies continued to use a putting-out system, supplying individual craftsmen with semi-finished products and decor designs, taking finished products from them and completing and selling the goods, either in the home country or abroad. Most of them only operated simple facilities, warehouses and shops themselves. Most major companies that had been in operation for a longer time had 100–200 employees in the last quarter of the 19th century. Only a few most important enterprises exceeded this number, including the Nový Bor branches of J. Vogelsang Söhne, Julius Mühlhaus & Co., Hartmann & Dieterichs and the Šenov-based company Stelzig, Kitzel & Co. Some finishing works were transformed from earlier enterprises and trading companies or continued their operations from the previous period, but most companies were newly founded above all in the 1860s and 1870s within the so-called Age of the Founders. In view of the method of operation of finishing works described above, it is no surprise that machinery equipment remained rather limited, as characteristically documented by the number of steam engines. As of 1886, one

112 Ibid. SACHER 1966, s. 52. HAIS 1982, pp. 123–170.

113 They were smaller companies in the context of the Austro-Hungarian monarchy. No glassworks from the Bor – Šenov area are therefore included in the prestigious publication *Die Gross-Industrie Oesterreichs*, part 2, Wien 1898. Only the Harrachov-based glassworks in Nový Svět and the Josef Riedel company from the Jizera Mountains are represented from northern Bohemia.

114 KREJČÍŘÍK 2009, pp. 112–171. ŠINDLAUER 1999. ČADA – KOUTNÝ – SEDLÁČEK – STRNAD 2001. RUCZ 2017, pp. 97–118.

GLASSWORKS 1872–1945

- BEFORE 1872
- 1872–1874
- 1885–1886
- 1893
- 1900–1909
- 1912–1925
- RAILWAYS



Map of the Bor – Šenov glassmaking area schematically depicting the locations of glasshouses active in 1872–1945. Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.



Postcard illustratively depicting the town of Kamenický Šenov with the smokestacks of local glass finishing plants and medallions of glassmaking techniques. Stanislav Kopecký's collection.



Nový Oldřichov, Clemens Rasch glassworks from 1885. The postcard already depicts a railway that was put into operation in 1903, from which an industrial railway was extended to the glassworks. Petr Joza's collection.



Kamenický Šenov, a postcard from the early 20th century depicts a glass school, house No. 56. Petr Joza's collection.

was registered only for Brüder Rachmann, Julius Mühlhaus & Co., Adalbert Scheinost, Elias Palme and for the Kinský mirror works. The 1887 address book also lists a sanding steam engine for Busch & Günzel in Bor and Ignaz Vogel's Sohn steam-driven grinding plant in Mistrovice.¹¹⁵ As early as 1880, a steam engine was listed also for the Franz Wagner bronze goods factory and glass finishing plant from Nový Oldřichov. A second steam engine was added there during a reconstruction of the company's machinery equipment in 1898.¹¹⁶ Water-driven glass grinding mills were often attached especially to medium-sized enterprises; they were frequently situated in localities other than the finishing works themselves.

FIRST HALF OF THE 20TH CENTURY

The steep rise of the glass industry in the Bohemian lands continued during the first quarter of the 20th century, and especially in its first decade. The trend of introducing new technologies and industrial machinery equipment strengthened in that period, above all in the container and sheet glass branches. Bottle production started to use semi-automatic machines and, from 1900, Owens automatic machines. In sheet glass production facilities, manual production was gradually replaced by Oppermann-Lubers and Sievert systems. Of fundamental importance was managing the Fourcault process of manufacturing flat glass by molten glass drawing, which was successfully used for the first time in the Bohemian lands in Hostomice near Teplice in 1919. The new Pittsburgh system of debiteuse-free flat glass drawing was introduced in the 1930s. Apart from exceptional cases of special glass, machinery had completely replaced manual production in these branches by the late 1920s and early 1930s. Melting furnaces and producers were modernized concurrently, the former mostly using the Siemens-Siebert system, and more machinery was introduced (for instance, cracking-off). Large continuous tank furnaces heated by producer gas of Siemens, Nehse or Klattenhoff type were installed in mass production. A small trial electric melting furnace was put into operation for the first time in the Annin glassworks in 1934. Machinery was gradually applied to a greater extent also in glass finishing (machine grinding, pressing machines). The whole industry was considerably export-oriented.¹¹⁷

Detailed statistics from the individual departments of the chambers of trade and commerce is preserved from the early 20th century, from 1902. Altogether 110 glassworks with 14,425 employees were registered within primary glass production at that time, 91 in Bohemia and 19 in Moravia and Silesia. The number of employees per glassworks was smaller in Bohemia and especially in the Jablonec and the Bor – Šenov areas, where smaller companies predominated, specialized to satisfy the varying demand from local finishing works. By far the most glassworks, 49, were situated in the Liberec chamber district; besides the two mentioned glassmaking areas, it also incorporated the Teplice area and eastern Bohemia. On the contrary, the highest number of mirror glass finishing works were in the districts of the Plzeň and Cheb chambers (Bohemian Forest, Upper Palatinate Forest); the Bor – Šenov area comprised three enterprises. North Bohemian glassmaking areas had a considerable share in utility glass grinding, where the respective chamber registered 480 grinding facilities with 3,270 employees and 7,470 home workers, more than 90 % of all installations in the Bohemian lands. The Liberec chamber held a dominant, almost 93 % share also in glass painting, with 574 painting works, 1,936 employees and 1,684 home workers. The same is true

115 DRAHOTOVÁ et al. 2005, pp. 330–332. For a synoptic list of the local refineries with the basic information, see RANŠOVÁ – HORNEKOVÁ 2001.

116 *Gross-industrie Oesterreichs* 1908, pp. 142–143.

117 KIRSCH 2003a, pp. 21–25, 42, 49–52. BROUL – GRISA – SMRČEK 2005, pp. 85–93, 101–144.



Photograph of the personnel of the Anton Rückl glassworks in Skalice, first third of the 20th century. Glass Museum Nový Bor.

of other glass finishing operations, with the same percentage representation of the Liberec chamber and 1,252 companies with 6,641 employees and 6,312 home workers. Altogether 46,823 people worked in glassmaking. The number of persons active in the glass industry grew fundamentally during the first decade, reaching as many as 54,291 as of 1910.¹¹⁸

The industry's successful development was completely disturbed by the First World War (1914–1918) and the subsequent constitutional changes. Some glassworks reoriented to war production, which enabled them to maintain production at least partially. Despite continuing supply problems, the production was quickly restored in the years after the war. As of 1920, the Czechoslovak Republic registered 106 glassworks, including 77 utility glass, 18 window glass, seven container glass and four cast flat glass production facilities. As many as 50,405 people worked directly in the glass industry in 1921, and altogether 110,877 people were dependent on it. A boom started already in 1920, but further development was hindered by an overproduction crisis in 1923. After it was overcome, growth continued until the early 1930s. Statistics registered 148 glassworks in the Bohemian lands in 1930, but the number is increased by minor composition glasshouses in the Jablonec region (32), which had not been included in the previous overviews. Including home workers, the glassmaking employed 60,887 people. However, that year already saw the first symptoms of the global economic crisis that broke out fully in 1931–1933. Glass exports dropped dramatically, by more than a half, and the whole industry stagnated until 1937; then the production enlivened for a short time, before another recession in 1938–1939 caused by political events, the separation of the border regions and the subsequent outbreak of the Second World War. The economic crisis brought about the demise of many companies and export houses, especially small and medium-sized, but also of several large stable businesses. Unemployment grew considerably.

118 KIRSCH 2003a, pp. 33–42.

Glassworks and finishing works that remained in operation mostly functioned in a limited and reduced regime. The production of refined utility and decorative glass dropped considerably above all, as the assortment focused more on cheaper types. The Jablonec and the Bor – Šenov areas were affected the most by this trend.¹¹⁹ The outbreak of the Second World War and the division of the land between the border regions, annexed by the German Empire, and the so-called Protectorate of Bohemia and Moravia hit hard not only the glass industry. Glassworks had great problems with fuel supplies. The production was gradually reduced and many companies ceased to exist definitively. Only 93 glassworks operated in the Czechoslovak Republic in 1938, due to the consequences of the economic crisis, and only 76 of them are listed at the end of the war.¹²⁰

CONTINUING WAVE OF NEW GLASSWORKS FOUNDATION IN BOR – ŠENOV AREA IN 1900–1925 AND DEVELOPMENT IN GLASS FINISHING

Nine more glassworks were founded in the Bor – Šenov area by 1925, as documented by the following list enumerating the date of foundation, locality, name and important owners.¹²¹

1900 – Kytlice, Rudolfhütte, Rudolf Wenzel, Gustav A. Loschek (before 1914).

1900 – Polevsko, Annahütte, Franz Ladisch, Julius a Rudolf Handschke, Karl Mühlbauer.

1905 – Kamenický Šenov, Jílek & Vetter, Bratři Jílkové (Brüder Jílek – 1914).

1907 – Polevsko, Klarahütte, Karl Mühlbauer.

1907/1908 – Prácheň, Štěpán Hrdina.

1909/1910 – Nový Bor, Fachschulhütte (Školní hut').

1910 – Dolní Prysok, Karlshütte, J. Fickl & Co.

1912/1913 – Nový Bor, Florahütte, Franz Ladisch, Glashüttenwerke W. Hantich & Co. (1935)

1925 – Kamenický Šenov, Franz Vetter.

Altogether nineteen glassworks operated in the region. As we can see from the list, most of them came into existence in the first decade of the 20th century, following previous founding waves in 1872–1874, 1885–1886 and 1893. Their operation was not concurrent, however, due to shutdowns, interruptions and, in some cases, definitive termination. The first glasshouse to definitively end production in 1911, following previous interruptions, was Augustahütte in Falknov, which had used an obsolete system of direct heating of the furnaces with brown coal. Rather surprisingly, the same method of heating was still used for two new smaller glasshouses in Polevsko (Anna and Klára) in the early 20th century. Other glassworks used producer gas furnaces of the modern Siemens-Siebert type, a system that replaced direct heating in other operations during the 1920s.¹²²

In the early 20th century (1902), the statistics show 1,031 primary production employees in the Bor – Šenov area, along with altogether 617 finishing works with 3,550 employees and 2,901 home workers, which comprised a total of 7,482 people working in the glass industry.¹²³ Another source from the same period lists 327 businesses in the territory of the Nový Bor judicial district alone, with 2,747 employees and 1,664 home workers, altogether 4,411 people. As the district had 21,940 inhabitants according to the 1900 census, more than 20 % of them worked in glassmaking.¹²⁴ A list of glassworks of the Liberec Chamber of Commerce and Trade presenting data from 1904–1908

119 Ibid., pp. 52–65.

120 Ibid., pp. 66–69.

121 GELNAR 1996, pp. 52–57. HAIS – RIMPLER – HAUDUM 2015, pp. 20–25.

122 HAIS 1982, pp. 130–132. HAIS 2021, pp. 8–14.

123 It was 15.98 % of all workers in this branch in the Bohemian lands, see KIRSCH 2003, p. 41.

124 HANTSCHERL 1911, pp. 249–267.



Headed paper of the Elias Palme company from Kamenický Šenov from 1921. SOKA Děčín, OÚ Děčín, Inv. No. 1836, sign. 11 43/218.

includes fifteen glasshouses in the Bor – Šenov area. The Augusta glasshouse in Falknov was not registered; probably, it was coming to an end already at that time. The glassworks operated 21 melting furnaces with 176 pots. Only the Tereza glassworks in Svor had three furnaces; the glassworks in Bor (Helena), Rybníště, Skalice and Kamenický Šenov (Adolf Rückl) had two, while the remaining glasshouses were equipped with a single furnace. A steam engine was only used in Horní Chříbská and Rybníště. Other glassworks were equipped with electric motors (Bratři Jílkové in Kamenický Šenov, Helena in Bor, Rybníště), a petrol engine (Svor) or an unspecified type of engine (Adolf Rückl in Kamenický Šenov, and Clemens Rasch in Nový Oldřichov). Cracking-off or grinding engines are also listed for the mentioned companies. The glassworks Theresienhütte in Hillův Mlýn and Rudolphütte in Kytlice were equipped with water-driven grinding mills. Characteristically, the highest tax revenues are recorded precisely from better-equipped companies. The statistics show clearly that like in the previous period, they were mostly smaller glasshouses focused above all on the production of semi-products for local finishing works. The number of furnaces, steam engines and other installations remains relatively modest especially compared to large industrial glass plants in the Teplice area; manual work remained substantial here.¹²⁵

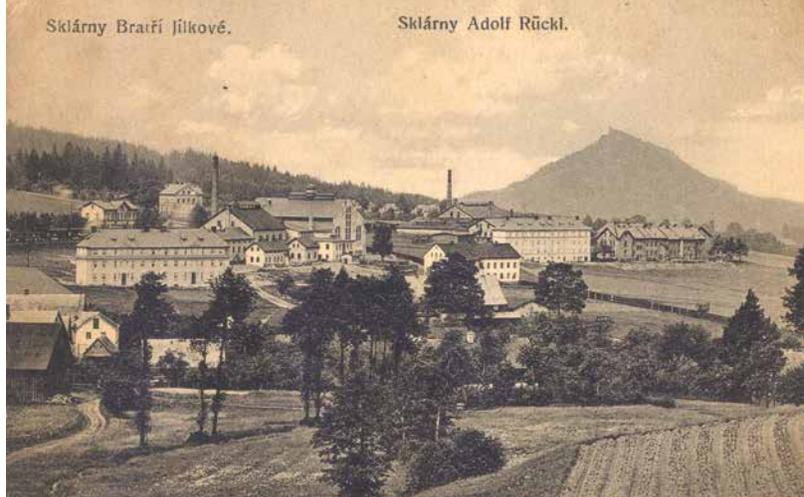
The situation at the beginning of the economic crisis is documented by data from 1930. Seventeen local glassworks employed 2,231 people. All companies together used a relatively low number of engines with a total power of 285.3 kW. At that time, 1,526 companies or businesses dealing with glass finishing were registered in the core of the Bor – Šenov area, the judicial districts of Nový Bor, Cvikov, Česká Kamenice and Varnsdorf. Of this number, there were 1,220 home businesses and 326 plants (another source says 306). They employed 2,213 home workers and 3,466 employees in the plants, altogether 5,679 people. Besides them, 49 persons are also listed in the judicial district of Benešov nad Ploučnicí, 55 in the neighbouring Česká Lípa judicial district (especially Volfartice), five glass jewellery plants with 297 employees in the Varnsdorf district and one such plant with 126 workers in the Česká Kamenice district.¹²⁶

The exports of glass from the Bor – Šenov area are estimated to have decreased to 38 % of the original pre-crisis level between 1929 and 1935 (from CSK 210 mln to CSK 80 mln); the slump was deepest in 1932 (CSK 60 mln, 28.57 %). As the sales in the domestic, internal market amounted to

125 GRISA 2017, pp. 165–188. KIRSCH 2003a, p. 54. *Adressbuch der Glas- und Keram-Industrie der Tschechoslowakei 1926. Adressbuch der Tschechoslowakischen Glas-Industrie 1928/29. Adressbuch der Glas-Industrie 1929.*

126 GRISA 2012, pp. 133–134, 139–140.

Kamenický Šenov, view from the east of both glassworks (Adolf Rückl, Bratři Jílkové) in the lower part of the town. The glassworks buildings are surrounded by worker houses. A postcard from c. 1930. Stanislav Kopecký's collection.



Prácheň, view of the eastern part of the village with the Štěpán Hrdina glassworks. Between the world wars, houses of a villa character were added to older, often log buildings. A postcard from c. 1930. Petr Joza's collection.



Rousínov, northwestern edge of the village with the so-called Czech Quarter consisting of small masonry houses of Czech grinders. A postcard from c. 1930. Tomáš Novák's collection.



approximately 5–10 % of the exports, the overall production dropped considerably. This unavoidably led to a considerable restriction of production, an increase in unemployment and gradually also to the dissolution of many companies. The lack of contracts and a reduction of production were visible already in the first half of 1930 in many glassworks (e.g. Adolf Rückl and Franz Vetter in Kamenický Šenov, Anton Rückl in Skalice). However, most glassworks did not avoid the complete stoppage of production and the dismissal of all employees between 1931 and 1934 (e.g. Clemens Rach in Nový Oldřichov, both glassworks in Polevsko, Helena in Bor, the glassworks in Rybniště and Dolní Prysk). The number of finishing works decreased by 29 % during the crisis years; of 336 companies, 88 ceased to exist. The bankruptcies were speeded up also by fiercer competition. This is why cartels started to be formed from 1934, setting binding volumes of production, unified prices and working conditions. In the Bor – Šenov area, a glassworks cartel (Nordböhmisches Hohlglas-Kartell) was formed on 15 March 1935 by ten of the thirteen glasshouses that survived the crisis years. The Klára glassworks in Polevsko, operated by the glassmaking cooperative Rudihuť, worked completely outside the cartel.¹²⁷ The glassworks in Svor and Dolní Prysk were organized within the framework of their owners from the Jablonec glassmaking area. The situation was unclear concerning the glasshouse in Rybniště, which was repeatedly out of operation. The glassworks Theresienhütte in Hillův Mlýn (c. 1930) and Fachschulhütte in Bor (1934) ceased to exist definitively during the crisis, while Helenenhütte in Bor and the glasshouse in Rybniště closed temporarily, resumed operation in the following years and ended definitively in 1942 and 1944. The Anna glassworks in Polevsko ceased to exist in 1943. The operations of local glassworks were reduced during the Second World War, and some of them went over to war production. The separation of the border regions in 1938 was followed by shutdowns caused by the departure of the Czech personnel to the interior. In contrast to finishing works, Czech employees dominated in glasshouses. After the end of the Second World War, the operations were resumed only in twelve glassworks.¹²⁸

AFTER 1945

The crucial acts for the development after the end of the Second World War, not only in the glass industry, were the nationalization of a large part of companies based on the president's decree of 19 May 1945 and the expulsion of the inhabitants of German nationality, which resulted in a lack of employees and especially expert personnel. The Industry Ministry established the General Directorate of Czechoslovak Glassmaking Plants (Generální ředitelství Československých závodů sklářských) and sixteen national companies in which the original companies were incorporated based on the respective branches of industry. Joint national administrations were established for smaller finishing works. The development after February 1948 was marked by the liquidation of the remnants of private enterprise, cooperatives and professional glassmaking, the preference for heavy industry, a fundamental reduction of the production of utility glass and jewellery in Jablonec, the nationalization and limiting of glass exports and reorientation to the needs of the domestic market. Politically motivated changes were reflected in a reorganization of the branch, within which the existing 23 national companies were cancelled and 41 new national companies formed in 1950.¹²⁹

All twelve reopened glassworks in the Bor – Šenov area were also nationalized; from 1946, most of them were included in the Prácheň-based national company Borské sklárny. From 1948, more finishing companies were incorporated in the national company Borokrystal Nový Bor and from

127 Ibid.

128 H AIS 1982, pp. 134–170.

129 KIRSCH 2003a, pp. 73–78.

1949 in the national company Umělecké sklo Nový Bor. Smaller and medium-sized finishing works were merged under Společná národní správa borských rafinerií in Nový Bor and Společná národní správa Kamenicko-šenovských rafinerií in Kamenický Šenov; 292 home workshops with 700–800 workers were also incorporated in these organizations, including 129 glass painters, 73 cutting lathe operators, 54 engravers, 29 grinders and edge grinders, 6 stopper makers and one etcher. Constant and repeated reorganizations of industrial branches were a typical feature of the time after 1948. The names of the national companies changed, as did their structure, orientation and the incorporation of the individual plants. As of 1 January 1953, all three above-mentioned companies were merged into the national company Borské sklo, which was transformed into the national company Užitékové sklo Nový Bor as of 1 January 1972 and the national company Crystalex Nový Bor as of 1 January 1974. The glassworks in Horní Chříbská, Flora-Hantich in Nový Bor, Bratři Jílkové in Kamenický Šenov, Štěpán Hrdina in Prácheň and Klára (Rudihut) in Polevsko were incorporated in the national company Borské sklo. The national company Spojené jablonecké sklárny (later Jablonecké sklárny), focused on the production of glass jewellery, was also formed in 1946. In it, the glassworks in Dolní Prysk and Nový Oldřichov were included from the Bor – Šenov area. Another national company, Severočeské sklárny (later Sklotas), formed in 1951, including the glassworks in Svor, Skalice and Adolf Rückl in Kamenický Šenov, focused on the production of optical glass and semi-optical glass. Franz Vetter glassworks in Kamenický Šenov went under the national company Lustry in 1958 and was liquidated in 1972 in connection with the launch of a new national company. Falknov-based Rudolfschütte also ceased to exist after a brief episode in 1945–1948.¹³⁰

The nationalized chandelier factories in and around Kamenický Šenov and Nový Bor were also merged in 1946; some of the companies, which were deemed unneeded, were liquidated in 1948–1949. This process led to the formation of the national company Spojené továrny na lustry (later Lustry).¹³¹ A fundamental technical change in primary glass production was the gradual replacement of producer gas by long-distance gas furnace heating. This transformation was first implemented in 1945–1946 in the glassworks in Horní Chříbská, Nový Bor (Flora) and Prácheň. Only some furnaces were connected to lighting gas at first in some glassworks. The implementation of gas heating in primary glass production was completed in Flora glassworks in Nový Bor in 1965 and in Franz Vetter glassworks in Kamenický Šenov in 1967. Long-distance gas was replaced by natural gas in the early 1990s.¹³²

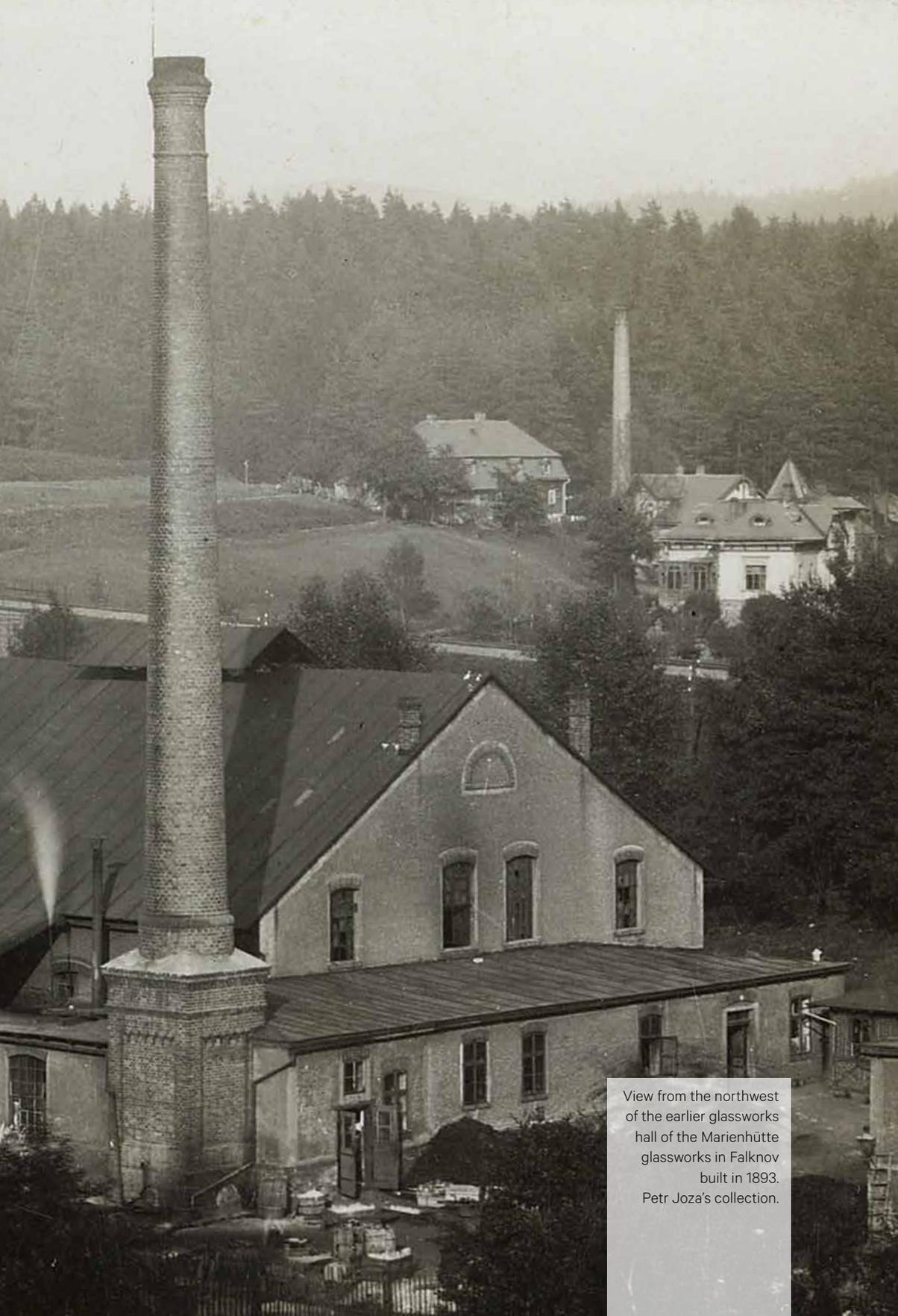
The condition of the glass industry generally was considerably delayed. Compared to other industrial branches, the investments in glassmaking were minimal. Limited modernizations failed to ensure enough semi-finished products for the finishing plants in operation. The situation only changed during the 1960s (after 1961), when many investments were made as well. To strengthen the production base, the decision was made to build large glassmaking combined plants. The preparation of the national company Borské sklo kombinát in Nový Bor (later national company Crystalex) began in 1964. The construction started in 1965, and the factory was put into operation in the autumn of 1967. The core of the combined plant in Kamenický Šenov (national company Lustry) was built in 1966–1971. The construction of combined plants is also connected with the introduction of tank furnaces with continuous electric glass melting, which had been tried before in the adapted Klára (Rudihut) glassworks in Polevsko. Fully-electric melting tanks for automatic utility glass production (LINKUŽ) followed in 1971. Automatic lines for mass production of beverage glass, grinding machines and other subsequent equipment were introduced in Crystalex Nový Bor.¹³³

130 RASOCHA 1989, pp. 9–79. HAIS 1982, pp. 135–137. KIRSCH 2003a, pp. 80–87.

131 ZÍKA 1966, pp. 16–17.

132 HAIS 1982, pp. 135–137. KIRSCH 2003a, pp. 347–357.

133 HAIS 1982, pp. 137–139. KIRSCH 2003a, pp. 86–87. For the construction of both glassmaking combined plants, see RASOCHA 1989, pp. 87–95, 100–105. FREIWILLIG 2019, pp. 261–270. FREIWILLIG 2021, pp. 68–95.



View from the northwest of the earlier glassworks hall of the Marienhütte glassworks in Falknov built in 1893. Petr Joza's collection.

TECHNICAL AND BUILDING DEVELOPMENT

GLASSMAKING TECHNOLOGY

The process of glass production is a chain of consecutive work operations. Already the first step is crucial – gathering enough quality materials, and the knowledge of their processing and use. The types of input materials changed over time and according to the type of glass produced. The basic composition of the glass mixture consisted in the earliest period of glass-forming materials (quartz, quartz sand), sodium materials, potassic materials – fluxing agents (wood ash, potash, nitre) and limestone as a stabilizer. Further materials were used for glass refining (arsenic), colouring and decolouration by manganese, cobalt and iron oxides. In the beginnings, in the Middle Ages and the Early Modern Period, glassmakers procured the necessary material themselves. This is why the earliest glassworks were situated in localities with a source of quartz, possibly limestone and wood needed for heating the furnaces and producing ash or potash. As the quality of the materials became increasingly important from the Early Modern Period, glassmakers started to buy them from suppliers. Special types of buildings, such as stamp batteries or potash works (*flusárna*) were used to prepare the materials. The next steps take place already in the glassworks themselves. The glass mixture, which results from mixing the materials in the needed ratios according to the type of glass and recipe, is melted down in melting furnaces, creating molten glass. Pots of quality refractory clays have been used for melting from the beginnings to these days. Glass melts at temperatures of c. 1,300–1,400 °C. However, as only temperatures around 1,200 °C were achieved in the Middle Ages and the Early Modern Period, molten glass was only achieved thanks to an increased addition of fluxing agents and longer melting time or by multiple-stage melting. The molten glass mass is collected from the pots by blowpipes and the requested objects are made by blowing, pressing or other techniques. Forms or various working techniques are used for shaping. Since glass is fragile and prone to cracking when exposed to great changes in temperature, the products need to be cooled in a controlled manner to a temperature below 100 °C in cooling furnaces. Glass products (semi-products) can also be refined or decorated in various ways. The term glass finishing is used for this process, which also took place in specialized buildings (glass finishing works, grinding mills, painting works, etc.). The transport of fuels, materials, semi-products for further processing and finished products played an increasing part in the course of the centuries and especially from the second half of the 19th century.

GLASSMAKING MATERIALS

In the earliest period (13th–17th centuries), materials for the glass mixture were presumably mined directly in the neighbourhood of glassworks. In particular, they include quartz or quartz sand, limestone, clay for the production of pots, the construction and repairs of furnaces, and possibly hard sandstone to produce grinding wheels, grates and other elements. A crucial commodity, which was needed in sufficient quantity, was wood for the heating of glass furnaces and the production of ash and subsequently potash. The availability of these materials was important when choosing locations for glassworks. The Lusatian Mountains represented a suitable locality from the perspective of the above-mentioned geological characteristic, providing all the needed materials. The earliest glassworks are markedly concentrated along the Lusatian Fault, which certainly offered the most advantageous conditions for procuring quality materials.¹ Regrettably, this presumption has not been unambiguously documented by material analyses or, from the later periods, by archival data yet. Very scarce mentions of stamp batteries in 16–18th-century sources indicate that quartz was not the only material used and crushed for the glass mixture in the Lusatian Mountains; more probably, the widespread, easily accessible and mineable quartz sandstone prevailed.² In the absence of written sources, quartz mining is often difficult to determine in the terrain, as its mining places apparently overlap with iron ore mining places in many cases.³ Slope cuts, surface mining places of north-south direction in barren quartz veins and high quantities of crushed quartz in heaps near mining works in the valley of the Milířky Stream in the cadastral area of Dolní Podluží are linked to quartz mining for glassworks as early as the 13th century.⁴ Several localities with medieval glassworks are archaeologically documented in the close neighbourhood of the site. No other clearly determined quartz mining areas have been registered yet in the region. If quartz alone was the material in the earlier period, it was probably procured by pebble collection from streams or in the fields.⁵

The collected or mined quartz was processed in furnaces called *kýzovna* (from the German term *Kiesofen*). Pieces of quartz were heated red-hot in the furnace and then raked out into a vessel with cold water so that they cracked. Thus worked material was manually picked over and sorted. Above all, it was necessary to remove red ferruginous parts. The sorted material was further worked in stamp batteries, an ordinary type of water-driven mechanical installations used to crush various materials. Via a cog wheel, the energy of a waterwheel raised bar or hammer stamps. The bar version predominated in stamp batteries used for quartz crushing (*Pochwerke*, *Pochhütte* in German), consisting of a beam frame in which were fixed vertical bars with metal tips that fit into a trough (*štok*) in the floor. Stamp batteries were commonly used also to crush waste raw glass that was reused as an admixture into the glass mixture and to pulverize waste fireclay for the production of glass pots (clay crushers). Quartz crushed into soft sand in the stamp batteries was then sifted using various types of sieves.⁶

1 GELNAR 1996, pp. 37–74. GELNAR 1997a, pp. 41–60. GELNAR 2000a, pp. 103–117.

2 KOLKA 2012, p. 37.

3 On links between iron ore and quartz mining, see ČERNÁ 2016, p. 208.

4 BRZÁK – FABIÁNEK – HAVRÁNEK 2007, p. 32. A locality on the left bank of the stream, near a quarry and the Berghaus gallery, is described as a quartz quarry on an educational trail in the Milířka valley.

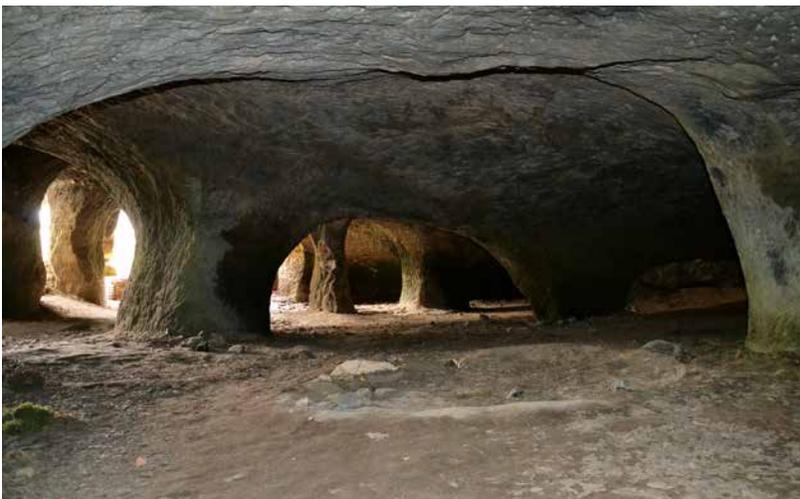
5 GELNAR 1996, p. 39. GELNAR 2010a, p. 15 and GELNAR 2000b, pp. 63–69.

6 DRAHOTOVÁ et al. 2005, pp. 379–381. HAIS 2017b, pp. 52–53.

Svitava, underground glass sand mine (so-called Pusté kostely) for nearby mirror grinding mills (No. 309 and 311, 308, Lindava), view from the road. Photo: author, 2020.



Svitava, underground glass sand mine (so-called Pusté kostely). Rock pillars were left in the space to ensure the stability of the massif. Photo: author, 2020.



Mining of glass sand for glassworks and in the Bor – Šenov area above all for the needs of local grinding mills, including mirror grinding mills, is securely documented in the broader Česká Lípa region in the later period (18–20th centuries). Sand was cheaper than quartz, and so was its processing. The mined sand was floated and separated into various sorts. In some cases, it was also annealed and sifted.⁷ These procedures are also known from the preparation of materials for the production of enamels. Quartz, flint or quartz sand, worked by the method described above, were used for them. Annealed semolina-sized material cracked in water was repeatedly ground in quartzite bowls, washed in water and burnt until a fine mixture was achieved.⁸ Direct mining for glassworks is apparently documented close to so-called Deserted Ponds (Wüste Teich) between Hradčany and Břehyně near Doksy in the late 18th century and the first half of the 19th century. Local sand was used by the nearby glassworks in Strážov and, long after its demise, also by Nová Huť near Svor. Both glassworks were held by the Kittel family.⁹

7 Ibid.

8 TOMÁNEK 1989b, pp. 180–182.

9 WURM 1887, p. 51.

Sand was either surface mined in sand pits (*Sandgrube* in German) or deep mined. Of course, the extent and method of mining were limited by the quality of the sand, its suitability for use and the affluence of the owner of the mining rights. Mining very often took place in the immediate vicinity of the operations in question (glassworks or grinding mill); this is also true of sandstone blocks, which were in many cases quarried directly on the building plot of the respective facility. The typical procedure in deep mining was to open the mining area in a rock wall through a more or less regular portal, mine soft sandstone into a certain depth and hew out rock pillars that ensured the stability of rock spaces. Where the quality of the deposit was good, the mining continued deeper, forming complex labyrinths of corridors and hall spaces monumentally structured by rock pillars. Both sand and building stone (blocks, so-called *štuky*) were mined in some localities; sand mining probably followed only after more quality layers of sandstone had been mined out for blocks.¹⁰ Surface mining in sand pits presumably took place in many places, but these features are difficult to localize in the terrain, and their function cannot always be precisely determined. Deep mines of the type described above are better preserved. In both cases, however, in the absence of archival sources, it is difficult to distinguish between glass and building sand mining. Glass sand mines are documented throughout the studied area in Upper Cretaceous sandstones of both Jizera and Březno Formations. Their locations are concentrated in areas with the occurrence of glass and mirror grinding mills, i.e. especially near Nový Bor, Sloup, Lindava, Dolní Prysk and Kamenický Šenov.¹¹ The use of glass sand in glassworks only started to predominate in the second half of the 19th century in connection with the discovery of quality natural sand deposits mainly in Upper Lusatia. Sand from the Hohenbock deposit was most often used also by Bohemian glassworks. Provodín near Jestřebí, Česká Lípa region, became another source of glass sand. The company Nordböh-mische Kristall-Quarzsand Werke, Wilh. Schulz started to mine there in 1908. A preparation plant, including sand floating, was built two years later. Mining continued in the locality until it was exhausted in 1977 and replaced by a deposit in nearby Srní.¹²

Other necessary materials for a glass mixture are sodium and potassium substances. From the Middle Ages, ash from trees, above all beech, was used as a source of potash. As shown by glassworks master rights, only waste wood could be collected. It was burnt directly in the forest. The tendency to use refined wood ash – called *flus*, potash (*potaš*, *Pottasche*) or *salajka* – grew from the second half of the 16th century. Craftsmen called *flusárník* made it in specialized facilities, pot-ash works (*flusárna*, *potašárna*). The number of potash works considerably increased in the second half of the 18th century due to the high demand for and consumption of potash in glassworks. Well-sifted ash was sprinkled with water and left lying for 24 hours. Infusing took place in vessels with a false bottom covered with straw, brushwood and small boards, with first cold and then hot water poured over. The infusion then evaporated in pots or cauldrons until solidifying completely. Calcination, a process aimed at increasing the purity of potash, started to be used in the 17th century. Calcination furnaces were used for this purpose. Various kinds of potash were produced by repeated soaking, recrystallization and calcination.¹³ Historical and, in some cases, present names of many hills, valleys or forest fields testify to ash burning and potash production for glassworks and other operations. As examples, let us name Popelová hora (Ash Hill, 652 m above sea level) on the boundary of the cadastral areas of Svor and Falknov or the hillock called Popel (Ash, 584 m asl)

10 ADAMOVIČ – MIKULÁŠ – CÍLEK 2010, pp. 212–215.

11 KÜHN 2006, p. 90, 94, 106. PEŠA 2004, pp. 83–122. VAŘILOVÁ et al. 2020, p. 303.

12 KIRSCH 2003a, pp. 243–244. See also Jiří Adamovič's text in the publication KOLEKTIV 2018, p. 23 and note 48.

13 DRAHOTOVÁ et al. 2005, pp. 386–395. WOITSCH 2003. ZUMAN 1936a, pp. 1–11, 84–92, 137–140, 154–165. ZUMAN 1936b, pp. 74–80.



Dolní Prysk, underground glass sand mine (so-called Riedel Cave), view of the front face of the slope with an entrance into the rock space. Photo: author, 2020.

in the Horní Chříbská cadastral area southeast of Krásné Pole. Other materials that were the source of potassium oxide in the glass mixture were nitre/saltpetre, which was used in the Bohemian lands approximately from the last quarter of the 17th century, and cream of tartar.¹⁴

Where, from the Early Modern Period, information is available about the manner of the procurement of materials, they are always supplied by specialized producers outside the studied region. Preserved accounts and other documents from 1687–1690 concerning the Juliovka glassworks testify to the purchase of saltpetre from Prague, cream of tartar and pyrolusite from Schneeberg, Saxony, arsenic from Dresden, nitre and borax from an unknown locality. Other materials are not described in detail; probably, they were procured automatically from near the glasshouse. In a discussion on the instructions for the glassworks, it was stated that it is financially much more advantageous to procure materials including quality lime first-hand (i.e., directly from the producers), rather than through traders from Zittau.¹⁵ Other materials were based on boron (borax, used from the last quarter of the 17th century), lead, manganese, cobalt (blueing – cobaltous silicate), iron oxides and other substances. Arsenic and, to a smaller extent, antimony trioxide were used for glass refinement. Cream of tartar was used as a reducing agent in melting, for instance for the red opaque molten glass haematinon (purpurin, Italian red). From the late 19th century, potash started to be produced in factories, mostly from molasses spent wash or potassium salts. Soda started to be produced industrially at the same time, first using the Leblanc process and later the Solvay process from rock salt.¹⁶

14 DRAHOTOVÁ et al. 2005, pp. 395–397. HAIS 2017b, p. 53.

15 ZUMAN 1936a, pp. 87, 139, 154–165.

16 DRAHOTOVÁ et al. 2005, pp. 397–408. HAIS 2017b, p. 54. KIRSCH 2003a, pp. 246–251.



Kyjov, so-called Doubice lime works, remnants of the masonry of a lime kiln; a railway bringing the raw material led along the embankment on the right. Photo: author, 2021.

The last basic material – limestone – was presumably procured in localities near the Lusatian Fault, where dragged Jurassic limestones were quarried. The most important limestone quarry was the so-called Doubice lime works in Vápenný (Maškův) Hill between Doubice and Krásná Lípa, the cadastral area of Kyjov. According to archival sources, quarrying took place there at least from the first half of the 17th century until 1928; the preserved remnants of the lime kiln, the old and the new quarry, interconnecting galleries and a transport gallery with a railway to the kiln were built in and after 1868. Detailed archival research there only documented the use of lime for the building industry and as fertilizer.¹⁷ More lime quarry areas and kilns are registered in the 17th and 18th centuries also on nearby so-called Peškova Stráž near Hely (Kyjov cadastral area), south of Brtníky, near the Saxon border close to Bílý Stream in the cadastral area of Mikulášovice or on the Saxon side near Hinterhermsdorf (in operation already in the 16th century), where lime was transported for processing and also purchased by manorial lords from the Bohemian side of the border. No supplies for local glassworks are documented for any of these localities, either, but in view of the fragmentary preservation of the archival sources, they cannot be ruled out.¹⁸

In the industrial period, where the data is more precise, glass materials were also supplied by specialized companies. A material of crucial importance was coal, which gradually replaced wood as fuel for the furnaces in the last quarter of the 19th century. Logically, therefore, the numerous new glassworks were concentrated above all in localities connected to the railway network that was being built at that time. As far as specific data is available, coal was supplied from the Most and Sokolov basins, from the Quido, Barbora and Fortuna mines, for example.

17 BELISOVÁ 2008, pp. 21–71. VAŘILOVÁ – ADAMOVIČ – BRZÁK 2008, pp. 94–107.

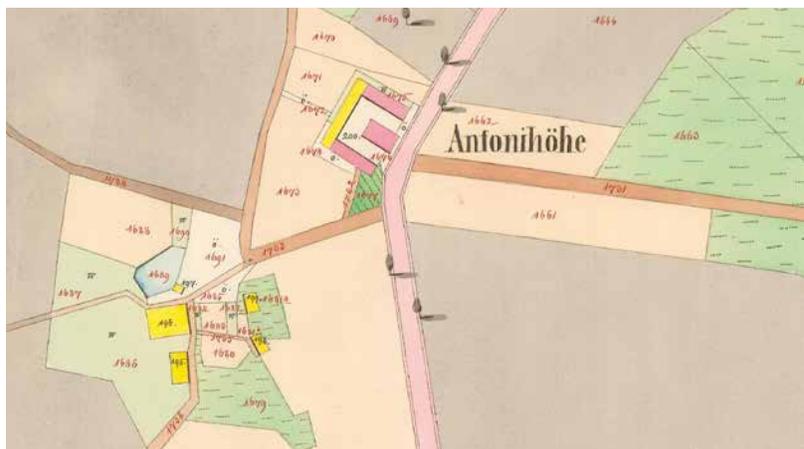
18 LISSEK 2008, pp. 118–126. VAŘILOVÁ et al. 2020, pp. 362–369, 374–389.

BUILDING DEVELOPMENT OF GLASSMAKING STAMP BATTERIES (QUARTZ STAMP BATTERIES, CLAY CRUSHERS)

Mentions of stamp batteries for quartz and other materials are surprisingly very meagre in the Bor – Šenov area; only two are documented. Stamp mills near the glassworks in Juliovka are indicated by a mention of a “quartz miller” in an instruction from 1688 and by the information about establishing “a new millrace along the glasshouse up to the second stream”.¹⁹ This means that the stamp battery must have probably been located on the Svitávka or its tributary, the Krompašský Stream. A mill, later house No. 1, operated in this area as early as the 16th century. Very probably, it worked as a glassworks mill for both the earlier glassworks in Kropach and the later one in Juliovka. The stamp battery might have been part of the mill.

The second place where a stamp battery is documented, the last one so far, is the Nová Huť glassworks in the cadastral area of Svor. A “*Mühlwerk*”, apparently used to crush quartz or other materials, is mentioned at the time of its foundation in 1750. It is also documented by a description of the glassworks estate from 1830, which lists the glassworks including a stamp battery (*stupník*, *Pochhütte*) building. The reports provide no notion about the appearance of either building.²⁰ No written reports, archival photographic documentation or actual remains of buildings in the Bor – Šenov area document later, industrial types of stamp mills, edge mills and other similar installations for crushing materials, which were mostly driven by a steam engine, either.²¹

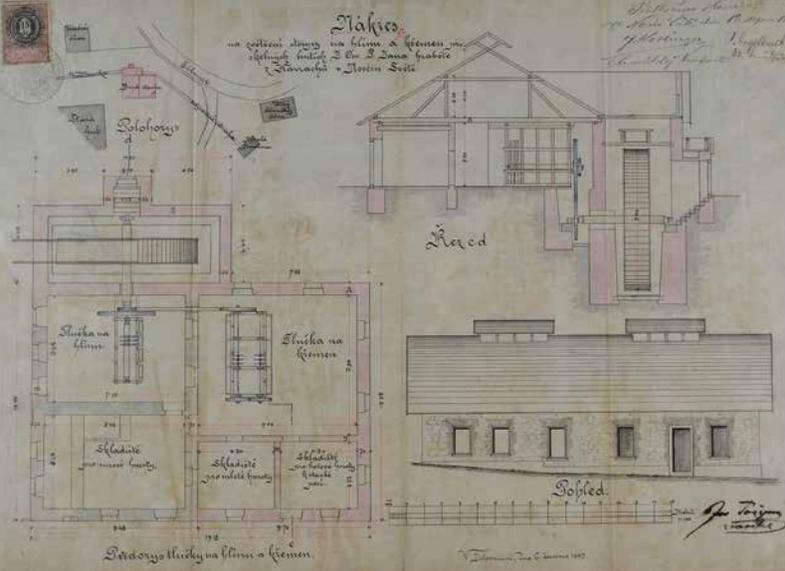
Compulsory imperial imprint of the Stable Cadastre from 1843, cadastral area Svor, with the Nová Huť glassworks premises in the lower left part. Right next to the pond is a minor combustible building (No. 197) of a stamp battery for crushing quartz and other glass materials. Czech Office for Surveying, Mapping and Cadastre.



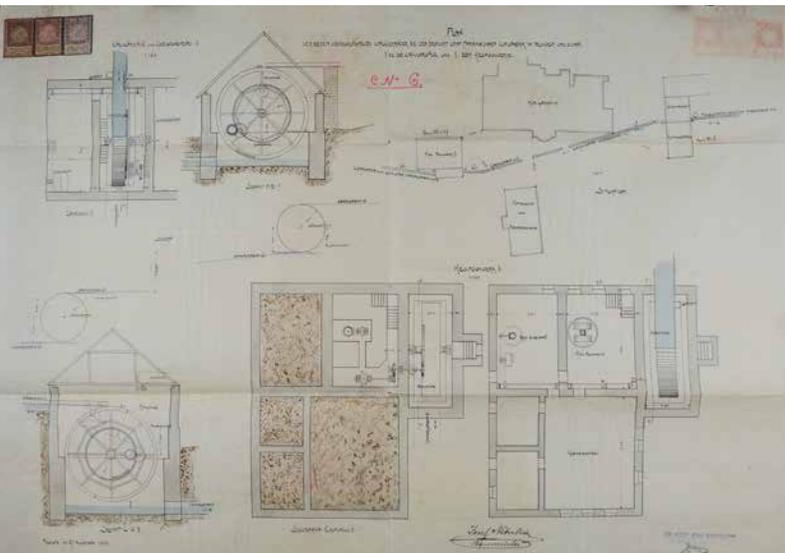
19 ZUMAN 1936a, p. 86. ZUMAN 1936b, pp. 74–80.

20 ZUMAN 1947, pp. 41, 140. In view of the depiction in the Stable Cadastre maps from 1843, it was presumably the most common log building. A “log house in which materials are worked by stamp batteries, driven by water” is also mentioned (before 1677) for a glasshouse near Nový Zámek (Zahrádky) – see ZUMAN 1936a, p. 84.

21 They were probably used to a greater extent above all for large industrial glassworks, e.g. in the Teplice, Duchcov, Plzeň or Sokolov regions, see BROUL – GRISA – SMRČEK 2005, pp. 20–21, 46–47.



Harrachov, Nový Svět glassworks, plan of an extension stamp battery, house No. 87, from 1889. The bar version of the device is still used to crush quartz and clayey materials. SOKA Semily, OÚ Jilemnice, Inv. No. 1518, carton 332.



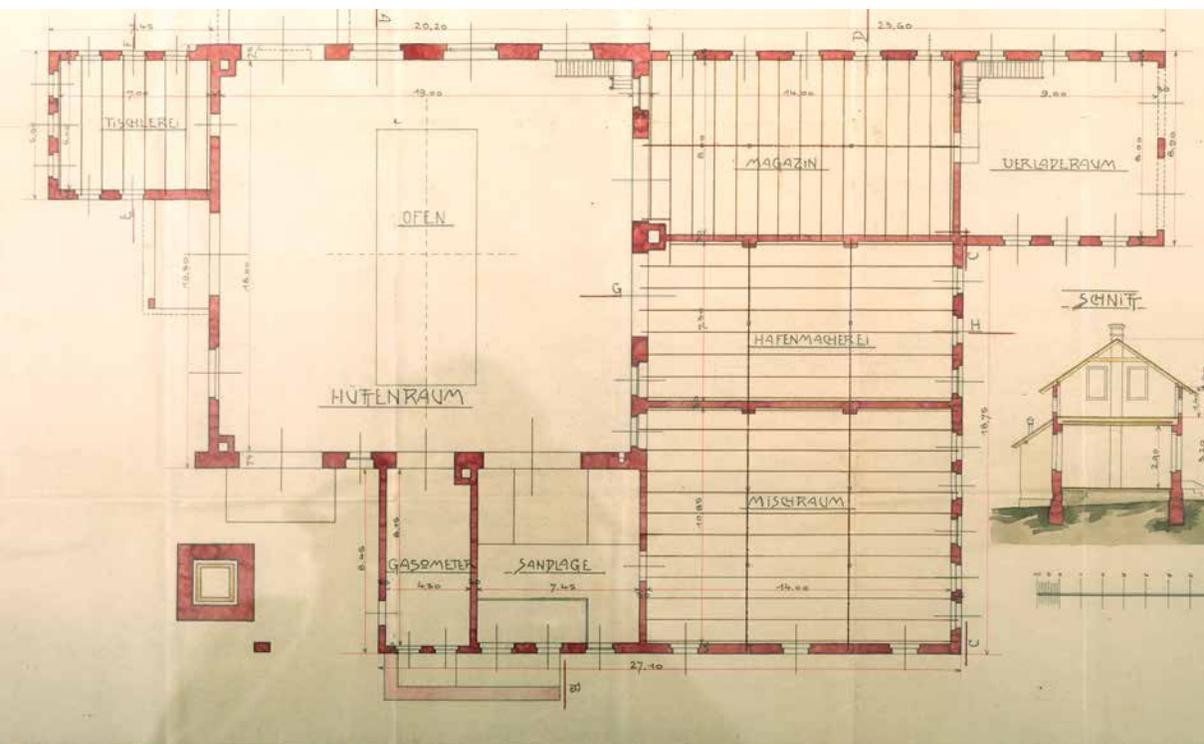
Harrachov, Nový Svět glassworks, plan from 1906. Top: addition of a circular saw to the grinding mill, house No. 6; bottom: reconstruction of the mechanism of the stamp battery, house No. 87, from the bar version to a wheel mill and a sieve, depicting the transmission mechanisms from the waterwheel. SOKA Semily, OÚ Jilemnice, Inv. No. 1518, carton 332.



Harrachov, Nový Svět glassworks, view of the uncovered relics of a stamp battery, house No. 87; a wheel mill on the right, a shaft on the left, and transmission mechanisms leading from the waterwheel chamber (outside the photograph to the left) in the bottom. Photo: Ivan Peřina, 2013.

PRIMARY GLASS PRODUCTION

Buildings called glasshouses or glassworks were used for glass production (melting), and sometimes also for finishing operations. The main process took place in the central part of these complexes, the glassworks hall, which contained the melting furnaces and also some or all of the auxiliary (cooling, tempering, wood drying) furnaces. A wooden platform (*verštat*) was built around the melting furnaces, its elevation making it possible to take away the molten glass from the furnaces and to blow and shape the glass using blowpipes and other tools. A free space opening into the roof structure is typical of glassworks halls. Ventilation extensions (called *rytíř*) rise in the roof ridge, mostly in the form of a frame structure with a small gable roof. The sides are opened, boarded or with slatted adjustable panelling. This element is characteristic of glassworks; also thanks to the higher mass of glassworks halls compared to other buildings, they usually visually dominate the complex. The glassworks hall and melting furnaces had their energy background consisting of gas, water and air distribution systems and, in the later period, above all producers. A factory chimney for waste gas draw-off and producer stations themselves were attached to the glassworks hall from the side from which the operations were supplied with fuel, often via an industrial railway. Auxiliary operations tend to be located either directly in the glassworks hall or, more often, in variously shaped annexes along its circumference. They include above all the mixing chamber, the



Kamenický Šenov, Bratři Jílkové glassworks, house No. 687. The ground plan of the old glassworks from 1905 shows the typical layout with the large glassworks hall with the melting furnace in the centre, the warehouse, shipment area, the pot room and the mixing chamber (*Mischraum*) to the right; the sand storage and the producer station follow at the bottom with the chimney nearby; the only annexe on the left side is the joiner workshop. SOKA Děčín, OÚ Děčín, sign. 11 37-414, carton 318.



Interior of a glassworks with a melting furnace, probably Prácheň, Štěpán Hrdina glassworks. Petr Joza's collection.

pot room (possibly with a separate pot storage), the form works (possibly with a joiner workshop), storages for sand and other materials, storehouses for finished products (possibly with dispatching or sample facilities), cracking-off facilities and often a grinding plant. Despite the production of semi-finished products for goods from Jablonec, drawing area annexes do not occur in the Bor – Šenov area; in glassworks in the Jizera Mountains, they have the form of long corridors for manual drawing of glass canes and tubes.

Glass production itself begins with the preparation of the glass mixture in an area called mixing chamber (*Gemengekammer*, *Gemengehaus*, sometimes also mixing room, *Mischraum*). The mixture, also called batch, resulted from mixing the glass materials described above in the prescribed weight ratios according to recipes for various kinds of glass. Scales were therefore a necessary part of the equipment of mixing chambers. The materials were mixed by the mixing operator (*kmenář*). In the earlier period, he did so manually in a wooden trough, and later (from the early 20th century) using machine rotary mixers. The necessary supplies of glass sand were stored in a separate room. Sand drying rooms equipped with furnaces were used to prepare the material. The homogenized glass mixture was loaded into pots in the melting furnaces by melting shovels. Pots, along with other auxiliary refractory material, were prepared, stored and, in the earlier period, also manually made in the pot room (*Hafenstube*). Before transferring into the melting furnaces, the pots were heated in tempering furnaces (*Hafentemperofen*, *Temperofen*). Glass melting lasted different times, depending on the type of glass and the melting furnace. It is a process in which a batch (the glass mixture and cullet) is transformed into molten glass using chemical reactions and physical processes under set temperatures. The required products were made by scooping molten glass from the pots via work openings in the furnace body, blowing and shaping. Subsequently, they were stored in cooling furnaces, which in the earlier period formed a twin furnace with the main melting furnace; in the later period, they were mostly situated along the perimeter wall of the glassworks hall, often passing through the walls into adjacent annexes. Sand and fuel wood drying furnaces, tempering and cooling furnaces had waste gases drawn off via prismatic chimneys protruding from the roof of the glassworks hall. For halls with a gable roof and masonry gables, the chimneys were often attached to gable walls.²²

22 For a brief and concise description of glass production and the function of the individual parts of the glassworks, see the relevant entries in HAIS 2010, pp. 18–21, 24.

Interior of the mixing chamber with wooden troughs for mixing the glass mixture.
Petr Joza's collection.



Interior of the form works with the production of wooden glass forms.
Petr Joza's collection.



View of a glassworks storage room.
Petr Joza's collection.



GLASS FURNACE DEVELOPMENT

Melting furnaces, possibly in combination with cooling and other auxiliary furnaces, represent the main means of glass production. The localization of these installations is crucial for the correct typological classification of vanished buildings.

So-called Bohemian melting and auxiliary pot furnace

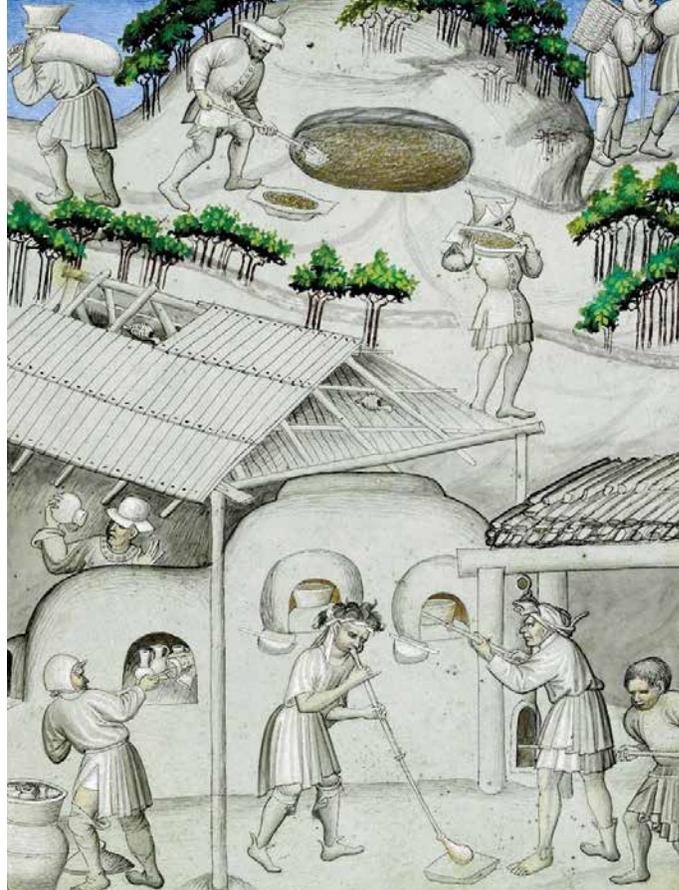
Besides archaeological finds, the crucial sources testifying to the appearance of furnaces in the Middle Ages and the Early Modern Period are the depictions of a glasshouse in the so-called Mandeville manuscript from 1410–1420 and in the work “De re metallica libri XII” by Georgius Agricola from 1556. They represent a type of melting and auxiliary furnace with a lengthwise horizontal, consecutive arrangement. The main melting furnace was heated from a heating area with a heating channel along the longitudinal axis (*šír*). The melting furnace was followed by a universal auxiliary furnace (*vošovna*, from the German term *Aschofen*), which was used to cool glass as well as for the calcination of various glass materials. The auxiliary furnace was heated by waste gas draw-off from the melting part by means of a vent. In the cooling furnaces, glass was deposited in pottery vessels. The furnace structure was built of gathered stone and soil-clay daub, the furnace ring and vault of packed refractory clay, replaced in later centuries by fireclay bricks.²³ The development of glass and the growth of production necessarily led to adaptations of the furnaces. They gradually grew larger and were equipped with more pots; there were six to ten, and most often eight of them. The pots were set on a sandstone slab bench. The ring forming the circumference of the furnace was pierced with work openings that were covered with so-called cakes (*koláč*) during the melting. After the enlargement of the furnaces, a second heating area (*šírloch*) was added under the auxiliary (cooling) furnace; for this reason, its body was moved higher above the melting furnace. The so-called furnace gate, through which the pots were replaced, was situated above the front heating area in the front wall of the ring. Grates of overlapping refractory sandstone newly appeared in the heating channel during the 18th century. Logs were inserted into the heating area obliquely through the front opening. Thus adapted furnaces achieved higher melting temperatures (1 300–1 400 °C) and enabled a more economic use of wood, which was in short supply.²⁴

This adapted type of double melting and auxiliary (cooling) furnace proved very useful; from the 17th until the middle of the 19th centuries, it was one of the most advanced furnaces with direct wood heating in Central Europe. The lack of wood and technological changes in glass production gradually pushed these furnaces out after the middle of the 19th century, but especially in more remote glassworks, they remained in operation until the end of that century. Except for earlier medieval furnace torso finds, no other example of a preserved or archaeologically examined installation is documented in the Bor – Šenov area as yet. Furnaces with direct wood heating were also used in the last two functioning glassworks in Horní Chřibská and Nová Huť. The one in Horní Chřibská ended operation around 1870. The glassworks hall and the whole glassworks complex underwent so many adaptations that nothing can be expected to be preserved even under the terrain. In contrast to that, the terrain in Nová Huť remained intact after its demise in 1875 and the subsequent destruction, including the waste heap and an adjacent water tank, making it an irreplaceable locality of potential extraordinary importance for the research of the appearance of glassworks in the region roughly in the middle of the 19th century, since after that time, the

23 DRAHOTOVÁ et al. 2005, pp. 466–469. HAIS 2013b, pp. 55–56. BROUL 1973, pp. 33–43.

24 DRAHOTOVÁ et al. 2005, pp. 469–476. HAIS 2013b, pp. 57–59. HAIS 2017b, p. 55.

Depiction of a medieval glasshouse from a book of travels by John Mandeville from 1410–1420. The melting furnace is in the centre, followed by the auxiliary (cooling) furnace on the left. The furnaces are covered by a simple shelter. The preparation of the materials is depicted in the upper part. Downloaded from https://cs.wikipedia.org/wiki/John_Mandeville.



adaptations were apparently minimal. The Jizera Mountains area is in a better situation, as the glassworks in Bedřichov²⁵ and Karlova hut²⁶ have been archaeologically examined, and the relicts of the glassworks in Kristiánov and na Jizerka (earlier glasshouse), both with typical drawing areas, have a great potential. Research of glassworks halls and partially furnaces has taken place also in the Schürer glasshouse in Broumy, Křivoklát region²⁷ and in glassworks in the Bohemian Forest (Šumava), the Upper Palatinate Forest (Český les), the Gratzen Mountains (Novohradské hory).²⁸

Coal heating of glass furnaces was gradually introduced in England and Ireland already from the 17th century. Possibilities of transition to heating by stone (black) coal, brown coal or peat were sought also in the Bohemian lands in the second half of the 18th century. The first attempts following models from England, Ireland and the Netherlands took place in the Hořovice glassworks in 1760–1770. Direct coal heating was employed more significantly in new glassworks in Trněný Újezd near Zákolany (1802) and Otovice (1805) in the Kladno basin.²⁹ The earliest examples in northern Bohemia include a briefly operating glasshouse in Bechlejovice near Děčín (1804), which had

25 STARÁ 2011, pp. 155–166.

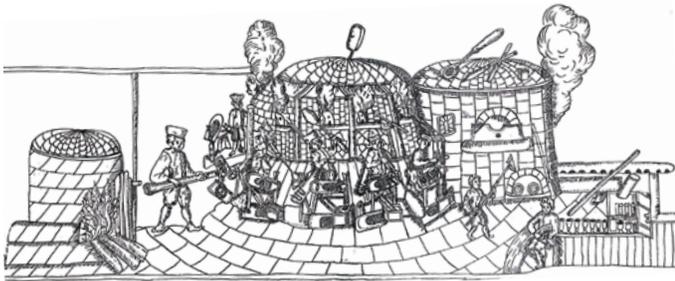
26 KAVÁN 1982, pp. 19–72.

27 ŽEGKLITZ 2011, pp. 167–212.

28 FRÖHLICH 2020, pp. 151–159. Much valuable knowledge is brought also by non-destructive research methods, see ČÁNI 2018, pp. 340–348. ČÁNI – MILITKÁ 2016, pp. 12–19. ČÁNI – PAŘEZ 2017, pp. 3–17.

29 ČÁNI – TICHÁ – VOLFOVÁ 2021, pp. 331–332, 334, 340.

a smaller coal deposit at its disposal. For a longer time, direct coal heating asserted itself only in the glassworks in Otovice, Radnice and Vranovice. Coal only became a glassworks fuel fully and permanently in the 1850s in Adamovo údolí near Duchcov (1852), Verneřice (Hrob) near Teplice (1854), Dolní Rychnov, Ovčárna and Leopoldovy Hamry in Sokolov region, Vranovice near Radnice in Plzeň region, Košťany in Teplice region, Markoušovice in Žaclěř region and Čejč near Hodonín. The construction of railways also played its part, as it enabled faster and cheaper transport of the fuel to the glassworks. The change of fuel influenced the design of the furnaces by the use of iron grates in the heating area and by the construction of high channels used to bring air below the grates and remove ash and cinder. Direct coal heating was problematic above all due to the release of sulphur oxides, which caused undesirable colouring of molten glass, and ash flying from the heating area, which polluted molten glass during its melting and working. Coal heating was applied in the Bor – Šenov area rather archaically only in the 1870s at the glassworks Theresienhütte in Svor (1872) and Augustahütte in Falknov (1873) and as late as the early 20th century at Annahütte (1900) and Klarahütte (1907) in Polevsko. Despite considerable problems, Klarahütte retained direct coal heating until 1925.³⁰



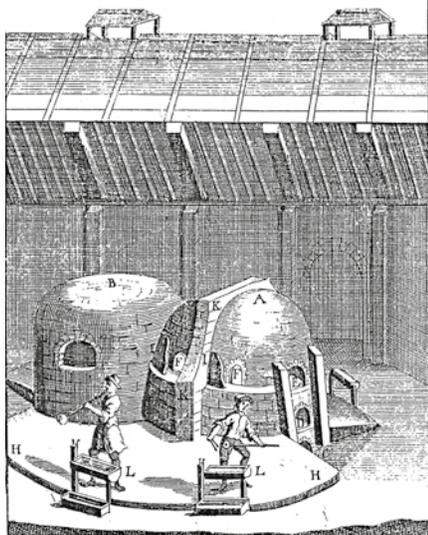
Depiction of glass furnaces in the Weissbach J. Christoph Preussler glassworks on a cup from 1727; the melting furnace in the middle, followed by the cooling furnace, the auxiliary furnace is situated to the left of them. Taken over from Hais 2022.



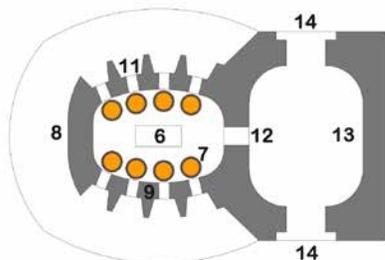
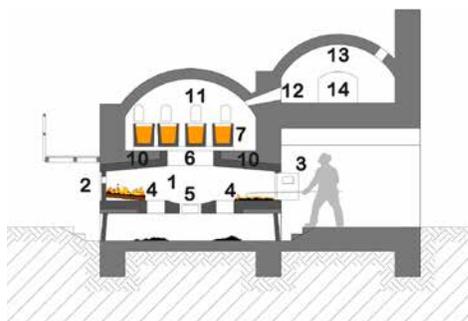
Model of a Bohemian glass furnace from the Preitenstein glassworks near Nečtiny, F. Rückl, c. 1850, exposition of the Glass Museum Kamenický Šenov. Photo: author, 2022.

30 DRAHOTOVÁ et al. 2005, pp. 477–479. SACHER 1966, p. 52. GRISA 1982, pp. 113–122.

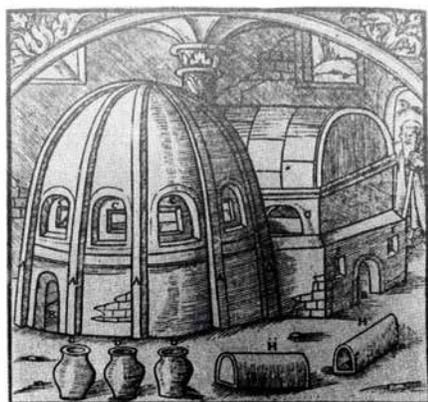
Fig.E.



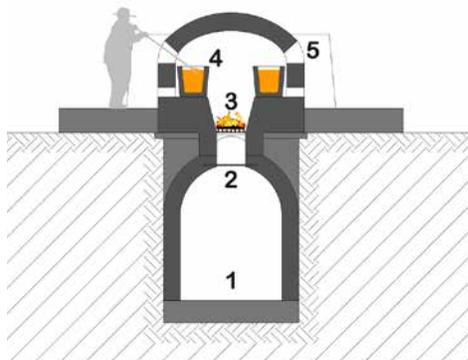
17 German furnace in a depiction from *Ars Vitraria Experimentalis* by Johann Kunckel, 1756 edition. The melting furnace (A) to the right, the cooling furnace (B) to the left. Taken over from Hais 2022.



Bohemian glass furnace with direct coal heating after Leng (1835). Scheme: Radek Mišánek after Hais 2022. Legend: 1 – heating channel, 2 – front heating area (*širloch*), 3 – rear heating area (*šir*), 4 – grates, 5 – grate adaptation for hearth glass drainage, 6 – hearth burner, 7 – pots, 8 – furnace gate, 9 – ring, 10 – bench (*bank*), 11 – work (loading) openings, 12 – vent (*vandloch*), 13 – cooling furnace (*vošovna*), 14 – loading openings.



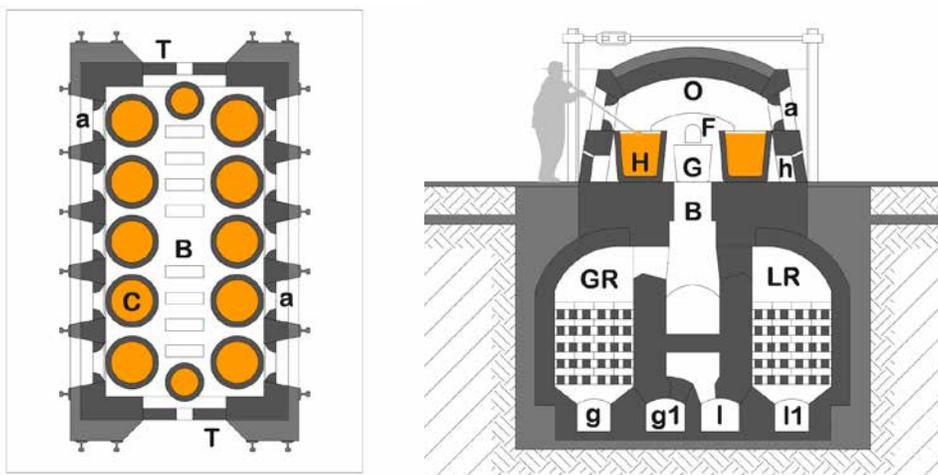
Venetian type of melting furnace with an attached cooling furnace after Georgius Agricola, 1556. Taken over from Broul 1973.



Scheme of a glass furnace with direct coal heating. Scheme: Radek Mišánek after Hais 2022. Legend: 1 – air intake and ash removal tunnel, 2 – grate, 3 – heating area, 4 – pots, 5 – work (loading) openings.

Siemens regenerative furnace

In 1856, Friedrich Siemens had the invention of a regenerative system utilizing waste gases to heat combustion air in industrial melting furnaces patented in England and Austria-Hungary. Two years later, the system was improved by an arrangement in four regenerative chambers under the furnace area and indirect heating by gasification of the fuel in producers. Wood or coal was gasified in producers. The furnaces had a rectangular shape and slot hearth burners. The regenerative system achieved 30–50 % fuel savings compared to other types of furnaces that did not use waste gas heat. It was the mass use of this furnace system that brought about the industrial revolution in glassmaking. Previous literature says that the first regenerative pot furnaces with wood gasification producers were used in the Riedel glassworks in the Jizera Mountains in Kořenov (1867), Jizerka (1868) and Polubný (1869). The J. D. Starck glassworks were progressive above all in this respect; they had used gasification producers before and introduced regenerative furnaces apparently at the same time. In 1868, the same device was installed by Welz glassworks in Hroby near Košťany, Teplice region. Many other companies followed in the late 1860s and early 1870s. As the changes faced technical problems, however, some glassworks temporarily returned to direct furnace heating until the process was fine-tuned.³¹ The first Siemens regenerative furnace in the Bor – Šenov area was installed at Helenenhütte glassworks in Nový Bor in 1874.

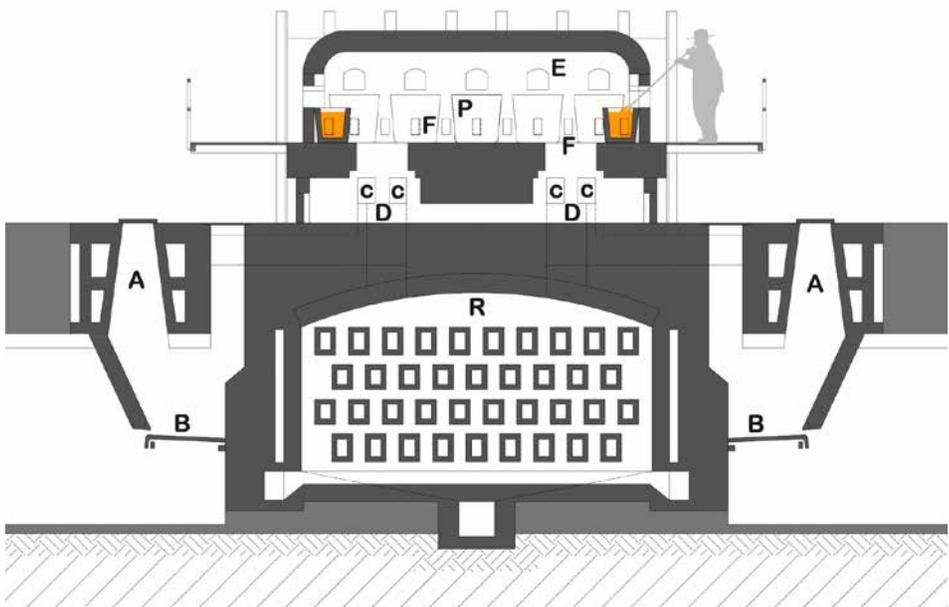


Regenerative glass melting furnace of the Siemens type heated by producer gas; bottom: ground plan; top: cross-section. Legend to the cross-section: a – gathering openings, B – hearth burners with the glass sink, F – gathering opening near the small pot, G – small pot (*saclick*), H – pots, h – pot manipulation openings (*žárník*), GR – gas chamber, LR – air chamber, g, g1 – gas channels, l, l1 – air channels, O – furnace combustion area. Legend to the ground plan: a – gathering openings, B – hearth burners, C – pots, T – furnace gates. Scheme: Radek Mišáanec after Hais 2022.

31 DRAHOTOVÁ et al. 2005, p. 480. HAIS 2022, pp. 22–29. BROUL – GRISA – SMRČEK 2005, pp. 20–23.

Nehse recuperative furnace

This is a low-flame furnace with hearth burners and a recuperative combustion air preheating system. Gas producers with oblique grates were attached to the side walls of the melting furnace, under which a ceramic recuperator was installed. In contrast to the Siemens system, waste gases in these installations only preheated air; producer gas did not need to be preheated because its path to the furnace was very short. The furnace was simpler in terms of both design and manipulation. Its disadvantage lay in the producers attached directly to the sides of the furnace, which leaked dust and gases during the filling.³² This was the first of the new systems to be employed in the Bor – Šenov area. Horní Chříbská glassworks were the first to use it in 1870, at first with wood heating and after an adaptation in 1873–1874 with brown coal heating. At the same time, Nehse-type furnaces were installed by the glassworks in Rybníště (1873, two furnaces) and by Helenenhütte in Nový Bor (1874, the second furnace was of Siemens type).



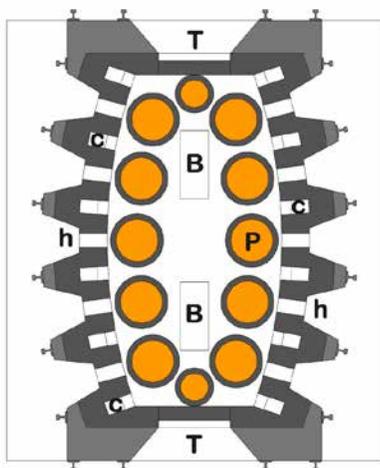
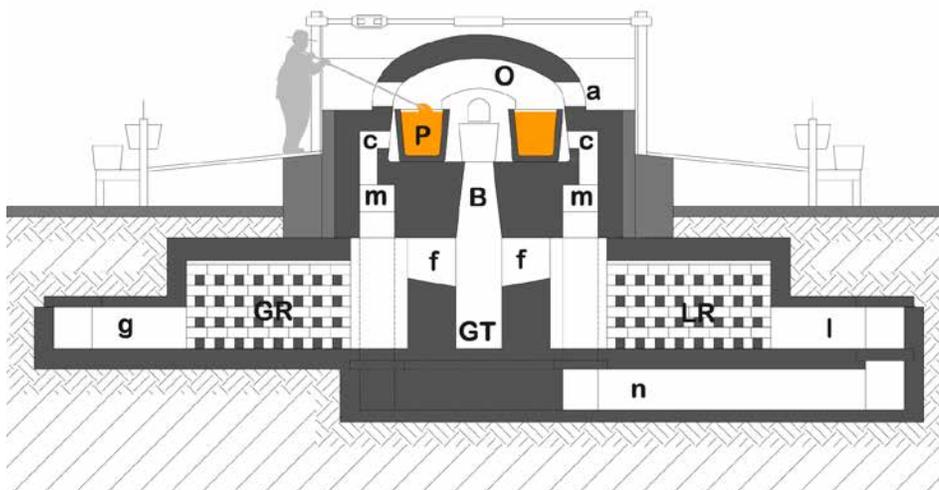
Recuperative glass melting furnace of the Nehse type heated by producer gas, longitudinal section.

Legend: A – producers, B – producer grates, R – ceramic recuperator, P – pots, E – gathering openings, F – waste gas exhaust channels, g – gas channels, D – preheated air. Scheme: Radek Míšanec after Hais 2022.

32 DRAHOTOVÁ et al. 2005, pp. 483–484. HAIS 2022, p. 24.

Siemens-Siebert furnace

H. Siebert patented an improved version of Siemens's ten-pot furnace in 1878. He adapted it to a twelve-pot one and changed its shape to oval, which suited glassmakers better. A multiple-part channel of constant dimensions was an important new element, as were regenerative horizontal chambers and a rectangular hearth burner. From the late 19th century, the improved version of pot furnaces heated by producer gas was gradually used in the reconstructions of all melting furnaces and became the dominant furnace system. This was true also in the studied area, where the first furnaces of this system were installed already around the middle of the 1880s (probably 1884 – Horní Chřibská, 1885 – Nový Oldřichov, 1885/1886 – Kamenický Šenov, Adolf Rückl). The furnaces were adapted to long-distance gas heating from the 1940s and to natural gas heating from the early 1990s. In some cases, the operation of these furnaces continued to the present time and was ended due to the complete closure of the plants (Nový Bor – Flora-Hantich glassworks, Janov nad Nisou – Vitrum glassworks).³³

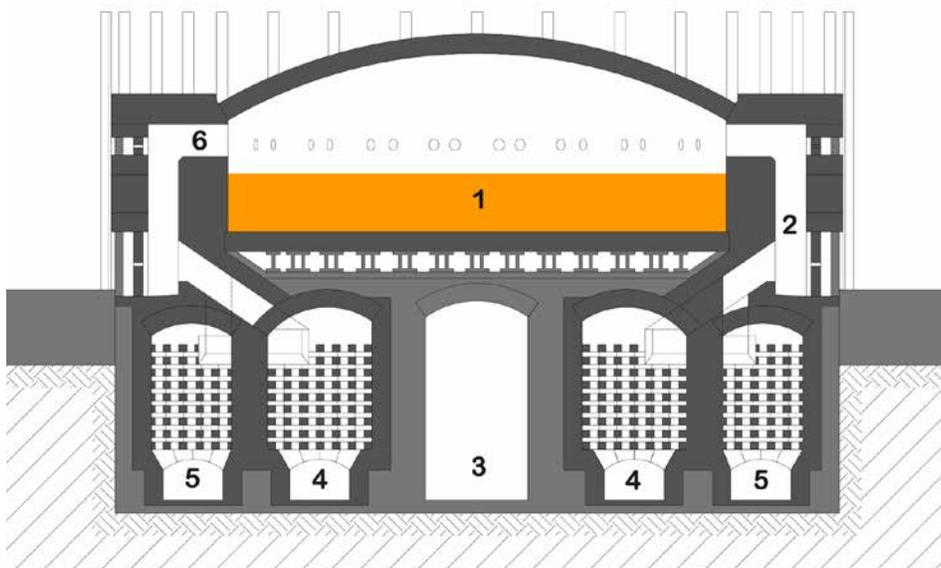


Regenerative glass melting furnace of the Siemens-Seibert type heated by producer gas; bottom: ground plan; top: longitudinal section. Legend: a – gathering openings, B – hearth burners, c – constant-dimension channel (burner) openings, f – ports, g – gas channels, GT – glass sink, h – pot manipulation opening (žárník), GR – gas chamber, LR – air chamber, I – air channel, m, n – constant-dimension channel, P – pots, O – furnace combustion area, T – furnace gates. Scheme: Radek Mišanec after Hais 2022.

33 DRAHOTOVÁ et al. 2005, pp. 484–485. HAIS 2022, pp. 24–27.

Tank furnaces

The first regenerative continuous tank furnace was built by Friedrich Siemens in Dresden in 1867. G. Nehse developed a rival system in the same place in 1874, and a system by Belgian designer Klattenhof was used as well. In Bohemia, the first tank furnaces of an unknown system were built from 1872 in a container glass plant (Österreichische Glasshütten A. G.) in Ústí nad Labem. Their use is typical precisely of large industrial glassworks producing container and sheet glass. In the Bor – Šenov area, day tanks were used at Anton Rückl glassworks in Skalice in 1920, at Karlshütte glassworks in Dolní Prysk sometime after 1930 and at the Klára glassworks in Polevsko in 1956.³⁴

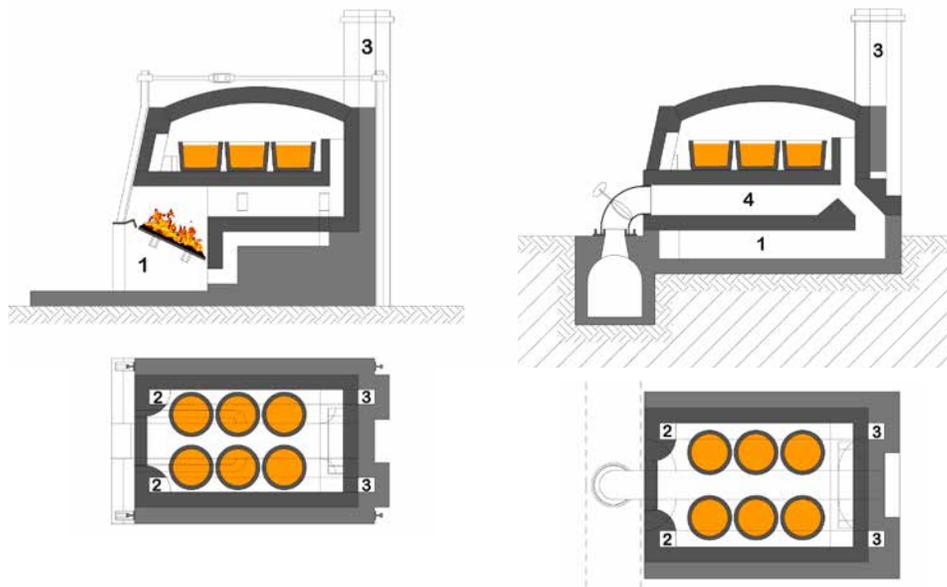


Day regenerative glass tank furnace of the Siemens type heated by producer gas, longitudinal section.
Legend: 1 – molten glass pool, 2 – ports (mixing of preheated air and gas), 3 – cooling and inspection channel under the pool, 4 – air chambers, 5 – gas chambers, 6 – burners. Scheme: Radek Míšanec after Hais 2022.

34 DRAHOTOVÁ et al. 2005, pp. 485–487. HAIS 2022, p. 27. The sheet and container glass production technology is not described in this work because it does not concern the studied region. For more information, see e.g. BROUL – GRISA – SMRČEK 2005, pp. 31–38, 85–89, 101–111.

Cooling, tempering and auxiliary furnaces

As waste heat of the main melting furnaces could no longer be used after their reconstructions, cooling and auxiliary furnaces were moved out of the centre of the hall, usually to the perimeter walls. They were newly designed as chamber furnaces with direct wood or coal heating, and later with producer, long-distance or natural gas heating. Large industrial glass plants started to use conveyor cooling furnaces as early as the 1920s; the Škoda-AMCO type with a lower and upper heated muffle was used from 1941.³⁵ Conveyor cooling furnaces (at first heated by long-distance gas) started to be gradually introduced in the Bor – Šenov area only from the 1960s.



Scheme of a pot tempering furnace with direct heating (left) and with producer gas heating (right); bottom: ground plans; top: longitudinal sections. Legend: 1 – air intake, 2 – waste gases, 3 – draw-off, 4 – producer gas. Scheme: Radek Mišáanec after Hais 2022.

We can also mention later types of test pot melting furnaces heated by lighting gas used in glassworks of the studied area. Two furnaces with a ceramic recuperator of the IMAG (Industrieöfen und Maschinen für die Glasindustrie, Berlin-Charlottenburg, formerly Amsler-Morton, AMCO) system were installed in the older glassworks hall of the Horní Chřibská glassworks in the early 1940s; one was put into operation during the war and once again, briefly, until 1947. Because of problems with the lifetime of hearth burners of Siemens-Siebert furnaces after the transition to lighting gas, Arnošt Jindra designed a high-flame regenerative pot furnace in 1950. It was tested in former A. Rückl glassworks in Kamenický Šenov and after its delimitation in Horní Chřibská; from 1960 it was put into operation as a Jindra-type furnace first in the Bratři Jílkové glasshouse in Kamenický Šenov and gradually also in other glassworks. A new standardized pot furnace line of Crystalex type was gradually developed under the guidance of A. Nikl in 1976–1981. The furnaces for six,

³⁵ DRAHOTOVÁ et al. 2005, pp. 484–485. HAIS 2022, pp. 26–27. KIRSCH 2003a, pp. 464–466.

eight and ten pots had a more tunnel-like shape and burners shifted away from the longitudinal axis to the sides. A multiple-zone melting furnace of Knoblauch type (from Freiberg, Saxony) was used in optical glass production at Svor from 1932; it enabled a separately adjustable melting regime for each two-pot section.³⁶ First attempts at introducing glass melting in electric furnaces can also be dated to the 1930s. The first small pot furnace with silit rods was built at the Annín glassworks in 1934 in cooperation with the Swiss company Brown-Boweri.³⁷ Companies specializing in glass furnace construction resided from the last quarter of the 19th mostly in Železná Ruda or in Plössberg, Bavaria (Uhrmann, Passauer, Wagenbauer, Hopf, Schmidt, Wudy and more).³⁸ F. Mikula's company from Proboštov near Teplice built furnaces most often in the Bor – Šenov area in the interwar period.

FUEL – WOOD, PRODUCER, LONG DISTANCE AND NATURAL GAS

As we have stated several times, wood was the dominant fuel in all glass furnaces from the Middle Ages until the middle of the 19th century. The furnaces were designed for direct heating. The presumable efficiency of such heating was only about five per cent. During the second half of the 19th century and especially in its last quarter, the Bohemian lands went through an almost general transition first to direct heating with black and brown coal and peat and then to indirect heating with producer gas. While black coal did not prove very useful in glassworks producers, brown coal from the Most and Sokolov basins was found to be the most suitable fuel. The introduction of modern furnace systems with indirect heating using producer gas evened out and, above all, shortened the melting process. Instead of four shifts (distributed into seven days according to the efficiency of melting in furnaces with direct heating), modern regenerative and recuperative pot furnaces made it possible to regularly melt and work glass in a six-day work cycle. Long-distance lighting gas from a high-pressure gas plant in Záluží near Litvínov was first installed in some glassworks in the Bor – Šenov area in the 1940s (1942). The glassworks in Dolní Prysk, Horní Chřibská, Prácheň (1946), Bratři Jílkové in Kamenický Šenov (1955) and Klára in Polevsko (1956) were connected to long-distance gas in the last years of the war and after the war. Only some furnaces were connected to lighting gas at first in some glassworks. The implementation of gas heating in primary glass production was completed in Flora glassworks in Nový Bor in 1965 and in Franz Vetter glassworks in Kamenický Šenov in 1967. Long-distance gas was replaced by natural gas in the early 1990s.³⁹

Siemens tensile producer

Modern producers for glassmaking purposes were designed in France as early as 1842. The first attempts at building pressure producers in the Bohemian lands took place in Čejč near Hodonín (František Paduška) in 1852 and in the J. D. Starck glassworks in Dolní Rychnov before 1856. In 1856, Friedrich Siemens patented a tensile producer, which found wide application in practice, unlike the previous attempts. Its design differed above all in the hopper depending on the type of fuel, most often wood or brown coal. Below the hopper was a shaft with a grate and under the ash pan, a water tank in which the coke and cinder that fell through was extinguished. The resulting steam cooled the grate bars. Flat grates were used at first, and then oblique ones above all. Sie-

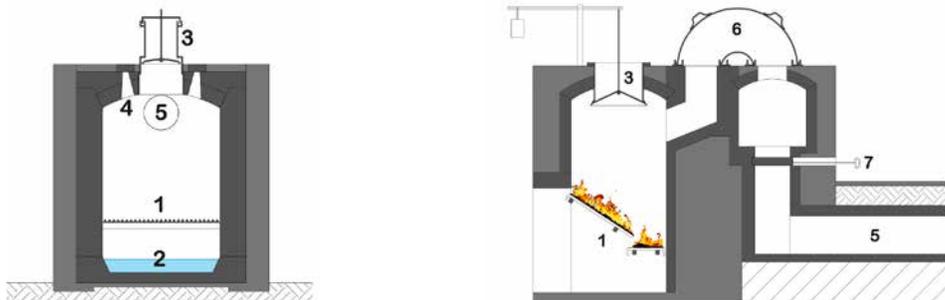
36 Ibid., pp. 392–393.

37 Ibid., pp. 448–449.

38 DRAHOTOVÁ et al. 2005, p. 482.

39 HAIS 1982, pp. 134–170. KIRSCH 2003a, pp. 353–357.

mens producer also had an installation for the separation of tar and water from the gas. The fact that a considerable quantity of unburnt fuel fell through was a disadvantage of the producer. Even so, its efficiency was about 50 %. Glassworks in the Bor – Šenov area commonly used this type of producer for brown coal heating until the 1960s (until the transition to long-distance lighting gas); it was the most frequently used installation of this type.

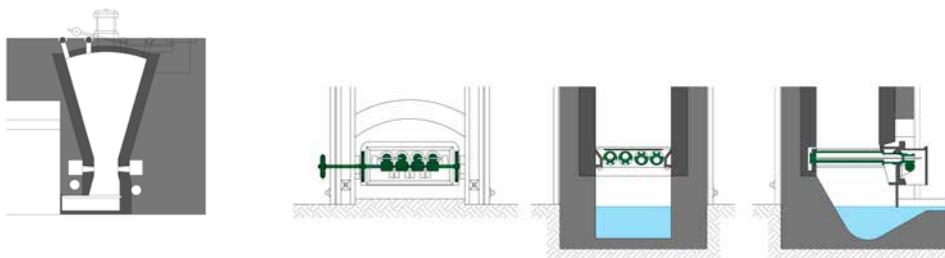


Scheme of a Siemens producer with a planar (left) and inclined (right) grate. Legend: 1 – grate, 2 – water basin, 3 – bell feeder, 4 – tapping opening, 5 – gas flow to the furnace, 6 – safety valve, 7 – gate valve.

Scheme: Radek Mišanec after Hais 2022.

Heller producer

This type of pressure producer, equipped with a pneumatic cinder removal system, steam saturation and air brought under the grate, was patented by Bedřich Heller from Plzeň in 1908. In the Bor – Šenov area, earlier Siemens-type producers were replaced by the Heller type in the Anna glassworks in Polevsko (1925) and in Rybníště (1934).



Scheme of a producer of the Heller system with air intake under the grate and steam saturation.

Scheme: Radek Mišanec after Hais 2022.

Scheme (front and side elevation) of rotary grates of the Škoda-Sauvageot system.

Scheme: Radek Mišanec after Hais 2022.

Another improvement of earlier shaft producers was the installation of modern revolving grates of the Škoda-Sauvageot system. The first installations were built at Inwald and Riedel companies around 1910. In the Bor – Šenov area, earlier Siemens-type producers were adapted by the installation of Škoda-Sauvageot revolving grates at the Bratři Jílkové glassworks in Kamenický Šenov (1932/33).⁴⁰

40 DRAHOTOVÁ et al. 2005, pp. 487–490. BROUL – GRISA – SMRČEK 2005, pp. 18–19. HAIS 2022, pp. 28–29. KIRSCH 2003a, pp. 347–353.

GLASS POT AND FORM PRODUCTION

Glass pots and auxiliary refractory materials were made in the pot room (*Hafenstube*). In the 19th century, the pot shape settled to a basic round shape (previously also oval) with a diameter of 70–90 cm and a height of 60–70 cm. They were made of refractory clays and opening materials in various ratios. The prepared mixture was shaped in a wooden form; the bottom was made by “treading” and the walls by “knocking”. Covered pots, called booths (*kukaň*), were used exceptionally. So-called *saclík*, mostly oval-shaped, was used to melt a smaller quantity of coloured molten glass. Ringlets were placed into the pots in the second half of the 19th century to withhold impurities. Two specialized glass pot production companies came into existence in the Bohemian lands, specifically the Teplice region – Ferdinand Fastners Söhne in Hrob (1890) and Adolf Pöhner in Košťany (1907), later Teplice (1924).⁴¹

Pre-forms (*optišky*) and forms were used to shape glass products; at first, they were made of burnt clay. Metal forms gradually asserted themselves, made of copper, bronze, lead or cast iron. Form foundries were part of some glassworks (outside the studied area) from the late 19th century. Neither earlier sources nor archaeological finds have documented wooden forms before the middle of the 19th century, even though they were presumably used. They were made in the form works manually by hollowing; later, simpler shapes were made using an adapted wood lathe driven by a treadle and later by an electric motor. Beech was the most often used type of wood, followed by alder or pear. Form makers prepared and repaired other wooden tools for the glassmakers as well.⁴²

AUXILIARY OPERATIONS AND INITIAL GLASS WORKING IN THE GLASSWORKS

The glassworks included workshops that were usually called cracking-off works (*Absprengerei*). Until the middle of the 19th century, the top parts of glass products were cracked off in the glassworks by coiling a hot glass thread around them and sudden cooling by putting a drop of water to a heated place. The resulting tension separated the top part. Later, a thin disc made of very hard sandstone or slate was used, fitted to a cutting lathe. Subsequently, the coarse and sharp edge was roughly ground using a mixture of quartz sand and water on a horizontal cast iron disc of a disc grinder. A sandstone disc with water was used for soft smoothing, and a wooden disc made of poplar wood or a brush with an admixture of polishing material for final polishing. The next operation, bevelling the sharp outer and inner edges (*sámování*), was carried out using cutting lathes and disc grinders. They were driven first by a treadle or water, and later by an electric motor. All-metal cracking-off machines, mostly driven by an electric engine, were introduced in the late 19th century. The top parts were partially cut by a diamond or widia (carbide) tool, and the cut was then exposed to a sharp flame from burners heated by a mixture of petrol and air. The machines were mostly three-position for small-lot production and multiple-position for large-series production, the latter combined with sealing of the upper edge of the product. Hole grinding machines were also used.⁴³

41 DRAHOTOVÁ et al. 2005, pp. 491–501.

42 Ibid., pp. 525–527.

43 Ibid., pp. 528–532. HAIS et al. 2010, pp. 41–42, 45. Machine producers include companies such as Faht, Rolke, Gundlach or Kutscher.

BUILDING DEVELOPMENT OF GLASSWORKS

Nothing in particular can be said about the glassworks in the Bor – Šenov area before the middle of the 19th century. No data has been discovered yet in archival sources, let alone plan documentation that would make it possible to describe local buildings in more detail. In medieval glassworks, the main melting furnace and the auxiliary furnaces were presumably only covered by an open-roofed structure made of wooden posts. At sites better examined archaeologically, this is documented by rows of postholes and underpinning. An analogical situation is documented also from other examined sites in the Ore Mountains (Moldava I). A possible appearance of the buildings is illustrated by a depiction in the so-called Mandeville manuscript from 1410–1420.⁴⁴ Based on the sporadic evidence of glassworks from the following centuries, we can assume that the glassworks halls and other buildings were mostly of log or frame construction on masonry underpinning. However, masonry buildings can also be presumed at least from the 16th century, above all for more important glassworks. A more likely masonry glassworks hall building stood in Juliovka near Krompach between 1687 and 1700. This can be inferred from information about the building's front façade, on which a sundial, the ducal coat of arms, the inscription Juliusthal and the sign of a cut-off hand were painted. A partially preserved cellar with a portal dated 1687 was apparently part of an inn that belonged to the glassworks.⁴⁵

A mostly wooden form of the two last glassworks in the Bor – Šenov area in Horní Chřibská and Nová Huť before the middle of the 19th century is documented by Stable Cadastre maps from 1843. In Nová Huť, this form apparently remained until the end of the glassworks around 1881. In Horní Chřibská glassworks, a new classicist masonry hall was built shortly afterwards, around 1846. According to contemporary depictions, it was a massive two-storey building with a simply structured façade and high half-hipped roof. A typical ventilation extension (so-called *rytíř*) rose from the roof ridge in the form of a small gable roof. An adaptation of the north annexes to the glassworks halls took place around 1870 in connection with the replacement of a furnace with direct wood heating by a Nehse-type furnace with indirect heating using producer gas. This gave the glassworks a characteristic appearance with an industrial glassworks hall and a dominant chimney body.⁴⁶

All new glassworks built between 1872–1925 also had a masonry form. With a few exceptions, they were buildings without major architectural ambitions. All the complexes were dominated by the glassworks hall with a high gable roof and factory chimneys. Depending on the size of the company, glassworks halls ranged from smaller (Annahütte in Polevsko) to large, considerably elongated halls for two main melting furnaces (Rybníště, Skalice, Dolní Prusk). In the latter case mentioned, the shape of the hall originated from an additional extension, or more precisely the merger of two halls slightly differing in width. The A. Rückl glassworks in Kamenický Šenov was rebuilt in 1926 by means of a layout extension and an overall adaptation of the earlier building. The building development and extension of operations at several glassworks led to the construction of two (Horní Chřibská, Marienhütte in Falknov, Bratři Jílkové in Kamenický Šenov) or even three (Svor) separately standing halls.

Glassworks hall structures of brick or mixed masonry were equipped with simple façades. A design with the basic surface covered with roughcast and smooth elements of lesene frames and

44 ČERNÁ 2004, pp. 9–10. ČERNÁ 2016, pp. 167–169. DRAHOTOVÁ et al. 2005, pp. 112–119.

45 ZUMAN 1936a, p. 86. KOLKA 2012, pp. 37, 102–106.

46 No direct sources concerning the construction of the new glassworks hall have been found yet. Information about the reconstruction of the glassworks is provided in SOKA Děčín, AO Horní Chřibská, municipal chronicle, 1889–1937, p. 23. SACHER 1964, unpagged, says that the reconstruction reportedly took place in 1847.

View from the northwest of two glassworks halls of the Marienhütte glassworks in Falknov (founded 1893) with a typical simple façade structure and annexes along the perimeter; a generator station is situated left of the chimney, and the second one under a single pitched roof near the later, right glassworks hall. Petr Joza's collection.



View from the southwest of the glassworks hall in Nový Oldřichov, rebuilt in 1906, with a distinctive façade structure, in the front near the gatehouse entryway. Petr Joza's collection.



Kamenický Šenov, Bratři Jílkové glassworks, view from the northwest of the later glassworks hall from 1922–1924. The building has an unusual mansard roof with a distinctively structured ventilation extension. Photo: author, 2022.



window and door frames predominated. In many buildings, segmental relieving arches of windows were accentuated by the use of fair-faced brick masonry. It is well visible in archival images of the glassworks in Skalice. In some buildings, it cannot be proved due to the absence of earlier photographs. As usual at that time, decorative rendition (cornices and various patterns) of fair-faced brick masonry was applied also to chimney bodies. Fair-faced brick masonry is documented for a relatively long time for some buildings (Theresienhütte in Hillův Mlýn, Štěpán Hrdina in Prácheň, Flora in Nový Bor, Franz Vetter in Kamenický Šenov, probably also glassworks hall No. 3 in Svor). It is unclear, however, whether this was a provisional solution due to the lack of finances or an intention that was nevertheless changed by later, often modern adaptations. Besides the old glassworks hall in Horní Chříbská, only two buildings out of the whole assemblage feature a distinctive architectural design. The first of them, the Clemens Rasch glassworks in Nový Oldřichov, got a prestigious form during an extension and reconstruction in 1906. The smoothly plastered façade was richly structured with strip bossage and the rough elements of a socle, corner bossage, voussoirs and frames above the window and door openings. The adjacent trade house and reception buildings were designed identically. Annexes along the perimeter of the glassworks hall had decorated frontal attics. Regrettably, the building vanished. The other, architecturally most valuable and, moreover, preserved project was the building of the second hall in the Bratři Jílkové glassworks in Kamenický Šenov in 1922–1924. Its outer shell was distinctively structured by simpler pillar and chimney bodies. Unorthodoxly, it has a mansard roof with a steel and wood roof structure and an extraordinarily varied ventilation extension (so-called *rytíř*) in the ridge. It also has a mansard shape with a turret in the middle.

Most of the nineteen industrial glassworks in the area had a typical layout with a glassworks hall in the middle, surrounded by annexes with single pitched roofs along all or most of its circumference. The annexes held the mixing chamber, the pot room, the forms works with a joiner workshop, the sand storage, as well as other storage spaces and facilities as needed. Producer stations with factory chimneys always stood on the side adjacent to the industrial railway. If the glassworks did not have an industrial railway, the producers were situated on the rear courtyard side, again often in the direction of an adjacent railway. This layout was partially modified if the buildings were constructed gradually over various temporal phases (Bratři Jílkové in Kamenický Šenov). In that case, the cluster of two glassworks halls and auxiliary operation annexes was expanded by the addition of more buildings containing the dispatching and the grinding works. The glassworks complexes in Svor and Skalice grew likewise. The glassworks in Rybníště, A. Rückl in Kamenický Šenov, Nový Oldřichov or Dolní Prysk rather had the form of free-standing buildings (grinding works, boiler houses, trade houses, storages, sheds, barns and other structures). The Š. Hrdina glassworks in Prácheň had a slightly different glassworks hall layout, with the producers, the chimney, the mixing chamber and the pot room attached to one shorter side of the ground plan and the storages, the dispatching and an engine shed to the other, leaving the longitudinal walls free. The visual dominance of the glassworks hall was even more distinctive at the latest Franz Vetter glassworks (Kamenický Šenov) from 1925. There, annexes were only built along the rear side from the industrial railway, where the chimney, the producer station, the mixing chamber and the pot room were situated. The remaining operations, including the grinding works, were located in a perpendicular wing. Where the plan documentation is preserved, it only mentions regional building offices and builders. The most frequent names are Franz Eschler and Max Eschler from Česká Kamenice. Only some annexes at the Š. Hrdina glassworks in Prácheň were designed by builder Adolf Richter from Kamenický Šenov and the reconstructions of the glassworks hall at A. Rückl in Kamenický Šenov by W. Lang & Co. office from Podmokly.⁴⁷

47 The conclusions concerning the building form and layout of the glassworks are based on the following two chapters, where the sources of information concerning the relevant complexes are listed as well.

AUXILIARY BUILDINGS, STORAGES, OFFICE BUILDINGS, RESIDENTIAL BUILDINGS (WORKER HOUSES, VILLAS)

In addition to production buildings – glassworks halls, the preserved glassworks complexes also included other buildings. First among them were numerous small auxiliary structures such as storage and office buildings. Their structural design and appearance usually copied that of the glassworks halls in a simplified manner. Residential buildings were intended for the holders of earlier glasswork estates and later glassworks. From the earlier period, the torso of a masonry glassworks master house in Kropach is preserved in the studied area; according to the use of sgraffiti, it can be dated to the second half of the 16th century. The glassworks master's house with an inn and a substantial economic background is preserved intact also in Horní Chřibská (No. 5, Krásné Pole). The building built before 1843 has a later historicizing adaptation of the façade. Worker houses and owner villas are typical above all of glassworks built from the last quarter of the 19th century. The most interesting and best preserved examples of the glassworks background in the Bor – Šenov area include those of the A. Rückl and Bratři Jílkové companies in the lower part of Kamenický Šenov. Due to the closeness of the two glassworks, they form an interesting unit together. The first stage of the construction took place concurrently with the foundation of the respective companies, around 1886 and 1905, with the second stage in the 1920s. However, they are by no means comparable in extent with the large worker colonies of the glassworks in northwestern Bohemia,

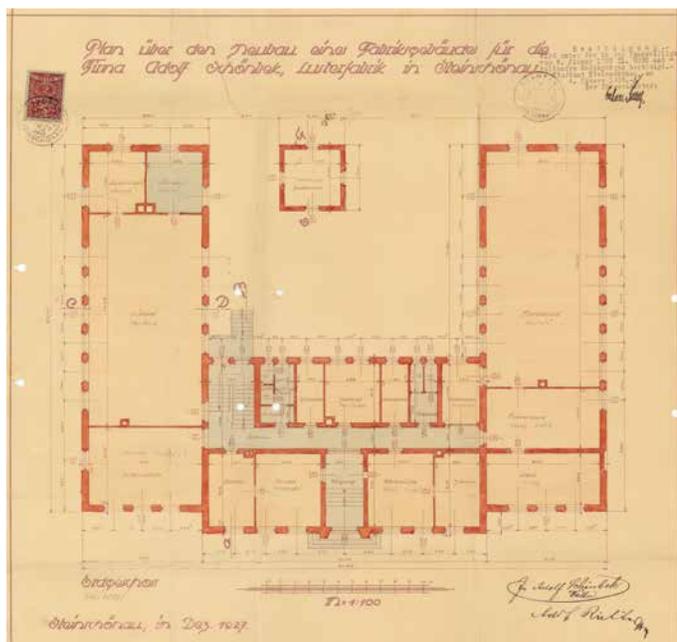


View of worker houses No. 213 and 51 belonging to the Theresienhütte glassworks in Svor. Tomáš Novák's collection.

let alone the miner complexes or the background of many big textile and other factories. Worker houses of fair-faced brick masonry were built for the glassworks in Horní Chřibská and Svor. Other buildings of that type came into existence at the glassworks in Prácheň, Skalice, Flora in Nový Bor and F. Vetter in Kamenický Šenov.

GLASS FINISHING

The term denotes the refining and decoration of semi-finished glass products. The primary working of the semi-products took place directly in the glassworks, including above all cracking-off (the separation of the top part, division into two parts, etc.), cutting, grinding, bevelling, hole or stopper grinding.⁴⁸ Glass painting took place directly in the glasshouses at first; auxiliary furnaces were used to fire the paint. Only from the second half of the 17th century did painters, cutters (engravers), grinders and other craftsmen settle in the neighbourhood of the glassworks and in the adjacent villages and towns, which gradually grew into glass finishing centres. From that time, glass finishing was separated from primary production. The individual techniques were operated in independent workshops that were mostly situated in residential houses. A high ratio of home work has been a typical feature of glass finishing since the 17th century to this day. Grinding mills had most of all the character of technical structures, especially larger ones driven by water and later electric energy. Engraver and painter workshops were often part of the residential sections of houses (*světnice*); they are very difficult to identify following the adaptations of the buildings after the craft was no longer pursued. Large workshops, which had the form of an annexe of a technical character or, from the late 19th century, of a separate building, are easier to distinguish. The most distinctive features are usually a denser grid of window openings, their size and, in annexes, also panes of an industrial character (steel, multiple-paned). This characterization does not apply to large finishing



Example of the layout of the Adolf Schönbek finishing works (chandelier factory), house No. 67 in Kamenický Šenov (Adolf Richter, 1927). The central wing has offices, the social background and communication areas designed on the ground floor; the left wing contains a girder workshop, a painting shop and other rooms; the right wing incorporates the storage, the chandelier pendant storage and an assembly workshop; a minor firing furnace building was supposed to stand in the courtyard. Kamenický Šenov construction authority, archives, file of house No. 67.

48 HAIS et al. 2010, p. 45.

operations, in the earlier period above all mirror works. Glass finishing works were gradually built from the second half and especially the last quarter of the 19th century; they unified workshops of several techniques, especially the grinding and painting works, along with operations dealing with the completion of the products, the necessary energy background (a raceway with a waterwheel or turbine, a boiler room and an engine room with a steam engine), extensive storages, business premises with a sample room and the clerical and social background. Within the completion of the products, the finishing works also included girdler workshops, foundries and similar operations.

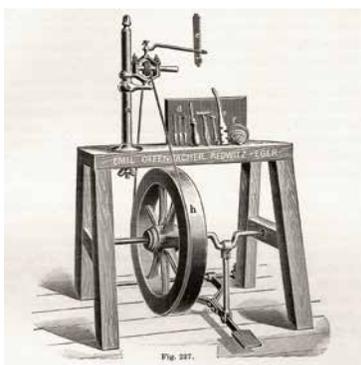
Engraving

This is the technique of glass decoration by a mechanically created drawing, relief or inscription. Engraving wheels of a small diameter (up to 5 cm) were used for this purpose. The engraving and grinding techniques were both called glass cutting (*Glaschneiden*) in the 17th and 18th centuries; the term engraving (*Glasgraveur*) started to be used later. At first, it was done using foot-propelled machines. A foot-propelled engraving machine (*Graveurwerkzeug, Graveurstuhl*) consisting of a wooden table with a treadle and a vertically mounted wooden wheel was commonly used after the considerable spread of this technique in the late 17th and early 18th centuries. A brass head with bearings was anchored to the work surface; in them, a shaft with a stepped belt pulley and the engraving wheel was mounted horizontally. A felt "flag" was hung above the wheel to prevent the abrasive material from flying off. Cooper wheels to which emery with oil was applied were used in art engraving. Other materials used for the wheel were corundum – electrocorundum (stone en-

Model of an engraving machine with foot propulsion, exposition of the Glass Museum Kamenický Šenov. Photo: author, 2022.



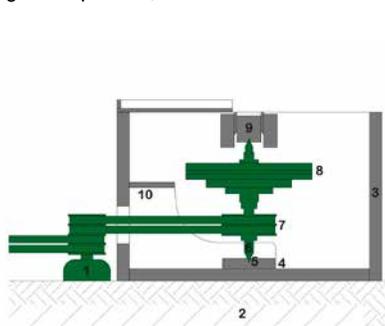
Example of machine production – an engraving machine with foot propulsion. Taken over from Hohlbaum 1910.



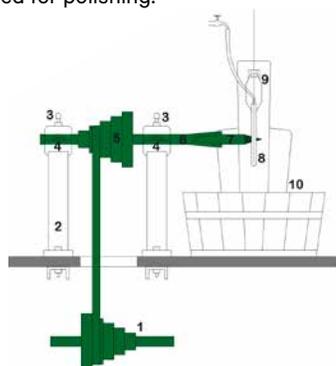
graving) or industrial diamond; water was brought to them, together with an emulsion in the case of the diamond. Engraving machines driven by an electric motor gradually asserted themselves from the late 19th century, but foot propulsion was commonly used in small home workshops up to the middle of the 20th century.⁴⁹ Due to the character of the engraving technique and the minimum technical equipment needed, engraving workshops occurred in ordinary houses, often directly in residential rooms. They show no specific features from the building perspective. The same is true of workshops that were part of larger finishing works. Within their layout, engraving workshops could be located virtually anywhere, as long as the room had enough window openings.

Grinding

This is the technique of mechanical glass working using a loose or bonded abrasive. Feet-propelled machines were used at first. The equipment of the grinding mills (*Schleifmühle*, *Schleifwerk*) consisted of several types of machines, depending on the chosen type of glass grinding. The basic types were the disc grinder (*hladinářský stroj*, *Scheifzeug*, *Schleifkasten*) used for the grinding and polishing of products using a wheel on a vertical shaft, and the cutting lathe (*kuličský stroj*, *Kuglerzeug*) with a horizontally mounted shaft with the grinding wheel attached to its end. Cast iron wheels to which sorted grinding sand in the form of an aqueous suspension was brought from above were used for rough grinding (so-called *nathřívání*). Fine grinding was done on wheels of natural sandstone of uniform granularity, porosity and hardness with a diameter of about 40 cm. Polishing wheels for disc grinder or edge polishing were made of poplar wood. Disk-shaped polishing brushes (*Polierscheibe*, *Borstenrad*) attached to a horizontal shaft were also used. Grinding sand was made of natural sandstone in the region; elsewhere, also of crushed and sifted quartz. The sand was gathered in wooden vessels, where it was cleared from the remnants of glass by tapping with an intake of water and sorted according to granularity. The finest uppermost layer (sludge) was used for polishing. In the 20th century, grinding sand was replaced by carborundum or electrocorundum abrasives. Besides fine sand sludge, putty powder and, from the 1920s, ground pumice, rottenstone or cerium dioxide were also used for polishing.⁵⁰



Disc grinder. Scheme: Radek Míšanec after Mařík – Vodháněl 1958. Legend: 1– electric motor, 2 – masonry base, 3 – wooden box, 4 – oak pad, 5 – hole with petrolatum, 6 – shaft with washers and a nut, 7 – vee belt pulley, 8 – disc with a hoop, 9 – beam with fastening wedges, 10 – cover.

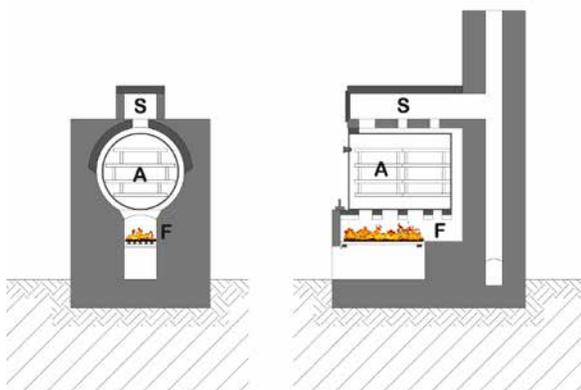


Cutting lathe. Scheme: Radek Míšanec after Mařík – Vodháněl 1958. Legend: 1 – drive shaft and counter-belt pulley, 2 – base, 3 – lubrication openings, 4 – bearings, 5 – belt pulley, 6 – shaft, 7 – exchangeable spindle with a thread, 8 – disc, 9 – roof with a pennant, a fastening wedge and a tube, 10 – tub.

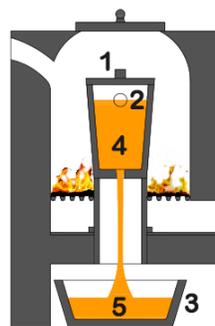
49 Ibid., pp. 48–49. DRAHOTOVÁ et al. 2005, p. 536.

50 H AIS et al. 2010, pp. 45–47. DRAHOTOVÁ et al. 2005, pp. 540–547. On later development of the machines, see KIRSCH 2003b, pp. 76–83.

Unlike engraving workshops, the larger grinder workshops were designed as separate rooms formed either by a reconstruction of a residential or farming part of the house or as a technical annex. Water-driven grinding mills had the workshop always situated next to the waterwheel chamber. Separate grinding mill buildings with minimum residential background are also known, as the owner usually lived in another house nearby. The individual tables (benches, boxes) to which the machines were fitted were located in the workshop. Cutting lathe and disc grinder benches were accompanied by a funnel-shaped vessel with water and loose abrasive and a wooden tub (*škopek*) over which the grinding itself took place. The machines were propelled by ropes or flat belts by means of transmission mechanisms situated below the workshop's floor. In the later period, the transmissions were installed in the basement of the engine room and under the roof of the workshop. Earlier machines had a wooden head; the frame and the belt pulley were of cast iron from the 19th century. The workshop also included sand and tool storage, especially for sets of wheels of different types and sizes.



Scheme of a painting firing furnace of a muffle type with direct heating by solid fuels; left: cross-section, right: longitudinal section. Legend: A – muffle, space for fired glass, F – heating area, S – waste gas draw-off into the chimney. Scheme: Radek Mišanec after Hais 2022.



Scheme of a simple enamel melting furnace, cross-section. Legend: 1 – fireclay pot with a lid, 2 – fireclay ball, 3 – vessel with water, 4 – molten glass, 5 – enamel (frit). Scheme: Radek Mišanec after Hais 2022.

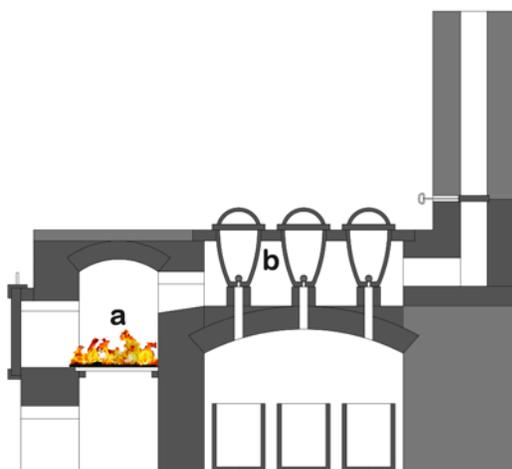
Painting, production of glass paints and enamels

The surface of semi-finished glass products was decorated also by the application of paints, lustres, precious metal preparations and other substances. Glass painting techniques can be divided into two basic kinds – fired and unfired paint. Vitreous enamels were used for the former. They consisted of boron-lead-silicon glass (flux), various pigments (colouring substances, transparent shades) and covering paints (opacifiers, compounds of tin, antimony, zinc, titanium, etc.). Firing did not take place in so-called cold painting, which was done using resinous or oil paints. The beginnings of both procedures date back to the second half of the 16th century and the glassworks in Falknov and Horní Chřibská are among the earliest centres of this technique in the Bohemian lands. Enamel painting is first documented there as of 1561 and cold painting as of 1602. Glass painters represented the predominant group of glassmaking craftsmen that stood behind the foundation of guilds in the Bor – Šenov area in the second half of the 17th century.⁵¹

51 DRAHOTOVÁ et al. 2005, pp. 140–146, 549–550.

Enamels were fired directly in the glassworks at first. To prevent pollution by fly ash from the waste gases, they were put into cooling pots covered with lids. Rather long after the separation of glass finishing from the primary production, probably in the late 18th or early 19th centuries, painters started to build firing furnaces of the so-called muffle type in their homes. They consisted of a cylindrical ceramic vessel (muffle) embedded in a masonry body. In some cases, they were inserted into the space of earlier bread ovens in smoke kitchens of residential houses. A heating area for solid fuels (above all wood, later brown coal) was situated under the muffle. Waste gases flowed through vents in the furnace body along the circumference of the muffle and an opening above it into the chimney. Glass for firing was placed into the vessel; the process was checked through an inspection opening in the front fireclay panel. The paints melted through and firmly connected with the glass surface in temperatures of 480–560 °C. This type of furnace was used until the 1930s when it was gradually replaced by electric resistor chamber furnaces (ARCO – A. Rösler and EFFENBERGER types). One of the first electric Siemens-Schuckert furnaces was allegedly tested by painter H. Bredschneider from Okrouhlá as early as 1929. Indirect heating of a firing furnace with a small wood gasification producer of the Siemens system operated by painter Franz Horn in Kamenický Šenov in the late 19th century was a rarity.⁵²

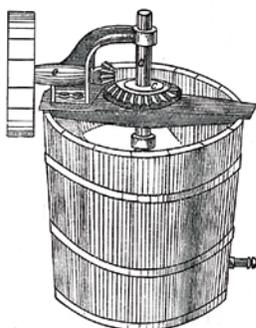
Glass paints (enamels) were prepared in so-called glass paint friction mills (*Farbenreibmühle*). The basic material was quartz, flint or quartz sand, which was mined, floated, sorted and subsequently annealed in furnaces. Annealed semolina-sized material cracked in water was then repeatedly ground in wood vessels with quartzite bottoms, washed in water and burnt until a fine mixture was achieved. The grinding device was driven by a waterwheel through a transmission mechanism, while the grinding itself was performed by quartzite stones. Simple metal-construction mills with shafts and porcelain vessels containing porcelain balls and turpentine were used for grinding during the 20th century. They were already mostly driven by an electric engine with the use of leather belts. Minium, borax, feldspar and potash were added to the prepared material in prescribed ratios. The thoroughly mixed mixture was melted in special furnaces consisting of a fireclay vessel (a pot with a lid or a crucible), the heating area and, below it, a vessel with water. Temperatures from



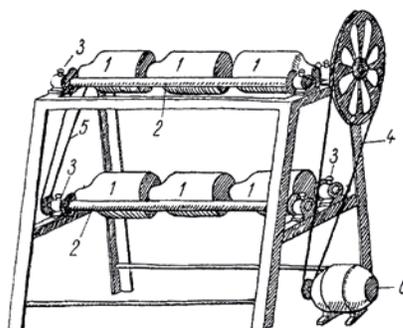
Scheme of a larger enamel melting furnace (heated by wood, later coal), longitudinal section. Legend: a – heating area with a grate, b – fireclay pots with lids, below them vessels with water, waste gas draw-off into the chimney to the right. Scheme: Radek Míšanec after Hais 2022.

52 Ibid., pp. 554–555. HAIS et al. 2010, pp. 49–52. HAIS 2022, pp. 196–197.

900 to 1,100 °C were achieved for a period of about five hours during the melting. In the bottom of the crucible was an aperture filled by a small fireclay ball. When the mixture was melted, the ball floated to the surface, the aperture opened and molten glass flew into the vessel with water. Thus prepared frit represented the basic flux, to which various pigments or opacifiers were added as needed. Enamels were then repeatedly ground, first roughly and then finely, with an addition of water and turpentine. The resulting mixture was scalded on a sand bath, dried, sifted on fine bronze sieves, sorted and subsequently packed in sacks or wooden boxes for shipment.⁵³



Drawing of an earlier type of an enamel grinding device. The wooden vessel has a tight quartzite bottom, a quartzite grinding stone on the vertical axis, spun by a waterwheel via the depicted transmissions; the drain hole is in the bottom part. Taken over from Hais 2022.



Drawing of a later type of an enamel grinding device. Legend: 1 – porcelain vessels for glass paints, 2 – shafts, 3 – bearings, 4 – propellant belt, 5 – transmission belt, 6 – electric motor. Taken over from Hais 2022.

Home glass paint production was used above all in Falknov, Kytlice and Hillův Mlýn; sporadically, it is also documented in Rousínov. In the last workshop of the Ruscher company in Mlýny, it ended around 1947, remaining shortly in operation even after its nationalization. Cheaper, but lower-quality factory production was represented in the area by the Josef Günzel and Karl Drobnik & Söhne companies from Nový Bor.⁵⁴

Buildings connected with glass painting can be identified in the terrain only if they have the form of larger workshops with window openings and especially a massive chimney, which is related to the location of firing furnaces and enamel melting furnaces. Painting premises in large finishing works can be characterized similarly. The existence of a painting workshop in ordinary residential houses is revealed above all by a preserved muffle firing furnace. In many cases, they are embedded in the place of earlier bread ovens.

Reverse glass painting

Reverse glass painting represented a specific type of craft, a painting technique applied to glass sheets using boiled oil paints diluted with turpentine. The paints were not fired. More demanding parts of the assortment were accompanied by a mirror, gilded engraving and ground and polished decoration. The main centre of this type of production was Skalice; outside the studied region, it was the boundary region of southern Bohemia and Austria (the villages of Pohoří and Sandl).

53 TOMÁNEK 1989b, pp. 180–182. TOMÁNEK 1982, pp. 197–207. HAIS 2022, pp. 190–193.

54 DRAHOTOVÁ et al. 2005, pp. 556–557. RANŠOVÁ – HORNEKOVÁ 2001, p. 70.

Its beginnings in Skalice in the 17th century are linked to the use of waste from sheet glass production in the glassworks in nearby Okrouhlá. The painting was mostly of a very utilitarian level, often featuring folk motifs. A large part of the production was exported to a greater part of Europe. Vincenz Janke (1769–1838) excelled among local painters. Most of the authors are unknown because they did not sign their works. This branch was already in decline in the early 19th century, with only three companies active in Skalice (Staritz, Schwalb, Mosig-Zinke).⁵⁵

Sandblasting, gilding, etching, matting; other techniques

Other techniques were also used in glass finishing, both within home work and in finishing plants. The sandblasting blower was patented in the 1870s, based on blasting hard grainy materials using air. Quartz sandblasting was carried out until the mid-1930s.⁵⁶ Glass was also decorated with precious metal preparations. Dust gold was used for gilding; it was fired after mixing with a flux and turpentine. Gilding was reportedly initially introduced to Falknov in 1740–1750 by Christian Endler, who came there from the Jizera Mountains. From 1880, so-called polished industrial gold was supplied by Degussa company. Silvering using an ammoniacal solution of silver nitrate was patented in 1849 and used in the Bohemian lands from the early 1860s. Lustres (solutions of organic compounds and metals that coloured them into various shades, creating a thin film on the surface of the glass) developed from in the late 19th century were also used for painting. Matting, another technique that forms a light-scattering layer on the surface of the glass, has been used since the last quarter of the 19th century. It is done chemically in a matting bath or by paste, or possibly mechanically by sandblasting. Decorative glass etching, a technique used from the late 18th and early 19th centuries, adapted the surface of glass by removing a colour layer into the desired depth using a hydrofluoric acid bath. Glass, especially mirror glass, was also polished – manually, using polishing wheels, or by immersion in a polishing bath.⁵⁷



Interior of one of the grinding mills, probably from Rousínov, with disc grinder benches. Rudolf Görtler, probably 1950s.

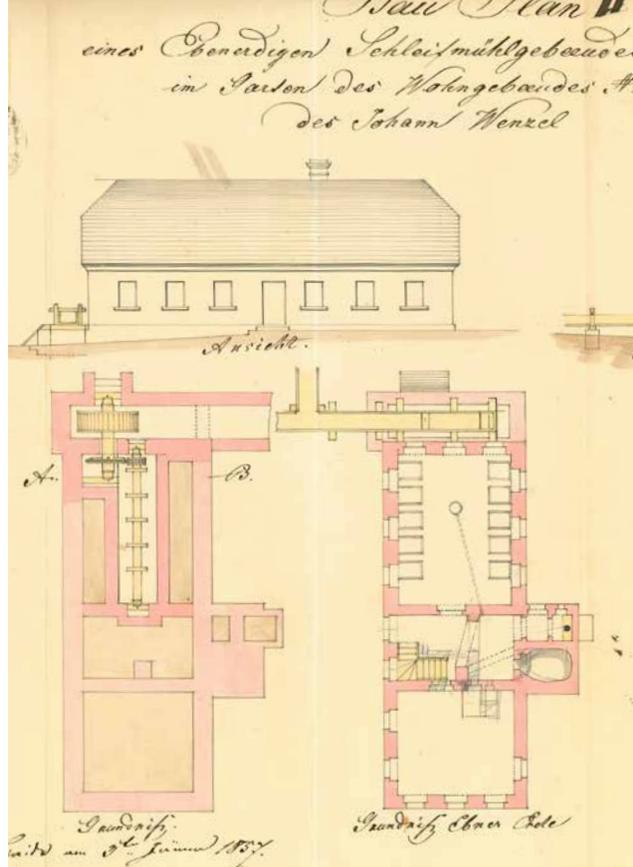
55 DRAHOTOVÁ et al. 2005, p. 561. TOMÁNEK 1981, pp. 195–196. KAVKA 2013.

56 DRAHOTOVÁ et al. 2005, pp. 548–549.

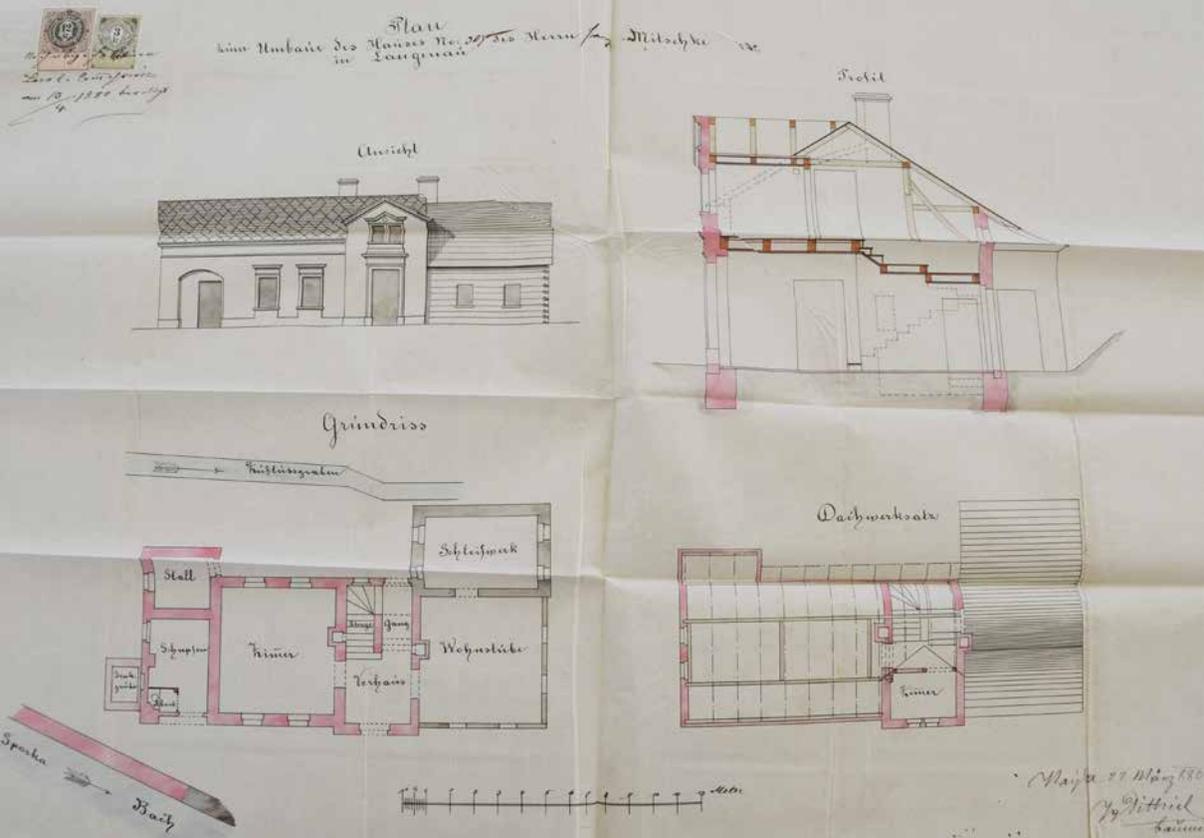
57 Ibid., pp. 557–560, 562–565. HAIS et al. 2010, pp. 52–55. HAIS 2022, pp. 193–194.

→ Plan documentation for the construction of a grinding mill, house No. 31 in Skalice (1857). The simple one-storey masonry building was still to have the traditional three-part layout. The ground plan to the right shows the living room at the bottom, above it the hall with a smoke kitchen, a bread oven and a vestibule with the lavatory; the upper part consists of the work hall with ten grinding benches.

SOKA Česká Lípa, OÚ Česká Lípa, Inv. No. 1112, sign. 11 54/ 245, carton 83.



↓ Plan documentation for a reconstruction of the residential part of a grinding mill, house No. 304 in Skalice (1880). Only the log part with the living room and the adjacent work hall (Scheifwerk) on the right-hand side of the layout were to be retained; new structures are drawn in red. SOKA Česká Lípa, AO Skalice, Inv. No. 98, carton 15.



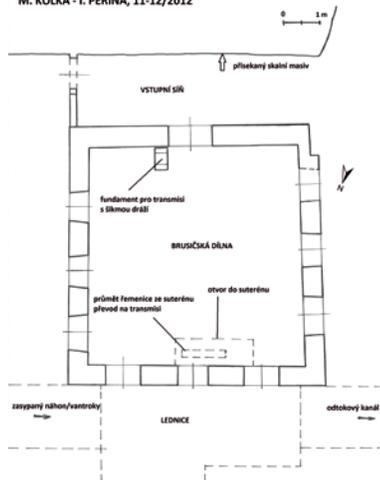
BUILDING DEVELOPMENT OF FINISHING WORKS

Of earlier buildings connected with glass finishing, the most characteristic one is the glass grinding mill; in the given region, they were mostly water-driven. As we have repeatedly emphasized, glass painter and engraver workshops are difficult to identify in the terrain after they cease operating. Following simple basic adaptations, they mostly have the character of residential buildings with which they were usually connected or of minor accessory buildings. From the last quarter of the 19th century, the designs of workshops are documented by sporadically preserved plan documentation, and in the first half of the 20th century, also by period photographs, drawings or machinery equipment schemes.

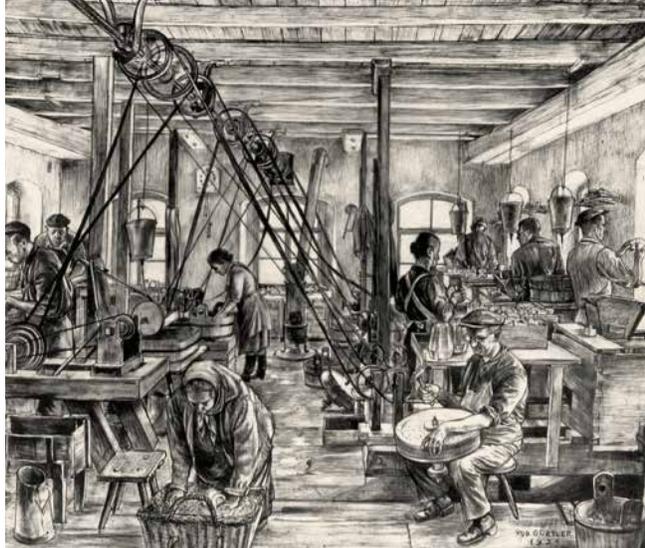
Water-driven glass grinding mills were not founded in Central Europe until the late 17th century, when they are documented in Kassel, Berlin, Petersdorf or Hermsdorf in the Silesian part of the Giant Mountains. Glass grinders also appear in the sources only in the second half of the 17th century. The earliest local glassmaker guild from Chřibská (1661 and 1669) does not yet speak about grinders in its statutes, but the guilds from Polevsko and Falknov (1683) and Kamenický Šenov (1694) do. The beginnings of water-driven grinding mills in northern Bohemia are dated to the early 18th century. In greater numbers, they are mentioned in the 1730s (1730 Falknov) and especially around 1750 (Falknov, Hillův Mlýn). The number of companies grew gradually, with a great expansion above all in the last quarter of the 18th century and then from the 1850s, in connection with the loosening of servitude relationships and thanks to the boom in the glass industry (especially the 1860s and 1870s). The number of grinding mills in the areas with the most suitable natural conditions and a glass finishing tradition (above all the Jizera Mountains and also near the glassworks in the Bohemian Forest and the Upper Palatinate Forest) reached several hundred in the late 19th century and the first half of the 20th century. Altogether 99 water-driven grinding mills have been documented in the Bor – Šenov area so far. Of these, 33 were in the territory of present-day Kytlice (Falknov, Dolní Falknov, Kytlice, Hillův Mlýn) and 44 in municipalities near Kamenický Šenov, Chřibská and Nový Bor – Dolní Prysk (15), Horní Prysk (9), Horní Kamenice (3), Kamenický Šenov (1), Horní Chřibská (1), Krásné Pole (1), Skalice (6), Nový Bor (2), Arnultovice (2), Chotovice (2), Pihel (1) and Radvanec (1). A total of 22 grinding mills have been detected in the Cvikov region. Most were situated on the Boberský Stream in Rousínov (11), Cvikov (7) and also on the Svorský Stream in Svor (3). An exception is represented by the short-time operation of grinding works in building No. 41 in Mařeničky on the Svitávka around 1910.⁵⁸

It is rather difficult to describe the development tendencies because the building form and equipment of the grinding mills did not change fundamentally. From the beginning, they were rectangular buildings with a traditional three-part layout. The central entrance hall (*Vorhaus, Vorzimmer*) was situated in the middle, accompanied by a smoke kitchen (*Küche, Küchel*), usually in the rear wing. The entrance hall was flanked by the living room (*Wohnstube, Zimmer*) on one side and by the grinding workshop (*Schleifstube, Werkstatt*) itself on the other. The propelling unit, the waterwheel, was situated in an annexe called wheel chamber (*Iednice, Radstube*) near the gable or the longitudinal (more often) façade, depending on what was more suitable in view of the location in the terrain. The earliest grinding mills were undoubtedly single-storey log buildings with gable roofs. Outwardly, therefore, they did not differ from local rural houses, but they had the production part situated in the place of the farming part (stables, storerooms). This characteristic feature is due to the fact that the buildings were built as grinding mills from the beginning. The ratio of masonry, plastered buildings gradually increased during the first half of the 19th century, and they

58 KOLKA 2012, pp. 37–39. KOLKA – PEŘINA 2014, pp. 171–193. TOMANDL 1979, pp. 23–31.



Survey of the torso of the standalone grinding mill in a farmstead, No. 12H in Mlýny. The residential house is situated on the opposite bank of the raceway (bottom). Miroslav Kolka – Ivan Peřina 2012.



Interior of the largest grinding mill in Rousínov (house No. 23). The transmission is hung typically on cast iron consoles below the ceiling, the transmission to the engines is by leather belts; the engine room is situated in the basement below the workshop. Rudolf Görtler, 1954.

completely dominated after the middle of the century. Single-storey late classicist buildings with an avant-corps were particularly typical. Two-storey buildings appeared rather exceptionally. Cases of grinding mills established in earlier residential farming houses can also be registered from the late 18th and early 19th centuries. They usually had the form of an annexe on a suitable side of the house, for instance in the farming part. Variants with a small grinding workshop separated from the living room are also known from the plan documentation (No. 261, Arnultovice). The construction of new purely production buildings, in which the residential area was minimized to one small room with a kitchen and a heating device, dominated in the second half of the 19th century (Nos. 193 and 209/II, Cvikov; Nos. 2, 57 and 65, Rousínov; No. 32, Arnultovice). They were usually built by small craftsmen close to their homesteads. However, many businesses were bought out by large glass companies, especially from Nový Bor and Česká Kamenice (Vogelsang Söhne, Brüder Podbira, Brüder Rachmann, Carl Hosch, A. Heide & Söhne, Franz Hegenbarth Söhne), and used as their branch plants. Some grinding works originated from a reconstruction of earlier grain mills (Nos. 1 and 2, Skalice). The grinding mill in No. 23, Rousínov differs from all others in both size and layout; in essence, it represents a smaller industrial building with a residential and apparently also clerical background.

The preservation of grinding works in the terrain is rather varied; many of them did not survive the end of operations after the nationalization and the displacement of the original inhabitants.

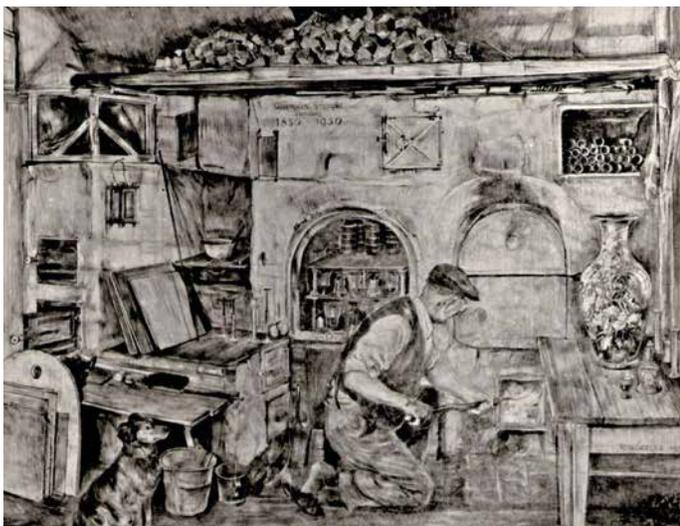
Dolní Prysk, glass grinding mill, house Reg. No. 6 (former No. 37). The production part was situated in this wing; the waterwheel chamber with the torso of the waterwheel is attached to its left gable wall. Photo: author, 2014.





↑ Dolní Prysk, glass grinding mill, house Reg. No. 38 (former No. 39). The building has a minimum residential background; the work hall in the photograph comprises most of the building. Photo: author, 2014.

← Interior of a cutting lathe workshop in Kamenický Šenov; the machines were driven by covered transmissions running along the perimeter of the room under the tables. Petr Joza's collection.

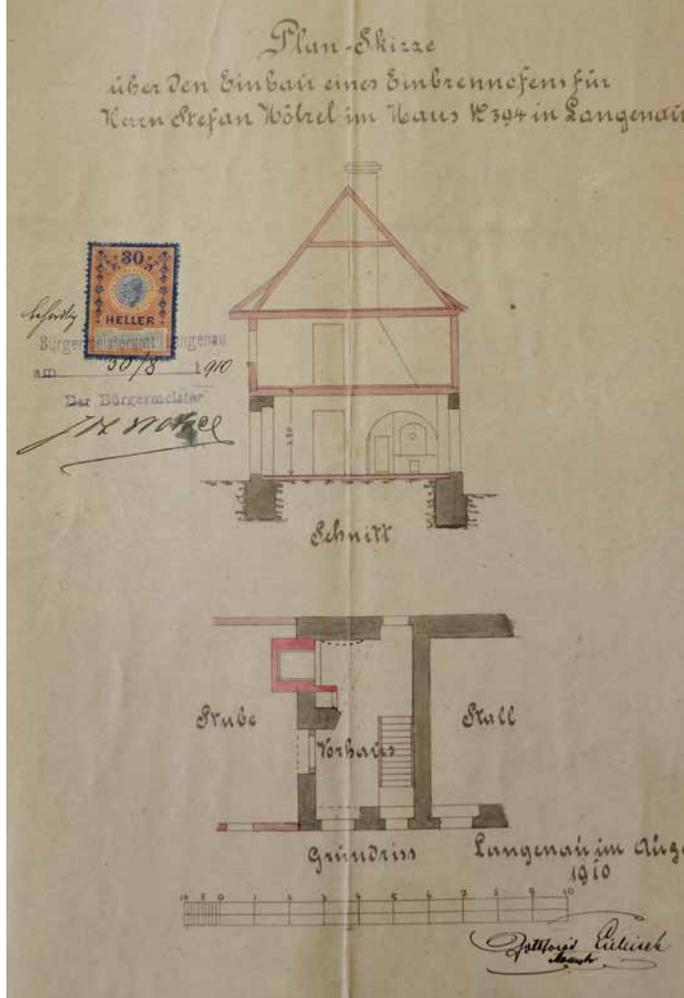


Schimpke's painting workshop in house No. 209 in Jedličná near Polevsko with two firing furnaces of a muffle type; glass firing is under way in the right-hand, covered one. Rudolf Görtler, 1959.

At least torsos of hydraulic structures (weirs, raceways, reservoirs, vaulted drainage channels and such like) are very often preserved. The most interesting of them is a masonry weir with a large raceway built of sandstone blocks covered by massive stone slabs near former house No. 23 in Rousínov. Torsos of the machinery equipment are very rarely preserved nowadays. The water-wheel torsos of grinding mills No. 341/II in Cvikov (part of the wheel, cog wheel and transmissions) and of Reg. No. 6 (formerly No. 37) in Dolní Pysk can therefore be considered unique. None of the used water turbines has been discovered in the terrain as yet. Part of an industrially made cutting lathe has also been identified for the above-mentioned building in Dolní Pysk. Until recently, a shaft and an almost complete transmission mechanism existed also in the removed grinding mill in No. 12H in Mlýny. Several more waterwheel shafts and torsos of transmissions are preserved in this village and in the neighbouring Dolní Falknov. All of the most valuable and best-preserved examples of grinding works are masonry buildings. Of the most common single-storey buildings, we can name houses No. 341/II in Cvikov, No. 41 in Kytlice, No. 45 in Kytlice (with an avant-corps and annexes), No. 38 in Kytlice (the residential part is still of a log construction), No. 14H in Hillův Mlýn (with a half-storey and an avant-corps) and No. 66 in Mlýny. The former grinding mill of the old glassworks in Falknov (No. 111, Kytlice) with a masonry ground floor and a logged first floor with a boarding probably had a rather interesting building development. Building Reg. No. 6 (formerly No. 37) in Dolní Pysk, consisting of a residential and a production wing, has two storeys as well. One of the new grinding plants of clearly industrial character with a dense grid of large windows of a factory type is Reg. No. 38 (formerly No. 39) in Dolní Pysk.

Dozens of smaller home grinding workshops also operated in the region from the late 19th century, but their precise identification in both the sources and the terrain is difficult. Larger grinding plants driven by steam engines started to come into existence outside water courses in the last quarter of the 19th century (near the Rybníště glassworks, Julius Mühlhaus & Co. in Arnultovice and more). However, they were all part of glasshouses or large glass finishing works. Electrically-powered grinding plants also appear from the late 19th century, along with the construction of power plants and the distribution network. One of the first large companies of this type was the Hartmann-Dieterichs finishing plant in Bor (1896) with extensive grinding works that were, despite modern reconstructions, preserved until recently (including the transmission system or industrially made cutting lathes). Other finishing works and glassworks as well as many smaller operations can be also included in this category. No more examples of preserved machinery equipment have been found, however, and we have to rely on contemporary photographs and archival plans.

Of small engraving and painting workshops (outside large finishing works with multiple operations), the latter are easier to identify in the terrain. A few dozen out of the hundreds of former painting works with firing furnaces might probably have survived to this day. Muffle firing furnaces have been identified in No. 14, Polevsko, No. 33, Horní Pysk and No. 109, Nový Bor, all located in the positions of traditional bread ovens. Others are documented by archival plan documentation, photographs or drawings by Rudolf Görtler. Following the model of a furnace dismantled in 1965 in one of the houses in Arnultovice, a reconstruction of the installation was carried out and exhibited in the Glass Museum in Nový Bor. Glass paint friction mills operated in the past above all in Kytlice (Nos. 38, 42), Falknov (No. 54) and Mlýny (No. 66). The only building outside of this glass paint production centre has been documented at the painting and grinding works in No. 52, Rousínov. It is made even more interesting by the fact that an archival photograph documents a high pinnacle chimney for the draw-off of waste gases from firing furnaces and enamel melting furnaces. A conversion into a painting workshop took place there in 1906. Of other buildings, the friction mill in house No. 54 in the upper part of Falknov is very well preserved; it is of a combined logged and masonry construction, equipped with a massive gable roof with small hipped ends. Torsos of vessels that might have been intended for enamel melting and grinding are reportedly preserved in some former grinding and paint mills. The painting workshop Karl Meltzer & Co. in Okrouhlá, which

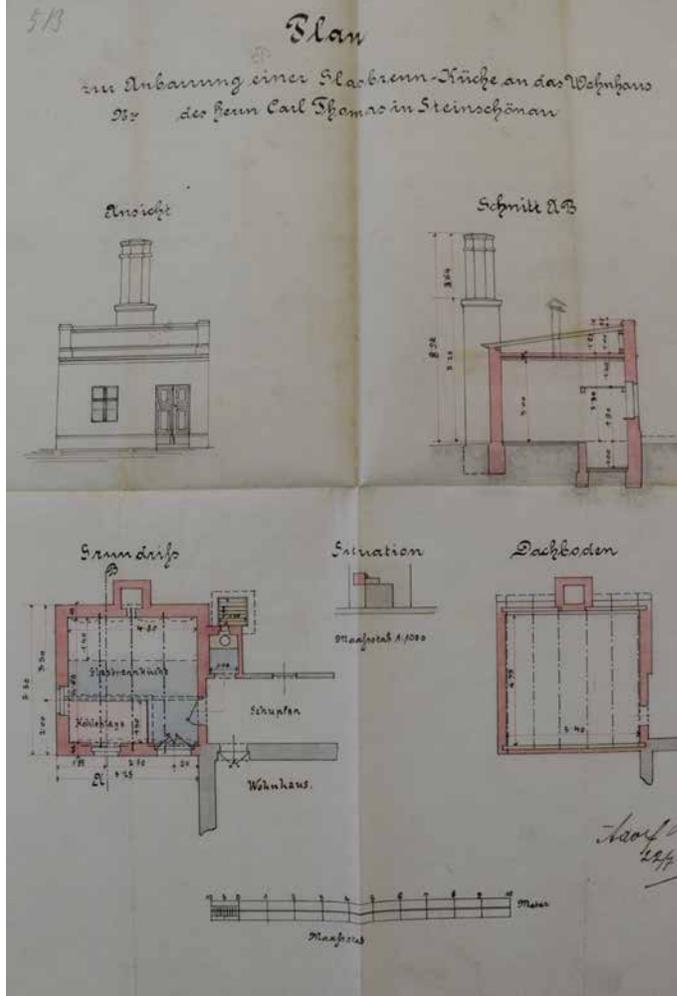


Example of the addition of a painting firing furnace to house No. 394 in Skalice in a plan from 1910. The furnace masonry sticks out into the living room (Stube); the furnace was operated from the smoke kitchen behind the hall (Vorhaus). SOKA Česká Lípa, AO Skalice, Inv. No. 98, carton 15.



Nový Bor, Hartmann-Dietrichs finishing works, house No. 306 from c. 1888. Photo: author, 2021.

Example of an annexe with a painting firing furnace, the operating area (*Glassbrennküche*), the coal storage (*Kohlenlage*) and a high chimney in a plan from 1897 to house No. 70 in Kamenický Šenov. SOKA Česká Lípa, AM Kamenický Šenov, Inv. No. 1187, carton 43.



Skalice, Stefan Hahnel finishing works, house No. 147. Photo: author, 2021.



focused on the production of church windows, was specific and larger, undoubtedly exceeding the boundaries of the region in importance. The company operated more painting workshops and finishing works in nearby Skalice. Only in Okrouhlá, however, it added to the workshop in No. 84 a sample house in the form of a high Gothic Revival chapel with extraordinary artistic decoration in 1893. A smaller factory chimney in the courtyard next to the painting workshop is also documented there.

The installations described above were gradually concentrated within glass finishing works. Until the mid-19th century, the individual techniques were located in several buildings owned or rented by the owner of the finishing works, within the spirit of a distributed manufactory. As we have stated above, many large companies operated water-driven grinding mills in this manner; however, they also employed engravers, painters, gilders and other craftsmen who worked at home. The company usually resided where its sales and store premises were situated; the owner sometimes lived there as well. Further development headed towards the concentration of most installations in one or a few premises and, therefore, towards the construction of central finishing works buildings in which all the workshops and their background were situated. The layout of large glass finishing works was adapted to their source of energy, especially if they were steam driven. The boiler room, the engine room and the chimney were usually situated in the courtyard. Grinding mills and other workshops that required the propulsion of machinery equipment were located in the main building closest to the engine room. Even where electric drive was used, these operations were mostly situated in lower storeys. Painting and engraving workshops resided in well-lighted sections. Best-accessible spaces, rooms close to the central staircases and central parts of the buildings were often used as sample facilities, sales premises and offices. Additional buildings in the courtyard were used as storage spaces for materials, wagon sheds or workshops for additional production (e.g., joiner workshops). Operations that were dangerous due to fire or other hazards often had separate buildings suitably situated within the whole premises.

The architectural and constructional design of glass finishing works is often closer to public buildings (schools, etc.) than to industrial buildings. This, together with their relatively easy adaptation, means that they lack characteristic features, especially if they do not have a factory chimney. Of the preserved complexes, the Ernst Klar glass jewellery finishing plant in Jiřetín pod Jedlovou is clearly on the highest level; it was built from 1909 and equipped with a dominant hall building with two prismatic towers. Many earlier well-preserved finishing works in the core of the Bor – Šenov area have a Neo-Renaissance character. They include the prominent companies of J. Mühlhaus & Co. in Arnultovice (c. 1870), Franz Wagner in Nový Oldřichov (c. 1869, additions in 1880, 1898), Hartmann-Dieterichs in Bor (c. 1895), F. X. Henke in Arnultovice (c. 1895), Gebrüder Zahn in Bor (c. 1895; earlier company, houses Nos. 320, 315, 328), Carl Goldberg in Bor (1897) or Stefan Hahnel in Skalice. Distinctive buildings came into existence in the early 20th century, often already with a reinforced concrete frame, brick walls and façade decoration in the geometric Art Nouveau style – B. Oppitz department store (1907, later Gebrüder Rachmann finishing works, No. 226), A. Heide & Söhne from Česká Kamenice (c. 1907), Sieber & Markgraf finishing works in Arnultovice (1913, second building after 1920). The buildings of Sommer & Zinke in Česká Kamenice (Nos. 448 and 804, c. 1924) and Gebrüder Zahn in Nový Bor (No. 632, c. 1920) had a more distinctive industrial character and a good architectural design. Simpler, but authentically preserved are finishing works such as Brüder Helzel in Chřibská (c. 1919) or Franz Stingl in Kamenický Šenov (new building near No. 73, 1929). A similar complex of Adolf Schönbek company in Kamenický Šenov (c. 1925) has regrettably been recently demolished. Similarly to glassworks, the authors of the buildings were solely local builders and architects, such as Franz Eschler and Max Eschler from Česká Kamenice, Maxmilian Dittrich from Nový Bor, Josef Schneider from Mimoň, Adolf Richter from Kamenický Šenov, the Rösler & Glaser office from Nový Bor or architect F. Doleschal from the same town.

Nový Bor, Gebrüder Zahn
finishing works, house No.
328 and 320 from c. 1895.
Photo: author, 2020.



Nový Bor, Gebrüder
Rachmann trade house and
later finishing works, house
No. 226 from 1907.
Photo: author, 2020.



Kamenický Šenov, Adolf
Schönbek finishing works
– chandelier factory, house
No. 67 from 1927 shortly
before its demolition.
Photo: author, 2021.



SPECIAL GLASS PRODUCTION – OPTICAL AND SEMI-OPTICAL GLASS

The production of optical and semi-optical glass also has a tradition in the Bor – Šenov area. It started to appear in the Bohemian lands in the second half of the 17th century. From 1678, spectacles and other optical products were made by Georg Görner from Sloup, using semi-finished products from the Falknov glassworks – suitable clear glass cast into clay moulds or cut from large glass discs. His successor, Samuel Görner, reportedly used grindstones from local sandstone for lens grinding around 1735. The family pursued this activity until the early 20th century, most of the time in Sloup (house No. 118) and later also in Nový Bor (No. 207). Spectacle glass grinding mill of the Mitschke family in Skalice (No. 304) is documented in the 1920s.⁵⁹ Industrial optical glass production was introduced for the first time in the region in Theresienhütte in Svor by the lessee, Josef Reiner, in 1932 (1933). Glass was melted in a multiple-zone melting furnace of Knoblauch type. Spectacle lenses were made by manual pressing from previously cut and balanced cubes of manually made sheet glass. The semi-product was preheated before pressing. Sun-protection glass was also made there, apparently using a technology of blowing into balls and cutting glasses from prepared segments. Prismatic glass for tank prisms became part of the assortment during the Second World War. After the nationalization of the glassworks and the formation of the national company Severočeské sklárny Svor, optical glass production was extended also to the former Adolf Rückl glassworks in Kamenický Šenov and Anton Rückl glassworks in Skalice. The former melted optical glass first in single-pot furnaces and from 1964 in electric melting furnaces; from 1974, the production went over to flat drawn welding glass using the Fourcault process. Production of sun-protection glasses of the same technology as in Svor was introduced also in Skalice, along with the production of pressed and ground welding glasses and so-called small optics. Machinery production of spectacle glasses became the principal part of this plant's activity in the early 1960s.⁶⁰

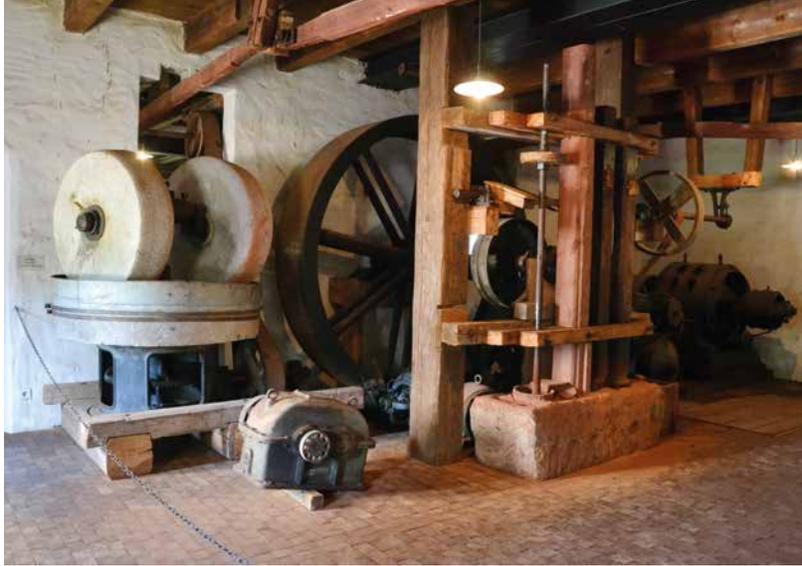
FLAT GLASS AND MIRROR PRODUCTION, BUILDING DEVELOPMENT OF MIRROR WORKS

Manual production of flat (sheet) glass was also part of the assortment of glassworks in the Bor – Šenov area, but to a lesser extent. Circular window panes (discs) were made above all in the earlier period. There were two ways of producing flat glass. The first procedure, which was used until the 1920s and exceptionally persists to this day, was production from glass cylinders. A cylinder was shaped from a blown ball by further blowing, swinging on a work platform or over a work pit and repeated heating. An opening was then made in its end (the cylinder was opened), the ends were removed, the cylinder was cut in two and let cool. Then it was put into a flattening furnace, where it was pressed into a sheet shape using a wet wooden tool. The location of a work pit close to the melting furnace is characteristic of this work procedure. The other technology was spinning. An iron stick was pasted to the top of a blown ball, and then a part of the glass was cracked off the pipe. The part that remained on the iron was further worked by spinning, shaping and reheating. Since it was crown-shaped, the glass was called crown or moon glass. From the early 20th century, flat glass underwent tumultuous technical development leading to massive machine production. The Oppermann-Lubbers system was applied first, and then especially perpendicular glass drawing with a debiteuse of the Fourcault system. This stage no longer concerns the Bor – Šenov area,

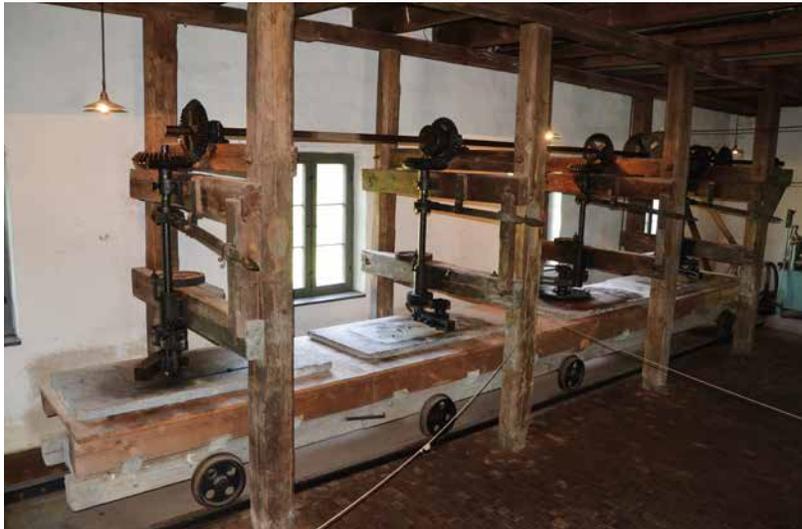
59 SACHER 1968, pp. 115–123. KIRSCH 2003b.

60 Ibid., pp. 254–255.

Theurn, museum exposition with transferred mirror works equipment. Right: stamp battery with vertical bars; left: wheel mill used to grind gypsum and possibly other materials; background: transmission mechanisms. Photo: author, 2021.



Theurn, transferred beam bench with mirror grinding machines. Glass sheets were attached by gypsum to the lower slab, while another sheet was attached in the same way to limestone slabs (so-called upper stone), moved by a vertical shaft with a transmission. Photo: author, 2021.



Theurn, transferred round grinding machine (*Rundschleifapparat*). A metal plate is situated in the lower masonry metal-plated part; the upper cast iron frame lifts the vertical shafts of two grinding limestone slabs (so-called upper stones) to which glass sheets are attached by gypsum. The transmission with the gearing is situated under the ceiling. Photo: author, 2021.



however; it is typical of the Teplice area with industrial flat and container glass production.⁶¹ Cast rolled flat glass, used above all for mirror production, was invented in France in the 17th century. The principle was that the pot with the molten glass was removed from the furnace and poured onto the horizontal surface of a casting table, where it was rolled into the desired thickness by a heavy metal roller. The sheet was then deposited in a cooling chamber. This technology found greater application in the Bohemian lands only around the middle of the 19th century and persisted until the 20th century when it was replaced for the most part by continuous cast glass production.⁶²

Mirror production is known from the 14th century. These were small concave mirrors made by pouring a molten lead and tin alloy into a hot glass ball using the blowpipe and cutting it out after cooling. The technology of pouring mercury on glass sheets covered with tin foil, making an amalgam, started to be used in Italy in the late 16th century. This method remained in use until the middle of the 19th century when it was replaced by the reduction silvering method – metal plating with silver nitrate. Venetian mirrors became the dominant goods by the middle of the 18th century. Nuremberg became an important mirror production centre in the German lands. The first mirror works were introduced to Bohemia in the second half of the 16th century and became more numerous above all from the second half of the 18th century in the Bohemian Forest and the Upper Palatinate Forest. Semi-finished products were worked in finishing works (mirror glass grinding and polishing workshops), at first above all on the Bavarian side of the border. Gradually, however, they became more numerous also on the Bohemian side. A great boom of these businesses in the Bohemian Forest and the Upper Palatinate Forest took place in the first half of the following century, when systems of as many as dozens of grinding and polishing works came into existence on many mountain and submontane watercourses. So-called Venetian mirrors with ground and engraved glass frames were distinguished from so-called Nuremberg ones with carved and gilded wooden frames.⁶³

A semi-product in the form of a glass sheet (160 × 80 cm) was worked into a mirror by grinding and polishing, decoration (faceting, engraving), underlaying with tin foils and setting into frames. These activities were carried out in finishing works called mirror works (*Spiegel Fabrick*), which included mirror grinding and polishing workshops (*Spiegelglasschleiferei*, *Spiegelschleiferei*, *Spiegelwerk*, *Spiegelpoliererei*, *Polierwerk*). Manufactories and later factory complexes also included tin foil hammer mills, stamp batteries processing abrasive sand and gypsum, sand preparation works, storage spaces and joiner workshops producing frames. The machinery was driven by waterwheels and later turbines; steam engines were used in some cases from the late 19th century, followed by electric motors. Grinding was done on wooden benches on which smooth limestone slabs were firmly anchored in a horizontal position. The glass sheet was plastered to the slab. A second glass sheet was similarly attached to the so-called upper stone. The grinding was done by rubbing the sheets one against the other using a loose abrasive from various fractions of glass sand, from the coarsest to the finest. Both sides of the glass sheets were always worked throughout the production process. The machines were driven by a waterwheel using transmissions and vertical shafts. Upper stones were replaced by cast iron plates during later adaptations.⁶⁴ A massive round grinding machine called *Rundschleifapparat* was used from the late 19th century. It consisted of a massive horizontal metal plate with a diameter of approximately 3.5 m anchored to a vertical shaft to which glass sheets were plastered, along with two upper stones (slabs) with more plastered sheets. Both parts rotated in opposite directions. The upper part was borne by a massive

61 BROUL – GRISA – SMRČEK 2005.

62 KIRSCH 2003b, pp. 127–131.

63 DRAHOTOVÁ et al. 2005, pp. 210–211. RICHTER 1998, pp. 4–6. PROCHÁZKA 2003, pp. 19–21.

64 The mirror grinding and polishing technology is described best for the Upper Palatinate region, but it did not fundamentally differ from the Bohemian lands, see RICHTER 1998, pp. 12–13.

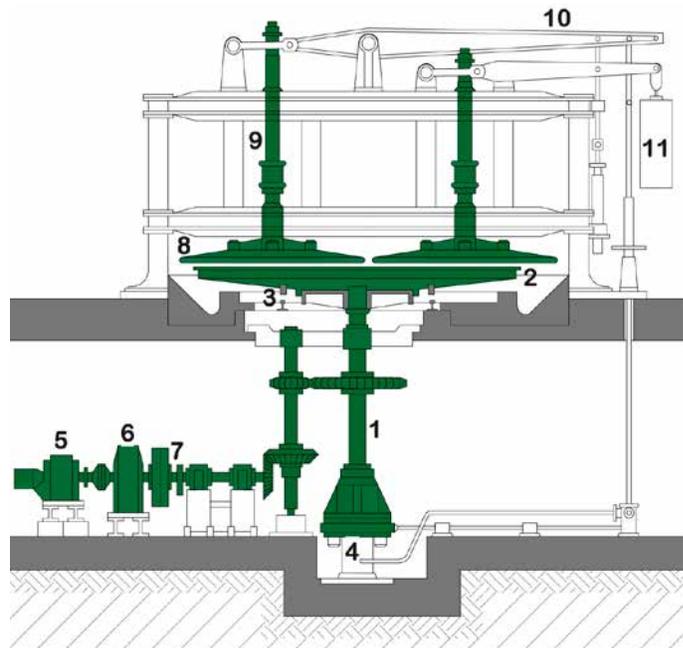
Lesná – Stará Knížecí Hut, uncovered foundations of a mirror grinding mill, house No. 9 (so-called *Neuwerk*).

Almost completely preserved round grinding machine of a later type with a revolving upper metal frame; two metal plates to which glass sheets were attached rise from the floor. The extensive transmission mechanism from a turbine is preserved below the floor.

Photo: author, 2020.

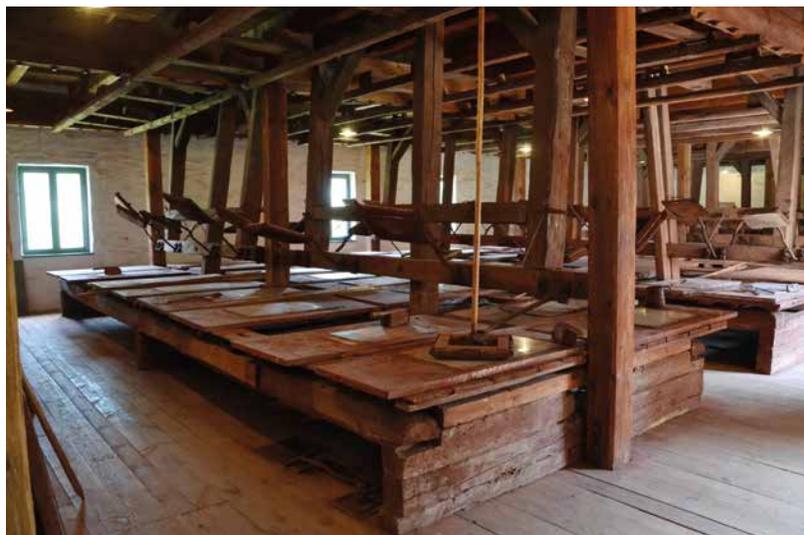


Scheme of a later type of a grinding machine from an industrial glass plant (Chudeřice). Scheme: Radek Mišanec after Kirsch et al. 2003. Legend: 1 – main shaft, 2 – circular table, 3 – table wheels and rails, 4 – hydraulic jack, 5 – synchronous electric motor, 6 – gearbox, 7 – clutch, 8 – grinding slab (*ferasa*), 9 – grinding slab shaft, 10 – grinding slab lifting levers, 11 – water tank.



Theurn, transferred mirror polishing works. Each beam bench consists of 2×8 polishing blocks. Glass sheets were attached by gypsum to limestone slabs that lay on the wooden surface; the polishing was done via a rod mechanism by a wooden block with a felt layer. Red colouring by the polishing mixture (*potée*) is visible on the device.

Photo: author, 2021.



metal frame followed by a horizontally led geared transmission. Later variants of these machines used a revolving metal frame that moved along a rail, with upper grinding wheels, also of a metal construction, attached to the frame.⁶⁵

After use, gypsum was prepared again by drying and firing in iron pots located in small buildings (*Gipsmühle, Gipshäusel*), usually in the immediate vicinity of grinding mills. Subsequently, it was pounded and ground in stamp batteries and wheel mills consisting of two vertically positioned sandstones on a short horizontal shaft. Likewise, it was necessary to prepare grinding sand, which was also processed at stamp batteries and later in tumbling mills. The ground material was floated, treated in sand washers and sorted into individual fractions. Emery with water was used as well. Glass surface imperfections and faults after grinding were removed by retouching (so-called *dušírování, doucieren*). The sheet was laid to a 50–60 cm high wooden block and marked spots were reground using grinding paste. The resulting product was flat, but matte and non-transparent. This was why polishing followed, using polishing blocks and polishing rouge called *potée* (fine ferric oxide). The blocks were assembled into wooden benches of frame construction with six to eight units in a row. The whole bench thus consisted of twelve to sixteen blocks. Glass sheets were plastered to the wooden boards of the blocks. Polishing itself was done by upper movable wooden boards, later metal plates (40 × 40 cm) with a felt layer set into a rotary movement by a rod mechanism, once again through transmissions. Due to the size of the polishing boards or plates, the sheets had to be moved continuously so that the whole surface was worked. The next operation was faceting – chamfering and grinding of the edges. Large sandstone cylinders on shafts, once again set in motion by transmissions, were used for this purpose. These machines were located



Sloup v Čechách, a view of the southwestern edge of the village from the east. The built-up area is dominated by the so-called Rock Castle (*Skalní hrad, hermitage*); below it stands the old castle premises and in front of them, an extensive farm court converted from the 1750s into the main company of the Kinský mirror works. The masses of the three residential buildings standing to this day (houses No. 181, 127 and 167) rise from the complex. Česká Lípa National History Museum and Gallery, sign. ND 8667.

65 Ibid., pp. 12–13. PROCHÁZKA 2003, pp. 280–282. KIRSCH 2003b, pp. 146–149.

Lindava, mirror grinding and polishing works, house No. 309 and 311. View from the south; the raceway was led left of the premises, cut into the sandstone bedrock of a forested hillock. The waterwheel chamber, the later turbine house and other production parts followed to the right of the premises.
Photo: Jiří Vidman, 2020.

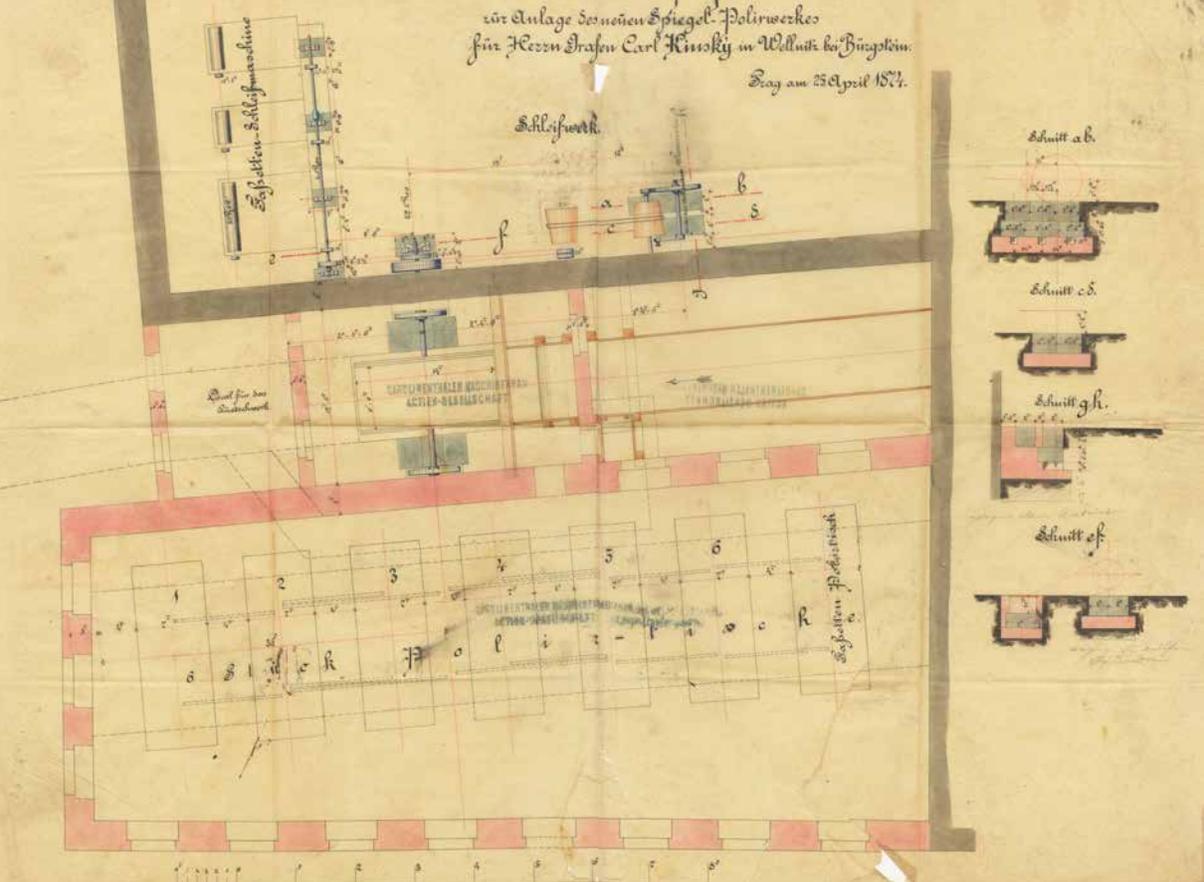


Janov, house No. 6; originally a tin foil hammer mill, later a grinding mill of the Kinský mirror works, view from the southwest; the raceway was led left of the premises under the transformer and to the rear façade of the building.
Photo: Jiří Vidman, 2020.



Lindava, mirror grinding and polishing works, house No. 308. The building is attached to a high rock wall; the raceway is led left of it and hidden under the terrain. The waterwheel chamber is cut into the massif behind the building. The symmetrically designed façades were originally fully plastered.
Photo: Jiří Vidman, 2020.





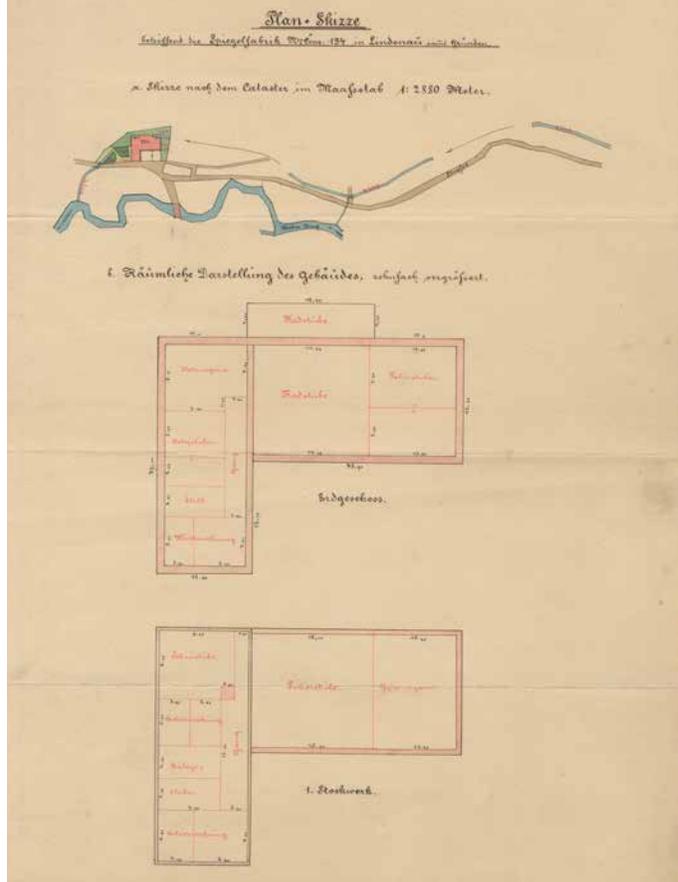
Lindava, mirror grinding and polishing works, house No. 309 and 311. Plan of the addition of new polishing works left of the raceway (red). Six benches with polishing blocks and one faceting bench were to be situated there. Top: part of an already standing grinding mill (red) with grinding and faceting benches, Carolinenthaler Maschinenbau Action-Gessellschaft, 1874. SOA Děčín, Vs Sloup, Inv. No. 306, carton 144.

in the grinding or polishing works in smaller companies, and in specialized workshops or even buildings in larger plants. One of the last processes was underlaying the mirrors with tin foils that were made in the respective hammer mills using hammer stamp batteries. Mercury was applied to the foils, and then the prepared polished sheet glass was attached. Mercury and tin merged into an amalgam.⁶⁶

As we have stated in previous chapters, one of the most important mirror production manufactories in the Bohemian lands operated in the Bor – Šenov area. Count Kinský founded it in the Sloup manor in 1756. Six premises were gradually built. The manufactory's main business was built first in a former farm court under a tor in Sloup close to the so-called old castle. It contained premises for mirror underlaying (first with tin foils, later silvering), completion of the products (inserting into frames), a laboratory, a joiner workshop producing boxes, as well as packing, sampling and shipment premises, offices and homes. The so-called Dolní Lindava Business (No. 194, Lindava) consisting of a grinding and a polishing workshop and a tin foil stamp mill was built in 1756–1760. The second grinding and polishing workshop came into existence in Lindava, houses Nos. 308 and 311 (so-called Velenice Business, 1767), and another tin foil hammer mill in No. 6, Janov (before

66 RICHTER 1998, pp. 12–17. PROCHÁZKA 2003, pp. 21–22.

Lindava, mirror grinding and polishing works, house No. 194. Sketch of the situation in the cadastral map and of the first floor and ground floor layout. The left wing was roofed with a mansard roof; according to the drawing, it has more subtle (log or half-timbered) walls on the first floor. The right production wing had a gable roof; the waterwheel chamber is attached to it on the ground floor. SOA Děčín, Vs Sloup, Inv. No. 957.



1800). The hammer mill was later converted into a grinding mill and a facility for the processing of wooden components. Two more buildings with predominantly polishing operations were built in Lindava in the 1850s and 1860s (No. 308, so-called Rabštejn Business, 1854 and No. 66, so-called Horní Lindava or Kunratice Business, 1869). Semi-finished products were apparently taken above all from the Falknov glassworks, after its demise also from other north Bohemian glassworks and from 1777 from the glasshouse in Prášily, which Count Kinský bought for this purpose. The Kinský family built another base with glassworks and dozens of mirror glass grinding and polishing workshops in 1823–1872 in Fichtenbach near Dolní Fojmava, Domažlice region.⁶⁷

Of the Sloup mirror works buildings, two grinding mills in Lindava (Nos. 309 and 311, No. 308) and a building in Janov are preserved intact. Only torsos of hydraulic structures and, possibly, masonry foundations remain of the other operations. Directly in Sloup, only buildings Nos. 181, 129 and 167 are standing of the former mirror works. The earlier of the preserved grinding mills in Lindava (Nos. 308 and 311) is a very valuable example of a Late Baroque building combining a masonry ground floor, a half-timbered first floor and a half-hipped roof. Original carpenter roof and ceiling structures are preserved from the time of construction in 1766–1767. Later adaptations on the first floor are logged. Quite exceptional is the design of an extensive hydraulic structure with a weir at the end of a rock gallery and a raceway leading partially through an open channel and in the lower part through an extraordinarily long rock gallery with waste weirs. Regrettably, the production and

67 SOA Děčín, Vs Sloup, Inv. No. 306, carton 144 (mirror works); inv. No. 330, sign. XVI/B, carton 151 (water law affairs); Inv. No. 957 (mirror works building plans). PAUDLER 1885, pp. 24–27, 49. KLÍMA 1955, p. 419. PROCHÁZKA 2003, pp. 29–58.

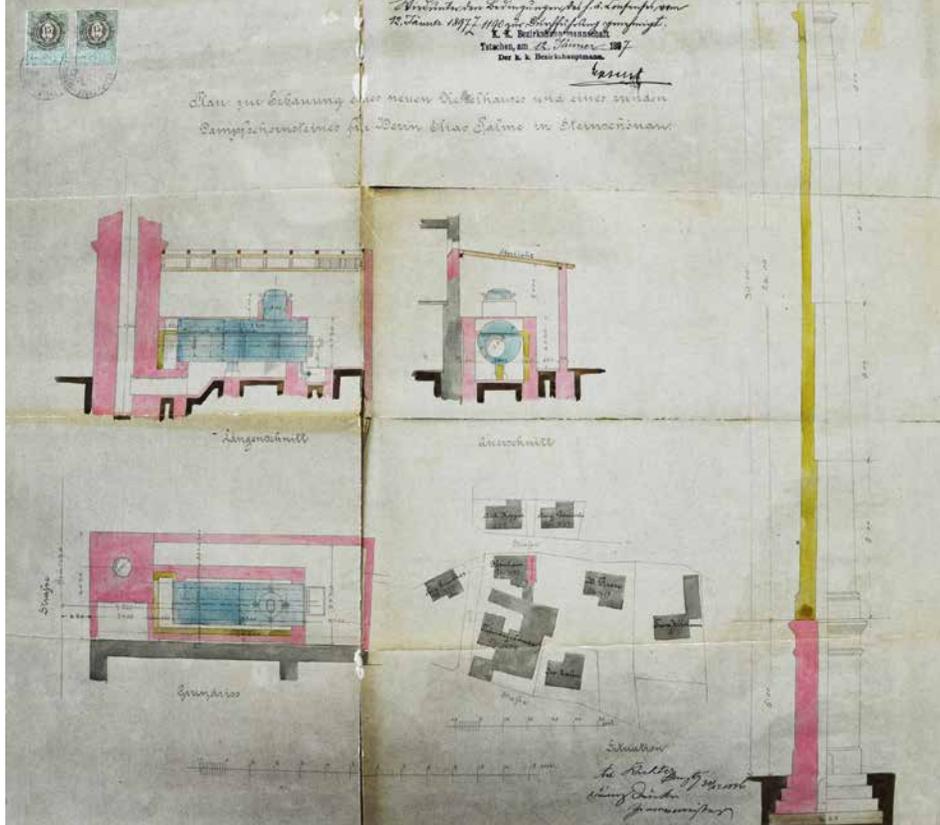
accessory buildings surrounding the main building have vanished for the most part; only their buried torsos are visible in the terrain. Later analogies for the dominant considerably elongated mass of the grinding and polishing works with a typical half-hipped roof can be found in archival images of dozens of these installations especially from the Upper Palatinate Forest, the Bohemian Forest and related localities on the German side of the border. Only two of the more than 120 buildings are preserved on the Bohemian side, however, in Pec pod Čerchovem and near Nemanice, Domažlice region.⁶⁸ Out of the buildings published and localized in the terrain so far, none have been identified that would approach the so-called Velenice grinding and polishing works in terms of age and the use of the half-timbered construction on the first floor.

The later, so-called Rabštejn Business in No. Lindava from 1854 is preserved very intact. The layout of its main building is divided into a central entrance area and two large vaulted working halls on the sides. The first floor is completely residential, which light dividing partitions and a corridor in the rear section along a hewn rock wall. The hydraulic structure smoothly followed the earlier Velenice Business. Its design is also unique, with its predominant part hidden in the bedrock. The raceway leads through a gallery up to a large rock cavern hewn into the wall behind the building where the waterwheel chamber is situated and a waste weir and a drainage channel are hewn. Compared to other glass finishing works in the region and mirror works in other regions, this polishing works building has an extraordinarily impressive historicizing façade. We cannot find any analogies for it, either. The tin foil hammer mill and later grinding mill in Janov has a regionally typical classicist mass with masonry ground floor, logged first floor and mansard roof. Its layout follows the traditional three-part division combining residential and production spaces on both sides of the central hall. Similarly designed was also Lindava's earliest grinding and polishing works, No. 194 from the late 1750s. The L-shaped building had a masonry ground floor and wheel chamber, and probably a logged or half-timbered first floor. The wing consisting of residential, office and production spaces had a high mansard roof topped with a turret. The other production wing with a gable roof consisted of the engine room and a production hall on the ground floor and a production hall and gypsum storage on the first floor. The latest polishing works in Lindava, No. 66, apparently also had a masonry ground floor and a combustible first floor; it was designed only as a production hall with an attached wheel chamber. A separate house was used for residential purposes. Comparing the described buildings with analogies from other regions, we can find similar layout designs for all described variants. The most common type is a grinding mill situated on the ground floor and a polishing workshop on the first floor. However, cases with polishing or grinding works on the ground floor and a residential first floor or the use of the full layout for production purposes (without a residential and farming background) can also be documented, especially in the last quarter of the 19th century. No torsos of machinery equipment have been discovered in the Bor – Šenov area as yet. According to plan documentation and detailed information in written sources, however, the machines were similar to those that have been transferred into museum operation in Theuern, Upper Palatinate, or uncovered in the place of vanished mirror works in the Upper Palatinate Forest.⁶⁹ Machinery (including waterwheels and transmissions) from První pražská strojírna (Carolinenthaler Maschinenbau Action-Gesellschaft) is documented in the 1870s for the Velenice Business in No. 309 and 311 in Lindava. Round grinding machines (*Rundschleifapparat*) and other devices by the Nuremberg-based company Bearnshaw & Co. operated there already in the late 1880s.⁷⁰

68 Numerous examples of mirror works premises are provided in archival photographs and plan documentation in the publications PROCHÁZKA 2003 and RICHTER 1998. Most of them are one- or two-storey buildings with a monumental elongated mass and a half-hipped roof. Earlier buildings from the second quarter of the 19th century are covered with a high hipped roof. The design of most façades is very modest.

69 See the publications quoted in the previous footnote.

70 SOA Děčín, Vs Sloup, Inv. No. 306, carton 144 (mirror works); inv. č. 330, sign. XVI/B, carton 151 (water law affairs); Inv. No. 957 (mirror works building plans).



Kamenický Šenov, Elias Palme chandelier factory, earlier company, house No. 168. Plan of a designed annex with a factory chimney to house No. 241 in Lidická Street; the new part was to serve as a boiler house for the steam engine, Adolf Richter, 1896. SOkA Česká Lípa, AM Kamenický Šenov, Inv. No. 1187, carton 43.

CHANDELIER AND ILLUMINATION GLASS PRODUCTION, BUILDING DEVELOPMENT OF CHANDELIER WORKS

Specialization in the refining and completion of chandeliers including metal accessories developed strongly within glass finishing in the Bor – Šenov region as early as the first half of the 18th century. As stated in the previous chapter, mentions of chandelier production in the glasshouse in Juliova near Kropach from the 1680s represent the earliest evidence of this type of production in the Bohemian lands; the same can be said about the chandelier assemblage workshop of Josef Palme that operated in Prácheň from 1724. In the following periods, manufactories and trading companies focusing on chandelier production concentrated above all in Kamenický Šenov, Prácheň, Nový Bor, Chříbská and Polevsko, as well as other municipalities in the region. No considerable changes in this trend came even after the companies' transition to factory production. The Elias Palme company in Kamenický Šenov started to dominate among chandelier manufacturers from the last quarter of the 19th century. The manufacture of chandeliers included the production of the load-bearing structure of metals or wood, the supply of glass parts and the working and decoration of both. Glass parts and chandelier pendants were often ordered from distant glassworks. An important impulse came from the invention of the light bulb in the late 1870s and the gradual introduction of electric light fittings. From that time, the designs resulted from a cooperation between glassmaking and electrical engineering companies.⁷¹

71 BROŽOVÁ 1985, pp. 8–16. KIRSCH 2003b, pp. 433–480.



Haida. Poststraße.

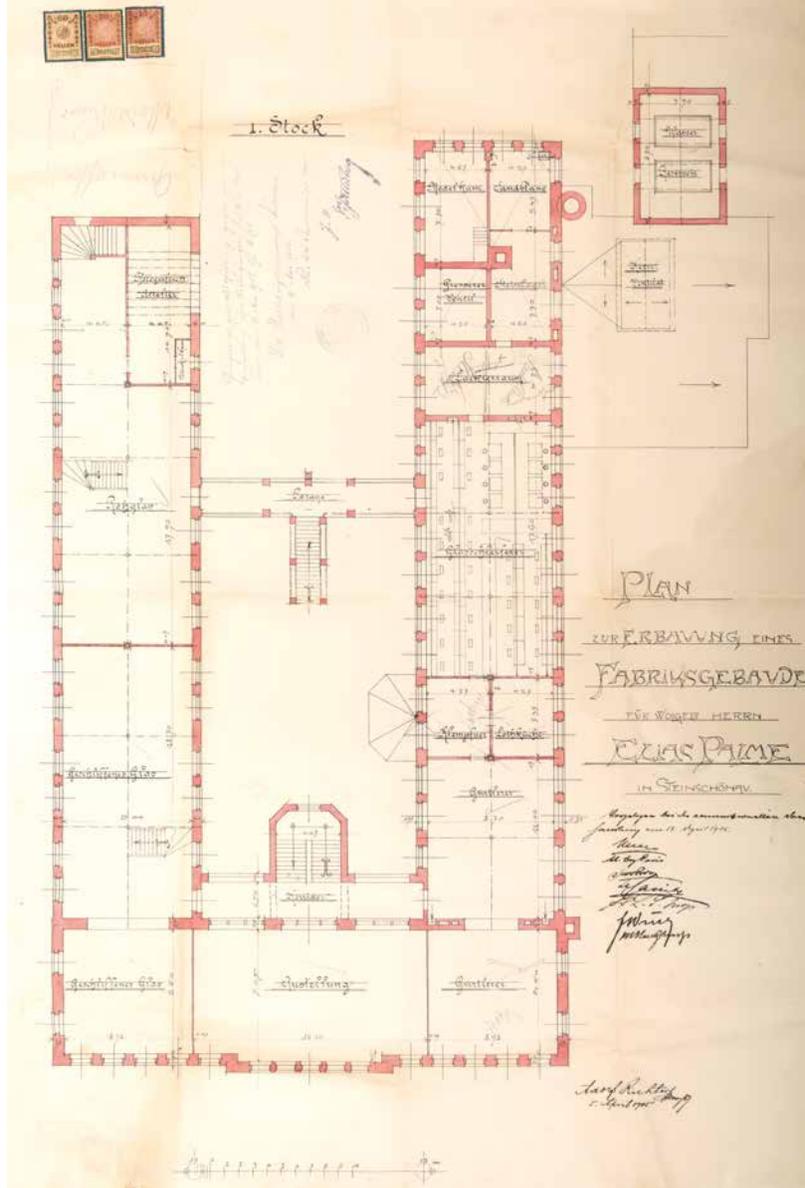
Nový Bor, view of Poštovní (present-day T. G. Masaryka) Street in the direction of the square; the left side was dominated by the building of the Carl Hosch chandelier factory (in the area of present-day house No. 830). Ladislav Komůrka's collection.

Brass and bronze were used most often for metal parts. Full or hollow casting was used, the latter using the lost-wax method. The moulds included a core of wood, clay, a mixture of sand and clay or a mixture of sand, sawdust and water. Wax was applied to this core in the width of the future cast; after pouring the metal, it melted. Another method used was casting into two-part sandstone moulds. The produced casts were worked by grinding (rough cleaning of the surface), filing and refinement (final modelling of imperfect imprints of the relief). Metal parts were decorated by silvering and gilding. Glass parts were made by the glassworks according to the customer's sample books. It was hollow blown glass shaped in forms and decorated with glassworks techniques and optic-blown decors. Parts for rods, chandelier arms, mouldings, leaves, bowls, points, balls or bells were made in this manner. Glass pendants had various shapes in various periods: flat (*pendle*), oval (*vachtle*), balls, pears, small heads, rosettes, stars, fruits or stones. They were made by pressing, sometimes done by pliers. The Jablonec glassmaking area dominated in the production of these elements from the second half of the 19th century. Like other types of refined glass, semi-finished products were worked by grinding on disc grinders and cutting lathes, polishing or painting (enamels, lustres). These techniques, as well as matting and etching, were also used in the production of illumination glass (kerosene lamps and their chimneys, lampshades, desk and wall light fittings, etc.).⁷²

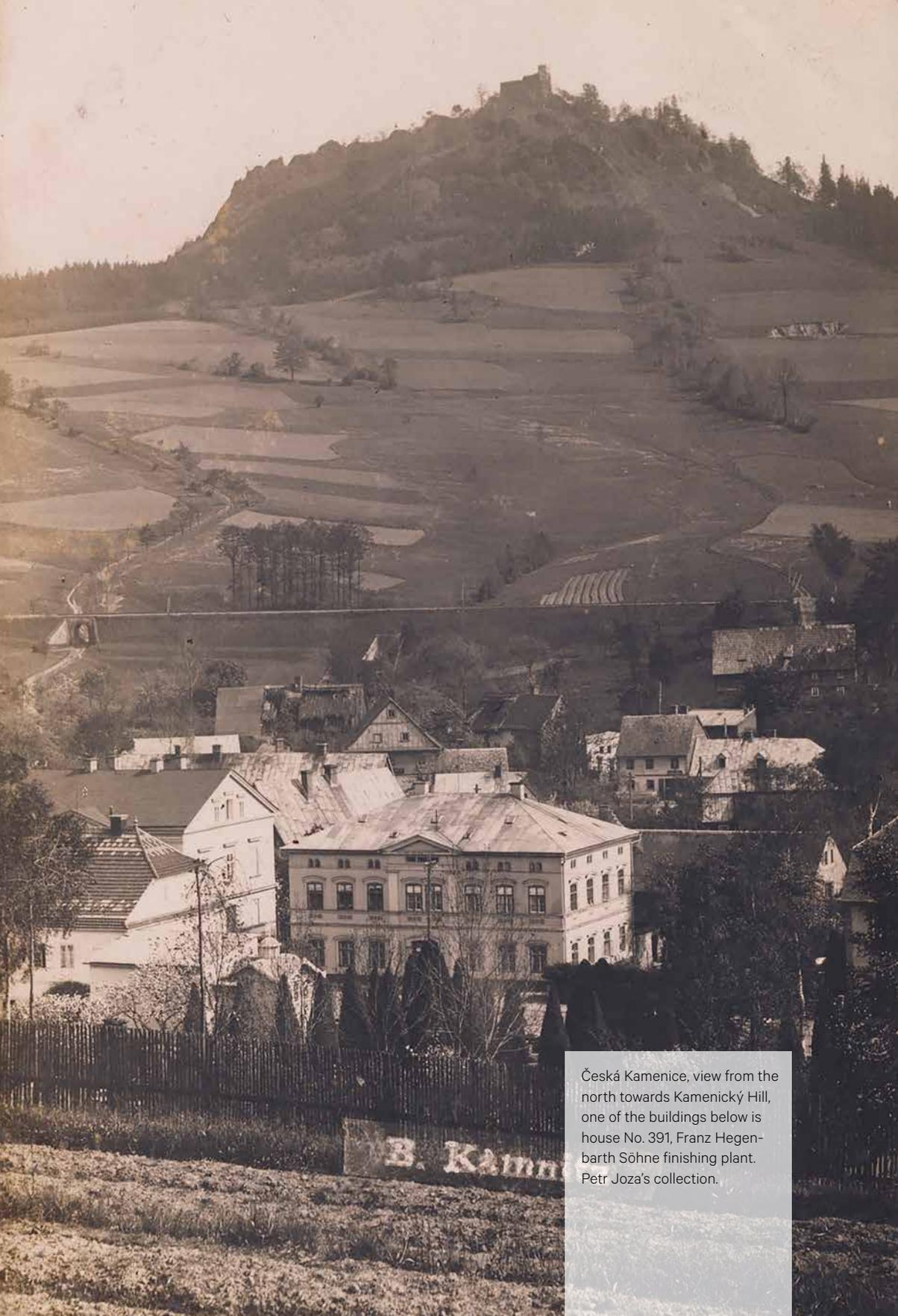
Of the numerous glass finishing works specializing in the production of chandeliers and light fittings, the two premises of the Elias Palme company in Kamenický Šenov are among the most interesting in terms of both construction and layout. The earlier, No. 168 Dlouhá Street, went through an interesting development from a log residential house with an attached workshop through a reconstruction and extension after a fire in 1868 to a smaller industrial complex in the 1890s that included glass finishing works, form works, a foundry and energy background with a steam engine and a dominant factory chimney. Regrettably, the complex went through many utilitarian modern reconstructions. For spatial reasons, the company built a new factory complex No. 686 nearby in 1905; its buildings already use a reinforced concrete frame, brick walls and plastered façades with decoration of Art Nouveau character. The complex was designed rationally, from prestige trading and office areas in the front wing to glass finishing operations and the boiler and engine room in

72 Ibid., pp. 407–414, 433–480.

Kamenický Šenov, Elias
 Palme chandelier factory,
 house No. 686. Plan of the
 construction of the main
 building (1905, Adolf
 Richter, Kamenický Šenov),
 first floor layout
 (approved version).
 SOKA Děčín, OÚ Děčín,
 Inv. No. 399, sign. 11 43/951.



one of the two court wings. Smaller buildings for the preparation and storage of materials (brass furnace, sand washer) stood in the courtyard behind them. The elongated rectangular core of the premises was made complete on the rear side by the foundry and form works building. Three high and three smaller factory chimneys rose from the buildings. The existence of one of the most important glass finishing works in the Bor – Šenov area, architecturally, historically as well as in terms of historic preservation, is considerably endangered, despite its status as a cultural monument; some of the buildings are within the destruction horizon already. Regrettably, earlier demolitions affected other important chandelier factories, Carl Hosch and Reinhold Palme Söhne in Nový Bor and, quite recently, in 2022, also the Adolf Schönbeck finishing works in Kamenický Šenov. Modern adaptations considerably changed or partially destroyed also the chandelier factories Theodor Palme, Christoph Palme & Co. and Kajetan May in Prácheň or Wilhelm Tschinkel in Horní Chřibská and Krásné Pole.



Česká Kamenice, view from the north towards Kamenický Hill, one of the buildings below is house No. 391, Franz Hegenbarth Söhne finishing plant. Petr Joza's collection.

B. Kamm

REGISTER OF LOCALITIES WITH GLASSMAKING OPERATIONS

The register presents the individual settlements in the Bor – Šenov area in which the occurrence of structures connected with glassmaking has been discovered. The register is organized alphabetically according to cadastral areas. The complete list of companies and entrepreneurs exceeds the spatial possibilities of this publication. The overview and maps include companies that were important from the historical and technological viewpoints and, above all, buildings of an industrial character. Structures connected with glassmaking materials, transport, especially railway transport, and electrification are also registered because they mostly had a considerable influence on the development of the companies and the modernization of their machinery.¹

ARNULTOVICE U NOVÉHO BORU CADASTRAL AREA

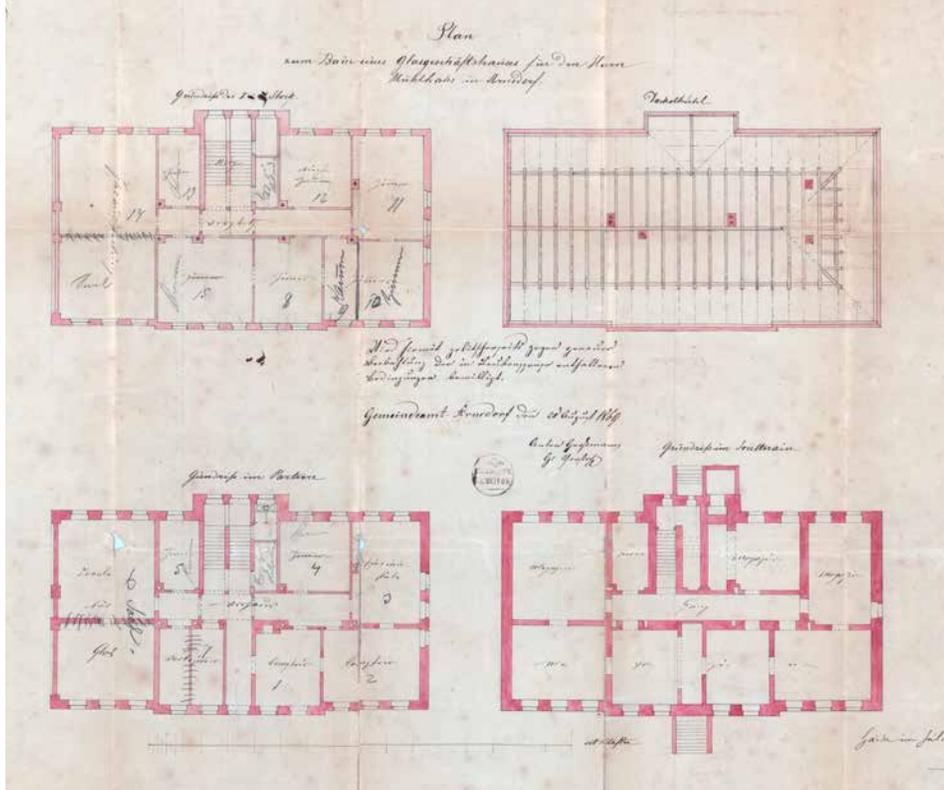
Many buildings that functioned as home workshops and glass finishing works in the past are situated in the territory of Arnultovice. In the last third of the 19th and the first half of the 20th century, Arnultovice had at least about eighty glass finishing works and smaller glassmaking traders; moreover, many home craftsmen, especially painters, grinders, cutting lathe operators and girdlers worked for them in local houses. The foundation of companies was concentrated in several waves in the 1870s, 1890s, 1920s and 1930s. The most important glass finishing plants included Brüder Hantschel, Franz Xaver Henke, Julius Mühlhaus & Co., Vinzenz Oppitz & Sohn, Sieber & Markgraf and Adolf Zinke. The most interesting buildings of these companies constructionally are concentrated above all in B. Egermanna Street on the boundary between the Arnultovice and Nový Bor cadastral areas. The most important industrial companies producing frames and gilded mouldings for the completion of glass products in the Bor – Šenov area were situated in the cadastral area of Arnultovice. Steam sawmills were also part of the operations.²

- 1 In view of the extent of the source base and the possibility of examination, especially of the interiors, it has been impossible to register all buildings. Precise localization was not possible for many companies due to the extent of the necessary archival research. Localities where only glass traders, home craftsmen without a link to a particular production building or glassmakers employed by companies from other municipalities are documented were left out altogether.
- 2 SOKA Č. Lípa, AO Arnultovice, Inv. No. 4, carton 2V, municipal chronicle 1849–1887. HANTSCHHEL 1911, pp. 253–260, 266, 275, 278, 293–294. SIEBER 1924, pp. 80–81, 134. RANŠOVÁ – HORNEKOVÁ 2001, pp. 72, 74–75, 76, 81–82, 83, 91, 96. FAHDT 1887, p. 99. *Verzeichnes der Hausbesitzer von Haida – Arnsdorf* 1934, p. 44. BERAN – VALCHAŘOVÁ 2007, p. 27. RASOCHA 1989, pp. 2, 6–7, 21, 25, 31–33. JINDRA – KOMŮRKA 2006b, pp. 35, 36, 91, 147, 148 a 150.



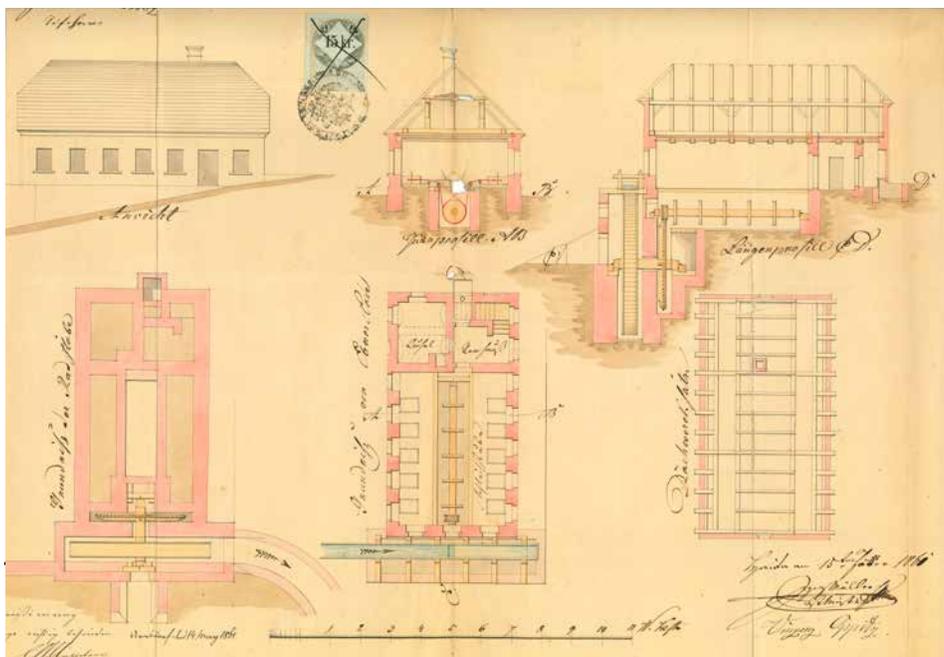
Arnultovice, view from the west of the built-up area with finishing plants lining B. Egermana Street; front centre: J. Mühlhaus & Co. finishing plant, houses No. 231 and 275; behind them: Brüder Rachmann metal production plant, house No. 322; left next to the railway: F. X. Henke finishing plant, house No. 132.
Photo: Jiří Vidman, 2021.

- | | |
|--|--|
| 1 Gross Seifert/Schindelwand glassworks | 24 Preibisch Oswald, painting workshop, house No. 325 |
| 2 underground glass sand mine | 25 Reinisch Robert, glass grinding mill, house No. 261 |
| 3 glass sand mines | 26 Richter Julius, finishing works, house No. 28 |
| 4 Austen Rudolf, painting workshop, house No. 78 | 27 Rückert Heinrich, painting workshop, house No. 208 |
| 5 Bienert Theodor, painting workshop, house No. 454 | 28 Scherbaum Heinrich, finishing works, house No. 272 |
| 6 Böhmer Hermann, finishing works, house No. 196 | 29 Schmutzer Hermann a Rudolf, finishing works and painting workshop, houses No. 54 and 315 |
| 7 Bredschneider Franz, finishing works, house No. 11 | 30 Sieber & Markgraf, finishing works, houses No. 428 and 500 |
| 8 Cristalla, finishing works, house No. 348 | 31 Skalitzky Johann, finishing works, house No. 137 |
| 9 Eckert Fritz, painting workshop, house No. 294 | 32 Sykora Hugo, painting workshop, house No. 495 |
| 10 Furche Karl Hermann, finishing works, house No. 405 | 33 Šimon Josef, finishing works, house No. 69 |
| 11 Gube Richard, painting workshop, house No. 477 | 34 Tschernich Carl, finishing works, house No. 159 |
| 12 Hantschel Brüder, finishing works, house No. 322 | 35 Warzel Heinrich, finishing works, house No. 24 |
| 13 Heller Ludwig, finishing works, house No. 532 | 36 Welek Friedrich, painting workshop, house No. 29 |
| 14 Henke Franz Xaver, finishing works, house No. 132 | 37 Wolf Josef, painting workshop, house No. 103 |
| 15 Hoffeuer Anton, finishing works, house No. 366 | 38 Wolf Wilhelm, finishing works, house No. 355 |
| 16 Inwald Josef A. G., finishing works, house No. 293 | 39 Zeuner Emil, finishing works, house No. 449 |
| 17 Knoll Ernst, painting workshop, house No. 518 | 40 Zinke Adolf, finishing works and bronze ware workshop, house No. 274 |
| 18 Kučera Mathias, finishing works, house No. 245 | 41 Deutschmann Franz & Co., steam sawmill, house No. 291; gilded moulding and frame factory, house No. 308 |
| 19 Ladisch & Menschel, finishing works, house No. 101 | 42 Handschke Julius, gilded moulding and frame factory, house No. 297 |
| 20 Mühlhaus Julius & Co., finishing works, houses No. 231, 275 | 43 Ladisch Franz, gilded moulding and frame factory, houses No. 358 and 471 |
| 21 Oppitz Heinrich & Emanuel, finishing works, house No. 317 | |
| 22 Oppitz Richard, finishing works, house No. 385 | |
| 23 Oppitz Vinzenz & Sohn, finishing and glass grinding works, house No. 32 | |



Arnultovice, J. Mühlhaus & Co. finishing plant, house No. 231, plan of the earliest, southeastern part of the building (1869, Ignaz Dittrich); bottom from the right: floor plant of the basement (storage) and ground floor (offices, sample room); top from the left: floor plan of the first floor and roof structure. Nový Bor Building Authority, archives, file of house No. 231.

Arnultovice, glass grinding mill, house No. 32, plan (Ignaz Müller, 1861); bottom: floor plants of the basement, ground plan and roof structure; top: sections and view on the left. SOKA Č. Lípa, OÚ Č. Lípa, Inv. No. 867, sign. W.B.35, carton 66.





Arnultovice, view from the southeast of the buildings of Sieber & Markgraf finishing plant, houses No. 428 and 500. Photo: Jiří Vidman, 2021.

BUKOVANY CADASTRAL AREA

Glass sand mining is documented in the cadastral area in an underground mine called Small Gipsy Cave.³

CHOTOVICE CADASTRAL AREA

The glass industry in the form of minor finishing works has been documented in the municipality above all from the last quarter of the 19th century. The following companies operated there in the 1920s and 1930s: J. F. Kreibitz, W. Kulka, Pohl & Koepke, A. H. Wittoch & Co. Two glass grinding mills operated in the cadastral area on the Chotovický Stream in at the end of the 19th century: house No. 29 (reconstruction of an earlier grain mill in the late 19th century, Nový Bor based company Brüder Podbira, vanished) and No. 54 (existed before 1843, owned by Hermann Keil at the beginning of the 20th century, fragmentarily preserved).⁴

3 BRZÁK – FABIÁNEK – HAVRÁNEK 2007, pp. 196–201. PEŠA 2004, pp. 85–86, 115. The position of the quarry is registered in the map of the Sloup v Čechách cadastral area.

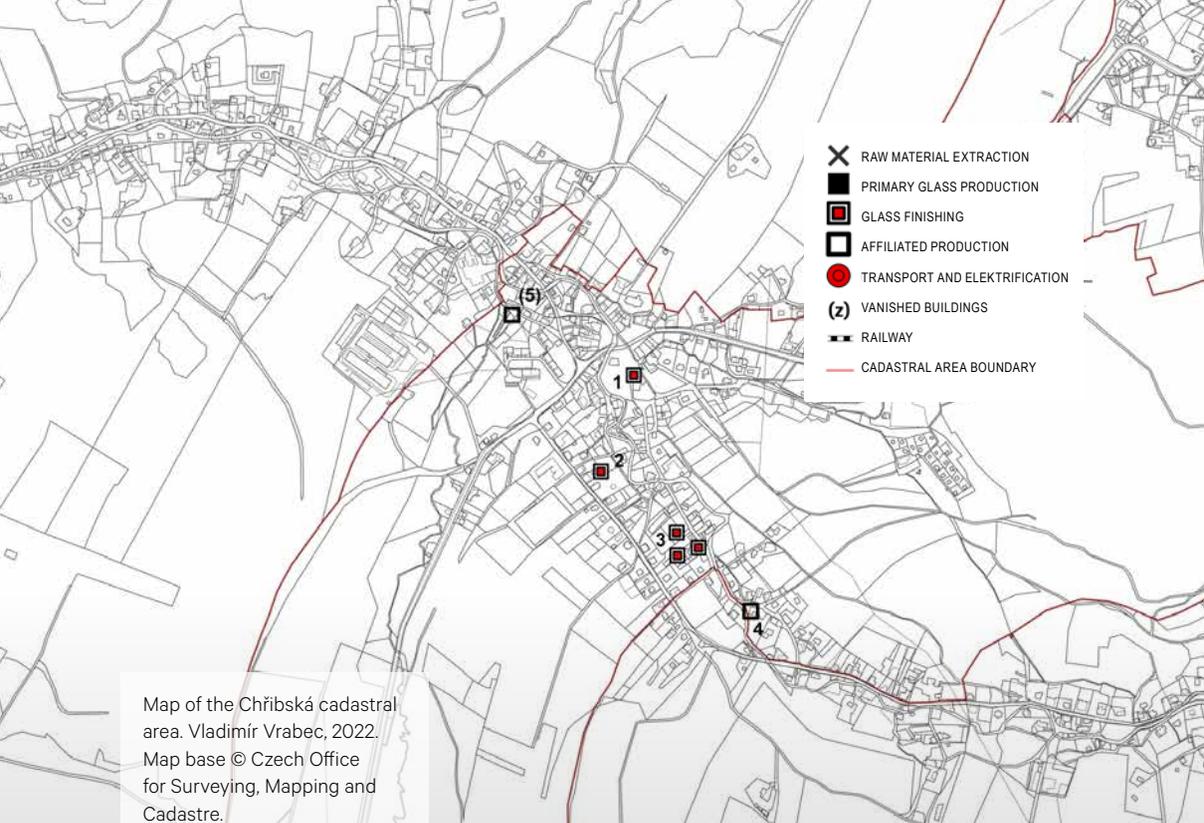
4 HANTSCHER 1911, p. 962. SOKA Č. Líba, fond OÚ Česká Líba, Inv. No. 9, carton 1V, Water Book for the judicial districts Česká Líba and Nový Bor (insert No. 60 and 62), Inv. No. 970, sign. W.B.60, W.B.65, 115/61, carton 73, Inv. No. 971, sign. W.B.62, carton 73. *Adressbuch des Glasindustriegebietes Haida-Steinschönau und Umgebung* 1928, p. 114.



Map of the Chotovice cadastral area. Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.

1 glass grinding mill, house No. 29

2 glass grinding mill and cutting lathe workshop, house No. 54



- | | |
|---|--|
| 1 Hampel & Worm glass grinding mill, house No. 23 | 4 Kreibich & Richtl foundry, metal form production, house No. 85 |
| 2 Karl Krollop finishing works, house No. 125 | |
| 3 Brüder Helzel finishing works, houses No. 311, 322, 278 | 5 Pohl a Karas ironworking, iron form production, house No. 147 |

CHŘIBSKÁ CADASTRAL AREA

The operation of the important glasshouse in Horní Chřibská made Chřibská and its neighbourhood one of the earliest centres of glass refining not only in the Bor – Šenov area. The first glass painters are registered in the town already by the 1654 tallage register. Their gradual increase in number led to the foundation of the oldest glass guild in Bohemia in 1661. The first engraver joined the guild in 1669, and their proportion grew more considerably from the late 17th and early 18th centuries. Several glass finishing works of a proto-industrial character operated in Chřibská. Franz Anton Zahn's imperial-royal privileged factory was one of the most important as of 1840. Address books from the late 1850s and early 1860s register Josef Zahn & Comp., Josef Grohmann, Anton Pohl and Josef Schlegel glass finishing works in Chřibská. The existence of four more important finishing plants can be documented in Chřibská in the first half of the 20th century: Brüder Helzel, Karl Krollop, Johann Liebsch and Hampel & Worm. The constructionally most valuable complex is undoubtedly the Brüder Helzel finishing plant, house No. 311 and 322, from 1919.⁵

5 VOLF 1968, p. 204. HETTESŠ 1964, pp. 4–5, 17–20. SLAVÍČKOVÁ 2001, pp. 8 and 22. GRISA 2015, p. 144. *Adressbuch der Glas- und Keram-Industrie der Tschechoslowakei 1926*, pp. 67 and 68. *Adressbuch der Glas-Industrie 1929*, p. 507. JOZA – NĚMEC 2012, pp. 66–67.



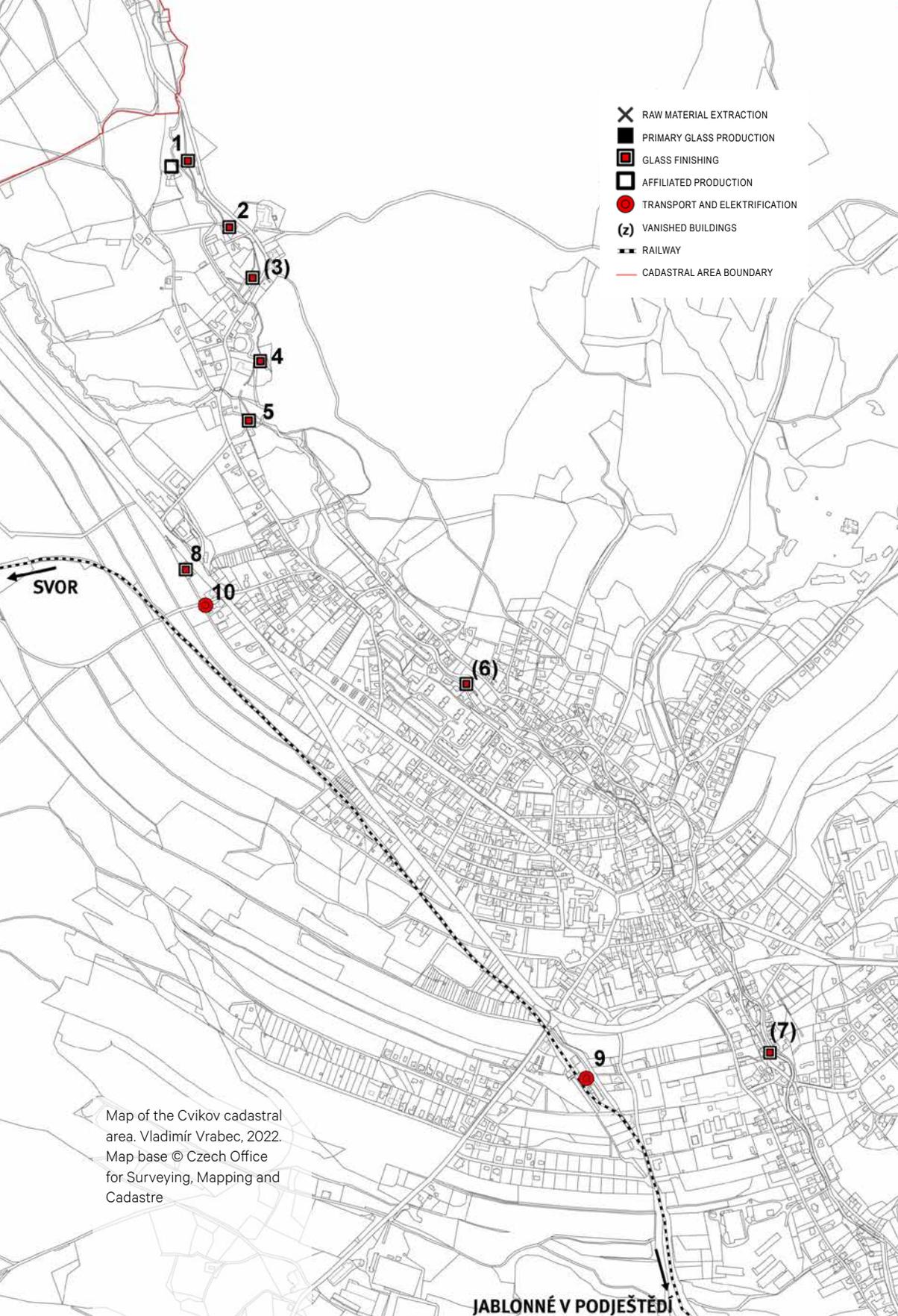
Cvikov, grinding mill, house No. 341/II, rebuilt for wood wool production in 1910. A torso of the overshot water-wheel is put away next to the building. Photo: author, 2019.

CVIKOV CADASTRAL AREA

Minor glassmaking operations were situated above all in the Martinovo Valley and, sporadically, in the upper and lower suburbs. They were above all water-driven glass grinding mills situated on the Boberský Stream and following in a continual line of these buildings in the nearby Rousínov. The first five glass bead grinding mills in the Cvikov cadastral area came into existence in the Martinovo Valley in the last quarter of the 18th century. Most devices were driven by overshot wheels.⁶

- | | |
|---|---|
| 1 Wilhelm Oppitz, glass grinding mill, wood wool production, house No. 341/II | 6 Franz Ziml, glass grinding mill and finishing works, house No. 224/II |
| 2 Würfel & Horna, glass grinding mill, house No. 199/II | 7 Balle Ignaz and Karl, glass grinding mill, house No. 209/II |
| 3 Karel Wejřwalda, glass grinding mill, house No. 195/II | 8 Rimpler Emil, finishing works, house No. 535/II |
| 4 Alber Heinrich, glass grinding mill, house No. 194/II | 9 Cvikov railway station, dispatch building, house No. 326/I, and warehouse |
| 5 Ramisch Josef and Antonie, Runge Ferdinand, glass grinding mill, house No. 193/II | 10 transformer |

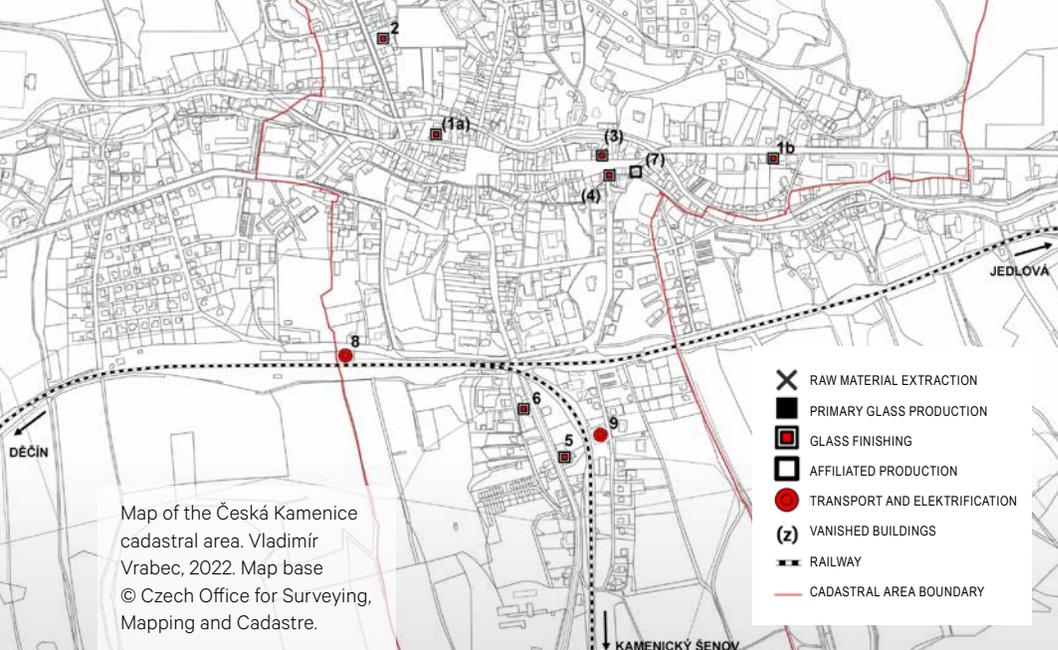
6 KOLKA 2012, pp. 38–39, 73–80, 83–86. SOMMER 1834, p. 263. RANŠOVÁ – HORNEKOVÁ 2001, pp. 88, 95, 96. *Adressbuch der Glas- und Keram-Industrie 1926*, p. 92. *Adressbuch der Tschechoslowakischen Glas-Industrie 1928/29*, p. 102.



- X RAW MATERIAL EXTRACTION
- PRIMARY GLASS PRODUCTION
- GLASS FINISHING
- AFFILIATED PRODUCTION
- TRANSPORT AND ELEKTRIFIKATION
- (2) VANISHED BUILDINGS
- RAILWAY
- CADASTRAL AREA BOUNDARY

Map of the Cvikov cadastral area. Vladimír Vrabec, 2022.
Map base © Czech Office for Surveying, Mapping and Cadastre

JABLONNÉ V PODJEŠTĚDÍ



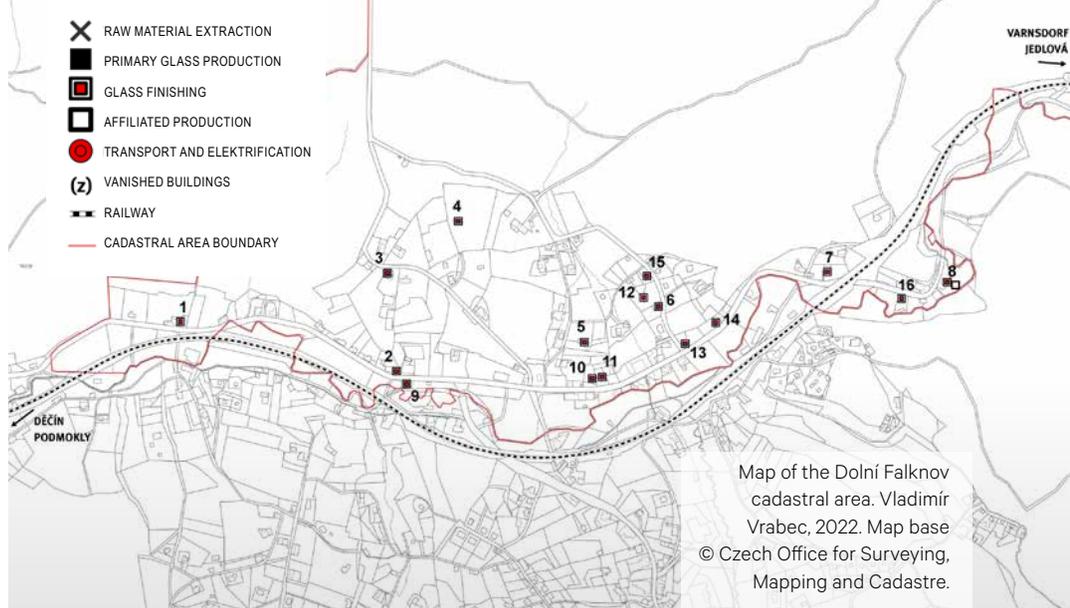
- 1a Franz Hegenbarth Söhne, glass trade and earlier finishing works, vanished house No. 259
 1b Franz Hegenbarth Söhne, later finishing works, houses No. 390–392
 2 A. Heide & Söhne, finishing works, house No. 25
 3 Johann Georg Asten, glass trade and finishing works, vanished house No. 179
 4 Hugo Hegenbarth, finishing works, house No. 159

- 5 Franz Heide, finishing works, house No. 488
 6 Sommer & Zinke, finishing works, house No. 448
 7 Adolf Renger, machine works, house No. 165
 8 Česká Kamenice railway station; dispatch building, house No. 342; warehouse, house No. 227 (Dolní Kamenice); vanished railway yard with water tower, house No. 71 (Dolní Kamenice)
 9 municipal power plant, house No. 522

ČESKÁ KAMENICE CADASTRAL AREA

Many glass craftsmen and traders were registered there in the late 17th and early 18th centuries and during the first half of the 18th century. A rather stabilized number of major glass finishing works operated in the town in the industrial period. In 1856 there were altogether twenty-two glass finishing works and twenty-four grinding mills. Some important companies originated as early as the first half of the 19th century (Franz Hegenbarth Söhne, A. Heide & Söhne, Hugo Hegenbarth). The Josef Dörre, Franz Heide, Julius Loesel and Heinrich Hegenbarth companies were founded in the second half of the 19th century; Sommer & Zinke, Josef Johne, Rudolf Kohn, Peter Pojezdný and Emanuel Staňka in the first half of the 20th century. The most interesting buildings constructionally include the finishing plants A. Heide & Söhne (house No. 25) and Sommer & Zinke (No. 448 and 804). Glass and porcelain paint production, Ferdinand Hübsch company, is also documented in the town. Local iron foundry and machinery plant Adolf Renger produced glass machinery among other things and supplied metal structures for the roof structures of some glassworks in the region.⁷

7 HETTEŠ 1964, pp. 19, 21. SLAVÍČKOVÁ 2001, p. 21. GRISA 2015, p. 142. KOLEKTIV 2002, pp. 36–37, 194–195, 252–253. FAHDT 1887, pp. 114–115. *Adressbuch der Glas-Industrie in Deutschland und Oesterreich-Ungarn* 1895, pp. 212, 243. FAHDT 1907, p. 108. *Adressbuch der Glas- und Keram-Industrie der Tschechoslowakei* 1926, p. 24. *Adressbuch der Tschechoslowakischen Glas-Industrie* 1928/29, p. 4. *Adressbuch der Glas-Industrie* 1929, p. 472. JOZA 2020, pp. 110, 143 and 159. VALCHAŘOVÁ – BERAN – ZIKMUND 2011, p. 239.



- | | |
|--|---|
| 1 glass grinding mill, house No. 1 (old house No. 90) | 9 painting workshop, house No. 10 |
| 2 glass grinding mill, house No. 9 (old house No. 4) | 10 painting workshop, house No. 34 |
| 3 glass grinding mill, house No. 18 (old house No. 7) | 11 painting workshop, house No. 35 |
| 4 glass grinding mill, house No. 23 (old house No. 11) | 12 painting workshop, house No. 42 |
| 5 glass grinding mill, house No. 31 (old house No. 16) | 13 painting workshop, house No. 48 |
| 6 glass grinding mill, house No. 41 (old house No. 79) | 14 painting workshop, house No. 49 |
| 7 glass grinding mill, house No. 53 (old house No. 19) | 15 painting workshop, house No. 70 |
| 8 glass grinding mill, grain mill, sawmill, tan stamp battery, wood wool production, house No. 57 (old house No. 20) | 16 Knížek Silvestr, finishing works, house No. 64 |

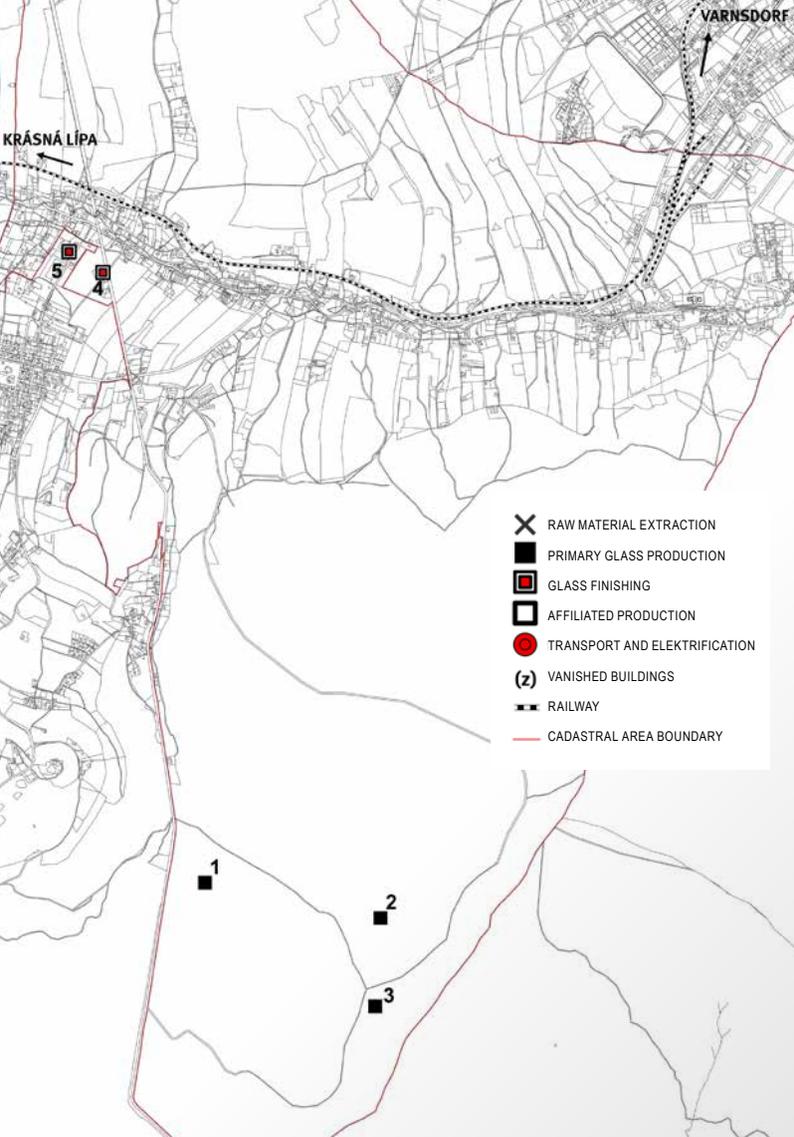
ČESKÁ LÍPA CADASTRAL AREA

Only a minor glass grinding mill operation in house No. 424 is documented in the town's cadastral area.⁸

DOLNÍ FALKNOV CADASTRAL AREA

The most numerous glass painter and gilder community within the Česká Kamenice manor concentrated in the Dolní Falknov settlement on the right bank of the Kamenice in the late 18th century. Small painter workshops operated there above all, situated in ordinary residential houses or in various workshop annexes to them. There are 23 painting workshops documented in the settlement as late as 1935–1945, for example in houses No. 10, 34, 35, 39, 42, 48, 49 and 70. Water-driven glass grinding mills were also numerous, making use of raceways built from the Kamenice and its minor right-bank tributaries. The first known grinder from Dolní Falknov was Johann Christoph Grohmann in 1760. Nine grinding mills were registered in 1795, but the number dropped to six in the following year due to a crisis. The operation ceased in houses No. 9, 23 and 31 (according to the new numbering). Five more grinding mills – No. 1, 18, 41, 51 and 53 (according to the new number-

⁸ In more detail, see the present author's text in the monograph KOLEKTIV 2018, pp. 414–415.



Map of the Dolní Podluží cadastral area plus one building from the Jiřetín pod Jedlovou cadastral area. Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.

- 1 vanished medieval glassworks location (Dolní Podluží I)
- 2 vanished medieval glassworks location (Dolní Podluží II)
- 3 vanished medieval glassworks location (Dolní Podluží III)
- 4 Hübner & Weiss, finishing works, house No. 432
- 5 Jiřetín pod Jedlovou cadastral area, Klar Ernst, glass grinding mill, house No. 259

ing) – ceased to exist during the first half of the 19th century. Only grinding mill No. 57 (old No. 20) remained in operation, combined with a grain mill; in 1873, it was rebuilt into a sawmill, tan stamp battery, joinery and wood wool production.⁹

DOLNÍ PODLUŽÍ CADASTRAL AREA

A quartz quarry is situated in the Milířka valley. Vanished medieval glasshouse locations were discovered near the Lesenský Stream on the eastern slopes of Pěnkavčí Hill. A glass stone grinding mill of the Hübner and Weiss company is also documented in the municipality.¹⁰

9 SLAVÍČKOVÁ – CVRK 1993, pp. 67–69. ZAHN undated, p. 38. HAIS 2022, p. 204. *Adressbuch der Glas-Industrie* 1929, p. 520. RANŠOVÁ – HORNEKOVÁ 2001, p. 78.

10 BRZÁK – FABIÁNEK – HAVRÁNEK 2007, pp. 32, 36. ČERNÁ 2004, pp. 9–11, 12–20, 41.



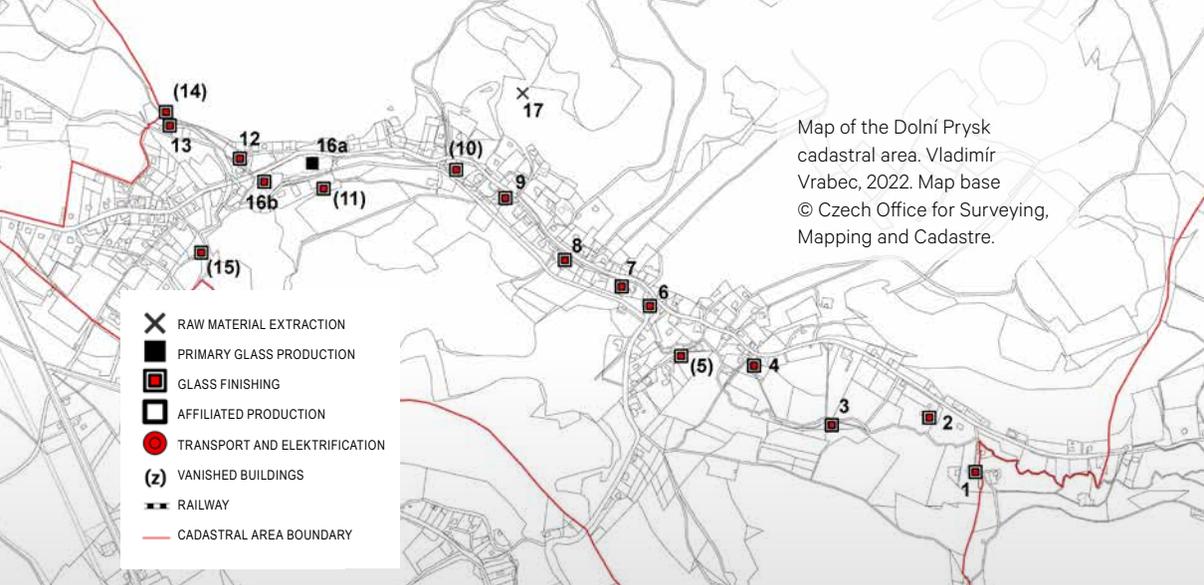
Dolní Prysk, view from the west of the lower edge of the village; centre: glassworks complex, house No. 100 (present-day Preciosa a. s.); front left-most: grinding mill Reg. No. 32 (former house No. 39).
Photo: Jiří Vidman, 2021.

DOLNÍ PRYSK CADASTRAL AREA

The elongated *Waldhufendorf*-type village became one of the most important glass finishing and trade localities in the Česká Kamenice manor from the 17th century. Fifteen water-driven grinding mills gradually came into existence there, all using overshot wheels. The most worth mentioning of the existing buildings are grinding mills Reg. No. 6 (former house No. 37, with a preserved torso of the shaft and the transmission mechanisms in the waterwheel chamber), Reg. No. 7 (former house No. 69) and Reg. No. 32 (former house No. 39). Görner & Schneider, August Fritsch, Eduard Ickert and Eduard Jekert finishing plants operated in Dolní Prysk in the 1920s, along with metal good manufacturer Gustav Wenzel (combination of metal assemblies with glass).¹¹

Karlshütte J. Fickl & Co. glassworks Johann Fickl built a glassworks in house No. 100 in 1910 and put it into operation at the beginning of the following year. It had one melting furnace for hollow glass production. The glassworks hall was extended for a second furnace on the western side before the First World War. A two-storey annexe of a provisional grinding mill with a traction engine room was attached to the west façade of the prolonged glassworks building in 1921. A new finishing plant was built in 1925. So-called bangles and glass rods for glass jewellery pressing were added to the assortment in the 1920s. The company was taken over by Štěpán Hrdina's glassworks

11 *Tereziánský katastr český. Svazek 2. Rustikál (kraje K-Ž)*, p. 91. SLAVÍČKOVÁ 2001, p. 21. SOKA Děčín, OÚ Děčín, Inv. No. 29, sign. XI/54, carton 13, water book of the judicial district Česká Kamenice (established 1872); Inv. No. 30, sign. XI/54, carton 13, water book of the judicial district Česká Kamenice (established 1926); inserts to water books, cartons 14 and 15. KOLKA – PEŘINA 2015, pp. 171–193. *Adressbuch der Glas- und Keram-Industrie der Tschechoslowakei* 1926, p. 74. *Adressbuch der Tschechoslowakischen Glas-Industrie* 1928/29, p. 74. *Adressbuch der Glas-Industrie* 1929, p. 520.



Map of the Dolní Prysk cadastral area. Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.

- | | | | |
|----|---|-----|---|
| 1 | glass grinding mill, grain mill, house No. 72 | 11 | glass grinding mill, house No. 38 |
| 2 | glass grinding mill, house No. 71 | 12 | glass grinding mill, Reg. No. 32 (former house No. 39) |
| 3 | glass grinding mill, Reg. No. 6 (former house No. 37) | 13 | glass grinding mill, house No. 68 |
| 4 | glass grinding mill, house No. 21 | 14 | glass grinding mill, grain mill, house No. 41 |
| 5 | glass grinding mill, house No. 65 | 15 | glass grinding mill, house No. 20 Vesnička (present-day house No. 36) |
| 6 | glass grinding mill, house No. 16 | 16a | Karlshütte, J. Fickl & Co. glassworks, house No. 100 |
| 7 | glass grinding mill, Reg. No. 7 (former house No. 69) | 16b | Karlshütte, J. Fickl & Co. glass finishing works, house No. 100 |
| 8 | glass grinding mill, Reg. No. 3 (former house No. 12) | 17 | so-called Riedl Cave glass sand mine |
| 9 | glass grinding mill, Reg. No. 1 (former house No. 9) | | |
| 10 | glass grinding mill, girdler works, house No. 3 | | |

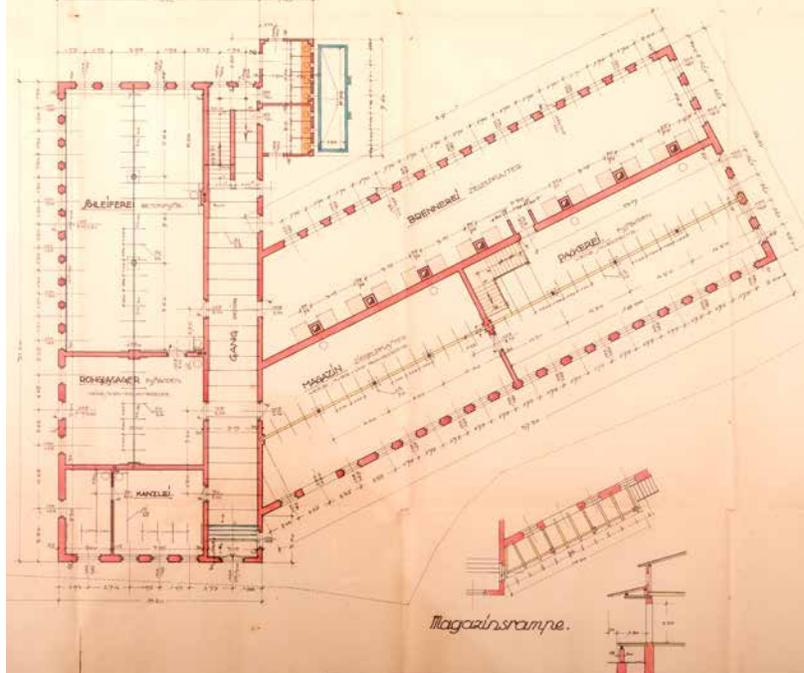
from Prácheň (Sklárny Union Dolní Prysk) at the beginning of 1929 and by Bangles Corporation R. Seidl & Co. from Jablonec nad Nisou in 1930. A tank furnace was installed in the glassworks in the 1930s. After nationalization in 1945, the glassworks was incorporated into the national company Jablonecké sklárny (present-day Preciosa, a. s.). The glassworks complex has been gradually rebuilt and supplemented with new buildings since the 1960s until the present.¹²

DOLNÍ SVĚTLÁ CADASTRAL AREA

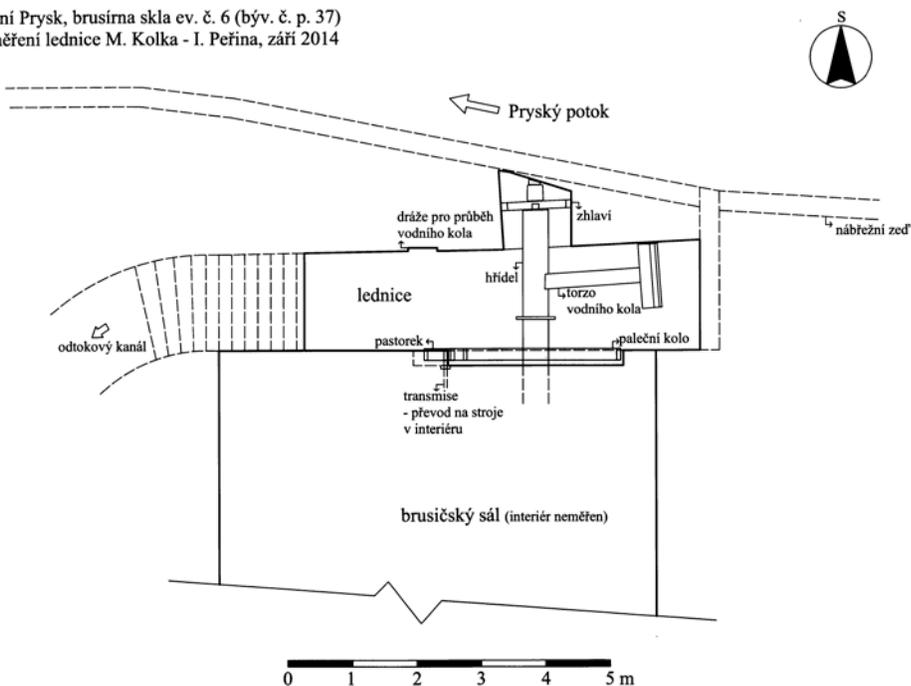
Several possible locations of vanished medieval and early modern glassworks have been considered in the cadastral area. Only a glasshouse on the northeastern slope of Kamenný Hill is documented archaeologically, however.¹³

- 12 SOKA Děčín, OÚ Děčín, Inv. No. 161, sign. 11 34/1333; Inv. No. 1836, sign. Kamnitz 11 34/219, Inv. No. 188, sign. 15 F/659 and 15 F/502, Inv. No. 1836, sign. Kamnitz 11 34/411. *Adressbuch der Tschechoslowakischen Glas-Industrie 1928/29*, p. 119. GELNAR 1996, p. 56. HAIS 2022, p. 27. RASOCHA 1989, pp. 12, 25, 31–33. Regrettably, it has not been possible to check the construction of the glassworks halls themselves and the types of melting furnaces from the available sources. All the described building adaptations were designed by builders Franz Eschler and Max Eschler of Česká Kamenice.
- 13 ČERNÁ 2004, pp. 21, 25. GELNAR 2003b, pp. 393–399.

Dolní Prysk, plan of a new finishing plant in the western part of the glassworks complex, house No. 100 (Franz Eschler – Max Eschler, 1925). Ground floor plan; left wing: office, semi-finished product storage and grinding works; long corridor with lavatories; right wing: storage, packaging room and painting workshop with a row of firing furnaces. SOkA Děčín, OÚ Děčín, Inv. No. 1836, sign. Kamnitz 11 34/219.



Dolní Prysk, brusírna skla ev. č. 6 (býv. č. p. 37) zaměření lednice M. Kolka - I. Peřina, září 2014



Dolní Prysk, glass grinding mill, Reg. No. 6 (former house No. 37), survey of the waterwheel chamber with torsos of the installations. Miroslav Kolka – Ivan Peřina 2014.



Dolní Prysk, view from the east (before 1914) of glassworks, house No. 100, the earlier glassworks hall with a smokestack that no longer exists today and typical annexes along the hall's circumference. Petr Joza's collection.



Dolní Prysk, view from the southwest (probably c. 1930) of the complex of glassworks, house No. 100; on the right, the connected pair of the glassworks halls; a lower two-storey grinding mill with firing furnaces is attached to the glassworks from the left; a finishing plant on the left. Petr Joza's collection.



Dolní Prysk, glass grinding mill, Reg. No. 6 (former house No. 37), view into the waterwheel chamber with the waterwheel shaft. Photo: author, 2014.

DOUBICE CADASTRAL AREA

The village was founded between 1457 and 1550, probably in an area cleared of forest by medieval glassworks. A glasshouse situated in the Doubice Forest and mentioned for the first time in trustworthy sources as of 1457 is the earliest glassworks documented in writing in the area.¹⁴ For the time being, it has been impossible to prove whether it is identical with an archaeologically examined glasshouse near the so-called Doubice Lime Works (Kyjov cadastral area). Another glassworks location was considered in the centre of the municipality near the pond, but it has not been confirmed yet.¹⁵

DUBICE U ČESKÉ LÍPY CADASTRAL AREA

An important glasshouse of the Nový Zámek manor operating in the second half of the 17th century is localized in present-day Robeč, part of the Dubice u České Lípy cadastral area, or in the neighbouring cadastral area of Kvítkov. Since a water-driven stamp battery is mentioned in the sources, it was probably situated close to the Robečský Stream, maybe under the Peklo gorge. The reconstruction of a cloth and stocking fulling shop of the Česká Lípa guild to a water-driven glass grinding mill is documented as of 1873 in the complex of the so-called Robeč Mill, house No. 1, originally belonging to the Kvítkov cadastral area. It was operated by the Gustav Lutz company founded as early as 1768.¹⁶

FALKNOV CADASTRAL AREA (FALKNOV AND KYTLICE)

Settlements in the territory of present-day village of Kytlice are among the key localities for the glass industry in the Bor – Šenov area. The greatest number of glassworks from the whole area came into existence in the Falknov cadastral area. In addition to the old Falknov glasshouse, four glassworks were built in 1873 and 1900. The existence of an even earlier glasshouse in the Falknov cadastral area, reportedly as of 1443, has not been confirmed.

Falknov glasshouse. The glasshouse was built in 1530 by Paul Schürer from Aschberg, Saxony. The production core was situated on the left bank of the Kamenice in the central part of the municipality, roughly around present-day house No. 117 (Kytlice). The glasshouse was owned by the Schürer family until 1731, when it was taken over by the Sloup manor and, in 1732 by Johann Kittel. Johann Josef Kittel discontinued the operation of the glasshouse in 1753–1755 and its buildings were torn down.¹⁷

Augustahütte (Buchberghütte) glassworks. The building with old house No. 127 and new house No. 50 (Falknov) stood on the northern foot of Malý Buk, approximately in the area of weekend houses Reg. No. 72, 73, 134, 135 and 117. The glasshouse was built by Vincenz Hrdlička and Augusta

14 CHMELÍK 1999, pp. 23–24.

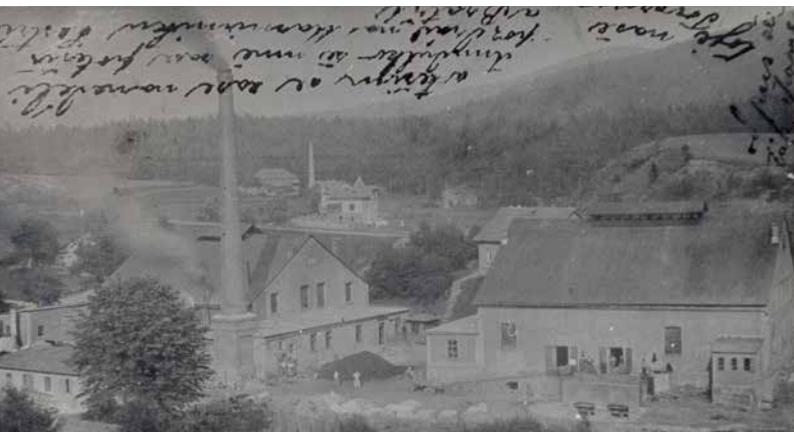
15 GELNAR 1999, pp. 55–59. GELNAR 2008a, pp. 108–117.

16 FAHDT 1887, p. 117. FAHDT 1907, p. 132. The company appears in no further address books. In more detail and with references to the sources, see the present author's text in the monograph KOLEKTIV 2018, pp. 415–417.

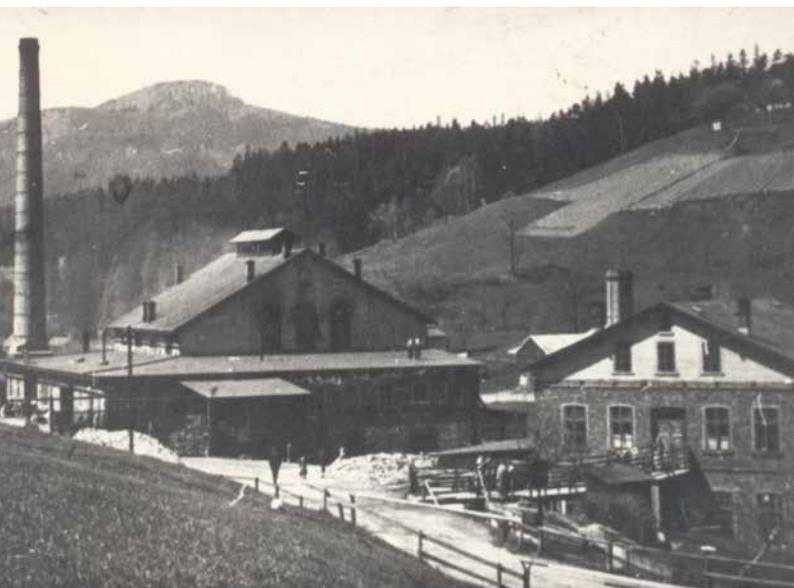
17 SLAVÍČKOVÁ – CVRK 1993, pp. 24–30, 29, 41, 60–64. MAREŠ 1893, pp. 15–16. BROŽOVÁ 1979a, pp. 45–49. *Tereziánský katastr český. Svazek 2. Rustikál (kraje K–Ž)*, p. 125. The localization of the glassworks near the later Polívka a Tábořský grinding mill, house No. 91, also appears in the literature. I do not consider it likely in view of the location of the glassworks mill with a sawmill and the terrain context in the given area. See GELNAR 1996, pp. 47–48.



Falknov, Marienhütte, view from the south across the railway to two glassworks halls with one smokestack (left). Petr Joza's collection.



Falknov, Marienhütte, view from the northwest; left: probably the earlier glassworks hall with a smokestack; right: the later hall with a producer station annex. Glass Museum Nový Bor, photograph collection.



Kytlice, Rudolfhütte, view from the southeast from a railway embankment; left: glassworks hall with annexes and a smokestack; right: grinding mill, house No. 116 (Kytlice). Glass Museum Nový Bor, photograph collection.

Klimmt in 1873. After completion, it was in operation only shortly. The operation did not resume until 1883, when it was taken over by Münzel & Palme. The glasshouse used direct heating of the melting furnace with coal, a rather obsolete system at that time; the furnace had eight pots. The company was operated by a lessee, Hans Münzel in 1893–1905 and, after him, by Štěpán Hrdina and Josef Jindra. The glasshouse ended its activity in 1908; in 1910 and 1911, its operation was briefly resumed by Nelhübel & Egermann. The glassworks' buildings ceased to exist around the middle of the 20th century. However, its position and extent remain visible thanks to remnants of masonry, terrain elevations and movable finds.¹⁸

Marienhütte glassworks. It stood in the northeastern part of the municipality, approximately in the area of present-day house No. 59 (Falknov) and north of it. It was built in 1893 as the third glassworks of the Münzel and Palme company; it was given old house No. 133 and new house No. 71 (Falknov). According to an 1895 address book, it used a melting furnace of the Siemens system. The second (southern?) glassworks hall was built probably before 1907 because two melting furnaces of the Siemens-Siebert with a total of 30 pots are already listed at that time. The glassworks became the property of the Nový Bor based Gebrüder Rachmann company in 1919. It was out of operation in 1922–1925; the production was resumed by lessee Eduard Knöspel from Polevsko in 1925 and, briefly and for the last time, by Hantich & Co. of Nový Bor in 1929 and 1930. The whole glassworks complex was demolished in the 1950s.¹⁹

Rudolfhütte glassworks. New glassworks, No. 115 (Kytlice), was built roughly in the area of Kytlice's earliest glasshouse in 1900. It stood near a railway between houses No. 114 and No. 1 (fire station). Grinding mill, No. 116 (old house No. 19, Falknov), originally a glassworks mill and sawmill, was incorporated into the new industrial complex. The founder of the glassworks was the local entrepreneur and sawmill owner Rudolf Wenzel. It had one ten or twelve-pot melting furnace of the Siemens-Siebert system heated by coal producer gas. Before 1914, the glassworks became the property of the company's managing director, Gustav A. Loschek. It was the last glassworks in the municipality to end operation in 1930. Brief attempts at its resumption were made in 1938 and in 1945–48. The complex was demolished probably around 1957.²⁰

Theresienhütte glassworks. The glassworks, house No. 8, was situated in the eastern part of Hillův Mlýn, next to the railway, in the area of present-day houses No. 8 and 127. The glassworks was built in 1893 on a plot close to a grinding mill, house No. 5 (Sloup part of Hillův Mlýn). The original type of the melting furnace is unknown; one furnace with twelve pots of the Siemens-Siebert system worked there before 1907, heated by brown coal producer gas. The builder was Raimund Knöspel from Hillův Mlýn. The operation ended in 1928. Only a waste heap is visible in the terrain today.²¹

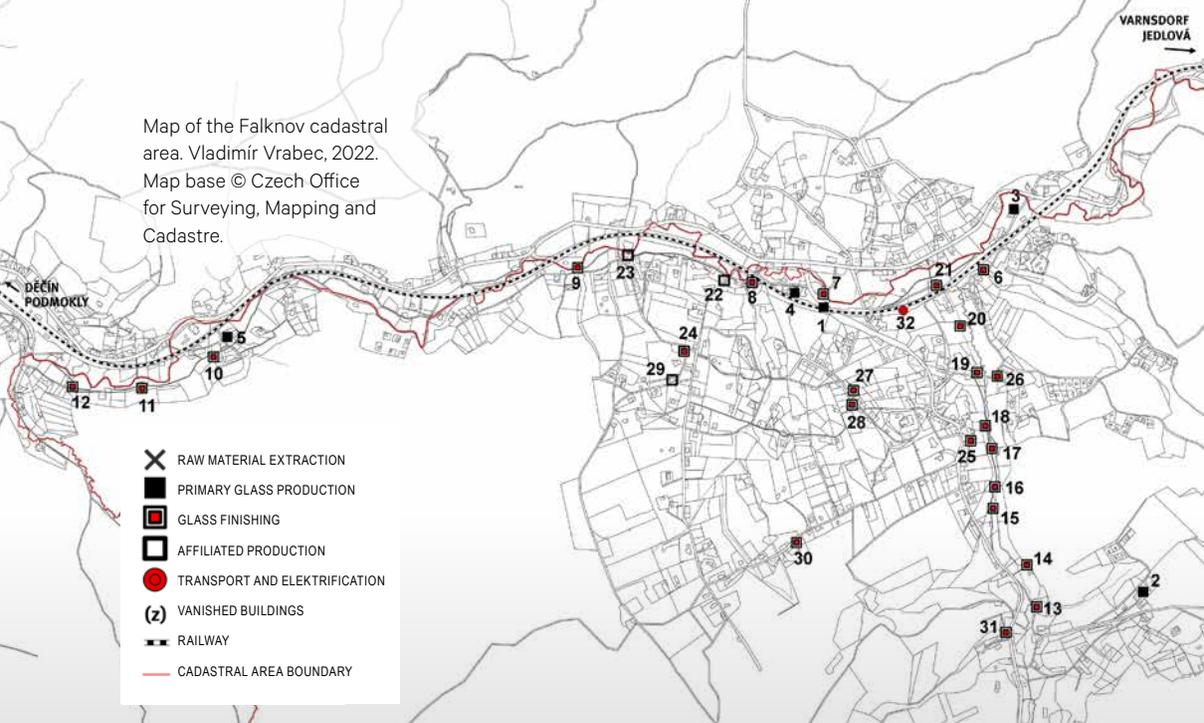
One of the first glass finishing centres in the Bohemian lands formed itself around the Falknov glassworks. Glass painters worked near the local glasshouse from the 1570s. More techniques were gradually added (engravers, grinders) and, from the late 17th century, glass trade. Local craftsmen were among the founders of the glass guild of the Sloup manor established in 1682. Falknov is one

18 SLAVÍČKOVÁ – CVRK 1993, pp. 56–57, 70. SOkA Děčín, AO Kytlice, Inv. No. 1, cart. 1, chronicle 1836–1945. FAHDT 1887, p. 46. JOZA – NĚMEC 2012, p. 38.

19 SLAVÍČKOVÁ – CVRK 1993, pp. 28, 70 and 73. *Adressbuch der Glas-Industrie in Deutschland und Oesterreich-Ungarn* 1895, p. 128. FAHDT 1907, p. 44. JOZA – NĚMEC 2012, pp. 37–38. JOZA 2020, pp. 174 and 175.

20 SLAVÍČKOVÁ – CVRK 1993, pp. 25, 53, 58, 71–73. JOZA – NĚMEC 2012, p. 38. FAHDT 1907, p. 74. *Adressbuch der Glas-Industrie* 1929, p. 174.

21 SLAVÍČKOVÁ – CVRK 1993, pp. 31, 35, 53, 70–73. *Adressbuch der Glas-Industrie in Deutschland und Oesterreich-Ungarn* 1895, p. 98. FAHDT 1907, p. 32. *Adressbuch der Tschechoslowakischen Glas-Industrie* 1928/29, p. 111. *Adressbuch der Glas-Industrie* 1929, p. 179.



- | | | | |
|----|--|----|---|
| 1 | Falknov glassworks, approximate location | 18 | glass grinding mill / glass paint friction mill, house No. 44 (Kytlice, old house No. 88) |
| 2 | Augustahütte glassworks (Falknov, house No. 50, old house No. 127) | 19 | glass grinding mill / glass paint friction mill, house No. 42 (Kytlice, old house No. 15) |
| 3 | Marienhütte glassworks (Falknov, house No. 71, old house No. 133) | 20 | glass grinding mill, house No. 41 (Kytlice; old house No. 16) |
| 4 | Rudolfhütte glassworks (Kytlice, house No. 115) | 21 | glass grinding mill / glass paint friction mill, house No. 38 (Kytlice, old house No. 17) |
| 5 | Theresienhütte glassworks (Hillův Mlýn, house No. 8H) | 22 | glass paint friction mill, house No. 108 (Kytlice, old house No. 92) |
| 6 | glass grinding mill/sawmill and crate production, house No. 66 (Falknov, old house No. 33) | 23 | sawmill / wood wool production, house No. 74 (Falknov, old house No. 24) |
| 7 | glass grinding mill, house No. 116 (Kytlice; old house No. 19, Falknov) | 24 | painting workshop, house No. 96 (Kytlice; old house No. 100) |
| 8 | glass grinding mill, house No. 111 Kytlice (old house No. 20 Falknov) | 25 | Eschler & Co. finishing works, house No. 152 (Kytlice) |
| 9 | glass grinding mill, old house No. 25 (Falknov) | 26 | painting workshop, house No. 58 (Falknov, old house No. 140) |
| 10 | glass grinding mill, house No. 5H (Hillův Mlýn, old house No. 3) | 27 | painting workshop, house No. 124 (Kytlice; old house No. 89) |
| 11 | glass grinding mill, house No. 12H (Hillův Mlýn, old house No. 5) | 28 | painting workshop, house No. 125 (Kytlice; old house No. 116) |
| 12 | glass grinding mill, house No. 14H (Hillův Mlýn, old house No. 7) | 29 | glass paint friction mill, house No. 92 (Kytlice, old house No. 99) |
| 13 | glass paint friction mill, house No. 54 (Falknov, old house No. 42) | 30 | painting workshop, house No. 64 (Kytlice; old house No. 68) |
| 14 | glass grinding mill, Reg. No. 80 (Falknov, old house No. 73, later house No. 55) | 31 | painting workshop, house No. 31 (Falknov, old house No. 39) |
| 15 | glass grinding mill / glass paint friction mill, house No. 48 (Kytlice, old house No. 7) | 32 | Kytlice railway station |
| 16 | glass grinding mill, house No. 46 (Kytlice; old house No. 8) | | |
| 17 | glass grinding mill, house No. 45 (Kytlice; old house No. 9) | | |

Kytlice, view from the west of grinding mill, house No. 111 (Kytlice), so-called glassworks grinding mill of the old Falknov glassworks. Petr Joza's collection.



Falknov, glass paint friction mill, house No. 54, view from the north; the foundations of an overshot waterwheel chamber are preserved near the perpendicular wing on the left. Photo: author, 2012.



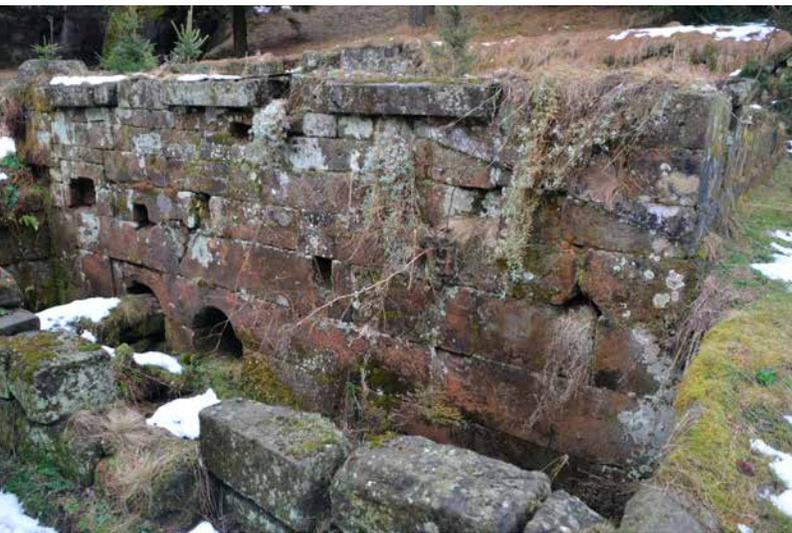
Hillův Mlýn, view of the buildings left of the railway station; the end of the grinding mill raceway is visible in the front, grinding mill, house No. 14H on the left, already after the construction of a masonry building in c. 1910. Petr Joza's collection.





Hillův Mlýn, grinding mill, house No. 14H, typical layout of local grinding mills from the early 20th century (c. 1910).

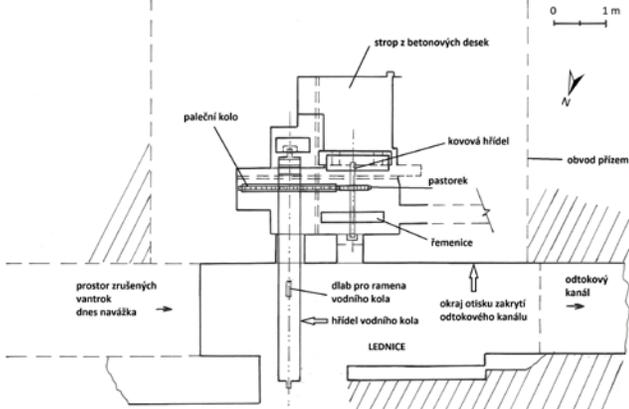
Photo: Ivan Peřina, 2013.



Hillův Mlýn, view of vanished grinding mill, house No. 12H; front: the waterwheel chamber area with a torso of the waterwheel shaft.

Photo: Ivan Peřina, 2013.

MLÝNY, BRUSÍRNA SKLA Č. P. 12H, PŮDORYS 1. P. P., M. KOLKA - I. PEŘINA, 11-12/2012



Hillův Mlýn, glass grinding mill, house No. 12H, survey of the waterwheel chamber and engine room in the basement.

Miroslav Kolka – Ivan Peřina 2012.

of the earliest localities with the occurrence of glass grinding mills in the Bohemian lands. The first grinding mill was built in 1730 by retired soldier Valentin Bienert. Around 1746, brothers Johann Wenzel and Josef Rösler from Jiřetín u Smržovky built a new grinding mill for Hans Bienert (old house No. 25). More buildings were added around the middle of the 18th century. A relation from 1753 concerning the foundation of the Kinský mirror works says that there were five grinding mills around Falknov in the Sloup part and four grinding mills in the Česká Kamenice part. As many as thirty grinding mills operated in the municipality in the 1780s. Glass painting and the production of glass paints spread considerably again in the second and third quarters of the 19th century due to inventions by Friedrich Egermann and new glass paints (enamels).²²

Water-driven glass grinding mills are documented on the Kamenice (four in Falknov and Kytlice, three in Hillův Mlýn) and one on the Červený Stream. Grinding mills and glass paint friction mills line above all the Hraniční Stream, where altogether nine of them operated. Among the most interesting buildings are glass grinding mills, house No. 111 (Kytlice, old house No. 20 Falknov), No. 12H (Hillův Mlýn, old house No. 5, the waterwheel chamber with the waterwheel shaft and the transmission mechanisms in the basement were preserved in the torso of the building until recently), No. 14H (Hillův Mlýn, old house No. 7), No. 45 (Kytlice, old house 9), No. 41 (Kytlice, old house No. 16) and glass paint friction mills No. 54 (Falknov, old house No. 42) and No. 38 (Kytlice, old house No. 17, originally a grinding mill). More glass finishing works were situated in Falknov and Kytlice, mostly documented as of 1920. Namely, they were the companies Emil Brückner, Eschler & Co., Wilhelm Galle, Fritz Hörtler, Ferdinand Lehmann, Rudolf Nechutnys, Franz Petters, Franz Pohlhammer, Johann Polivka, Franz Pörner, Josef Rösler, Berthold Ruscher, Hermann Schier, Adolf Taborský & Co., Emanuel Vávra, Antonín Veselý and Wasserreich & Burlisch. Thirty-eight painting workshops were still registered in Falknov and Kytlice in 1935–1945.²³

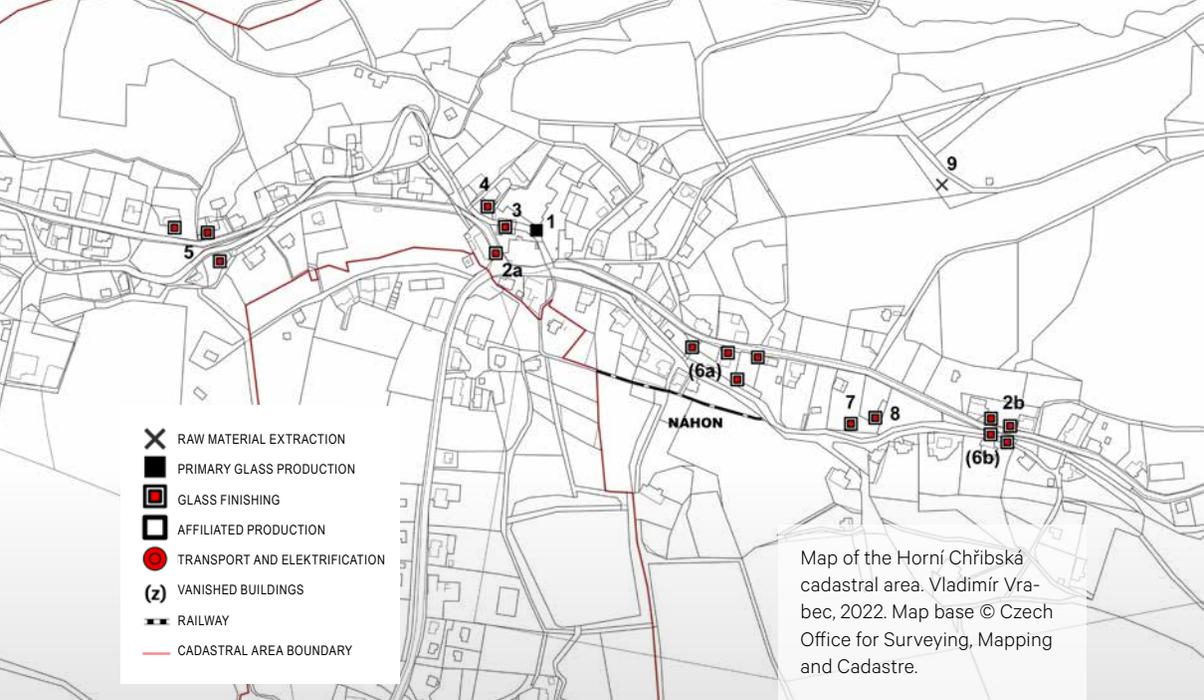
HORNÍ CHŘIBSKÁ CADASTRAL AREA

The municipality became an important centre of glass finishing, especially painting, in the late 16th and early 17th centuries at the latest; glass engraving (cutting) was also significant from the late 17th and early 18th centuries. Glass painting, cutting lathe grinding and, in larger businesses, chandelier and illumination glass production dominated in the municipality in the 19th century and the first half of the 20th century. The existence of medieval and early modern glassworks in the cadastral area of Horní Chřibská cannot be ruled out, but it has not been confirmed yet. The existence of five glass finishing works can be documented in Horní Chřibská in the last quarter of the 19th century and the first half of the 20th century; they used buildings variously distributed in the municipality and in the neighbouring Krásné Pole. Regrettably, many of these buildings no longer exist. The vanished Wilhelm Tschinkel chandelier factory from 1910, house No. 172, was especially constructionally important.²⁴

22 SLAVÍČKOVÁ – CVRK 1993, pp. 66–67. KOLKA – PEŘINA 2015, p. 171.

23 A rich file agenda containing plans of hydraulic structures is preserved in the relevant inserts to water books in the State District Archives Česká Lípa, fonds OÚ Č. Lípa – see the list of sources. See also JIRÁK 1932, p. 9. SLAVÍČKOVÁ – CVRK 1993, pp. 24–25, 29, 59, 61–62, 64, 66–67, 72. KOLKA – PEŘINA 2014, pp. 257–276. JOZA 2020, p. 171. ZAHN undated, p. 37. HAIS 2020, pp. 187–206. RANŠOVÁ – HORNEKOVÁ 2001, pp. 68–93.

24 GELNAR 1999, pp. 63–67. HETTEŠ 1964, pp. 4–5. SLAVÍČKOVÁ 2001, p. 21. *Adressbuch der Glas-Industrie in Deutschland und Oesterreich-Ungarn* 1895, pp. 241, 277. FAHDT 1907, p. 137. *Adressbuch der Glas- und Keram-Industrie der Tschechoslowakei* 1926, p. 74. *Adressbuch der Glas-Industrie* 1929, p. 521. SOKA Děčín, AO Horní Chřibská, municipal chronicle, pp. 30, 84–88, 95, 102–103, 105. SOKA Děčín, fonds ONV Varnsdorf, Inv. No. 125, cart. 21, files of industrial companies, Horní Chřibská, Wilhelm Tschinkel glassworks, house No. 62. JOZA – NĚMEC 2012, p. 66.



- 1 glassworks, house No. 180, Michel & Mayer, August Mayer & Sohn
- 2a Hampel & Worm finishing works, trade house, No. 184
- 2a Hampel & Worm finishing works, buildings Reg. No. 14 (former house No. 74), house No. 75
- 3 Eschler & Co. finishing works, houses No. 170, 171
- 4 Emil Zillich finishing works, houses No. 25, 99, 122
- 5 Franz Model & Co. finishing works, houses No. 26, 27, 94

- 6a Wilhelm Tschinkel finishing works (chandelier production), houses No. 62, 144, 172, boiler house
- 6b Wilhelm Tschinkel glass grinding mill, house No. 150, finishing works, house No. 118
- 7 Anton Gontka cutting lathe workshop, Reg. No. 21 (former house No. 68)
- 8 Wenzel Pinkas cutting lathe workshop, house No. 69
- 9 glass sand mine

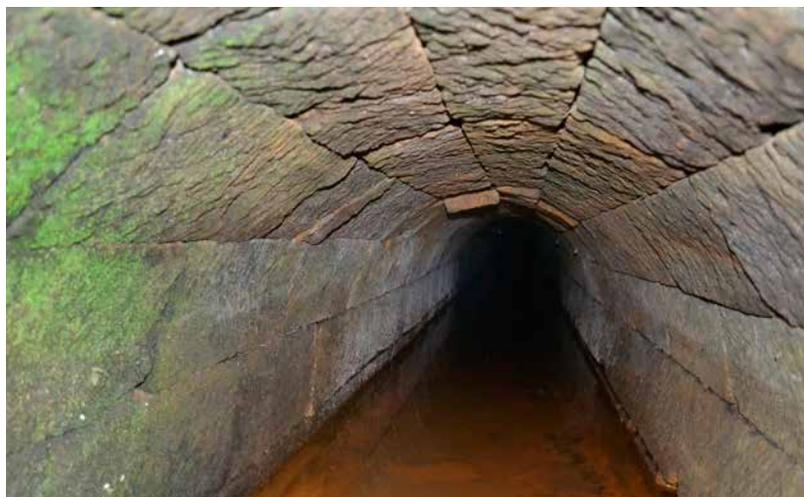


Horní Chříbská, centre of the municipality viewed from the west; centre: glassworks complex, house No. 180; front from the left: Emil Zillich and Alfred Heide finishing plants, Hampel & Worm trade house; right: grinding mill of the same company. Petr Zámešný collection.

HORNÍ KAMENICE CADASTRAL AREA

A glass grinder was registered in the municipality in a tallage return (fasse) as early as 1713; two disc grinder operators followed in 1724. Three water-driven glass grinding mills were in operation there in the last quarter of the 19th and the first half of the 20th centuries: houses No. 88 (after 1926, No. 429 in Česká Kamenice) and No. 81 on the Lísecký Stream, and house No. 67 on the Šenovský Stream.²⁵

Horní Prysk, glass grinding mill, house No. 109; a carefully vaulted drainage channel from sandstone blocks is preserved after the vanished production building.
Photo: author, 2014.



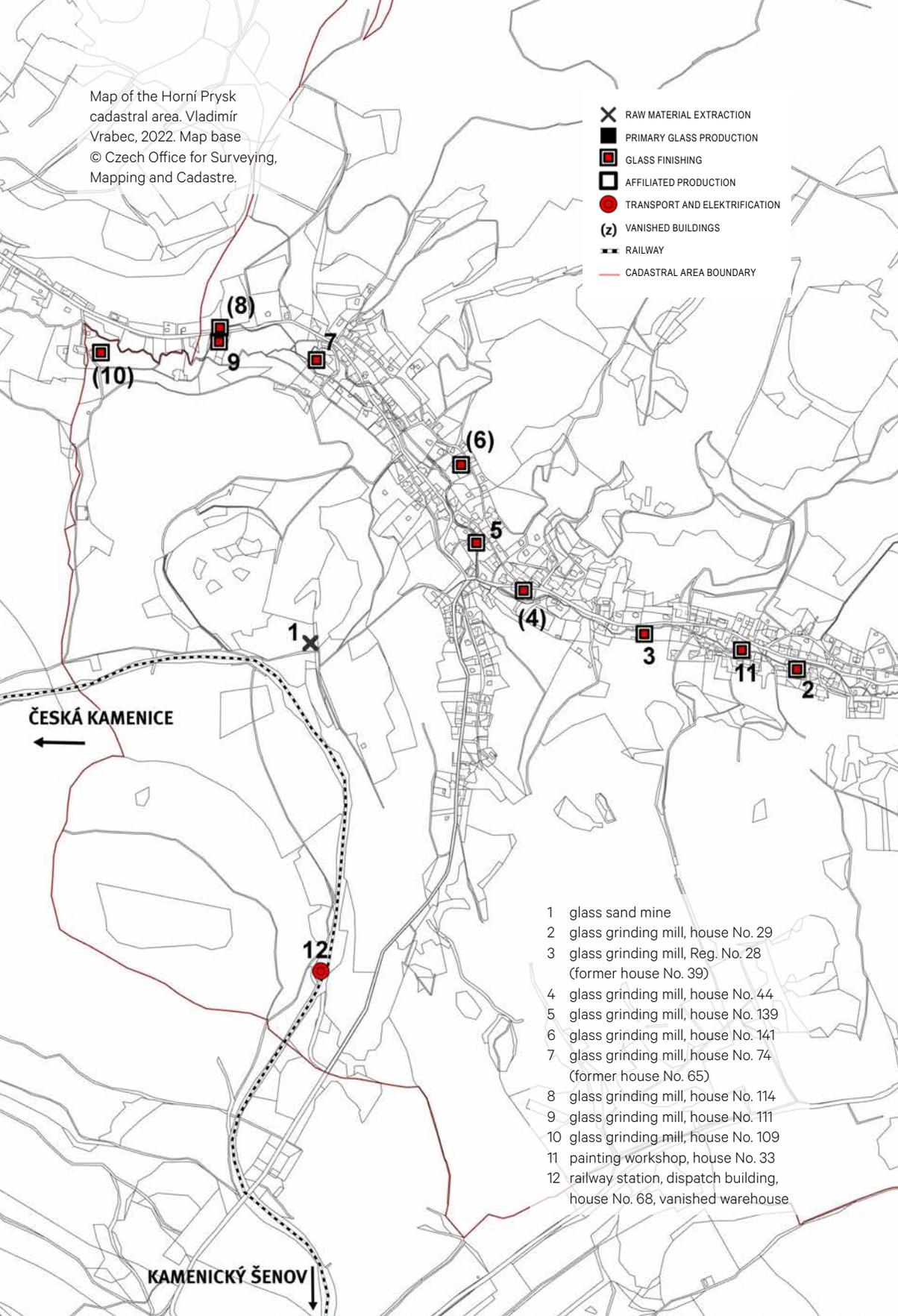
HORNÍ PRYSK CADASTRAL AREA

The typical *Waldhufendorf*-type village was one of the centres of glass refining and trade from the late 17th and early 18th centuries at the latest. The location of a medieval glasshouse is presumed in the saddle of the western foot of Stříbrný Hill. Glass engravers and painters are documented above all in the municipality. Paint firing furnaces are preserved to this day in some buildings (e.g., house No. 33). The following glass finishing plants operated in Horní Prysk in the 1920s and 1930s: Görner & Co., Heinze & Kittel, Kurt R. L. Kraemer, Josef Palme, Franz Semsch, Weidlich & Fiedler and Karl Wenzel. Nine water-driven grinding mills, all with overshot wheels, were gradually built on the Pryský Stream. Interesting buildings include grinding mills Reg. No. 28 (former house No. 39) and house No. 74 (originally No. 65, Helfermühle grain mill, later adapted to a grinding mill) or the vaulted drainage channel from the grinding mill in house No. 109.²⁶

- 25 SLAVÍČKOVÁ 2001, p. 21. *Tereziánský katastr český. Svazek 2. Rustikál (kraje K-Ž)*, p. 91. SOkA Děčín, OÚ Děčín, Inv. No. 29, sign. XI/54, carton 13, water book of the judicial district Česká Kamenice (established 1872), inserts No. 60, 61, 62; Inv. No. 30, sign. XI/54, carton 13, water book of the judicial district Česká Kamenice (established 1926), insert No. 62.
- 26 GELNAR 1997a, p. 50. SLAVÍČKOVÁ 2001, p. 21. *Tereziánský katastr český. Svazek 2. Rustikál (kraje K-Ž)*, p. 91. *Adressbuch der Glas- und Keram-Industrie der Tschechoslowakei* 1926, pp. 75–76. *Adressbuch der Tschechoslowakischen Glas-Industrie* 1928/29, p. 77. *Adressbuch der Glas-Industrie* 1929, pp. 521–523. SOkA Děčín, OÚ Děčín, Inv. No. 29, sign. XI/54, carton 13, water book of the judicial district Česká Kamenice (from 1872), inserts No. 73, 74, 75, 76, 77, 78, 79, 80, 83 and Inv. No. 30, sign. XI/54, carton 13, water book of the judicial district Česká Kamenice (established 1926), inserts No. 25, 36. JIRÁK 1932, p. 12.

Map of the Horní Prusk
cadastral area. Vladimír
Vrabec, 2022. Map base
© Czech Office for Surveying,
Mapping and Cadastre.

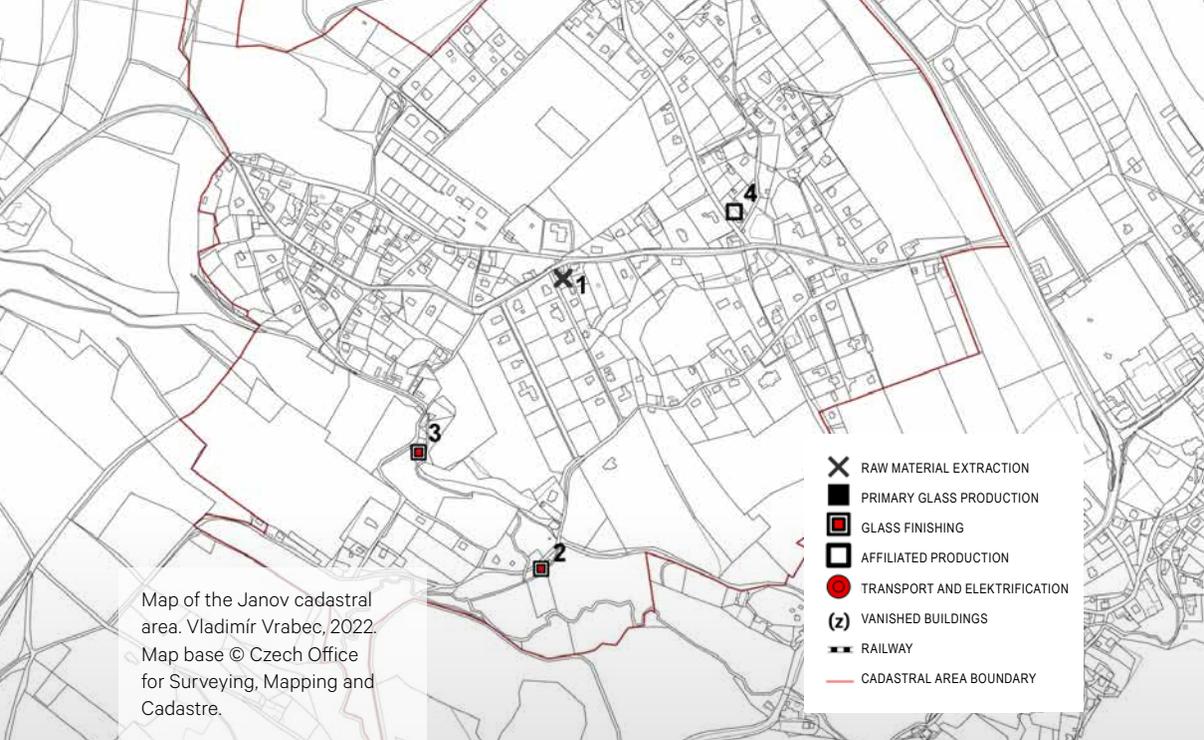
- X RAW MATERIAL EXTRACTION
- PRIMARY GLASS PRODUCTION
- GLASS FINISHING
- AFFILIATED PRODUCTION
- TRANSPORT AND ELEKTRIFICATION
- (z) VANISHED BUILDINGS
- RAILWAY
- CADASTRAL AREA BOUNDARY



ČESKÁ KAMENICE
←

KAMENICKÝ ŠENOV
↓

- 1 glass sand mine
- 2 glass grinding mill, house No. 29
- 3 glass grinding mill, Reg. No. 28
(former house No. 39)
- 4 glass grinding mill, house No. 44
- 5 glass grinding mill, house No. 139
- 6 glass grinding mill, house No. 141
- 7 glass grinding mill, house No. 74
(former house No. 65)
- 8 glass grinding mill, house No. 114
- 9 glass grinding mill, house No. 111
- 10 glass grinding mill, house No. 109
- 11 painting workshop, house No. 33
- 12 railway station, dispatch building,
house No. 68, vanished warehouse



Map of the Janov cadastral area. Vladimír Vrabec, 2022.
Map base © Czech Office for Surveying, Mapping and Cadastre.

- | | |
|---|---|
| 1 sand mine (probably glass sand) | 3 grain mill / glass grinding mill, house No. 11 |
| 2 Tin foil hammer mill, mirror grinding mill, house No. 6 (Kinský mirror works) | 4 Richard Spatzier machine works, glasswork machinery production, house No. 155 |

HORNÍ SVĚTLÁ CADASTRAL AREA

Several possible locations of vanished medieval and early modern glassworks have been considered in the cadastral area. Only one has been proved, south of the village on the southeast slopes of Kopřivnice Hill near a forest track leading from the village to the Naděje dam.²⁷

JANOV U NOVÉHO BORU CADASTRAL AREA

Tin foil hammer mill, mirror grinding mill No. 6, Kinský mirror works. The building is described as a tin foil hammer mill (*Folienhammer*) in sources from about 1800 and later. A Venetian mirror grinding mill was reportedly established there in 1883. At that time, an inventory of the mirror works equipment registered both woodworking and glassmaking machines in the building (four cutting lathes and three bevelling machines). It is evident from the inventory that wooden parts of mirrors (frames, mouldings) must have also been made on the premises. Gustav Palme's sawmill operated there later.²⁸

27 ČERNÁ 2004, p. 21. GELNAR 2011, pp. 395–402. GELNAR 1997a, pp. 42–46. GELNAR 2003b, pp. 393–399.

28 PAUDLER 1885, pp. 24–27. SOA Děčín, Vs Sloup, Inv. No. 306, carton 144 (mirror works); inv. No. 330, sign. XVI/B, carton 151 (water law affairs); Inv. No. (map, c. 1800); Inv. No. 957 (mirror works building plans). SOkA Č. Lípa, fond OÚ Č. Lípa, Inv. No. 9, carton 1V, Water Book for the judicial districts Česká Lípa and Nový Bor (insert No. 43), Inv. No. 977, sign. W.B.43, 11 54/20, carton 73.



Janov, mirror grinding mill, house No. 6, view from the southeast; the courtyard annexe was used as the waterwheel chamber. Photo: Jiří Vidman 2020.

The following glass grinding mills were registered in the municipality in address books from the first quarter of the 20th century: Ludwig Müller (house No. 25) and Theodor Renelt (No. 53). A water-driven grinding mill functioned for a shorter time also in a former grain mill, house No. 11 (Emanuel Tlustý). Ten to fifteen painting workshops also operated in the municipality, gradually founded in many local houses. The same can be said about cutting lathes, but they were less numerous. An important smaller company was Richard Spatzier's machine works in house No. 155, which produced also glass machines, in addition to transmissions and woodworking machines. Their cutting lathes above all were used in many companies in the region.²⁹

JEDLOVÁ CADASTRAL AREA

Rollhütte glassworks (Rollerhütte, Rollhütte am Tannenberg). The glassworks stood in the southern part of the cadastral area close to one of the so-called Jedlová Ponds, which is now called Hutní or Rolský Pond. The location was destroyed by the construction of a railway in 1868. The glasshouse was probably founded in 1680 by Johann Kaspar Kittel of Polevsko. His sons Kaspar and Johann operated it in 1723 and Christoph Anton Kittel in 1731. The glasshouse allegedly ceased to exist after a fire in 1739.³⁰

29 MÜLLER 1986, unpaginated list of houses at the end.

30 GELNAR 2002a, pp. 9–17. GELNAR 2008b, pp. 84–93. GELNAR 2007, pp. 225–234. SMETANA 1998, pp. 58–59.

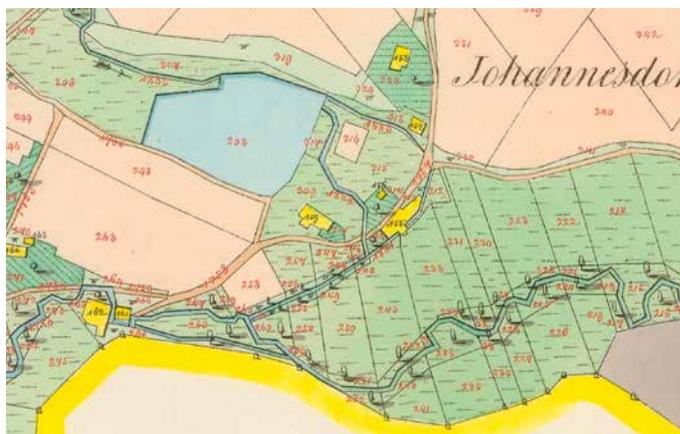


Jiřetín pod Jedlovou, glass grinding mill, house No. 259, view from the northeast. Photo: Jiří Vidman 2021.

JIŘETÍN POD JEDLOVOU CADASTRAL AREA

Ernst Klar glass grinding mill, 259 Nádražní Street The premises consist of two perpendicular wings, a high hall with an engine room and two prismatic towers. A new building stands in the place of a boiler room with a smokestack. The company was founded in Varnsdorf in 1896; the Jiřetín branch built in 1909 focused on fashion jewellery glass production for companies from Jablonec. More buildings were added in 1917. After nationalization in 1945, the finishing works became part of the national company Jablonecké sklárny.³¹

Janov, section of the imperial imprint of the Stable Cadastre from 1843 (Sloup cadastral area); waste drainage leads from the pond, raceway to the grinding mill (large building in yellow colour, building plot No. 155) is situated above it. Czech Office for Surveying, Mapping and Cadastre.



31 VALCHAŘOVÁ – BERAN – ZIKMUND 2011, p. 213. JOZA – NĚMEC 2012, p. 132. The position of the complex is marked on the map of the Dolní Podluží cadastral area.



Kamenický Šenov, view of the central part of the town from the north. Front left: Franz Stingl finishing works, house No. 73; above it, present-day Glass Museum, house No. 69; right: Stelzig, Kittel & Co. finishing works; right rear: Elias Palme chandelier factory premises, house No. 686. Photo: Jiří Vidman 2021.

KAMENICKÝ ŠENOV CADASTRAL AREA

While painters above all concentrated in the municipality in the second half of the 17th century, engravers completely dominated from the 1690s. The rapid development of refining techniques in Kamenický Šenov resulted in the foundation of a glass guild in the town in 1694. Concurrently, one of the most important glass trading centres was being formed there. An overview of the most important factories and manufactories as of 1840 registered the following companies in the municipality: Emanuel Hesse, Josef Zahn, Karl Helzel, Clemens Knechtel, Florian Horn, Johann Hesse, Josef Heinrich, Ignaz Vogel, Florian Vogel, Ignaz Krause, Franz Ronge, Franz Schöbel, Josef Conrath, Emanuel Knechtel, Anton Schimmel, Josef Reichert and Josef Müller.³² More than thirty larger finishing works are registered in the locality in 1887, and the number exceeded forty as of 1895. More than fifty companies dealt with glass finishing in the 1920s (1926) and about seventy before the outbreak of the economic crisis (1928/1929).³³

Three glassworks came into existence in the town: **Adolf Rückl** (1885–1886), **Jílek & Vetter** (1905, later Bratři Jílkové) and **Franz Vetter** (1925) – see the Catalogue of Selected Glassmaking Buildings and Complexes. The following companies belong among the constructionally most interesting finishing plants: **Elias Palme chandelier factory** (founded in 1849, resettled to house No. 168,

32 HETTEŠ 1964, pp. 4–5, 17–23. RYNEŠ 1966, pp. 121–126. SCHEBEK 1878, pp. 277–284. SLAVÍČKOVÁ 2001, pp. 16–23. BROŽOVÁ 1997, pp. 61–79. GRISA 2015, pp. 163–164. PALME 2018.

33 FAHDT 1887, pp. 122–124. *Adressbuch der Glas-Industrie in Deutschland und Oesterreich-Ungarn* 1895. FAHDT 1907, pp. 143–147. *Adressbuch der Glas- und Keram-Industrie der Tschechoslowakei* 1926, pp. 81–87. *Adressbuch der Tschechoslowakischen Glas-Industrie* 1928/29, pp. 86–91. *Adressbuch des Glasindustriegebietes Haida-Steinschönaun und Umgebung* 1928, pp. 164–165.

Kamenický Šenov, view from the southeast of Franz Stingl finishing works, house No. 73; right: earlier Classicist building; left: new building from 1929. Photo: Jiří Vidman 2021.

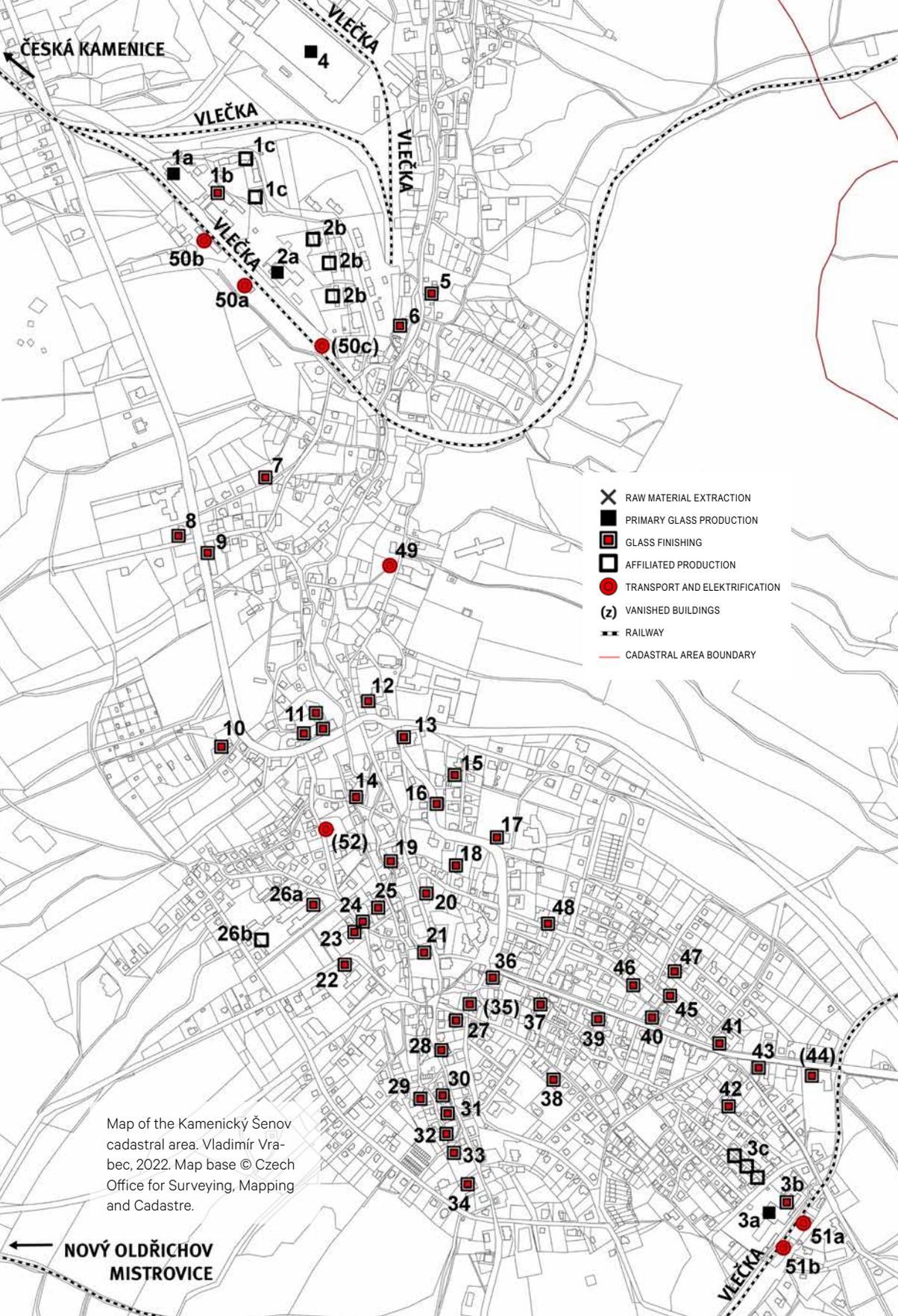


Kamenický Šenov, view of present-day Kamenická Street from a bridge across the Šenovský Stream; right: Stelzig, Kittel & Co. finishing works, house No. 151. Petr Joza's collection.



Kamenický Šenov, view of the late Baroque glassmaking house No. 69 from c. 1769; trading company of the Vogel family; from 1847, Josef Zahn & Comp. finishing works and 1918, J. & L. Lobmeyr's Neffe Stefan Rath finishing works; today, Glass Museum. Petr Joza's collection.





Map of the Kamenický Šenov cadastral area. Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.

- X RAW MATERIAL EXTRACTION
- PRIMARY GLASS PRODUCTION
- GLASS FINISHING
- AFFILIATED PRODUCTION
- TRANSPORT AND ELEKTRIFICATION
- (z) VANISHED BUILDINGS
- - - RAILWAY
- CADASTRAL AREA BOUNDARY

ČESKÁ KAMENICE

VLEČKA

VLEČKA

VLEČKA

VLEČKA

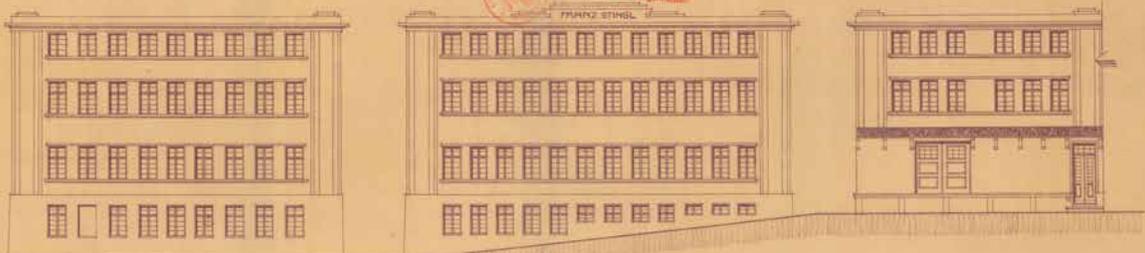
VLEČKA

NOVÝ OLDŘICHOV
MISTROVICE

- 1a Adolf Rückl glassworks, house No. 129, glassworks hall, annexes, smokestack
- 1b Adolf Rückl glassworks, house No. 129, grinding mill
- 1c Adolf Rückl glassworks, house No. 129, worker houses
- 2a Bratři Jílkové glassworks, house No. 687, glassworks halls, annexes, smokestack
- 2b Bratři Jílkové glassworks, house No. 687, worker houses
- 3a Franz Vetter glassworks, house No. 970, glassworks hall, annexes
- 3b Franz Vetter glassworks, house No. 970, grinding mill
- 3c Franz Vetter glassworks, house No. 970, worker houses
- 4 Lustrý glassmaking combined plant, national company, house No. 914, Preciosa a. s. glass grinding mill, house No. 94
- 6 Josef Vetter finishing works, house No. 127
- 7 Brüder Brettschneider finishing works, house No. 388
- 8 Palme & Walter finishing works, house No. 581
- 9 J. Ortweiler finishing works, house No. 861
- 10 Otto Tücher finishing works, house No. 532
- 11 Stelzig, Kittel & Co. finishing works, houses No. 450, 151, 998
- 12 Franz Stingl finishing works, house No. 73
- 13 J. & L. Lobmeyr's Neffe Stefan Rath finishing works, house No. 69
- 14 Franz Tschinkel finishing works, house No. 160
- 15 Josef Mucha finishing works, house No. 723
- 16 Engelbert John finishing works, house No. 486
- 17 Czerney & Co. finishing works, house No. 470
- 18 Victorie finishing works, later Leopold Palda, house No. 512
- 19 Christian Milan finishing works, house No. č. p. 60
- 20 Conrath & Liebsch finishing works, house No. 57
- 21 Josef Kelbel & Co. finishing works, house No. 52
- 22 Franz Kriesche finishing works, house No. 489
- 23 Emil Wurm finishing works, house No. 520
- 24 Julius Fischer finishing works, house No. 241
- 25 Elias Palme chandelier factory, house No. 168
- 26a Elias Palme chandelier factory, house No. 686, main building and annexes
- 26b Elias Palme chandelier factory, house No. 686, form works, foundry
- 27 Adolf A. Helzel finishing works, house No. 650
- 28 Heinrich Palme jun. finishing plant, house No. 32
- 29 Schmid & Co. finishing works, house No. 185
- 30 Friedrich Pietsch finishing works, house No. 44
- 31 Karl Palme finishing works, house No. 43
- 32 Rudolf Mehr finishing works, house No. 213
- 33 Herbert Uhle finishing works, house No. 191
- 34 Carl Vater finishing works, house No. 42
- 35 Gustav Ahne finishing works (painting workshop), house No. 202
- 36 Gebrüder Lorenz finishing works, house No. 261
- 37 August Terne finishing works, house No. 318
- 38 Franz Krivanek finishing works, house No. 86
- 39 Gebrüder Pallme-König finishing works, house No. 228
- 40 Josef Löhnert finishing works, house No. 262
- 41 Josef Conrath & Co. finishing works, later Hermann Grohmann, house No. 332
- 42 Rösler & Eckert finishing works, house No. 633
- 43 Friedrich Günther finishing works, house No. 421
- 44 Adolf Schönbek chandelier factory, house No. 65
- 45 Franz John finishing works, house No. 508
- 46 Walter & Biemann finishing works, house No. 229
- 47 Pfützner & Nikolaus finishing works, house No. 533
- 48 Edgar Arlt finishing works, house No. 526
- 49 backpack bench in Kostelní Vrch Street
- 50a Kamenický Šenov, Dolní nádraží railway station, dispatch building, house No. 575
- 50b Kamenický Šenov, Dolní nádraží railway station, warehouse
- 50c Kamenický Šenov, Dolní nádraží railway station, engine shed with waterworks
- 51a Kamenický Šenov – Prácheň, Horní nádraží railway station, dispatch building, house No. 667
- 51b Kamenický Šenov – Prácheň, Horní nádraží railway station, warehouse
- 52 municipal power plant, houses No. 165, 166

Kamenický Šenov, plan of the façade of a new factory building of house No. 73, Franz Stingl finishing plant (Josef Schneider, 1929). Kamenický Šenov Building Authority, Building Archives, file of house No. 73.

Plan zum Bau eines Fabrikgebäudes für die ungar. Firma Franz Stingl in Kamenický Šenov auf Parzelle Nr. 238.



Zeichn., im April 1929.

Blauplan 1:100

Gezeichnet von Josef Schneider
Kamenický Šenov
Nahrungsmittel-Fabrik



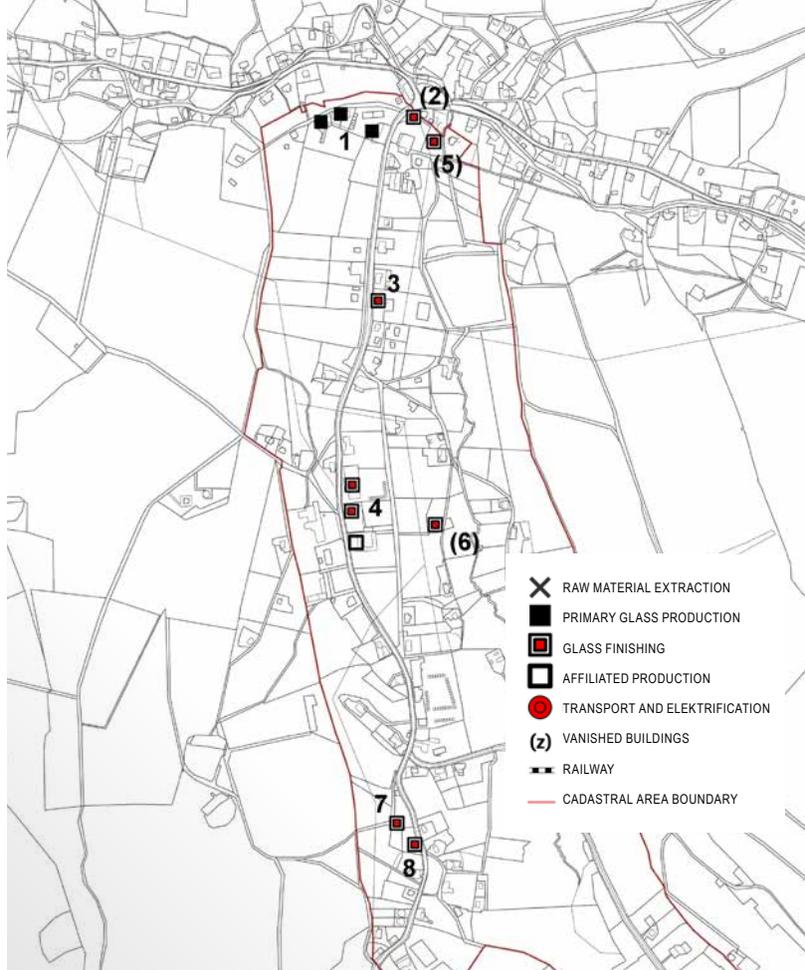
Drawing reconstruction of the upper part of Kamenický Šenov as of 1860 with medallions of major glass finishing works and export companies. Česká Lípa National History Museum and Gallery, sign. V-4898, first third of the 20th century.

which was gradually rebuilt into the form of a small factory complex; the local cutting lathe and grinding workshops, put into operation in 1876, were the first steam-driven facilities of this kind in the northern Bohemian glassmaking area; new factory complex house No. 686 – see the Catalogue of Selected Glassmaking Buildings and Complexes)³⁴; **Adolf Schönbek chandelier factory** (house No. 65 was built in 1928, demolished in 2022); **Franz Stigl** (house No. 73; earlier building of glass traders from the Zahn and Kraus families from the late 18th and early 19th centuries; later building with a ferroconcrete structure built in 1929), Stelzig, Kittel & Co. (two-storey house No. 450 from 1896 has a Neo-Renaissance façade; two-storey house No. 151 from the early 20th century was completely adapted in modern style; the two buildings are connected by a wooden gallery on the first-floor level), J. Ortweiler (painting works and grinding mill were founded in 1889 in vanished house No. 142 near Kopeček Street, house No. 861 came into existence in the late 1920s or early 1930s); **Lustrý glassmaking combined plant** (the extensive complex, house No. 914, is part of Preciosa a. s. today; the chandelier and light fittings production complex including a glassworks hall, a mixing chamber, form works, a monoblock with finishing operations, an administrative building and the necessary energy background was built in 1966–1972).³⁵

34 BRAUNOVÁ 2019, pp. 317–325. SOKA Česká Lípa, AM Kamenický Šenov, Inv. No. 1187, carton 43, building files 1864–1900 (file house No. 168). PALME 1935, pp. 74–79. FRÖMME 2009, pp. 121–127. POLÁK 2013, p. 21.

35 Kamenický Šenov Building Authority, Building Archives, files of houses No. 73, 861, 322. BERAN – VALCHAŘOVÁ 2007, p. 22, 25. PALME 2018, pp. 306–310. *Die Gross-industrie Oesterreichs 1908*, part 2., p. 137. FAHDT 1887, p. 124. *Adressbuch der Glas-Industrie in Deutschland und Oesterreich-Ungarn 1895*, p. 287. KOLEKTIV 1930, pp. 106–107. FREIWILLIG 2021, pp. 68–95.

Map of the Krásné Pole cadastral area. Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.

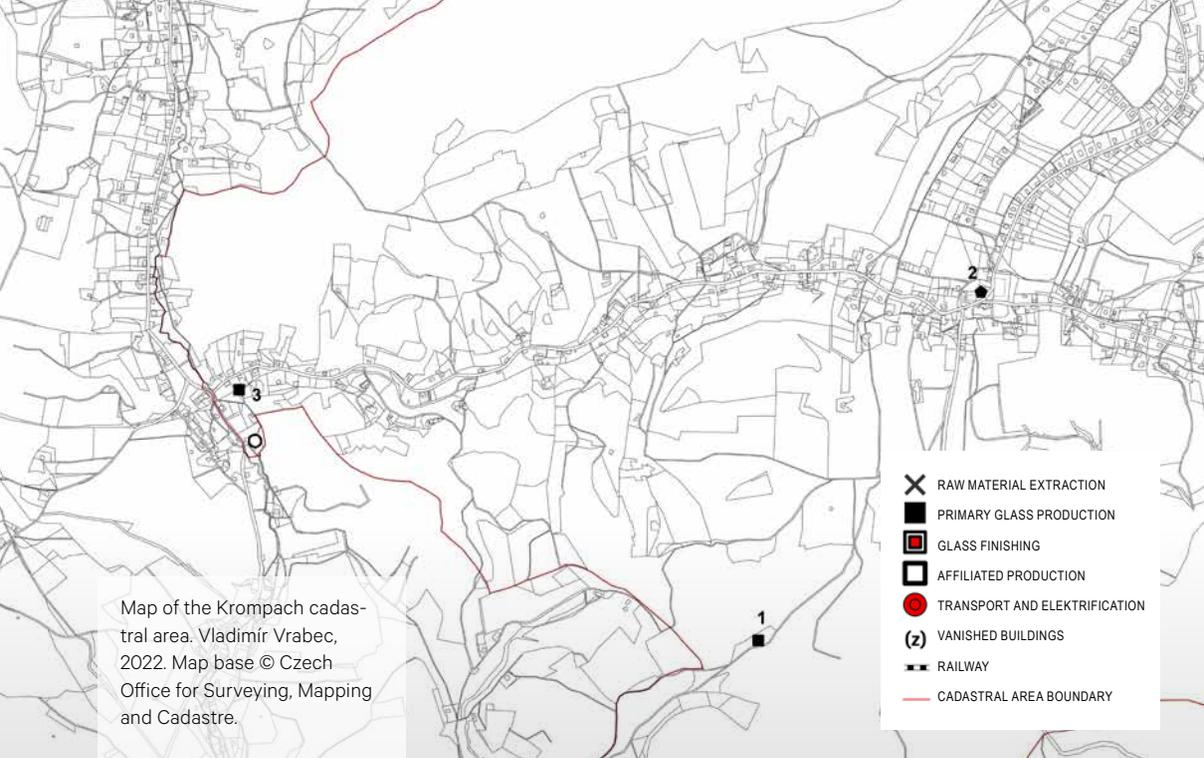


- | | |
|---|--|
| <p>1 Michel & Mayer, August Mayer & Sohn glass-works complex, house No. 180, Horní Chříbská, glassworks master's house No. 5 + operating background, worker houses No. 104 and 107, 106</p> <p>2 glass grinding mill, house No. 3, Hampel & Worm finishing works</p> <p>3 Franz Keßlers Witve finishing works, house No. 13</p> <p>4 Wilhelm Tschinkel finishing works, houses No. 22, 98 and 101, girdler workshop, house No. 26</p> | <p>5 Anton Schuckert engraving workshop, houses No. 1 and 2</p> <p>6 Johann Grohmann engraving workshop, house No. 48 (present-day Reg. No. 10)</p> <p>7 Robert Stejskal engraving workshop, house No. 79</p> <p>8 Wilhelm Kindermann glass etching workshop, house No. 71</p> |
|---|--|

KRÁSNE POLE CADASTRAL AREA

The existence of several finishing works in Krásné Pole can be documented in the last quarter of the 19th and the first half of the 20th centuries. The most important companies had premises also in Horní Chříbská; this was the case of the finishing works Hampel & Worm (grinding mill, house No. 3, vanished) and Wilhelm Tschinkel (houses No. 101, 98; girdler works, No. 26).³⁶

³⁶ SOKA Děčín, AO Horní Chříbská, municipal chronicle, pp. 95, 84–88, 104–105. *Adressbuch der Glas- und Keramik-Industrie der Tschechoslowakei* 1926, p. 75. *Adressbuch der Glas-Industrie* 1929, p. 521.



Map of the Kropach cadastral area. Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.

- X RAW MATERIAL EXTRACTION
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- TRANSPORT AND ELEKTRIFICATION
- (z) VANISHED BUILDINGS
- RAILWAY
- CADASTRAL AREA BOUNDARY

- 1 Kropach glassworks (before 1549), approximate localization
- 2 Kropach glassworks, glassworks master's house No. 48, core of the glassworks estate
- 3 Juliovka glassworks (1687– c. 1700), localization of the vanished complex; the position of mill, house No. 1, and the probable location of a quartz stamp battery marked by a circle

KROPACH CADASTRAL AREA

Kropach glassworks. The first local glasshouse dated before 1549 was probably located southwest of the municipality (the toponym *Hüttenwiesen*). It was operated by the Schürer family until the middle of the 17th century. However, the glassworks estate was situated in the core of the village in the place of three earlier farmsteads. A remnant of this estate is house No. 48, probably the glassworks master's house.³⁷ **Juliovka glassworks.** A smaller glasshouse was founded by Julius Francis of Saxe-Lauenburg, the owner of the Zákupy manor, in 1687. Its position is probably referred to by the date on a portal through which the spaces hewn into the adjacent rock massif were entered. The glasshouse ceased to exist in the early 18th century. At least five buildings stood there according to the rich archival material: the glassworks hall; the apartment of the glassworks scribe, combined with an inn with a stable, warehouse for products and a cellar (probably a preserved cellar with dating 1687); the glass master's house; and two cottages (probably for glassmakers). A melting furnace, probably with six pots, a new melting furnace of Johann Christoph Fiedler's design (which did not prove useful), a cooling furnace and a wood drying furnace were listed as the equipment. A stamp battery and a grain mill (probably later house No. 1) stood nearby.³⁸

37 PANÁČEK – GELNAR 2018, pp. 249–274. ZUMAN 1936a, pp. 1–11.
 38 Ibid., pp. 85–92, 137–140, 154–165. KOLKA 2012, pp. 37, 102–106.

KYJOV CADASTRAL AREA

Limestone quarrying is documented in the cadastral area of Kyjov near the so-called Doubice Lime Works at Vápenný (Maškův) Hill and at the so-called Peškova Hillside near Hely. Several vanished medieval glasshouses have been localized in the area. The fundamental locality for the region is the glasshouse near the so-called Doubice Lime Works. Another glasshouse was reportedly situated in the U Kapličky field on the east slope of Široký Hill.³⁹



Kytlické Mlýny, view of the central part of the village with the railway station. Photo: Jiří Vidman 2021.

KYTLICKÉ MLÝNY CADASTRAL AREA

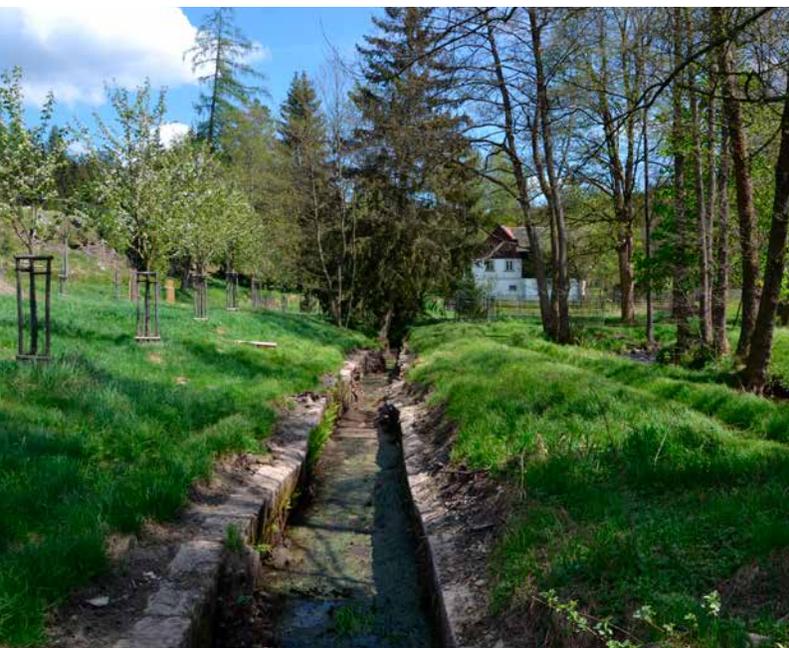
Like the neighbouring Falknov and Kytlice, Hillův Mlýn is one of the most important localities in the Bor – Šenov glassmaking area. Painters and engravers concentrated there at first.⁴⁰ An extraordinary occurrence of water-driven glass grinding mills became the local speciality during the 18th century and especially in its second half. A grinding mill was in operation on the Kamenice as early as 1744. New grinding mills of Josef Köhler and Gottfried Kühnel worked in the Kamenice part as of that date. The latter built another grinding mill on the Bílý Stream in 1752. Fourteen grinding mills came into existence in the municipality by 1795, but the number dropped to eight in the following year due to a crisis. In the Česká Kamenice part, the operation of eleven grinding mills is documented in the second half of the 19th century – houses No. 1, 3, 8, 11, 15 (new, founded in 1854), 18,

39 ČERNÁ 2004, pp. 22–24, 26–30.

40 SLAVÍČKOVÁ – CVRK 1993, pp. 30–35, 67–69. SLAVÍČKOVÁ 2001, p. 22.



- | | | | |
|---|---|-----|---|
| 1 | glass grinding mill, house No. 1 (old house No. 66) | 10 | glass grinding mill, house No. 57 (old house No. 40) |
| 2 | glass grinding mill, tan stamp battery, house No. 3 (old house No. 58) | 11 | glass grinding mill, houses No. 59, 60 (old house No. 41) |
| 3 | glass grinding mill, sawmill, house No. 8 (old house No. 45) | 12 | glass grinding mill, house No. 65 (old house No. 42) |
| 4 | glass grinding mill, house No. 11 (old house No. 21) | 13 | glass grinding mill / glass paint friction mill, house No. 66 (old house No. 46) |
| 5 | glass grinding mill, woodworking company, house No. 15 (old house No. 20) | 14 | glass grinding mill, sawmill, mechanical joinery, house No. 77 (old house No. 43) |
| 6 | glass grinding mill, house No. 18 (old house No. 25) | 15 | glass grinding mill / glass paint friction mill, house No. 79 (old house No. 50) |
| 7 | glass grinding mill, house No. 19 (old house No. 23 or 24) | 16 | R. Klinger finishing works, house No. 64 |
| 8 | glass grinding mill, house No. 21 (old house No. 26) | 17a | Mlýny railway station, dispatch building, house No. 39 |
| 9 | glass grinding mill, grain mill, sawmill, house No. 29 (old house No. 16) | 17b | Mlýny railway station, waterworks |



Kytlické Mlýny, view upstream of the preserved bed of the raceway that provided water for grinding mills, houses No. 8, 3 and 1. Photo: author, 2022.

57, 65, 66, 77 (in 1890 adapted to a sawmill and wooden part production, i.a. for grinding mills) and 79 (replaced by No. 83?). A tan stamp battery was added to No. 3 and a glass paint friction mill to No. 79. The operation of grinding mills in No. 15 (replaced by wooden element production) and No. 66 (by a glass paint friction mill) survived until 1930; of grinding mills No. 1, 3, 18 and 65, until 1945. Altogether ten glass grinding mills and glass paint friction mills are documented on the Kamenice, and five more on minor tributaries. All the machines were driven by overshot wheels. The most interesting are the following buildings: glass grinding mill, house No. 15 (old house No. 20, later rebuilt into a wood processing company; part of the hydraulic structure and torsos of the equipment are preserved), glass grinding mill No. 66 (old house No. 46, later a glass paint friction mill; a torso of the transmission, a part of the waterwheel chamber with an opening for the waterwheel and fireclay vessels for glass paint grinding are preserved).⁴¹

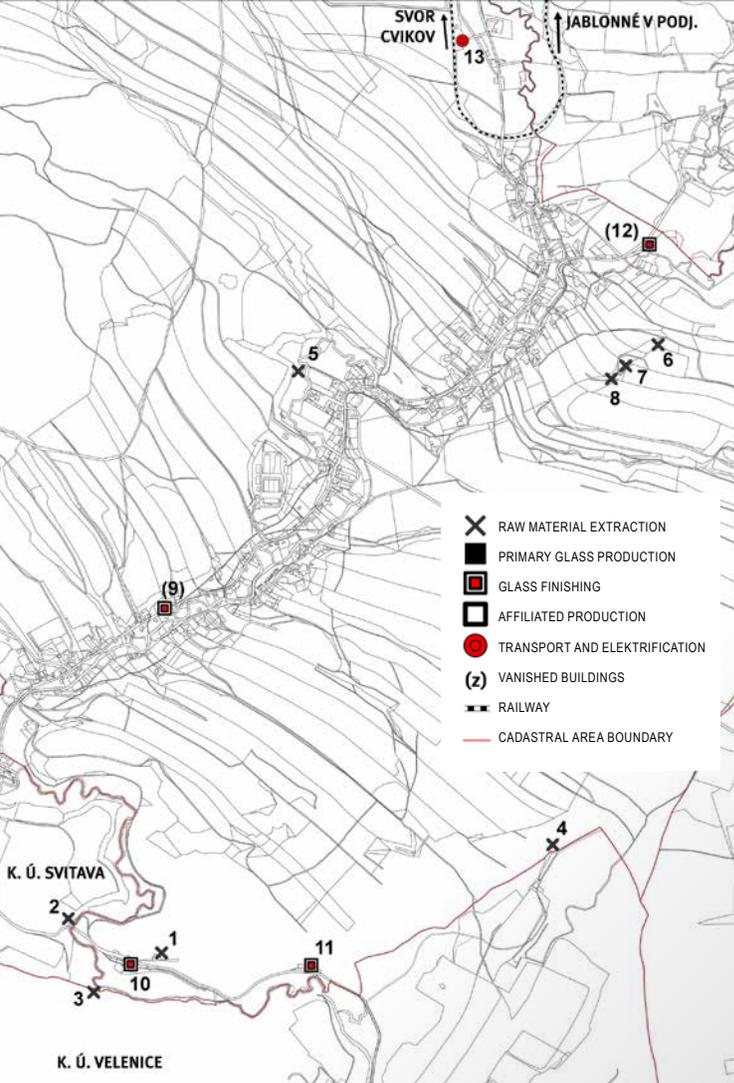
LINDAVA CADASTRAL AREA

Mirror grinding and polishing works, operating as part of the Kinský mirror works (from 1756), were an important part of the municipality from the second half of the 18th century. The earliest **mirror grinding and polishing works, house No. 194 (Dolní Lindava Business)** came into existence between 1756 and 1760. As of 1795, the business included a mirror foil hammer mill, a gypsum mill, frame production workshops and a partially vaulted raceway. In the late 1880s, two overshot waterwheels with a power of 12.5 HP propelled polishing machines with 36 blocks on the ground floor and with 100 blocks on the first floor. In 1923, the mirror works were rebuilt into a bone stamp mill

Lindava postcard from the first quarter of the 20th century. The bottom window depicts mirror grinding and polishing works, house No. 194. Marek Říha's collection.



41 SOKA Děčín, OÚ Děčín, Inv. No. 29, water book of the judicial district Česká Kamenice from 1872, inserts No. 16, 18, 20, 22, 23, 24, 25, 26, 27, 28; Inv. No. 30, water book of the judicial district Česká Kamenice from 1926, inserts No. 7, 16, 19, 21, 24, 50, 70, 73; Inv. No. 34, cart. 34. JIRÁK 1932, p. 11. SLAVÍČKOVÁ – CVRK 1993, pp. 53, 67, 69, 72. More information has been drawn from a manuscript and photographic documentation by Emil Sedláček (April 2014).



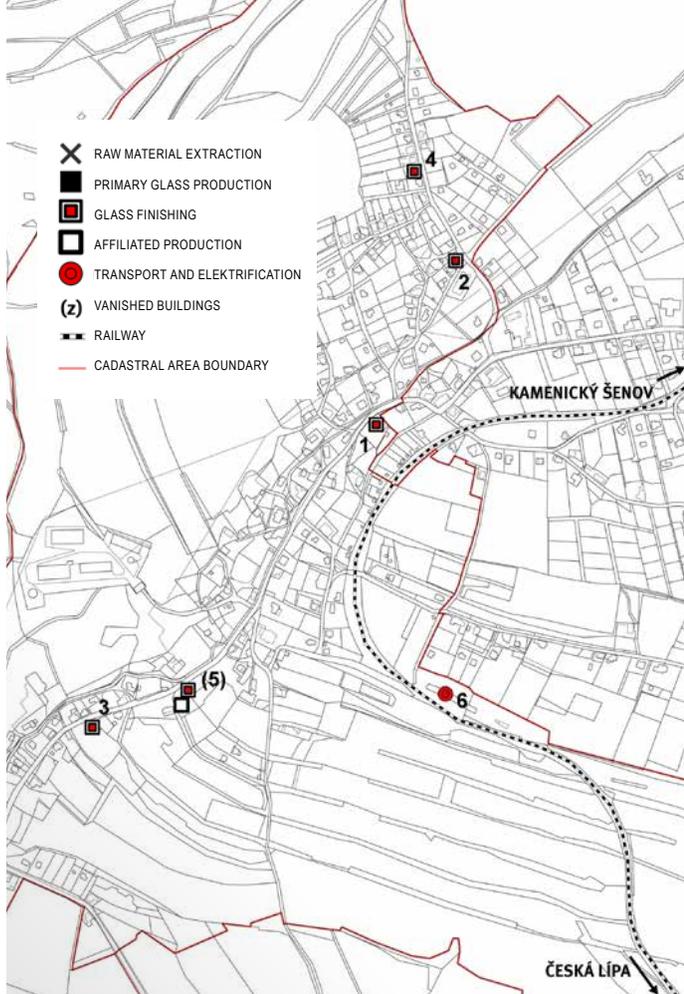
Map of the Lindava cadastral area. Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.

- 1 underground glass sand mine (so-called Pusté kostely 1)
- 2 underground glass sand mine (so-called Pusté kostely 2), Svitava cadastral area
- 3 underground glass sand mine (so-called Pusté kostely 3, pod Výrovem), Svitava/Velenice cadastral area
- 4 underground glass sand mine (Věneček Hill)
- 5 underground glass sand mine
- 6, 7, 8 underground glass sand mines (so-called Sandloche, Kovářský Hill)
- 9 mirror grinding and polishing works, house No. 194 (Dolní Lindava Business)
- 10 mirror grinding and polishing works, houses No. 309 and 311 (Velenice Business)
- 11 mirror grinding and polishing works, house No. 308 (Rabštejn Business)
- 12 mirror grinding and polishing works, house No. 66 (Horní Lindava or Kunratice Business)
- 13 Lindava railway station, dispatch building, house No. 319, warehouse

of the Heinrich Eckert company. The complex ceased to exist in the 1950s. The second **grinding and polishing works, house No. 309 and 311 (Velenice Business)** came into existence in 1767 and the third **grinding and polishing works No. 308 (Rabštejn Business)** in 1854 – see the Catalogue of Selected Glassmaking Buildings and Complexes. Only a hydraulic structure with a wide raceway from the Svitávka and a massive vaulted drainage channel are preserved of the last **grinding and polishing works, house No. 66 (Horní Lindava or Kunratice Business)**. These grinding and polishing works were built in 1869. As of 1888, the grinding works used an overshot waterwheel with a power of 16.5 HP propelling polishing machines with 21 blocks on the ground floor and with 126 blocks on the first floor. The complex ceased to exist in the 1950s.⁴²

42 SOA Děčín, Vs Sloup, Inv. No. 306, carton 144 (mirror works); Inv. No. 330, sign. XVI/B, carton 151 (water law affairs); Inv. No. 957 (mirror works building plans). SOkA Česká Lípa, fond OÚ Č. Lípa, Inv. No. 9, carton 1V, Water Book for the judicial districts Česká Lípa and Nový Bor (insert No. 79 and 73); Inv. No. 10, carton 1V, water book of the judicial districts Česká Lípa, Nový Bor, Mimoň, 1932–1938 (inserts No. 50). Inv. No. 1008, sign. W.B.79, W.B.81, 11 54/25, XI 5/56, carton 75; Inv. No. 1002, sign. W.B.82, 11 54/23, carton 75; Inv. No. 994, carton 75. PAUDLER 1885, pp. 24–27. PEŠA 2004, pp. 87–92, 95–98, 102–109.

Map of the Mistrovice cadastral area.
 Vladimír Vrabec, 2022. Map base
 © Czech Office for Surveying,
 Mapping and Cadastre.



- 1 Knötsch & Kittel finishing works, house No. 77 (present-day Reg. No. 77)
- 2 Thomas Pýr finishing works, house No. 105
- 3 Franz Grossmann glass grinding works, house No. 210
- 4 Johann Röhlich glass grinding works, house No. 221
- 5 Johann Zekert, finishing works and bronze goods production
- 6 Mistrovice railway station, dispatch building, house No. 217, weighing facility, vanished warehouse

MISTROVICE CADASTRAL AREA

The municipality became one of the glass finishing centres in the Bor – Šenov area gradually from the first half of the 18th century. A glasshouse is also localized in Mistrovice, reportedly mentioned as of 1700. Many buildings can be linked to glassmaking – houses of engravers (cutters), cutting lathe operators, painters, gilders and glass traders. Cutting lathe operators dominated among them in terms of numbers, but above all in the first half of the 19th century, they were outshone by local famous engravers (Franz Anton Pelikan, August Böhm, Ignaz Pelikan, Florian August Gürtler, August Hegenbarth). The companies of Florian and Franz Görner, Ignaz Pelikan and Franz Josef Renelt (glass gilding) were among the important glass finishing and trade businesses at that time. As of 1882, 244 people worked in thirty-two painting workshops, thirty-one engraving workshops and six girdler workshops in Mistrovice and the neighbouring Oldřichov. Nine to thirteen larger finishing works also operated there; some persisted from earlier times, others were newly founded in the 1860s and 1870s (W. Hegenbarth & Söhne, Johann Zekert & Söhne, Franz Martin, Thomas Pýr), around 1900 (Knötsch & Kittel) and after 1918 (Karl Halusa, Oskar Schneider). The J. J. Gürtler & Söhne finishing works could pride itself on a very long continuity; it was founded in 1775

and remained in operation until the 1930s. A steam-driven grinding mill is mentioned at the Ignaz Vogel's Sohn finishing plant as of 1887; another one is mentioned for Johann Zekert & Söhne as of 1895.⁴³

NADĚJE CADASTRAL AREA

Medieval and early modern glassworks are localized in the cadastral area of Naděje. Written sources document a glasshouse under Dürrenberg (present-day Suchý Hill, 628 metres above sea level). The glasshouse is mentioned in a privilege from 1637 for Valentin Schürer, the reeve (Vogt) and glassworks master of Krompach, which mentions the possibilities of its restoration.⁴⁴

NOVÝ BOR CADASTRAL AREA

The development of the built-up area belongs to the period after the elevation of the locality to a town (1757), when numerous glass traders moved into the town above all. A stagnation followed from the third of the 19th century, however, in connection with a glass industry crisis and the discontinuation of most local trading companies. Of Bor's earlier trading companies and finishing works, only Josef Janke & Comp., Friedrich Egermann and some smaller workshops survived into the second half of the 19th century. The recovery of glass finishing was supported by the foundation of a branch of the Frankfurt-based company J. Vogelsang & Söhne in 1847. A greater glass industry boom in the town only followed from the 1870s, undoubtedly in connection with the construction of a railway (1869). About forty large and medium-sized finishing works operated there by 1918, plus dozens of smaller workshops and hundreds of home craftsmen who worked in commission for larger companies. The growth of the businesses continued after 1918 and throughout the 1920s; their number was around sixty.⁴⁵

Helenenhütte glassworks. The rectangular mass of a plastered masonry glassworks hall is still visible in house No. 254. The glassworks was built by König, Werner & Co. in 1873–1874. It was the first in the region to use a melting furnace of the Siemens system and the third to use the Nehse system; both furnaces were heated with brown coal producer gas. After ten years, it became the property of Michel & Mayer and, after it split in 1902, it was registered under the heading E. Michel & Co. Two new Siemens-Siebert melting furnaces with twenty pots were installed in the glassworks before 1907. At that time, the glassworks included a grinding works with fifteen grinder benches and a finishing works. The engines were driven by a 2 HP electric motor. Lessee Franz Hantich resumed the glassworks' operation in 1919 and Vater & Co. in 1923. The operation ceased during the economic crisis, in 1932, and was briefly restored by August Schmidt – ASA in 1940–1942.⁴⁶

43 KOLEKTIV 2013, pp. 10–41, 43–44, 79–85. VOLF 1968, p. 205. BROŽOVÁ 1997, pp. 66–68. SCHÖTTNER 2002, pp. 63–102. SCHÖTTNER 2003, pp. 141–178. URBAN 1966, pp. 304–306. GRISA 2015, p. 164. FAHDT 1887, pp. 117–119. *Adressbuch der Glas-Industrie in Deutschland und Oesterreich-Ungarn* 1895. FAHDT 1907, pp. 133–134. *Adressbuch der Glas- und Keram-Industrie der Tschechoslowakei* 1926, pp. 71–72. *Adressbuch der Tschechoslowakischen Glas-Industrie* 1928/29, pp. 70–72. *Adressbuch des Glasindustriegebietes Haida-Steinschönau und Umgebung* 1928, pp. 197–200.

44 ČERNÁ 2004, pp. 25, 31, 34–35. ZUMAN 1936a, p. 4.

45 HANTSCHHEL 1911, pp. 251–261. SIEBER 1913, pp. 149–161. JINDRA 2010, pp. 102–105. RANŠOVÁ – HORNEKOVÁ 2001.

46 SIEBER 1913, pp. 148–149. HANTSCHHEL 1911, p. 250. RANŠOVÁ – HORNEKOVÁ 2001, pp. 75–76. FAHDT 1887, p. 42. GRISA 2017, pp. 174–175, 182–183. FAHDT 1907, p. 41. *Adressbuch der Glas-Industrie* 1929, p. 179. JINDRA – KOMŮRKA 2006b, pp. 12, 18, 89 and 148.

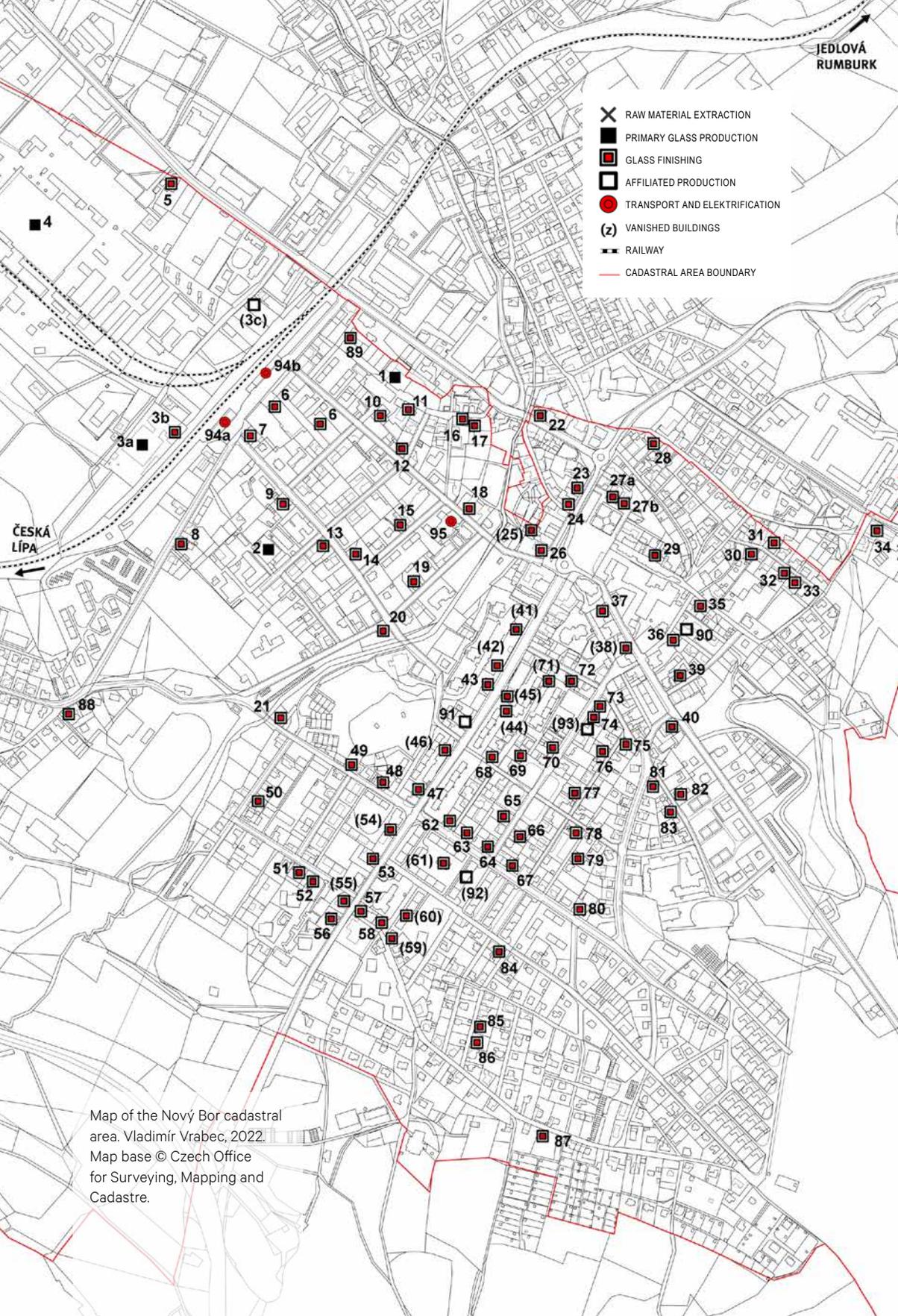


Nový Bor, view from the southeast of the premises of Hartmann-Dieterichs finishing plant, houses No. 306 and 326. Photo: Jiří Vidman 2020.

Fachschulhütte (School Glassworks). House No. 704 has the original plastered core of the glassworks hall preserved in its mass. A smokestack built by the H. Heinicke company of Vienna is standing north of the glassworks hall. The construction of the school glassworks began on 3 August 1909, and the operation commenced in February 1910. The builder was the Glass Industry Professional School in Nový Bor (founded 1870). The Glass Testing Institute, the first institution of its kind in Austria-Hungary, came into existence together with the glassworks. A melting furnace of the Siemens system was installed in the glassworks hall, heated by two shaft traction Siemens producers. The furnace was built by the Alois Uhrmann Jr. company of Dubí near Teplice. The complex also included a tempering furnace and two chamber cooling furnaces. After 1918, the management of the glassworks went over to the town, which leased it to local companies with the provision that one pot was contractually earmarked for the school. From 1920, the glassworks was leased to E. Hantich & Co. (later Glasshüttenwerke W. Hantich & Co.). Its operation ended during the economic crisis, in 1934.⁴⁷ **Florahütte glassworks** – see the Catalogue of Selected Glassmaking Buildings and Complexes. **Crystalex glassmaking combined plant.** The extensive complex of house No. 634 with its own industrial railway is situated northwest of the town. The construction of the glassworks and finishing plant, an administrative building, a canteen, the energy background and other operating buildings took place in 1965–1967.⁴⁸

47 HAIS 2011, pp. 495–510. HAIS 2022, pp. 333–342. RANŠOVÁ – HORNEKOVÁ 2001, p. 83. *Adressbuch der Glas-Industrie* 1929, pp. 178–179.

48 FREIWILLIG 2019, pp. 261–270.



JEDLOVÁ
RUMBURK

- ✕ RAW MATERIAL EXTRACTION
- PRIMARY GLASS PRODUCTION
- ▣ GLASS FINISHING
- AFFILIATED PRODUCTION
- TRANSPORT AND ELEKTRIFICATION
- (z) VANISHED BUILDINGS
- RAILWAY
- CADASTRAL AREA BOUNDARY

ČESKÁ
LÍPA

Map of the Nový Bor cadastral area. Vladimír Vrabec, 2022.
Map base © Czech Office for Surveying, Mapping and Cadastre.

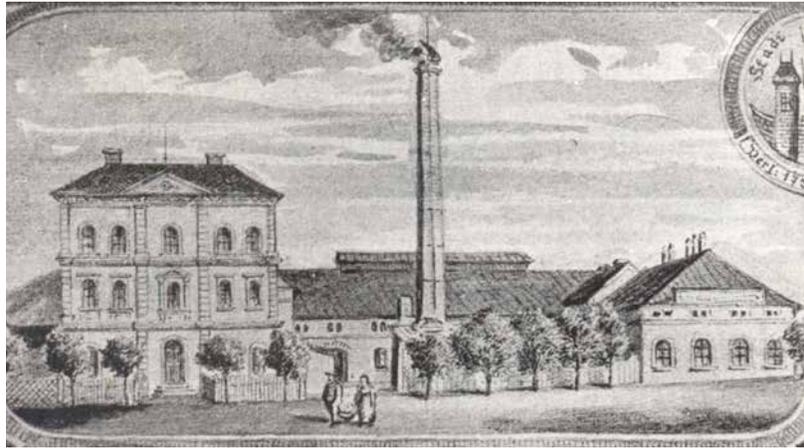
- 1 Helenehütte glassworks, house No. 254, glassworks hall, annexes, smokestack
- 2 Fachschulhütte (school) glassworks houses No. 704, 703, 408, glassworks hall, annexes, smokestack
- 3a Florahütte glassworks, house No. 399, glassworks hall, annexes, smokestack
- 3b Florahütte glassworks, house No. 399, grinding works, painting works, annexes
- 3c Florahütte glassworks, house No. 399, worker house No. 524, sheds
- 4 Crystalex glassmaking combined plant, national company, house No. 634, Crystalex CZ s. r. o.
- 5 Worm & Co. finishing works, house No. 375
- 6 Hartmann & Dieterichs finishing works, houses No. 306, 326 and 268
- 7 Josef Schlegel finishing works, house No. 292
- 8 Eduard Ziml finishing works, house No. 535
- 9 Wenzel Kulka finishing works, house No. 519, vanished glass grinding works, house No. 446
- 10 Adolf Sallmann finishing works, house No. 518
- 11 Brüder Mechold finishing works, house No. 302
- 12 Artur Schöller finishing works, house No. 579
- 13 Gebrüder Kraut finishing works, house No. 386, more operations in No. 5
- 14 Josef Sitte finishing works, house No. 389
- 15 Josef Hofmann finishing works, house No. 401
- 16 August Hocke painting works, house No. 245
- 17 Winkler & Wittig finishing works, house No. 298
- 18 Adolf Rasche finishing works, house No. 385
- 19 Josef Janke & Comp. finishing works, later Gebrüder Palme & Co., Wilhelm Glaser, house No. 587
- 20 Emil Adolf Oppitz finishing works, house No. 551
- 21 glass grinding mill, house No. 32
- 22 Tschernich & Co. finishing works, house No. 76
- 23 Proft & Co. finishing works, house No. 66
- 24 Beyermann & Co. finishing works, house No. 67
- 25 Karl Grossmann finishing works, house No. 575
- 26 Josef Janke & Comp. trading company, finishing works, house No. 57
- 27a Adolf Morawetz finishing works, house No. 100
- 27b Friedrich Egermann finishing works, houses No. 101 + 100, Karel Wünsch house No. 101
- 28 Julius Melzer finishing works, house No. 79
- 29 Würfel & Horna finishing works, house No. 108
- 30 Johann Eisner finishing works, house No. 560
- 31 Josef Bártl finishing works, house No. 321
- 32 Pohl & Koepeke finishing works, house No. 361
- 33 Brüder Štěpánek finishing works, house No. 407
- 34 Gebrüder Zahn finishing works, house No. 632
- 35 Gebrüder Zahn finishing works, later Gebrüder Rachmann, houses No. 315, 320, 328
- 36 Efler & Werner finishing works, house No. 262
- 37 Salamon Reich & Co. finishing works, house No. 129
- 38 Wächter & Weigt finishing works, house No. 587
- 39 B. Oppitz (vorm. August Oppitz) finishing works (trade/export house), later Gebrüder Rachmann, house No. 226
- 40 Thomas A. Pistor finishing works, house No. 263
- 41 Carl Hosch chandelier factory, house No. 51
- 42 Rudolf Raubinek finishing works, house No. 47
- 43 Marzin, Püschel & Zubaty finishing works, house No. 46
- 44 Heinrich Hesse painting works, church window production, house No. 14
- 45 Adalbert Scheinost finishing works, later Wolff & Hess, Salamon Reich & Co., house No. 12
- 46 Sitte & Püschel finishing works, house No. 40
- 47 Emil R. Pracht finishing works, house No. 227
- 48 Heinrich R. Markowsky finishing works, house No. 34
- 49 Julius Hansel & Comp. finishing works, house No. 33
- 50 Konrad Werner finishing works, house No. 379
- 51 Reinhold Kieslich finishing works, house No. 383
- 52 Oppitz & Max finishing works (light fittings production), house No. 373
- 53 Josef Gerner finishing works, house No. 260 and vanished glass grinding works, house No. 293
- 54 Reinhold Palme & Söhne chandelier factory, house No. 29
- 55 Brüder Podbira finishing works, house No. 279
- 56 Brüder Podbira finishing works, house No. 341
- 57 Karl Werner finishing works, house No. 240
- 58 Heinrich Fuchs finishing works, house No. 269
- 59 F. E. Kreibitz finishing works, house No. 445
- 60 Friedrich Günther girdler workshop, house No. 252
- 61 Rudolf Behmel finishing works, house No. 159
- 62 Josef Simchen finishing works, house No. 154
- 63 Josef Wendler finishing works, house No. 161
- 64 Wilhelm Karl Meissner finishing works, houses No. 191, 317
- 65 A. L. Czech & Co. finishing works, later Carl Stölzles Söhne, Karl Palda, house No. 187
- 66 Franz Josef Grohmann finishing works, house No. 188
- 67 Gabriel John finishing works, house No. 360
- 68 Rudolf Eiselt finishing works, house No. 150
- 69 Emil R. Peukert finishing works, house No. 167
- 70 Carl Schappel finishing works, house No. 171
- 71 Efler & Werner finishing works, house No. 9
- 72 Johann Kindermann finishing works, house No. 314
- 73 J. Vogelsang & Söhne finishing works, house No. 17
- 74 F. Valentin & Söhne finishing works, house No. 177
- 75 Johann Pavlík finishing works, house No. 209
- 76 Brüder Mechold finishing works, house No. 206
- 77 Johann Oertel & Co. finishing works, house No. 182
- 78 Carl Goldberg finishing works, house No. 235
- 79 Felix Průša finishing works, house No. 424
- 80 F. Pavel & Co. finishing works, also Lindemann, Pavel & Co., house No. 558
- 81 Josef Blažek finishing works, house No. 439
- 82 Antonín Janák finishing works, house No. 576
- 83 Franz Štěpánek finishing works, house No. 442
- 84 Schubert & Wenzel finishing works, house No. 353
- 85 Emil Ruscher finishing works, house No. 478

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| 86 Eduard Gaerber painting workshop, house No. 479 | 92 Carl Drobnik & Söhne glass paint factory, house No. 195 |
| 87 Friedrich Pohl painting workshop, house No. 532 | 93 Josef Günzel glass paint factory, house No. 178 |
| 88 Hermann Fabich finishing works, house No. 273 | 94a Nový Bor railway station, dispatch building, house No. 228 |
| 89 Otto Müller painting workshop, house No. 270 | 94b Nový Bor railway station, warehouse |
| 90 Wilhelm Rachmann Metallwerke machine works, metal production, house No. 264 | 95 municipal power plant, house No. 319 |
| 91 Josef Günzel glass paint factory, house No. 43 | |

The following companies belong among the constructionally most interesting finishing plants: **Goldberg Carl** (in 1898 moved to the former porcelain finishing plant of the Benj. F. Hunt & Söhne company, house No. 235, reconstruction in 1899); **Grohmann Franz Josef** (masonry historicizing house No. 188 from 1868); **Grossmann Karl** (operated in house No. 575 from 1920; the valuable modern building with a dominant five-storey part ceased to exist in the late 20th century); **Hartmann & Dieterichs** (a very valuable factory complex of houses No. 306, 326 and 268; house No. 306 from 1888 with a Neo-Renaissance façade, a three-storey grinding mill with timber ceilings, two-storey building No. 326 from 1896 with a subsequent grinding works; transmissions and cutting lathes by the Edwin Beckel machine works from Skalice from the first half of the 20th century were used until the end of operation in 2022); **Carl Hosch chandelier and finishing works** (late Classicist three-storey production building, house No. 51 came into existence in 1868 by a reconstruction of an earlier house from the late 17th or early 18th century; vanished in 1950 or 1953); **Kraut Gebrüder** (three-storey building, house No. 386, built between 1910 and 1914); **Oertel Johann & Co.** (originally Classicist house No. 182, present-day house No. 192, from the early 1790s; reconstruction in the second decade of the 20th century; three new production wings before 1872); **Palda Karl (formerly Czech, A. L. & Co., Stölzles Carl Söhne A. S.,** Classicist house No. 187 from the 1790s; from 1839, Czech, A. L. & Co. finishing works; the house was extended on the western side before 1843 and in 1866; the construction of a courtyard wing with a grinding works and packing premises in 1898; interconnected by connection wings in 1903); **Palme Reinhold Söhne chandelier factory** (house No. 29 bought in 1857; monumental two-storey late Classicist building originated from an extension of an earlier masonry house from the late 18th and early 19th centuries; vanished due to a fire in 1951); **Podbira Brüder** (Neo-Renaissance house No. 279 built just before 1890; vanished in 2022; intactly preserved historicizing house No. 341 from the 1890s); **Rasche Adolf** (house No. 385 built in 1910, radically rebuilt and extended in the 1930s); **Vogelsang J. & Söhne, Valentin F. & Söhne** (finishing works situated in house No. 17, originally No. 17 and 177; Classicist core from the 1790s; the three-storey south wing came into existence before 1872); **Zahn Gebrüder** (until 1926, it operated in the complex of houses No. 320, 315 and 328 – see the Catalogue of Selected Glass-making Buildings and Complexes; in 1926, the construction of a new factory building No. 215 in the cadastral area Sloup v Čechách, later No. 632 Nový Bor; the architecturally distinctive two-storey building has a dominant tower with a tented roof). The most important affiliated production building was the **Wilhelm Rachmann Metallwerke machine works** (factory complex No. 264 – see the Catalogue of Selected Glassmaking Buildings and Complexes). Several manufacturers of glass paints and glass and porcelain finishing materials also operated in the town (Carl Drobnik & Söhne, Josef F. Günzel, Johann Wollmann).⁴⁹

49 HANTSCH 1911, pp. 252–264. SIEBER 1913, pp. 150–161. RANŠOVÁ – HORNEKOVÁ 2001, pp. 70, 72–73, 75, 77, 79, 83–87, 89–90, 91–93, 95. RASOCHA 1989, pp. 2–8, 29, 31, 48–50, 55–56, 59–61, 65, 67. FAHDT 1887, pp. 107, 112. *Adressbuch der Glas-Industrie in Deutschland und Oesterreich-Ungarn* 1895, pp. 234, 320. JINDRA – KOMŮRKA 2006b, pp. 12–14, 18–21, 24, 30–34, 40, 49, 57, 58, 60, 64, 69, 74, 75, 87, 88, 91, 148. JINDRA – KOMŮRKA 2017, pp. 27, 28, 42, 45, 68.

Nový Bor, Helenehütte glassworks, reproduction of a drawing from the last quarter of the 19th century; in the centre, the glassworks hall with a producer station and a smokestack. Glass Museum Nový Bor.



Nový Bor, view from the northwest of Fachschulhütte glassworks; on the left, glass school, house No., 316; behind it, Gebrüder Kraut finishing works, house No. 386. Photo: Jiří Vidman 2020.



Nový Bor, view from the southeast of glassmaking combined plant Crystalex complex. Photo: Jiří Vidman 2020.

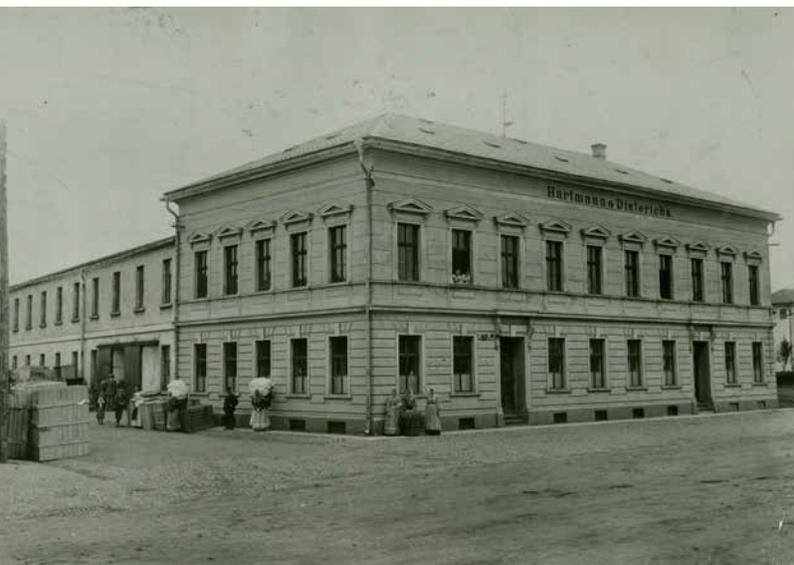




Nový Bor, view from the southwest of Carl Goldberg finishing works, house No. 235. Photo: Jiří Vidman 2021.



Nový Bor, Hartmann-Dieterichs finishing works, view from 1897 of grinding works, house No. 326, from present-day Mařákova Street. Glass Museum Nový Bor.



Nový Bor, Hartmann-Dieterichs finishing works, view from 1897 of house No. 306, from present-day Nádražní Street. Glass Museum Nový Bor.

Nový Bor, view from the southeast of the garden town around Palackého Square. Bottom left: Franz Josef Grohmann finishing works, house No. 188; above it, Karl Palda finishing works, house No. 187; centre right: Johann Oertel & Co. finishing works, present-day houses No. 192 and 182; above it, the dominant mass of F. Valentin & Söhne finishing works, house No. 177 (present-day house No. 17).
Photo: Jiří Vidman 2021.



Nový Bor, Gebrüder Zahn finishing works, house No. 632; view of the main building from the northwest.
Photo: author, 2020.



Nový Bor, view from the southwest of Otto Müller painting works, house No. 270; the smokestack was brought down in 1948; behind the building is another finishing works in B. Egermanna Street (Arnultovice cadastral area); left: Mathias Kučera company (previously Anton Pelikan), house No. 245; right: Brüder Hantschel, house No. 322, first quarter of the 20th century. Glass Museum Nový Bor.





Nový Oldřichov, view from the southwest of Franz Wagner finishing works and bronze goods production, houses No. 105 and 120. Photo: Jiří Vidman 2021.

NOVÝ OLDŘICHOV CADASTRAL AREA

Starting with the last third of the 18th century, Oldřichov and the neighbouring Mistrovice became an important glass finishing locality in the Bor – Šenov area. Cutting lathe operators and engravers dominated among glass craftsmen in the village. More important finishing works in the municipality have their beginnings in the 1860s (Josef Hegenbarth – 1863, Franz Wagner – 1864). Hermann Müller's finishing works are listed besides them in 1887, the Müller & Friedrich company three years later and the Ernst Friedrich finishing works in 1892. More refining companies came into existence in the municipality in the following two decades – Gustav Roenelt & Comp. (1907), Josef Wunsch (1911) and Franz & Emil Proft (1918). Eleven finishing works operated there at the end of the 1920s; newly registered companies including Otto Heller, František Kreuz and Emmerich Matějka.⁵⁰

Clemens Rasch & Sohn glassworks and finishing works. Only the finishing works and glass trade building, house No. 168, is standing today in the complex of the former glassworks, house No. 125. The torsos of the glassworks hall and the industrial railway are situated in the overgrown terrain to the east. The core of the company consisted of the former glass finishing and trade company of brothers Görner from 1830 in house No. 62, later taken over by Franz Pelikan and in 1855 by the Clemens Rasch & Sohn company. The glassworks construction took place in 1885. The glassworks hall housed one ten-pot Siemens-Siebert melting furnace heated with brown coal producer gas.

50 KOLEKTIV 2013, pp. 74–85. FAHDT 1887, p. 125. *Adressbuch der Glas-Industrie in Deutschland und Oesterreich-Ungarn* 1895, pp. 137, 280 and 329. FAHDT 1907, p. 50. *Adressbuch der Glas- und Keram-Industrie der Tschechoslowakei* 1926, p. 90. *Adressbuch der Tschechoslowakischen Glas-Industrie* 1928/29, pp. 98–99. *Adressbuch der Glas-Industrie* 1929, p. 541. *Adressbuch des Glasindustriegebietes Haida-Steinschönau und Umgebung* 1928, pp. 201–204.

Nový Oldřichov, view from the east (c. 1920); centre: Clemens Rasch & Sohn glassworks, house No. 125; left of the glassworks hall: trade house and finishing works, house No. 168. Petr Joza's collection.

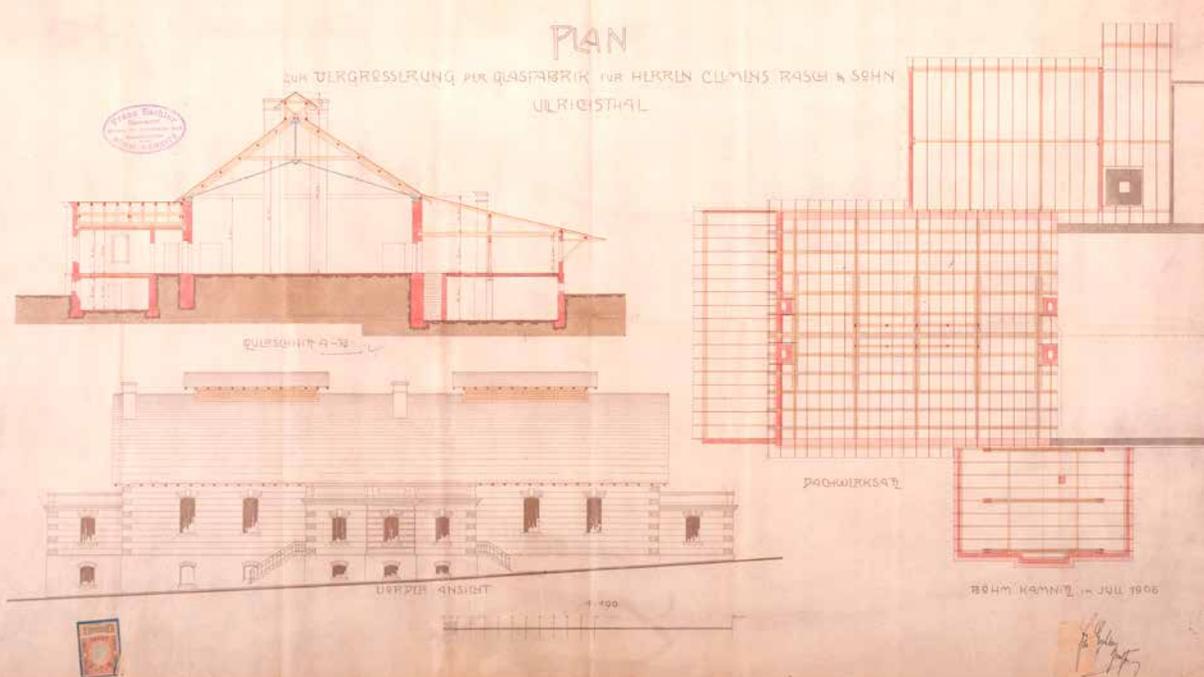


Nový Oldřichov, view of the south façade of Clemens Rasch & Sohn trade house and finishing works, house No. 168. Photo: author, 2022.



Nový Oldřichov, view from the southeast (c. 1910); in the left part, Franz Wagner finishing works and bronze goods production complex, houses No. 105 and 120; in front of it, Ernst Friedrich finishing works, house No. 130. Petr Joza's collection.

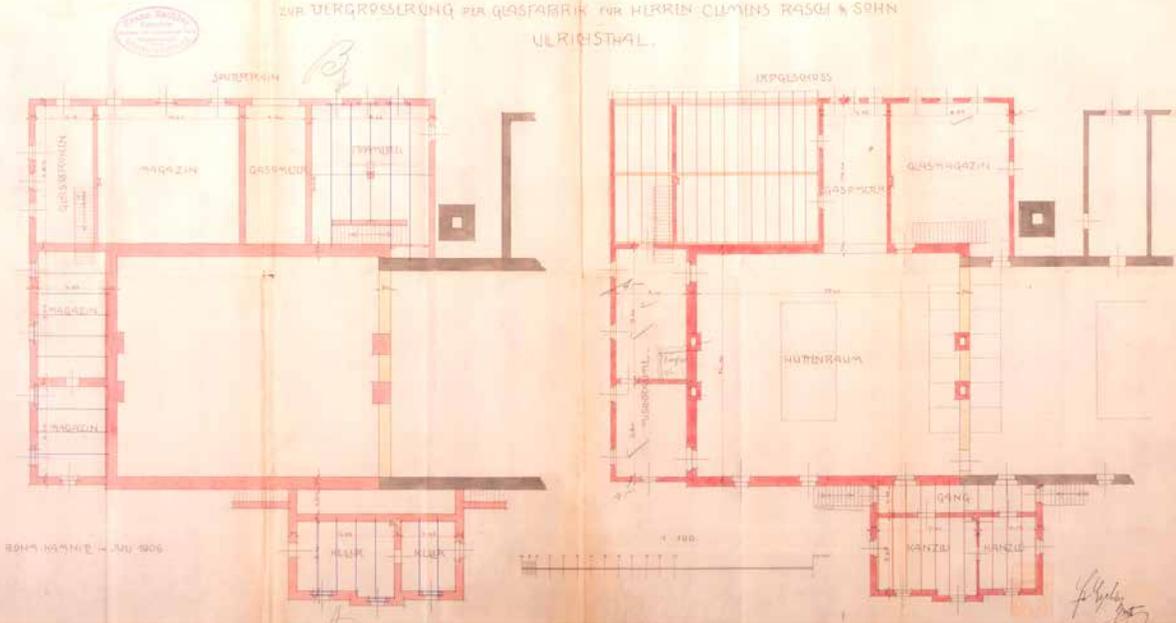




↑ Nový Oldřichov, glass-works, house No. 125; plan of the addition of a second melting furnace to the glassworks (Franz Eschler, 1906). Top right: cross-section of the glassworks hall; right: ground floor plan; bottom: view of the main south façade. SOkA Děčín, Inv. No. 161, sign. 11 44/1265.

← Nový Oldřichov, glass-works, house No. 125, layout plan (Franz Eschler, 1906) for the extension of the glassworks; top: terrain section. The upper part of the layout (oriented to the east) is a railway station with the glassworks' industrial railway; next to it, the earlier part of the glassworks hall with annexes and a smokestack are marked in black, the extension for a second melting furnace in red. SOkA Děčín, Inv. No. 161, sign. 11 44/1265.

PLAN
ZUR VERGRÖßERUNG DER GLASFABRIK FÜR HERRN CLEMENS RASCH & SOHN
ULRICHSTAL.



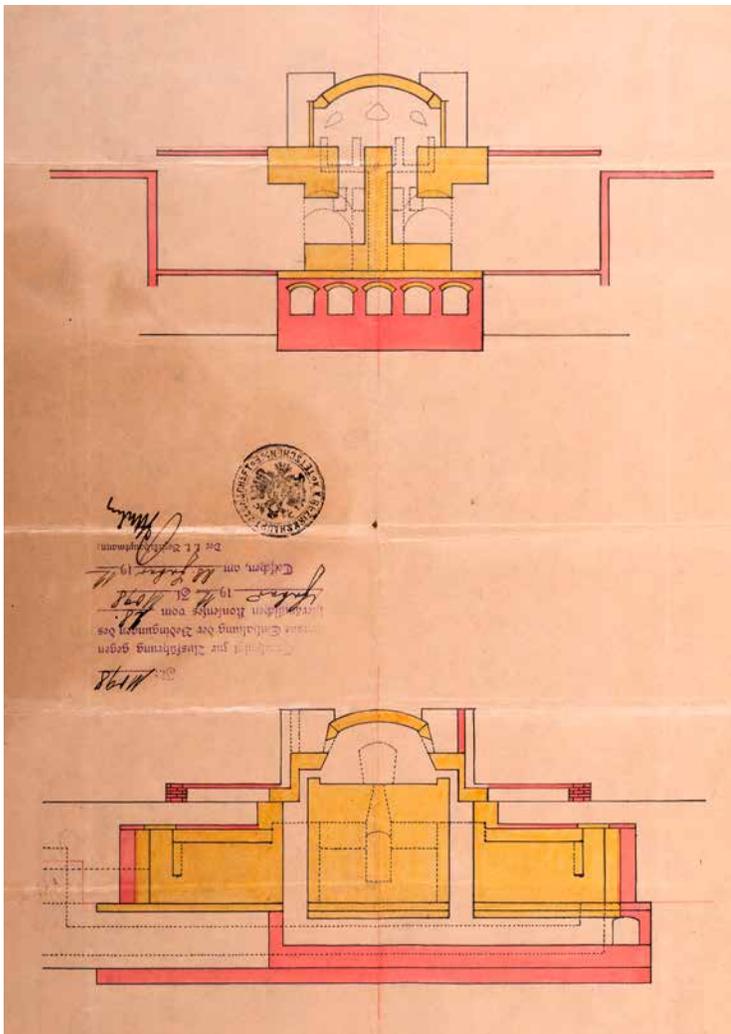
↑ Nový Oldřichov, glassworks, house No. 125; plan of the addition of a second melting furnace to the glassworks (Franz Eschler, 1906).

Left: basement floor plan; the circumference of the glassworks hall is accompanied by the form, producer, storage and sherd storage on the top, two storages on the left and two cellars on the bottom. Masonry of the original glassworks hall and the smokestack is marked in black, masonry to be demolished in yellow.

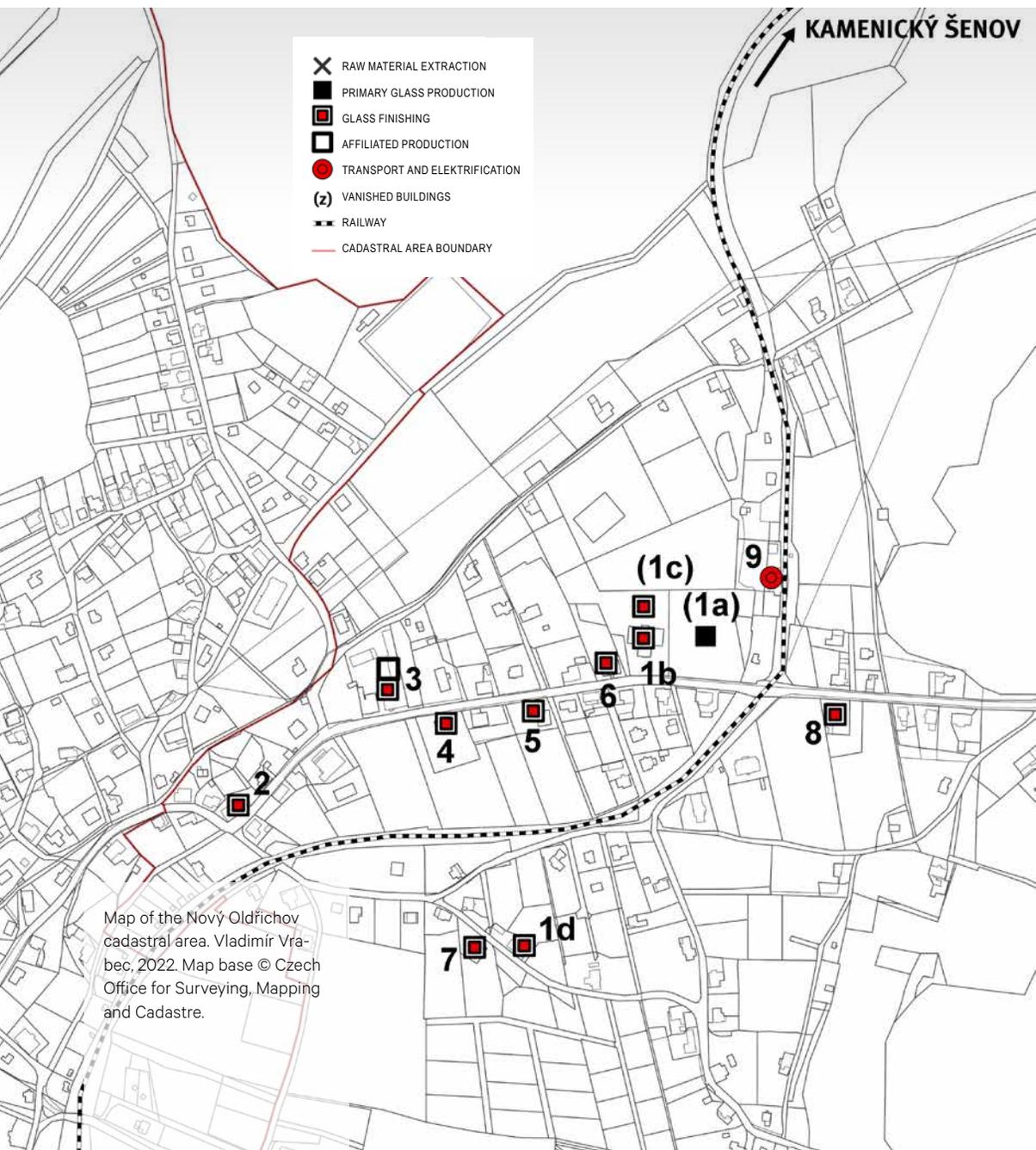
Right: ground floor plan; upstairs, the glassworks hall is accompanied with glass storage, a producer and a roof structure above storages; left: two mixing rooms (the position of the tempering furnaces is drawn by a pencil); bottom: an annexe with a corridor and offices. SOkA Děčín, OÚ Děčín, Inv. No. 161, sign.

11 44/1265.

→ Nový Oldřichov, glassworks, house No. 125, cross sections of a new Siemens-Siebert melting furnace (1912) for the earlier part of the glassworks hall. SOkA Děčín, OÚ Děčín, Inv. No. 161, sign. 11 44/1786.



- 1a Rasch Clemens, glassworks, house No. 125 – glassworks hall
- 1b Rasch Clemens, trade house, finishing works, house No. 168
- 1c Rasch Clemens, glass grinding works, house No. 169, storages
- 1d Rasch Clemens, glassworks, house No. 62 – finishing works, grinding works, storages
- 2 Müller & Friedrich, finishing works, house No. 2
- 3 Wagner Franz, finishing works and bronze goods production, houses No. 105, 120
- 4 Friedrich Ernst, finishing works, house No. 130
- 5 Wünsch Josef, finishing works, house No. 131
- 6 Roenelt Gustav & Comp., finishing works, house No. 139
- 7 Hegenbarth Josef, finishing works, house No. 146
- 8 Matějka Emmerich, finishing works, house No. 180
- 9 Nový Oldřichov railway station, dispatch building, house No. 148, warehouse, weighing facility



Map of the Nový Oldřichov cadastral area. Vladimír Vrábec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.



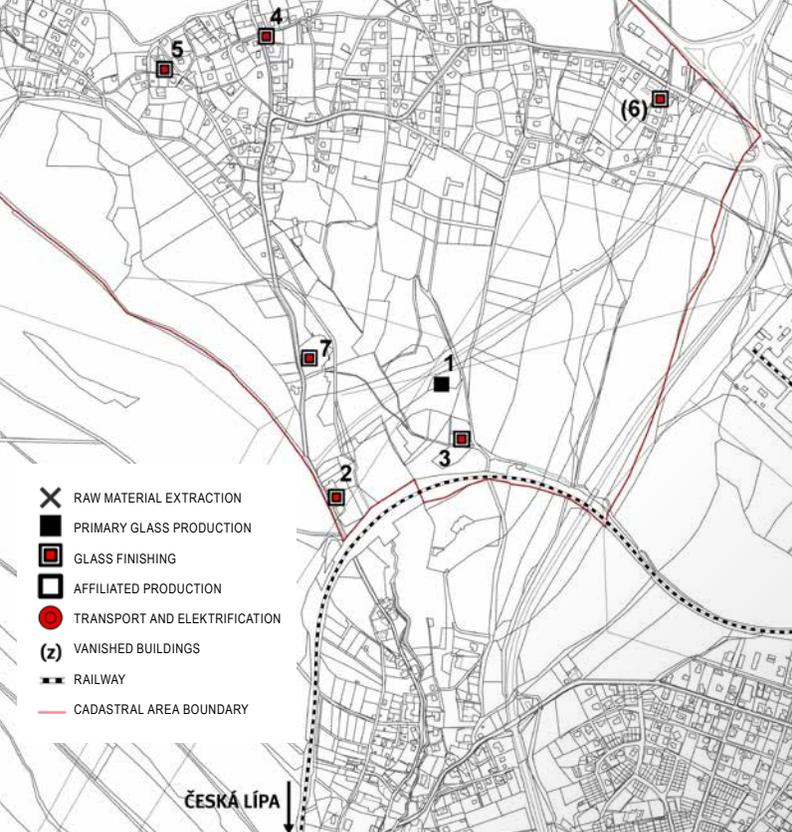
Nový Oldřichov, depiction of Franz Wagner finishing plant and bronze goods production complex; front: house No. 120; left: house No. 105; both buildings are followed from the courtyard side by boiler and engine houses with smokestacks. *Gross-industrie Oesterreichs*, part 2, Wien 1908, p. 141.

Two melting furnaces of the same type with the same number of pots were added to the glass-house in 1906–1907. A reconstruction of the old furnace was carried out by the Michl Uhrmann company from Železná Ruda. The preserved house No. 168 as well as the vanished buildings of a grinding mill, house No. 169, warehouses and a gatehouse were built in 1907. All the buildings were unified by a façade with a distinctive architectural structure. After the nationalization in 1945, only the finishing works remained in operation until 1952 (n. p. Borské sklárny). Then the glassworks operated until 1966 within the framework of the national company Jablonecké sklárny. Subsequently, the buildings served as warehouses; most were demolished in the 1980s (1988).⁵¹

Important glass finishing buildings are summed up in the following list: Ernst Friedrich (rebuilt house No. 130 from 1892 with a torso of a Neo-Renaissance façade); Josef Hegenbarth (Neo-Renaissance single-storey house No. 146 underwent a modern reconstruction); Emmerich Matějka (house No. 180 is a good example of a finishing plant from the late 1920s in the inter-war modern style); Müller & Friedrich (from 1890 situated in house No. 2; after a fire in 1904, it got an impressive façade with a geometric decor of an Art Nouveau character; regrettably, it vanished altogether due to radical modern adaptations); **Franz Wagner, finishing works and bronze goods production** (the industrial complex consists of a masonry two-storey finishing works, house No. 105, and a bronze goods production building, house No. 120, founded in 1863; the construction of a factory and residential building in 1869; an extension and modernization of the machinery equipment in 1880; from the following year, the machines were driven by a 10 HP steam engine; further extension in 1898, addition of a 25 HP steam engine).⁵²

51 SOKA Děčín, OÚ Děčín, Inv. No. 160, sign. 11 44/973, Inv. No. 161, sign. 11 44/1265 and 11 44/1786, Inv. No. 188, sign. 15 R/1192, Inv. No. 1836, sign. Kamnitz 11 44/418 and 11 44/466. FAHDT 1887, p. 52. *Adressbuch der Glas-Industrie* 1929, p. 202. *Gross-industrie Oesterreichs* 1908, part 2, pp. 131–133. RASOCHA 1989, pp. 28–33, 66. KOLEKTIV 2013, pp. 47, 78, 79.

52 *Adressbuch der Glas-Industrie* 1929, p. 541. KOLEKTIV 2013, pp. 74, 77, 80, 85, 123. *Gross-industrie Oesterreichs* 1908, part 2, pp. 142–143.



Map of the Okrouhlá cadastral area. Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.

- | | | | |
|---|--|---|--|
| 1 | vanished glassworks location | 4 | Wolf Heinrich, painting workshop, house No. 44 |
| 2 | Meltzer Karl, houses No. 1, 84, 93, painting works, church window production with sample house | 5 | Bendel Hugo, painting workshop, house No. 51 |
| 3 | Geppert Robert & Co, finishing works, house No. 4 (present-day house No. 127) | 6 | Hackel Wilhelm, finishing works, house No. 77 |
| | | 7 | Heller Franz, painting workshop, house No. 39 |

OKROUHLÁ CADASTRAL AREA

The municipality is characterized by a high concentration of painters; fewer engravers, cutting lathe operators and girdlers are recorded. A presumed glasshouse was situated on the southern edge of the municipality, close to house No. 4 (present-day house No. 127). One of the most important finishing works in Okrouhlá in the late 18th century was Hackel & Comp. Of larger glass refining companies, Johann Wendler, Robert Geppert & Co., Wilhelm Hackel and Hans Zöckel were registered in the late 19th and the first third of the 20th centuries. Besides, about fourteen painting workshops, a hundred home glass painters, ten grinders, ten girdlers and several engravers, gilders, polishers and cutting lathe operators operated in the municipality.⁵³ The most important complex is the Karl Meltzer glass painting works – see the Catalogue of Selected Glassmaking Buildings and Complexes.

53 *Tereziánský katastr český. Svazek 2. Rustikál (kraje K–Ž)*, pp. 116–117, 124–125. GELNAR 2004, pp. 249–262. HANTSCHHEL 1911, pp. 269, 987–988. *Adressbuch der Glas-Industrie in Deutschland und Oesterreich-Ungarn* 1895, p. 334. FAHDT 1907, pp. 141–142. *Adressbuch der Glas- und Keram-Industrie der Tschechoslowakei* 1926, p. 80. *Adressbuch der Tschechoslowakischen Glas-Industrie* 1928/29, pp. 83–84. *Adressbuch der Glas-Industrie* 1929, p. 531. *Adressbuch des Glasindustriegebietes Haida-Steinschönau und Umgebung* 1928, pp. 152–153. RANŠOVÁ – HORNEKOVÁ 2001, pp. 69, 72, 74, 76, 94 and 96.

PIHEL CADASTRAL AREA

The inhabitants of the village also made their living by glassmaking (cutting lathe operators, painters, engravers) to a smaller extent. A mirror grinding and polishing works with mirror bevelling and underlaying workshops operated in the manor court, house No. 4, in 1808–1818. Barbara Schirner's glass grinding mill was situated in the same complex (northwest of present-day house No. 237) later. Carl Kindermann machine factory and foundry was reportedly established in the place of a former grinding mill in house No. 219 (or 220) in 1873. The company supplied glass machinery (cutting lathes, engraving machines with accessories) among other products. The buildings ceased to exist probably after the middle of the 20th century.⁵⁴

Pihel, advertisement of Carl Kindermann machinery factory and foundry. Glass Museum Nový Bor.

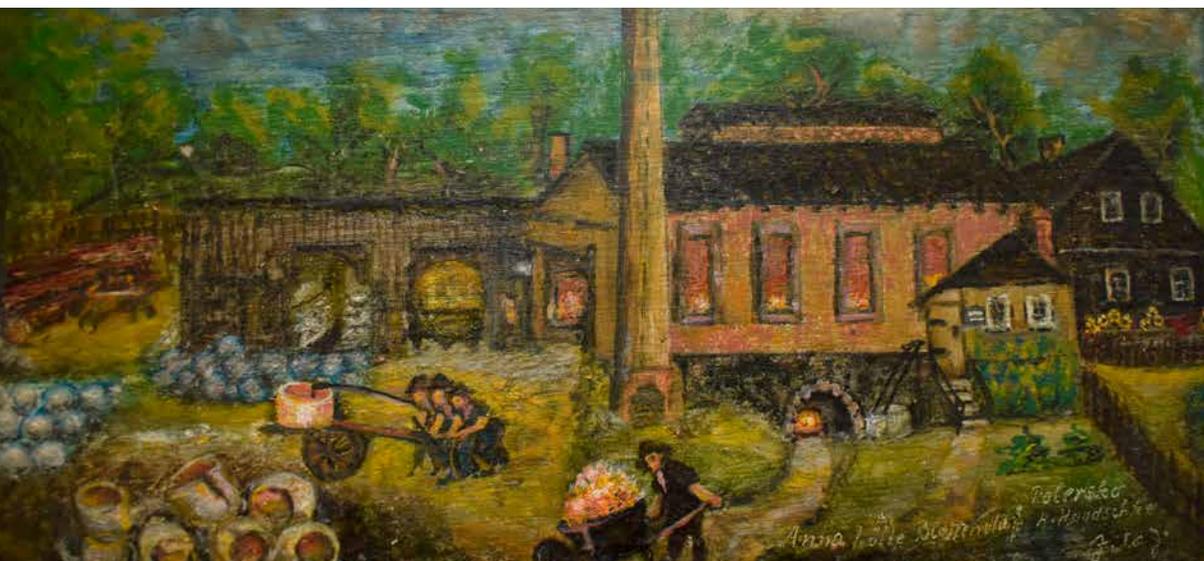


PÍSEČNÁ CADASTRAL AREA

A glass grinding mill, house No. 36 on the Dobranovský Stream, is documented in the village. The building's hydraulic structure is relatively well preserved, as are the imprints of building structures in the rock massive under house Reg. No. 3. The facility was built by Adalbert Petrowický according to preserved plans from 1870. A steam-driven grinding mill reportedly also operated in the municipality.⁵⁵

54 HANTSCHHEL 1911, pp. 976–977. PAUDLER 1895, pp. 24–27. SOkA Česká Lípa, fond OÚ Č. Lípa, Inv. No. 9, carton 1V, Water Book for the judicial districts Česká Lípa and Nový Bor (insert No. 99) and Inv. No. 1080, sign. W.B.99, carton 81.

55 In more detail and with references to the sources and reproductions of plan documentation, see the present author's text in the monograph KOLEKTIV 2018, pp. 407–409.



Polevsko, Annahütte glassworks, depiction of the situation around 1918 (painting of a wooden panel, J. Zita, second quarter of the 20th century). Right: glassworks hall; glassmakers are hauling away worn-out pots on a cart and hot ash from the tunnel under the heating area.
Glass Museum Nový Bor, reproduction: M. Váchalová.

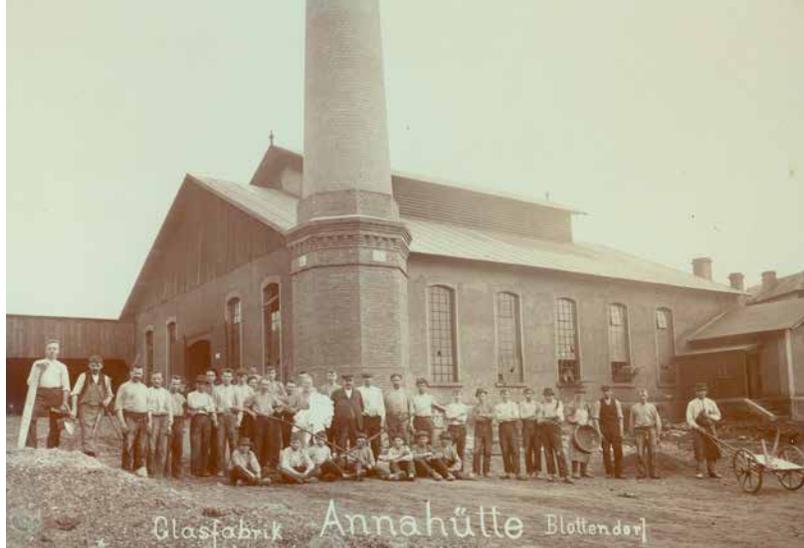
POLEVSKO CADASTRAL AREA

The municipality is the cradle of glass finishing in the Bor – Šenov area. It had an important position also in the beginnings of glass trading, as the earliest north Bohemian trading companies came into existence there starting from the late 17th century. The second oldest glassmaker guild in the Bohemian lands was founded in Polevsko and the nearby Falknov in 1682. Cutting lathe operators, painters and engravers were the most numerous in the municipality in the last quarter of the 18th and the first third of the 19th centuries, followed by stopper makers, chandelier and wooden form manufacturers. A list of the most important manufactories includes glass finishing and trading companies Franz Anton Janke, Josef Görner and Johann Knöspel in Polevsko in 1840.⁵⁶ A change of glass finishing in Polevsko is documented by data as of 1884. The focus of production clearly shifted towards glass painting. Muffle firing furnaces are preserved to this day in some home painting workshops (e.g., house No. 14). Eleven glass finishing works operated in the municipality in that year; their number increased to thirteen in 1910 and returned to eleven in the following two decades.⁵⁷

56 HANTSCHER 1911, pp. 217, 232, 926–929. SOKA Česká Lípa, AO Polevsko, Inv. No. 2, carton 1V, municipal chronicle 1837–1945, pp. 19–23, 26–31, 36–43, 45. ŠIMÁNKOVÁ 2008, pp. 51–53, 58–72. ŠIMÁNKOVÁ 2006, pp. 247–252. SCHEBEK 1878, pp. 271–277. GRISA 2015, pp. 154–155.

57 SOKA Česká Lípa, AO Polevsko, Inv. No. 2, carton 1V, municipal chronicle 1837–1945, pp. 212–218, 220–222, 281–283, 361–363, 396–403. FAHDT 1887, p. 99. *Adressbuch der Glas-Industrie in Deutschland und Oesterreich-Ungarn* 1895, pp. 195, 240, 245, 261, 266 and 272. FAHDT 1907, pp. 107–108. *Adressbuch der Glas- und Keram-Industrie der Tschechoslowakei* 1926, pp. 22–23. *Adressbuch der Tschechoslowakischen Glas-Industrie* 1928/29, pp. 2–3. *Adressbuch der Glas-Industrie* 1929, p. 471. *Adressbuch des Glasindustriegebietes Haida-Steinschönau und Umgebung* 1928, pp. 81–91.

Polevsko, Annahütte glassworks from the southwest (after the reconstruction following the 1925 fire). Glass Museum Nový Bor.

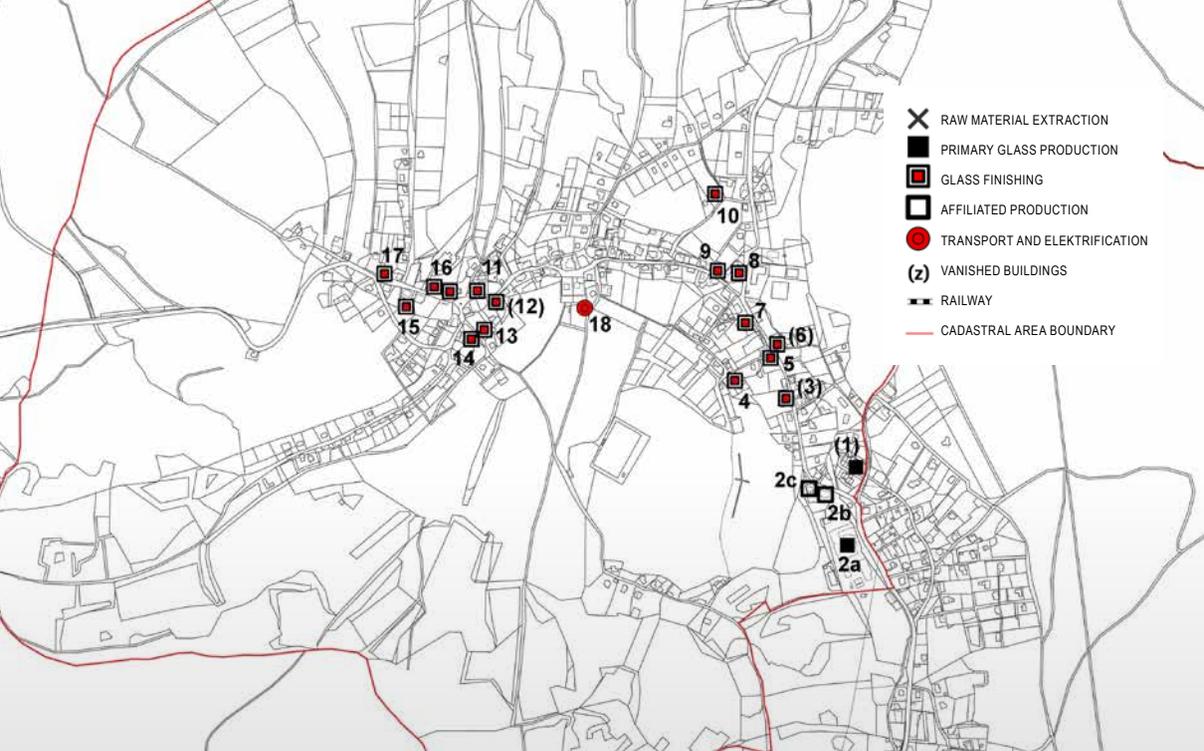


Polevsko, view of the lower part of the municipality from the southeast; centre: Annahütte glassworks with a smokestack. Česká Lípa National History Museum and Gallery, sign. ND-8172.



Polevsko, interior of Annahütte glassworks hall with a Siemens-Siebert melting furnace (1928). Glass Museum Nový Bor.





Map of the Polevsko cadastral area. Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.

- | | |
|---|--|
| 1 Annahütte glassworks, house No. 169 | 9 Ackermann Anton, house No. 53, finishing works and light fittings production |
| 2a Klarahütte glassworks, house No. 175 | 10 Diessner Emil, house No. 50, painting workshop |
| 2b Klarahütte glassworks, worker house No. 174 | 11 Kühnel Franz, house No. 27, finishing works and glass trade |
| 2c Klarahütte glassworks, worker house No. 180 | 12 Schiffner Franz, house No. 103, finishing works and light fittings production |
| 3 Taborsky Franz & Comp., later Proksch Franz Rudolf, Běhounek J., house No. 69, grinding mill | 13 Liehmann Franz, house No. 107, finishing works and glass trade |
| 4 Gerhard Hermann & Rudolf, house No. 141, painting workshop | 14 Janke Franz Anton, Janke Brüder, later Kühnel Franz, house No. 110, finishing works and glass trade |
| 5 Posselt Josef, house No. 163, finishing works and glass trade | 15 Schiffner Emil, house No. 153, finishing works and glass trade |
| 6 Knöspel Franz, house No. 58, finishing works and glass trade, 1806–1829 Egermann Friedrich, painting workshop | 16 Knöspel Raimund & Söhne, houses No. 23 and 24, finishing works |
| 7 Ahne Franz Ferdinand, house No. 75, finishing works and glass trade | 17 Watzel Wilhelm, house No. 14, painting workshop |
| 8 Handschke Gebrüder, house No. 152, finishing works and glass trade | 18 transformer |

Annahütte glassworks. The complex of the vanished factory, house No. 169, was situated in the place of terraced houses No. 193–195, 196–199. The glassworks was founded in 1900 by the partners Rudolf Handschke, Julius Handschke, Karl Mühlbauer and Franz Ladisch. One eight-pot melting furnace and cooling furnaces with direct brown coal heating were situated in the glassworks hall. The facility underwent the first modernization around 1920, when the original melting furnace was replaced by a new one, probably of the Siemens-Siebert system, heated with producer gas from shaft producers. The glasshouse was damaged by fire from an explosion of the producers on 4 July 1925, but it was renovated immediately afterwards. The smokestack was built by

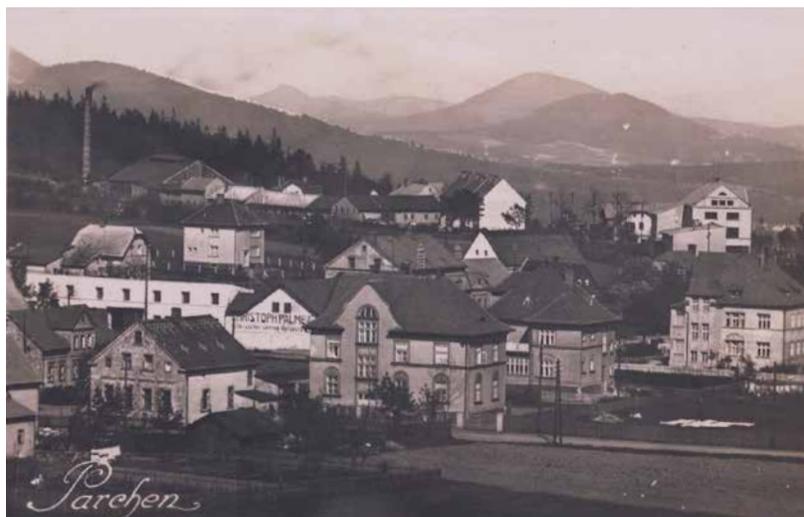
H. R. Heinecke Wien. The glassworks operation ceased in the early 1940s and was never restored. The complex was demolished in 1958.⁵⁸ **Klarahütte glassworks** – see the Catalogue of Selected Glassmaking Buildings and Complexes.

Of glass finishing works, the following buildings are the most interesting: **Gebrüder Handschke** (founded in 1866, first in house No. 95; in 1870, it resettled to new house No. 152); **Gebrüder Janke** (Franz Anton Janke bought house No. 110, old house No. 82 for a glass trade and finishing company before 1837; the existing house was built in 1799–1800 by glass trader Joseph Kuckauf; a perpendicular wing with production and storage areas was attached before 1843; the house was rebuilt in the last quarter of the 19th century and bought by **Franz Kühnel** around 1900); **Franz Knöspel** (glass trade and refinery from 1859 in house No. 58, former Egerman workshop; a vanished two-storey house with a masonry ground floor, a logged first floor and a mansard roof probably came from the late 18th or early 19th century); **Raimund Knöspel & Söhne** (as finishing works, the company used above all older house No. 23, which was rebuilt into a trade house before 1884; the neighbouring house No. 24 from the second half of the 19th century is listed as a painting or cutting lathe and grinding workshop).⁵⁹

PRÁCHEŇ CADASTRAL AREA

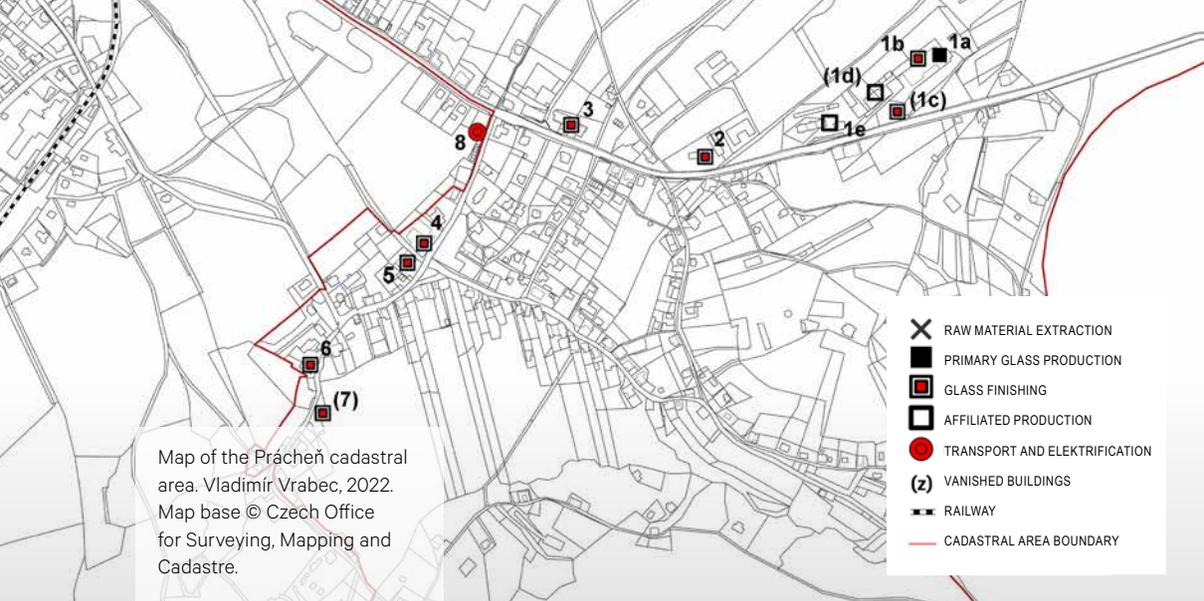
The originally separate villages of Šelty and Prácheň were among the most important glass finishing and trade localities in the Bor – Šenov area. Lists of craftsmen recorded high numbers of engravers, cutting lathe operators and chandelier and light fittings workshops in that area already from the early 18th century. The oldest one was founded by Josef Palme in 1724. In 1859, the chandelier works moved to Nový Bor and operated under the Reinhold Palme Söhne firm after 1871. In the first half of the 19th century, the most important businesses included glass finishing and trading companies Franz Scholze, Johann Siedel and Sebastian Zinke, besides the above-mentioned

Prácheň, view of the Šelty section from the southwest (second quarter of the 20th century); front left: Christoph Palme & Co finishing works; rear right: Theodor Palme finishing works; rear left: Štěpán Hrdina glassworks complex with worker houses. Petr Joza's collection.



58 SOKA Česká Lípa, AO Polevsko, Inv. No. 2, carton 1V, municipal chronicle 1837–1945, p. 248. HANTSCHER 1911, pp. 250–251, 926. HAIS 2021, pp. 8–14. HAIS 2022, pp. 300–310.

59 RANŠOVÁ – HORNEKOVÁ 2001, p. 74. HAIS 2022, pp. 208, 301. JINDRA – KOMŮRKA 2006a, pp. 100–101.



- | | |
|--|--|
| <p>1a Štěpán Hrdina glassworks, house No. 178 (old house No. 80, Šelty)</p> <p>1b Štěpán Hrdina glassworks, house No. 178 – grinding mill</p> <p>1c Štěpán Hrdina glassworks, worker house No. 180, formerly syderlit (lacquered earthenware) goods factory</p> <p>1d Štěpán Hrdina glassworks, office and auxiliary building, house No. 181</p> <p>1e Štěpán Hrdina glassworks, worker houses No. 183, 184–186</p> <p>2 Palme Theodor, house No. 178 (old house No. 38, Šelty), finishing works</p> | <p>3 Palme Christoph & Co., house No. 197 (old house No. 61, 66, 89, Šelty), finishing works</p> <p>4 May Kajetan & Söhne, houses No. 120, 121 (old house No. 39, Prácheň), finishing works</p> <p>5 Günther Emil, house No. 118 (old house No. 40, Prácheň), finishing works</p> <p>6 Hesse Karl, house No. 108 (old house No. 56, Prácheň), painting workshop</p> <p>7 Meltzer Heinrich, old house No. 51, 52, 53, Prácheň, finishing works</p> <p>8 transformer, Kamenický Šenov cadastral area</p> |
|--|--|

chandelier works. Five larger finishing works (Kajetan May, Heinrich Meltzer, Christoph Palme & Co., Friedrich Uhle and Sebastian Zinke Söhne) operated in the locality as of 1887. Their number increased to nine at the end of the 19th century and fourteen at the end of the 1920s. The companies focused on the production of glass for lighting fixtures, bronze goods (metal assemblies) and luxury glass.

Štěpán Hrdina glassworks – see the Catalogue of Selected Glassmaking Buildings and Complexes. Other important industrial glass finishing complexes include: **Kajetan May & Söhne** (at first situated in an older two-storey partially log building No. 121, old house No. 39, most probably from the late 18th or early 19th century; a new production building No. 120, old house No. 92 was built around 1900); **Palme Theodor** (valuable building No. 187, old house No. 38 in Šelty originating before 1926; a complex reconstruction c. 2013); **Emil Günther** (a Neo-Renaissance building from c. 1888); **Christoph Palme & Co.** (Šelty, old house No. 61, 66, 89 – new house No. 197; the buildings are considerably rebuilt).⁶⁰

60 SLAVÍČKOVÁ 2001, pp. 22–23. SIEBER 1913, pp. 155–156. BROŽOVÁ 1997, p. 68. GRISA 2015, pp. 164–165. FAHDT 1887, p. 120. *Adressbuch der Glas-Industrie in Deutschland und Oesterreich-Ungarn* 1895, pp. 237, 274, 276, 287, 288, 292, 324 and 343. FAHDT 1907, pp. 137–139. *Adressbuch der Glas- und Keram-Industrie der Tschechoslowakei* 1926, pp. 76–77. *Adressbuch der Tschechoslowakischen Glas-Industrie* 1928/29, pp. 78–80. *Adressbuch der Glas-Industrie* 1929, pp. 523–524. *Adressbuch des Glasindustriegebietes Haida-Stein-schönau und Umgebung* 1928, pp. 193–196. KOLEKTIV 1930, pp. 106–107.

Prácheň, view from the southeast (1930) of the burnt-out Kajetan May & Söhne finishing works; right: house No. 120; in the background on the right edge: earlier logged house No. 121. Petr Joza's collection.



Prácheň, Theodor Palme finishing works, view of the main building, house No. 187. Photo: author, 2006.

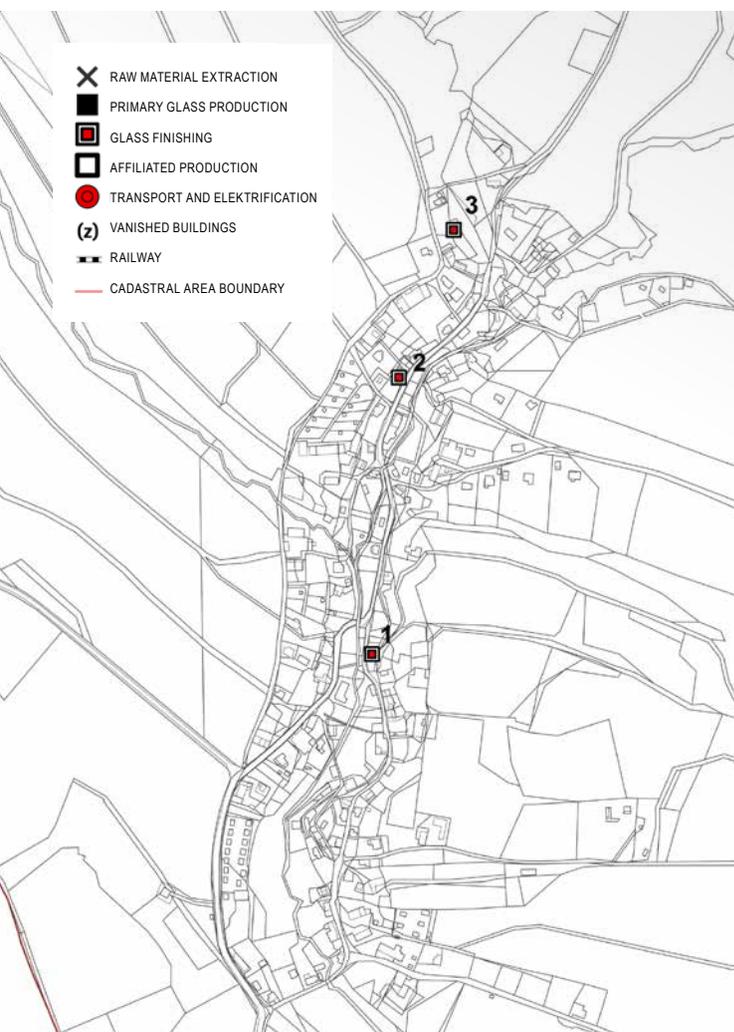


Prácheň, Theodor Palme finishing works, current condition of house No. 187. Photo: author, 2019.



RADVANEČ CADASTRAL AREA

A water-driven glass grinding mill, house No. 104, is preserved with a torso of the hydraulic structure. According to references to unpreserved archival materials, the hydraulic structure had functioned there from 1846; later, Anton Ambros Egermann of Nový Bor used it for the glass grinding mill. The grinding mill underwent a reconstruction in or shortly after 1866. The grinding benches were driven by an overshot waterwheel. Besides that, only smaller finishing works operated in the municipality.⁶¹

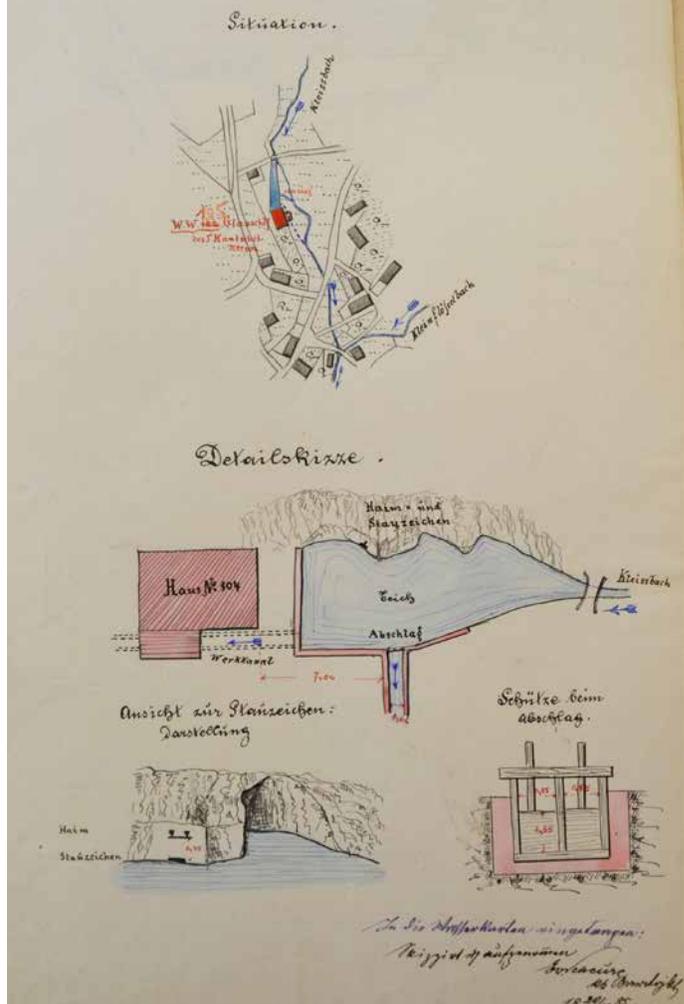


Map of the Radvaneč cadastral area. Vladimír Vrabec, 2022.
Map base © Czech Office for Surveying, Mapping and Cadastre.

- 1 Franz Langer & Co., house No. 69, finishing works
- 2 Anton Teifel, house No. 33, finishing works
- 3 Anton Ambros Egermann, later Karl Runge, Josef Hantschel, Anton Ludwig, house No. 104, grinding mill

61 SOKA Česká Lípa, fond OÚ Č. Lípa, Inv. No. 9, carton 1V, Water Book for the judicial districts Česká Lípa and Nový Bor (insert No. 105), Inv. No. 1089, sign. W.B.105, W.B.122, 1154/128, carton 85. *Adressbuch der Glas- und Keram-Industrie der Tschechoslowakei* 1926, p. 79. *Adressbuch der Tschechoslowakischen Glas-Industrie* 1928/29, p. 83. *Adressbuch des Glasindustriegebietes Haida-Steinschönau und Umgebung* 1928, pp. 147–148.

Radvanec, Josef
 Hantschel's grinding mill,
 house No. 104 (1885);
 top: layout plan; bottom:
 drawings of elements of the
 hydraulic structure; details
 show the layout of the
 grinding mill with
 a waterwheel chamber
 annexe. SOkA Česká
 Lípa, OÚ Česká Lípa, Inv.
 No. 1089, sign. W.B.105
 (W.B.122), carton 85.



ROZHLED CADASTRAL AREA

The village probably came into existence in a place cleared of trees by glassworks. It may be referred to by the toponym Gläserndorf mentioned in a lost deed for Jiřetín from 1539. Two medieval glasshouse locations are documented in the cadastral area (one in the centre of the village, near house No. 20, the other on the northeastern edge of the cadastral area, near the western edge of Lesná, roughly west of house No. 67).⁵²



Headed paper of E. Michel & Co. from 1913; top right: Rybníště glassworks; bottom left: Helenehütte glassworks in Nový Bor. Glass Museum Nový Bor.

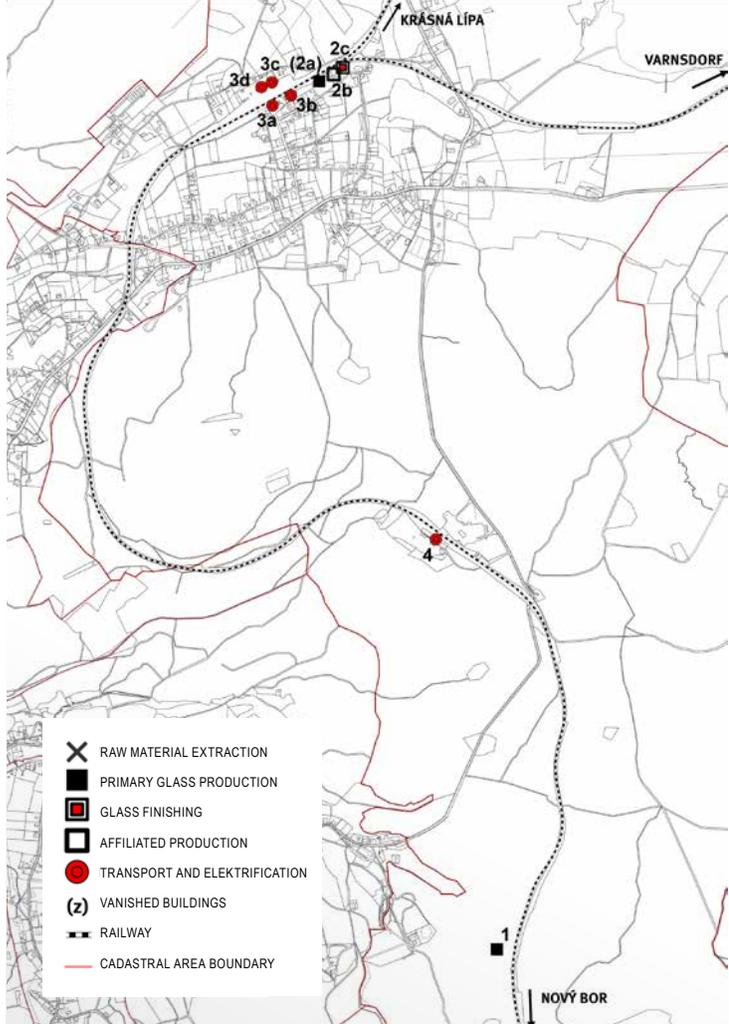
RYBNIŠTĚ CADASTRAL AREA

Only a locality on the southwestern foot of Malý Stožec has been confirmed so far of the presumed locations of vanished medieval glasshouses. **Franz Zahn, Michel & Mayer, E. Michel & Co. glassworks** The remnants of the glassworks are situated near the Rybníště railway station, where an industrial railway was connected. The modern glass plant was built by Franz Zahn, the owner of the Horní Chříbská glassworks, in 1873. The glassworks used two melting furnaces of the Nehse type heated by producer gas. The southwestern part of the complex was comprised of a massive glassworks hall with a gabled roof and two ventilation extensions in the ridge. A grinding works, complete with a boiler house, an engine house and a second smokestack was situated northeast of the glassworks hall. Michel & Mayer acquired the glassworks in 1882 and E. Michel & Co. in 1902. Before 1887, the original Nehse furnaces were replaced by two Siemens-Siebert furnaces with twenty to twenty-two pots. Both steam and electric drives with 30 and 5 HP, respectively, were listed for the local finishing plant at the beginning of the 20th century. The buildings were damaged by a major fire in 1935. The glassworks ceased to exist after an ammunition explosion in 1944. An overgrown hillock is today in the place of the glassworks hall; the adapted buildings of the former grinding works, engine house and boiler house are standing northeast of it (house No. 243; without house No. or house Reg. No.). Regrettably, both smokestacks ceased to exist.⁶³

63 HOCKAUF 1885, p. 184. JOZA – NĚMEC 2012, p. 131. NĚMEC 2012, pp. 64–65. FAHDT 1887, p. 42. FAHDT 1907, pp. 41–42. *Adressbuch der Glas-Industrie* 1929, p. 199. GRISA 2017, pp. 174–175, 182–183.

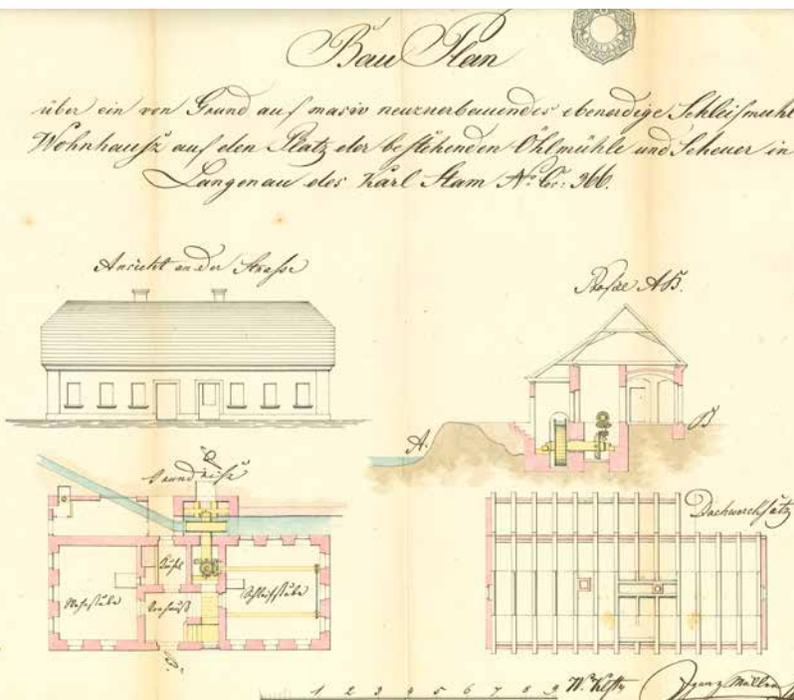
Map of the Rybníště cadastral area.
 Vladimír Vrabc, 2022. Map base
 © Czech Office for Surveying,
 Mapping and Cadastre.

- 1 vanished medieval glassworks location
- 2a F. Zahn, Michel & Mayer, E. Michel & Co. glassworks, glassworks hall, annexes, smokestack
- 2b F. Zahn, Michel & Mayer, E. Michel & Co. glassworks, house No. 243, boiler room, engine room, smokestack
- 2c F. Zahn, Michel & Mayer, E. Michel & Co. glassworks, grinding works (no house No. or Reg. No.)
- 3a Rybníště railway station, dispatch building, house No. 133
- 3b Rybníště railway station, warehouse
- 3c Rybníště railway station, engine shed, house No. 138
- 3d Rybníště railway station, waterworks, house No. 139
- 4 Chříbská railway station, dispatch building, house No. 152



SKALICE U ČESKÉ LÍPY CADASTRAL AREA

Skalice is one of the main and oldest glass finishing centres in the Bor – Šenov area. It had an important position in the beginnings of glass trading, as the earliest north Bohemian trading companies came into existence there as early as the last quarter of the 17th century. Many of the companies ceased to exist during the 19th century, but some were transformed into businesses focused besides glass trading also on glass finishing. A greater concentration of glass craftsmen can be seen in Skalice from the late 17th century. Engravers predominated among them in the first half of the 18th century, but grinders and cutting lathe operators were also registered in the first decades of the 18th century. Grinding and cutting lathe workshops above all became a typical part of local houses from the second half of the 18th century up to the 20th century; dozens of them operated in the village. Skalice was famous for its painting workshops and so-called reverse glass painting. Address books also register a high percentage of stopper maker and glass silvering workshops in the municipality. During the industrial period, local glass finishing companies founded several glass grinding mills on the Šporka Stream, often by means of a reconstruction of earlier grain mills. More grinding works were driven by different types of engines, diesel or electric, from the late 19th



Skalice u České Lípy, plan for the construction of Karl Stam's glass grinding mill, house No. 366 in the place of a former oil press and barn (master mason Ignaz Müller, 1854). SOKA Česká Lípa, OÚ Česká Lípa, Inv. No. 1111, sign. W.B.66 (W.B.78), carton 83.

century. These facilities were operated, not only in Skalice, by the R. B. Markovsky, Karl Meltzer & Comp., Brüder Rachmann, Stefan Hanel, Eduard Wotzel, Franz Weber and J. A. Zeisler companies.⁶⁴

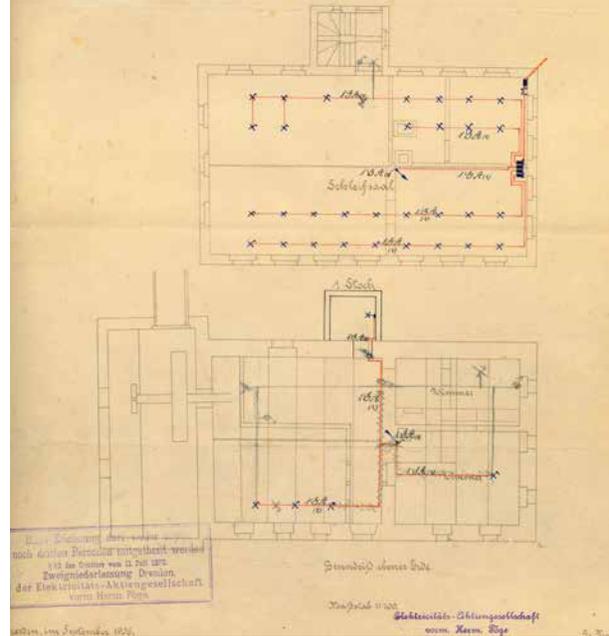
In the first half of the 19th century, the older trading companies gradually became the first large finishing works – Franz Salomon Zahn (1834, F. S. Zahn's Söhne from 1874); Karl Meltzer & Comp. (1822). A greater boom of new companies can be seen from the late 1860s, without doubt linked to the commissioning of a railway. As of 1887, the address book registered ten finishing works in the municipality; the number grew to nineteen in the following decade and as many as twenty-nine in the 1920s. Long-functioning and important finishing plants included the Stefan Hanel, Wilhelm Hanke, Ferdinand Hantschel, Anton Hille, Theodor Horaczek & Co., Kittel & Tamme, R. B. Markowsky, Anton Martinkovicz, Karl Meltzer & Co., Brüder Rachmann, Brüder Tholfuss, J. A. Zeisler and Franz Zimmerhackel companies. A small but interesting ironworking workshop producing metal glass forms is documented in the municipality, operated by Johann Zeh in 1840 (probably situated in house No. 257).⁶⁵

64 SOKA Česká Lípa, AO Skalice, Inv. No. 38, carton 8V, municipal chronicle (part I), p. 2; Inv. No. 39, carton 8V, municipal chronicle (part II), pp. 186, 194, 196–197, 220–238, 244–246, 255. Ibid., fond OÚ Č. Lípa, Inv. No. 9, carton IV, Water Book for the judicial districts Česká Lípa and Nový Bor (inserts No. 69, 70, 67, 65, 66).

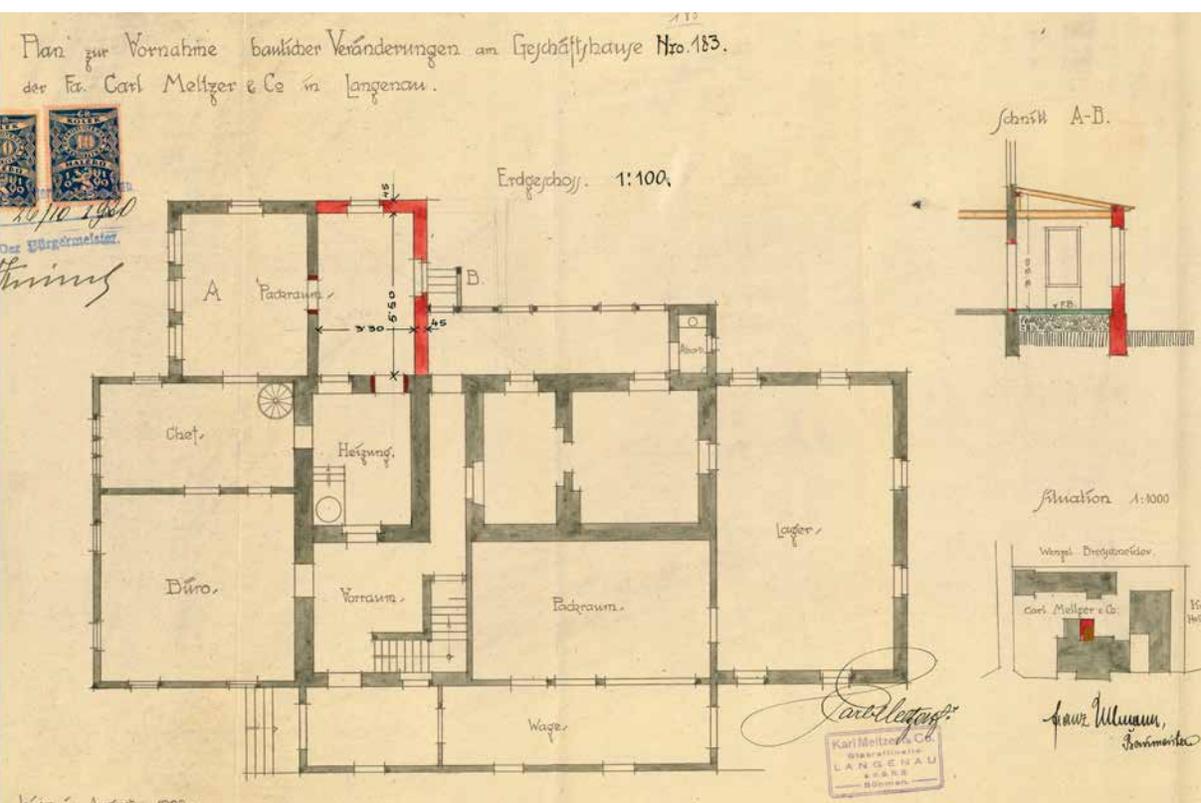
65 SOKA Česká Lípa, AO Skalice, Inv. No. 38, carton 8V, municipal chronicle (part I), p. 2 and Inv. No. 39, carton 8V, municipal chronicle (part II), pp. 256–257. FAHDT 1887, pp. 115–117. *Adressbuch der Glas-Industrie in Deutschland und Oesterreich-Ungarn* 1895, pp. 226, 240, 241, 248, 250, 251, 259, 293, 295, 302, 322, 338, 339, 340 a 342. FAHDT 1907, pp. 131–132. *Adressbuch der Glas- und Keramik-Industrie der Tschechoslowakei* 1926, pp. 68–70. *Adressbuch der Tschechoslowakischen Glas-Industrie* 1928/29, pp. 65–69. *Adressbuch der Glas-Industrie* 1929, pp. 509–511. *Adressbuch des Glasindustriegebietes Haida-Steinschönau und Umgebung* 1928, pp. 115–136. HANTSCHHEL 1911, pp. 251–266, 966–971. RANŠOVÁ – HORNEKOVÁ 2001, pp. 68–96. GRISA 2015, p. 157.

→ Skalice u České Lípy, electrification plan for Karl Meltzer & Co. grinding mill, house No. 2 (Elektricitäts-Aktiengesellschaft vorm. Herm. Pöge, Dresden branch, 1906). Bottom: ground floor plan; top: first floor plan. SOKA Česká Lípa, AO Skalice, Inv. No. 98, carton 15.

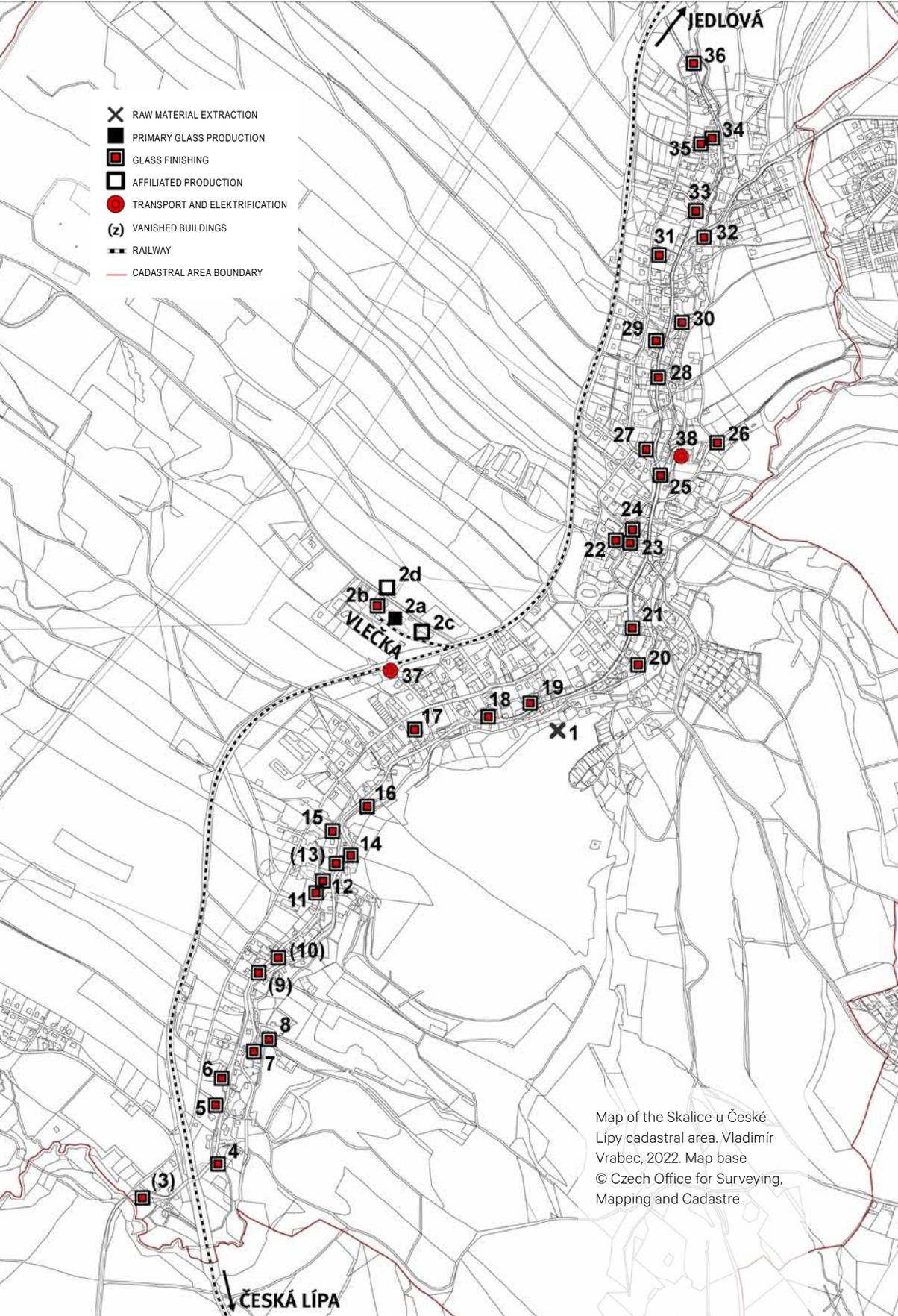
Plan zur elektrischen Beleuchtungsanlage in der Glasschleiferei der Herren Karl Meltzer u. Co. in Langenau.



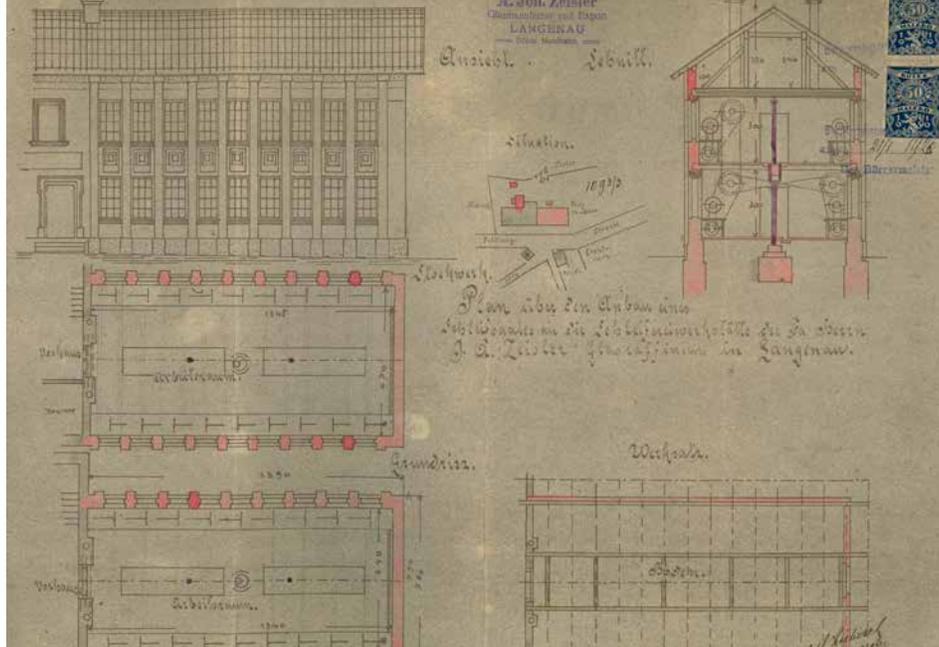
↓ Skalice u České Lípy, plan of adaptations to Karl Meltzer & Co. finishing work's trade house No. 183 (builder Franz Ullmann, 1920). SOKA Česká Lípa, AO Skalice, Inv. No. 155, carton 16.



- X RAW MATERIAL EXTRACTION
- PRIMARY GLASS PRODUCTION
- ▣ GLASS FINISHING
- AFFILIATED PRODUCTION
- TRANSPORT AND ELEKTRIFIKATION
- (z) VANISHED BUILDINGS
- RAILWAY
- CADASTRAL AREA BOUNDARY

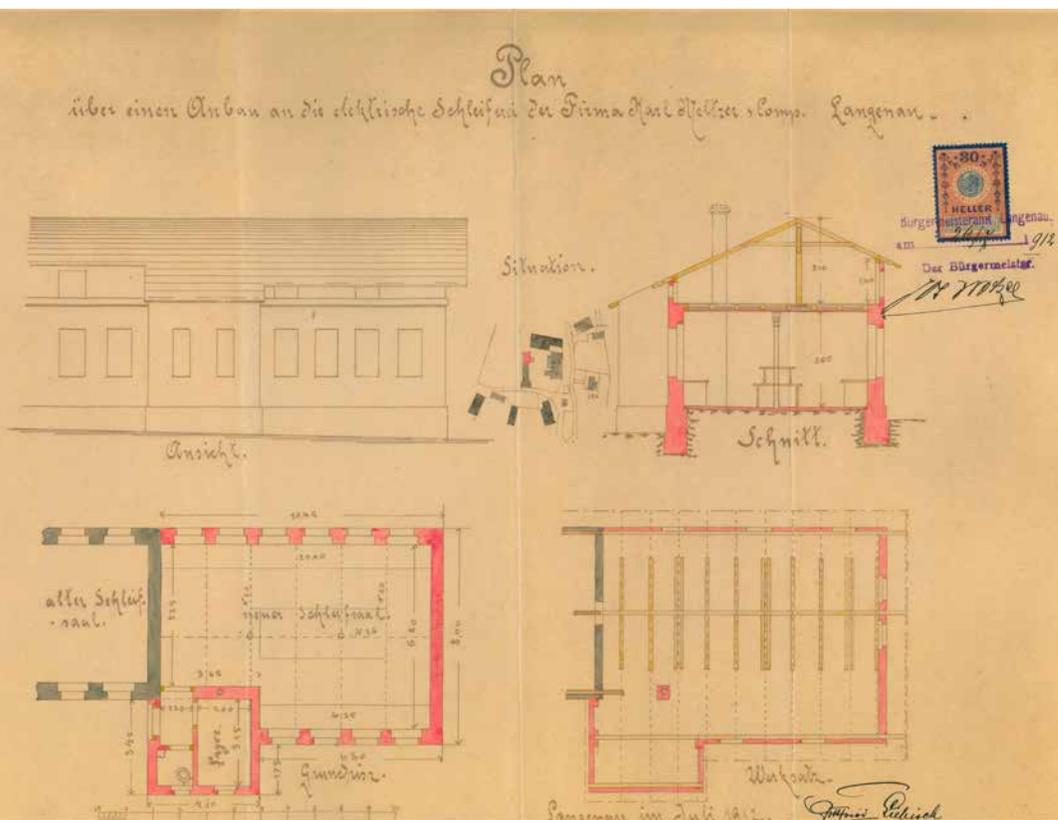


Map of the Skalice u České Lípy cadastral area. Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.



Skalice u České Lípy, plan of the extension of A. Johann Zeisler grinding works, house No. 468 (Rudolf Liebisch, 1920). SOKA Česká Lípa, AO Skalice, Inv. No. 155, carton 16.

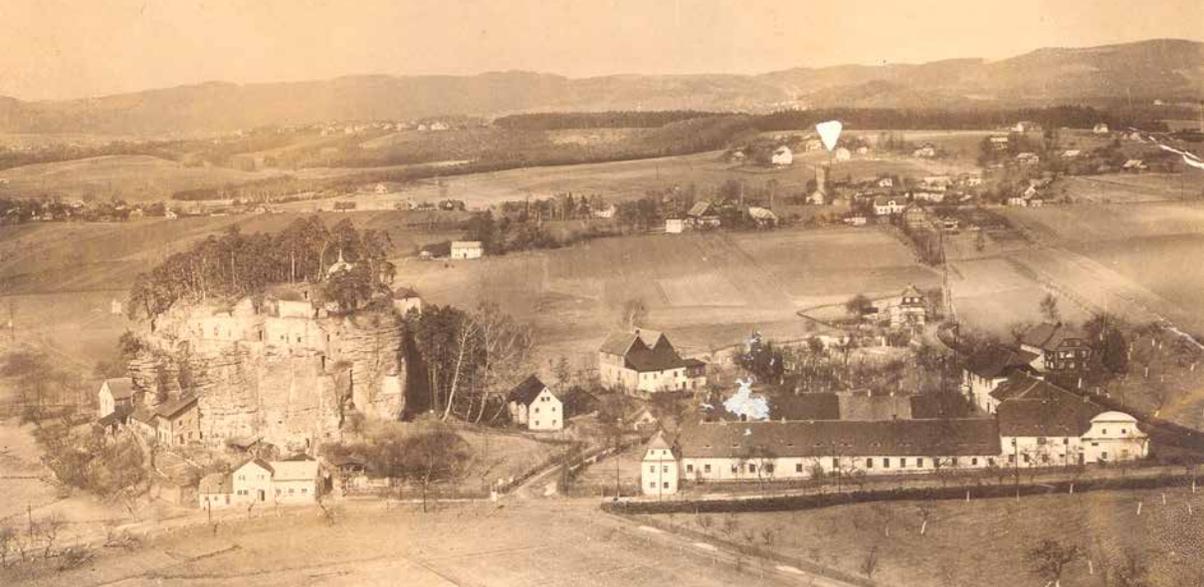
- 1 underground glass sand mine, Skalický Hill
- 2a Anton Rückl & Söhne glassworks, house No. 416, glassworks hall, annexes, background
- 2b Anton Rückl & Söhne glassworks, house No. 416, grinding works, storages
- 2c Anton Rückl & Söhne glassworks, house No. 416, residential house No. 415, gatehouse, storages
- 2d Anton Rückl & Söhne glassworks, house No. 416, office building, house No. 435, guard house No. 498
- 3 Brüder Rachmann glass grinding mill, house No. 1
- 4 Karl Meltzer & Co. glass grinding mill, house No. 2
- 5 Francizka Werner cutting lathe workshop, house No. 417
- 6 Richard Hoffmann cutting lathe workshop, house No. 15
- 7 Otto Pech cutting lathe workshop, house No. 338
- 8 Franz Büchse cutting lathe workshop, RIO (R. B. Markowsky) grinding workshop, house No. 444
- 9 Stefan Wenzel glass grinding mill, house No. 25
- 10 Karl Meltzer & Co. glass grinding mill, house No. 31
- 11 R. B. Markowsky finishing works, house No. 45
- 12 Stefan Simm finishing works, house No. 47
- 13 R. B. Markowsky glass grinding mill, house No. 366
- 14 Emil Keil glass grinding workshop, house No. 311
- 15 Eduard Ringelham cutting lathe workshop, house No. 52
- 16 Anton Mitschke optical glass grinding mill, house No. 304
- 17 R. B. Markowsky finishing works, house No. 71
- 18 Heinrich Pech engraving workshop, house No. 362
- 19 Carl Teifel, Anton Martinkovič painting workshop, house No. 89
- 20 Alfred Storch engraving workshop, house No. 106
- 21 Heinrich Hackel cutting lathe workshop, houses No. 108 + 476
- 22 Alfred Kittel grinding workshop, house No. 118
- 23 Eduard Wotzel finishing works, house No. 260
- 24 Eduard Wotzel grinding workshop, house No. 278
- 25 A. J. Zeisler finishing works, house No. 244
- 26 A. J. Zeisler finishing works, house No. 468
- 27 Alois Filipp finishing works, house No. 380
- 28 Adolf Scholz finishing works, house No. 140
- 29 Stefan Hanel finishing works, later Johann Grossmann, house No. 147
- 30 Ferdinand Keil finishing works, house No. 218
- 31 Franz Weber grinding workshop, house No. 157
- 32 Ferdinand Hantschel finishing works, house No. 205
- 33 Theodor Horatschek & Co. finishing works, house No. 167
- 34 Karl Meltzer & Co. finishing works, house No. 183
- 35 Karl Meltzer & Co. grinding workshop, house No. 182
- 36 Adolf Pirzkall engraving workshop, house No. 188
- 37 Skalice railway station, dispatch building, house No. 397, annexe, industrial railway to the glass-works
- 38 municipal power plant, house No. 230



Skalice u České Lípy, plan of an annexe to Karl Meltzer & Co. grinding works, house No. 182 (Gottfried Liebisch, 1912). SOKA Česká Lípa, AO Skalice, Inv. No. 98, carton 16.

The constructionally most important buildings are summed up in the following overview: **Anton Rückl & Söhne glassworks** (see the Catalogue of Selected Glassmaking Buildings and Complexes); **Stefan Hanel finishing (chandelier) works, house No. 147** (architecturally most valuable and best preserved finishing works in the municipality with an intactly preserved Neo-Renaissance façade); **glass finishing works and bronze goods production Karl Meltzer & Co.** (the company's main office was in the earlier Classicist house No. 183 equipped with offices, trading and packing premises, storages and a residential background; a grinding works with electrically driven engines, built probably in 1906, stood nearby in house No. 182; more water-driven grinding mills were situated in houses No. 2 and 31); A. Johann Zeisler finishing works, house No. 244 and 468 (at first resided in the older Classicist house No. 244; new grinding works, house No. 244, built in 1919, extended in 1920; machinery driven electrically and by a crude oil engine; the intactly preserved façade vanished in reconstructions carried out between 2016 and 2020).⁶⁶

66 SOKA Česká Lípa, AO Skalice, Inv. No. 39, carton 8V, municipal chronicle (part II), pp. 231–236, 256–257; Inv. No. 98, carton 15 and 16; Inv. No. 155, carton 16. HANTSCHER 1911, p. 261. RANŠOVÁ – HORNEKOVÁ 2001, pp. 80–81, 96. RASOCHA 1989, pp. 22, 48, 60–62. See also the chronicle and address books in the previous footnote.



Sloup v Čechách, one of the typical views (second quarter of the 20th century) of the hermitage and mirror works, house No. 129 (front right). Ladislav Komůrka's collection.

SLOUP V ČECHÁCH CADASTRAL AREA

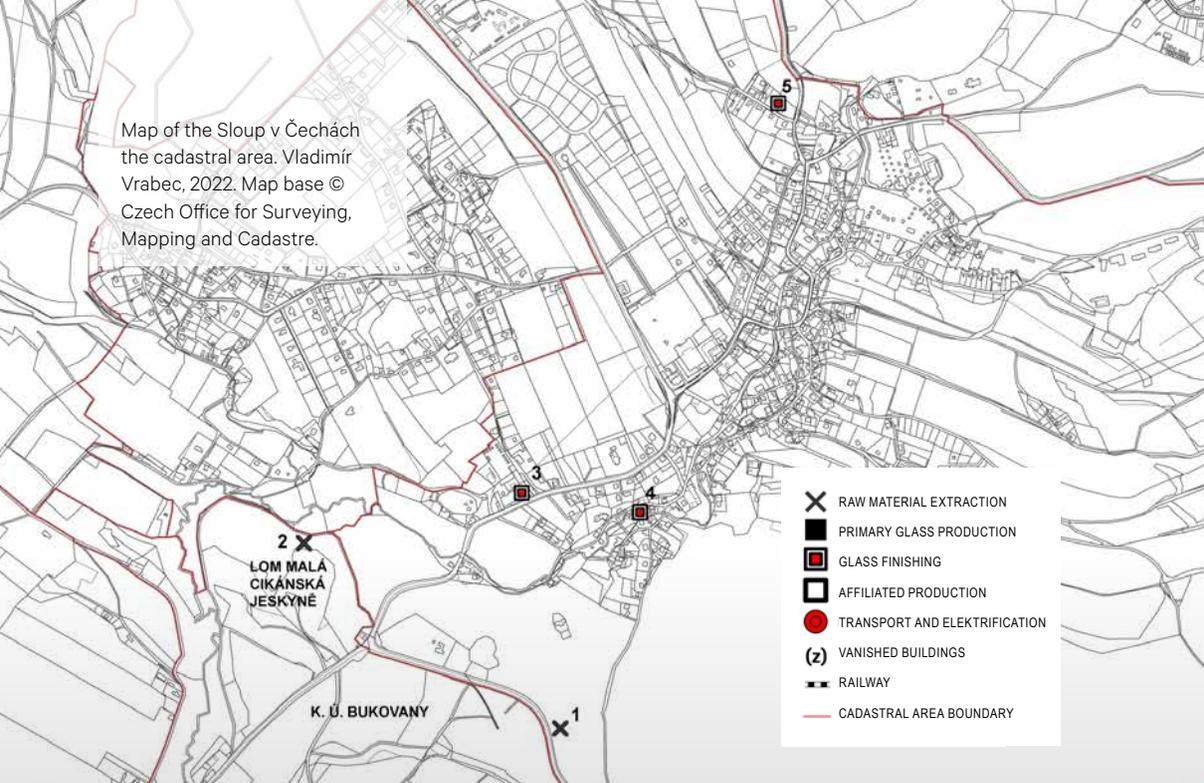
Dozens of small glass craftsmen (painters, engravers) operated in the municipality in the past. After the trading companies ceased to exist during the second quarter of the 19th century, some were transformed into smaller businesses dealing with glass finishing and export. Ludwig Gärtner's company made a list of major manufactories in Sloup as of 1840. In addition to the Kinský mirror works, one to four smaller finishing works operated in the municipality in the late 19th and the first half of the 20th centuries. The Raimund Stössel finishing plant was listed as of 1887, Theodor Weidner as of 1895 and Franz Beierle (grinding mill), Richard Hantschel, Rudolf Mitschke, Nováček & Co. and Karl Schlegel (later Schlegel & Teifel) in the 1920s.⁶⁷

Kinský mirror works (originally house No. 129). The mirror works were founded by Count Josef Jan Maximilián Kinský in 1756. He situated the main part of the manufactory in a former farm court under the so-called Rock Castle (Skalní hrad). Only a torso with residential houses No. 181 and 129, 167 and Reg. No. 87 is preserved of the extensive main three-winged complex. According to a description of the mirror works from 1889, the Sloup business consisted of the following parts: mirror silvering workshop, production completion workshop (setting mirrors into wooden frames), laboratory, gilding workshop, packaging room, joiner workshop (crate production), sample house, dispatch facilities, offices, residential house and garden. The machinery was first driven by a steam engine, still listed as of 1887, and later by electric motors. In 1913, the mirror works were bought by the Johne & Breuer company, later operating under the names Johne & May (1926), Johne & Geisler (1928) and, finally, Buresch & Johne. The operation was gradually reduced at that time, but it only ended definitively in 1946.⁶⁸

67 GRISA 2015, p. 155. FAHDT 1887, pp. 99–100. *Adressbuch der Glas-Industrie in Deutschland und Oesterreich-Ungarn* 1895, p. 332. *Adressbuch der Glas- und Keram-Industrie der Tschechoslowakei* 1926, p. 25. *Adressbuch der Tschechoslowakischen Glas-Industrie* 1928/29, pp. 5–6. RANŠOVÁ – HORNEKOVÁ 2001, pp. 69, 74, 81, 82, 90, 94. PEŠA 2004, p. 94.

68 PAUDLER 1885, pp. 24–27. HANTSCHHEL 1911, p. 261. KLÍMA 1955, pp. 419–423. *Adressbuch der Glas-Industrie in Deutschland und Oesterreich-Ungarn* 1895, p. 258. RANŠOVÁ – HORNEKOVÁ 2001, p. 73.

Map of the Sloup v Čechách the cadastral area. Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.



- | | | | |
|---|---|---|---|
| 1 | underground glass sand mine | 4 | Rudolf Mitschke finishing works, house No. 216 |
| 2 | underground glass sand mine (so-called Small Gipsy Cave), Bukovany cadastral area | 5 | Karl Schlegel and Karl Teifel finishing works, houses No. 231 (present-day Reg. No. 64) and 232 |
| 3 | Kinský mirror works (main business), houses No. 129, 181 (today also houses No. 167, Reg. No. 87) | | |

SLUNEČNÁ CADASTRAL AREA

Glass traders are documented in the municipality from the 18th century; the most important of them in the first third of the 19th century was Johann Georg Jirschik. Many home craftsmen, above all cutting lathe operators, grinders, engravers and painters, worked there as well. No larger finishing works are documented in Slunečná. In 1908, twenty-six local glass cutting lathe operators founded a cooperative named *Werkgenossenschaft der Glaskugler in Sonnenberg* with a grinding and cutting lathe workshop in house No. 105. The machines were driven by a petrol engine.⁶⁹

SVOJKOV CADASTRAL AREA

Glass production in the municipality's territory is only documented in the form of a glasshouse and bead production manufactory operated very briefly by the Sloup manor around 1756.⁷⁰

69 *Tereziánský katastr český. Svazek 2. Rustikál (kraje K-Ž)*, pp. 97 and 117. HANTSCHHEL 1911, pp. 996-1000. *Adressbuch der Glas-Industrie* 1929, p. 533. RANŠOVÁ – HORNEKOVÁ 2001, p. 70.

70 PAUDLER 1885, p. 27. KLÍMA 1955, pp. 419-421. GELNAR 2012a, pp. 183-190.



Svor, view from the southeast of the location of the vanished Nová Huť glassworks; a stamp battery stood below the pond, and a glassworks hall to the left. Photo: Jiří Vidman 2020.

SVOR CADASTRAL AREA

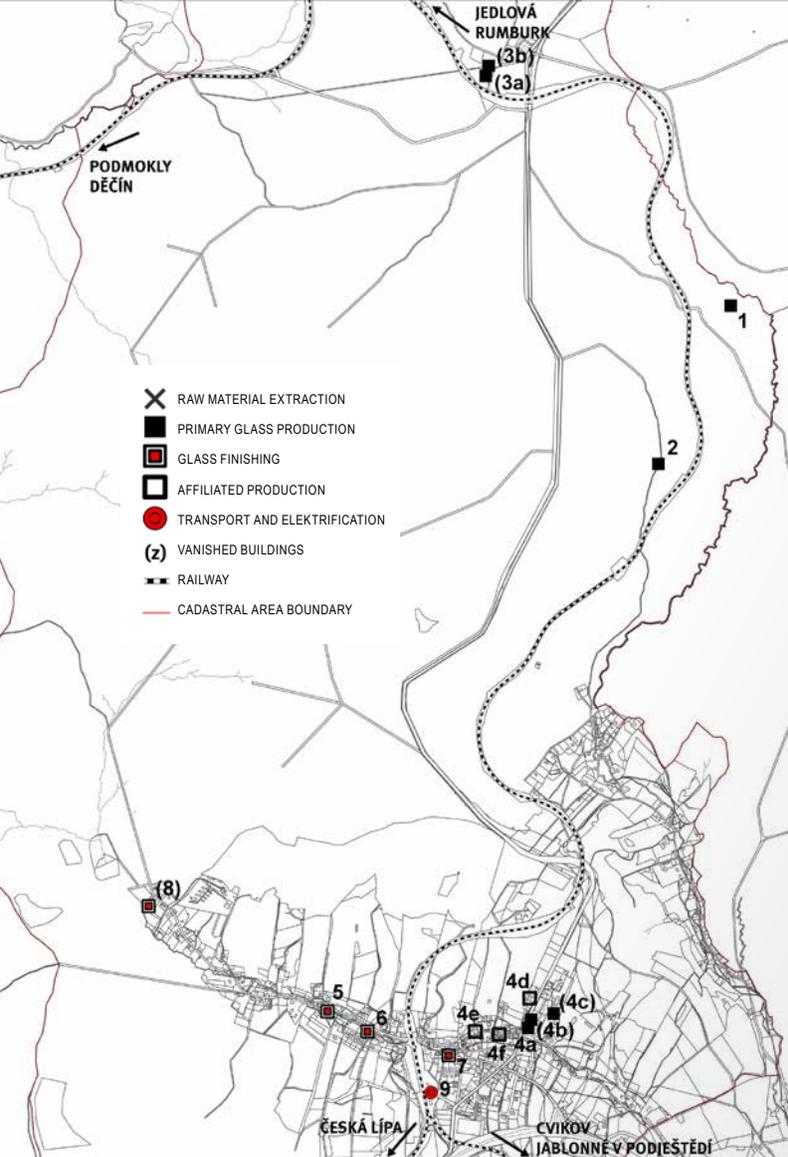
The cadastral area includes also the village of Rousínov, which is described in more detail below. Vanished medieval glasshouse locations have been localized in the northern part of the cadastral area. A glasshouse is archaeologically proved on the right bank of the Rousínovský Stream on the south slopes of Bouřný Hill. More possible glassworks locations are situated on the eastern foot of Velký Buk; for the time being, they are only documented by movable finds.⁷¹

Nová Huť glassworks. The glasshouse was founded by Johann Wenzel Müller in 1750; it ceased operating in 1875, and the buildings were demolished in 1881. The destruction of the glassworks hall and a waste heap are well visible in the terrain. The glassworks (house No. 146, building plot No. 196) was most probably of a log or frame construction. According to the sources, it was equipped with one melting furnace, undoubtedly with direct wood heating. A small quartz stamp battery (building plot No. 197) stood on the other side of the road, under the southeastern tip of a preserved pond. Another rectangular, apparently residential building (house No. 144, building plot No. 195) was situated south of the glassworks hall. Two smaller, apparently residential houses (probably for glassmakers, building plots No. 198 and 199) stood east of the glassworks hall. A nearby inn, house No. 159, built between 1802 and 1804, was accompanied by the buildings of stables and a barn or wagon shed; together, they formed a U-shaped layout.⁷² The industrial **Theresienhütte, Balle & Reim, Münzel & Palme, Karl Münzel, Josef Riedel glassworks** also operated in the cadastral area (see the Catalogue of Selected Glassmaking Buildings and Complexes).

Specific information about craftsmen dealing with glass grinding, engraving and painting in Svor is only available from the second half of the 19th century. Many focused on the production of illumination glass. Several finishing works operated in the municipality, in addition to dozens of home

71 ČERNÁ 2004, pp. 35–36. GELNAR 1997a, p. 49. GELNAR 2010b, pp. 217–224. GELNAR 2021, pp. 233–244.

72 ZUMAN 1947, pp. 38–44, 69–72, 131–142, 166–168. LNĚNIČKOVÁ 1997, p. 204. Stable Cadastre maps from 1843 and later reambulations, see <https://ags.cuzk.cz/archiv/>, cadastral area Svor.



Map of the Svor cadastral area. Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.

- | | |
|--|--|
| <p>1 vanished medieval glassworks location</p> <p>2 vanished medieval glassworks location</p> <p>3a Nová Huť glassworks, house No. 146, glassworks hall, residential and administrative buildings</p> <p>3b Nová Huť glassworks, house No. 146, quartz stamp battery</p> <p>4a Münzel & Palme glassworks, house No. 162, glassworks hall 1, administrative building, house No. 38, annexes</p> <p>4b Münzel & Palme glassworks, house No. 162, glassworks hall 2, annexes, smokestack, finishing works, residential buildings, houses No. 39, 215</p> <p>4c Münzel & Palme glassworks, house No. 162, glassworks hall 3, annexes, smokestack, finishing works, transformer</p> | <p>4d Münzel & Palme glassworks, house No. 162, residential house No. 163, worker houses No. 211 and 212, villa, house No. 234</p> <p>4e Münzel & Palme glassworks, house No. 162, worker houses No. 51 and 213</p> <p>4f Münzel & Palme glassworks, house No. 162, worker houses No. 214 and 215</p> <p>5 Wilhelm Weber, later Hermann Michel, glass grinding mill, house No. 110</p> <p>6 Wenzel Warzel, later Franz and Marie Weiss, glass grinding mill, house No. 114</p> <p>7 Vincenz Wunsch, glass grinding mill, house No. 127</p> <p>8 Anton Watzel, sawmill and glass grinding mill, house No. 150</p> <p>9 Svor railway station, dispatch building, house No. 240</p> |
|--|--|

craftsmen. The oldest and probably most important was Ignaz Ullrich's company (later Johann Ullrich's Witwe). Six more finishing works functioned, some only briefly, in Svor in the 1920s: Anton Holfeuer, Fritz Knobloch, Hermann Michel, Josef Rückl, E. Ulrich & Co. and Friedrich Gulich.⁷³ The following glass grinding mills, driven by overshot waterwheels, are also documented in the cadastral area: house No. 110 (later house No. 187), No. 114 (built in 1869, the building and torsos of the hydraulic structure are preserved), No. 127 (situated in a well-preserved Classicist building in 1870, later rebuilt into a tinsmith's shop), No. 150 (built near a sawmill from 1793, the hydraulic structure is preserved).⁷⁴



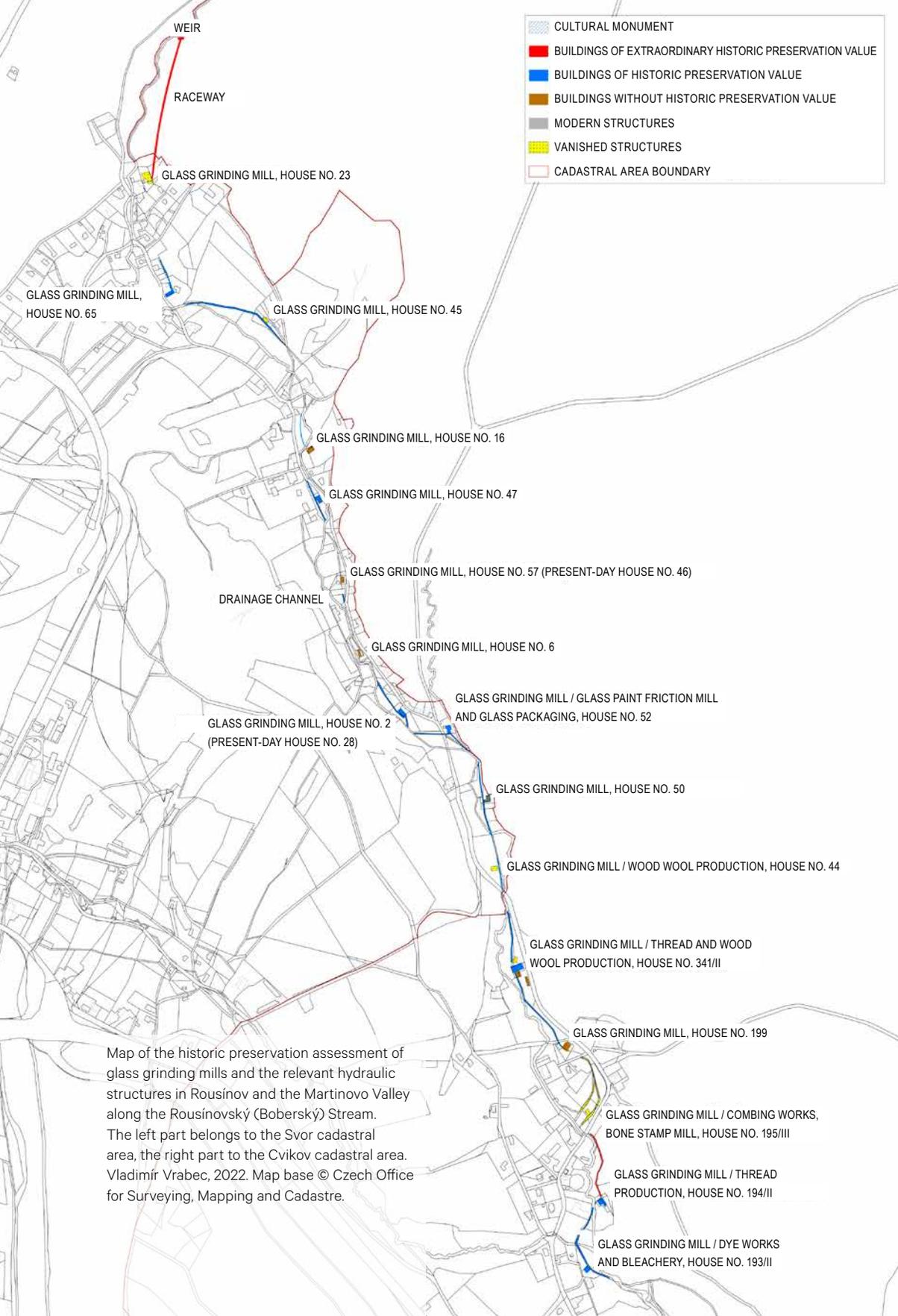
Rousínov, view from the southeast of the lower part of the village with buildings along the Rousínovský Stream; bottom, left from the road: glass grinding mill, house No. 2 (present-day house No. 28); on the upper edge of the image: grinding mill, house No. 47. Photo: Jiří Vidman 2020.

SVOR CADASTRAL AREA - ROUSÍNŮV

The *Waldhufendorf*-type village secondarily singled out from the eastern edge of the cadastral area of Svor in the late 16th century became the centre of glass grinding in the Cvikov region from the last quarter of the 18th century. Altogether eleven water-driven glass grinding mills operated there. The earliest ones were founded near the southern edge of Rousínov, already in the cadastral

⁷³ *Adressbuch der Glas-Industrie in Deutschland und Oesterreich-Ungarn* 1895, p. 326. FAHDT 1907, p. 141. *Adressbuch der Glas- und Keram-Industrie der Tschechoslowakei* 1926, p. 79. *Adressbuch der Tschechoslowakischen Glas-Industrie* 1928/29, p. 83. *Adressbuch der Glas-Industrie* 1929, p. 530.

⁷⁴ KOLKA 2012, pp. 179–185. ASCHENBRENNER 2020, p. 36.



- CULTURAL MONUMENT
- BUILDINGS OF EXTRAORDINARY HISTORIC PRESERVATION VALUE
- BUILDINGS OF HISTORIC PRESERVATION VALUE
- BUILDINGS WITHOUT HISTORIC PRESERVATION VALUE
- MODERN STRUCTURES
- VANISHED STRUCTURES
- CADASTRAL AREA BOUNDARY

Map of the historic preservation assessment of glass grinding mills and the relevant hydraulic structures in Rousínov and the Martinovo Valley along the Rousínovský (Boberský) Stream. The left part belongs to the Svor cadastral area, the right part to the Cvikov cadastral area. Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.

WEIR

RACEWAY

GLASS GRINDING MILL, HOUSE NO. 23

GLASS GRINDING MILL, HOUSE NO. 65

GLASS GRINDING MILL, HOUSE NO. 45

GLASS GRINDING MILL, HOUSE NO. 16

GLASS GRINDING MILL, HOUSE NO. 47

GLASS GRINDING MILL, HOUSE NO. 57 (PRESENT-DAY HOUSE NO. 46)

DRAINAGE CHANNEL

GLASS GRINDING MILL, HOUSE NO. 6

GLASS GRINDING MILL, HOUSE NO. 2 (PRESENT-DAY HOUSE NO. 28)

GLASS GRINDING MILL / GLASS PAINT FRICTION MILL AND GLASS PACKAGING, HOUSE NO. 52

GLASS GRINDING MILL, HOUSE NO. 50

GLASS GRINDING MILL / WOOD WOOL PRODUCTION, HOUSE NO. 44

GLASS GRINDING MILL / THREAD AND WOOD WOOL PRODUCTION, HOUSE NO. 341/II

GLASS GRINDING MILL, HOUSE NO. 199

GLASS GRINDING MILL / COMBING WORKS, BONE STAMP MILL, HOUSE NO. 195/III

GLASS GRINDING MILL / THREAD PRODUCTION, HOUSE NO. 194/II

GLASS GRINDING MILL / DYE WORKS AND BLEACHERY, HOUSE NO. 193/II

Rousínov, view of the northern edge of the village (second quarter of the 20th century); right: grinding mill, house No. 23; around it, log houses of local grinders; left: new houses of the so-called Czech Quarter. Tomáš Novák's collection.



Rousínov, right: grinding mill, house No. 52, functioning as painting works and glass paint friction mill in 1906–1922; the left building with a prismatic smokestack belongs to this operation; centre: residential part; the grinding mill is situated on the right edge of the image. Tomáš Novák's collection.



area of Cvikov; they were smoothly followed by more buildings in the Martinovo Valley along the course of the Rousínovský (Boberský) Stream (see Cvikov cadastral area). Of the six grinding mills, houses No. 44 (built in 1783) and 46 (before 1788, later transferred to house No. 341/II in Cvikov) belonged to Rousínov. The first grinding mills in the central and upper part of Rousínov were situated in houses No. 23 (built 1782, grinding mill 1784) and 47 (1788). In the 1790s, more were added in houses No. 50 (1794) and 45 (1798) and, around 1818, in house No. 52. All of them were bead grinding mills, mostly founded or later operated by grinders from well-known centres of this production in Falknov and Polevsko. Five more facilities were added to the six grinding mills (after the transfer of one building to Cvikov) in the third quarter of the 19th century in houses No. 16 (1857/1859), (1858), 57 (1859), 6 (1867) and 2 (after 1872). Most had the form of production buildings close to an older residential house.⁷⁵

75 KOLKA 2012, pp. 38–41.

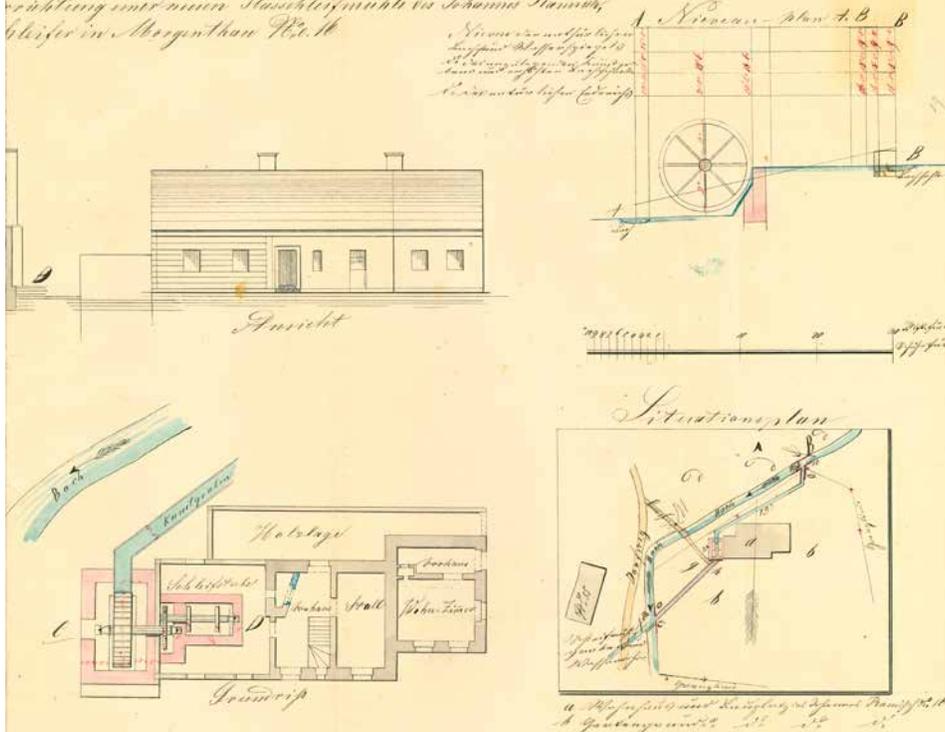


Rousínov, grinding mill, house No. 23, weir on the Rousínovský Stream; the large masonry body of a raceway covered by massive stone slabs turns off to the left bank. Photo: author, 2019.



Rousínov, grinding mill, house No. 52, view of the south production wing with a grinder hall; bottom right: turbine house. Photo: author, 2019.

The grinding benches and other machinery were driven exclusively by overshot waterwheels; in two cases, they were replaced by Francis turbines. Constructionally and technologically interesting grinding mills include the following: house No. 2 (present-day house No. 28, built between 1872 and 1874, building with a work hall and minor background); house No. 16 (rebuilt in the modern era; a very interesting type of the reconstruction of an earlier residential house carried out in 1857; the work hall rebuilt in masonry in 1913); house No. 23 (Rotmühle, Rothholzmühle, an intactly preserved masonry weir and a large raceway covered with massive stone slabs; the grinding mill vanished, a new building No. 88 is standing in its place; J. Vogelsang & Söhne launched a major reconstruction in 1873; in 1875, there were 24 benches and after the reconstruction, as many as 75 benches; the machinery was driven by a waterwheel with a diameter of 4.08 m and, after the reconstruction in 1874, newly by one of the first turbines in the region; as of 1922, a Francis turbine by Andrae & Fellgner of Hrádek nad Nisou); house No. 47 (an intactly preserved two-storey building with a historicizing structuring from 1872, torsos of the hydraulic structure); house No. 52 (an intactly preserved masonry building from 1906, the northern part comprises a two-storey residential building, the southern part a single-storey work hall with factory windows; a turbine house is at-



Rousínov, glass grinding mill, house No. 16, floor plan from a plan of the reconstruction of a residential house into a grinding mill (A. Lederer, c. 1858); red: new masonry of the waterwheel chamber and the space under the wheel below the work hall, which was rather unusually inserted into the former log living room. SOkA Česká Lípa, OÚ Jablonné v P., Inv. No. 135, carton 73.

tached to the south gable; in 1906, reconstruction to a glass paint friction mill and painting works; to the north stood a small building used for an enamel production furnace, with a high prismatic smokestack nearby; a grinding mill was restored by the Carl Hosch company of Nový Bor in 1922 at the latest; in 1924, the waterwheel was replaced by a Francis shaft turbine by Andrae & Fellgner of Hrádek nad Nisou); house No. 65 (torso of a masonry building from 1858).⁷⁶

VOLFARTICE CADASTRAL AREA

Glass traders and a rather great number of home craftsmen, especially engravers and cutting lathe operators, in the early 20th century also girdlers, are documented in the municipality from the 18th century. Of the small number of local companies excels above all the enamel bead (so-called Venetian goods) finishing plant Stephan Hellmich. It is included also in the list of the most important manufactories and factories as of 1840. The company was reportedly operated in the leased farmstead No. 122 at the southeastern end of the cadastral area (at present, the newly built house No. 130). Ten grinding machines were driven by a waterwheel. The nearby mill No. 123 (present-day house No. 325 and Reg. No. 1) might have been used for these facilities. Josef Fritsch and Franz Wiesner finishing works were registered in the municipality in the late 1920s.⁷⁷

⁷⁶ Ibid., pp. 154–176. HAIS 2022, pp. 178–185. RIMPLER 2007.

⁷⁷ Tereziánský katastr český. Svazek 2. Rustikál (kraje K–Ž), pp. 97, 121. SOMMER 1833, pp. 311–312. GRISA 2015, pp. 144–145. HANTSCHER 1911, pp. 916–918. Adressbuch der Tschechoslowakischen Glas-Industrie 1928/29, p. 102. Adressbuch der Glas-Industrie 1929, p. 546.



Kamenický Šenov, glassworks complex, house No. 687, view into the glassworks hall with a Siemens-Siebert melting furnace. Stanislav Kopecký's collection.

*Glasindustrie
Steinschönau.*

CATALOGUE OF SELECTED GLASSMAKING BUILDINGS AND COMPLEXES

No. 180 Horní Chřibská – Franz Zahn, Michel & Mayer, August Mayer & Sohn glassworks

The glassworks with the longest temporal continuity in the Bor – Šenov area was founded between 1457 and 1504. The glasshouse was operated by the important glassmaker family of Friedrich until 1689. The manorial lord of Česká Kamenice bought it in 1697.¹ From 1720, it was leased and the wood supplies curtailed. Johann Josef Kittel bought the glassworks as a hereditary possession in 1767.² A list of glassworks from 1771–1772 mentions a furnace, probably with eleven pots, in the Horní Chřibská glasshouse.³ A five-pot furnace is listed as of 1786. Anton Kittel owned the glasshouse from that date until his death in 1820, then his heirs and after them, the husbands of his daughter Johanna – Franz Anton Weidlich and, from 1836, Franz Böse.⁴ The glassworks hall, registered as house No. 6 (Krásné Pole), was probably a log structure for a large part. On the contrary, the glassworks master's house with an inn (No. 5, Krásné Pole) already had a masonry Classicist form at that time.⁵ A new masonry glassworks hall with a high half-hipped roof was built around 1846, under Franz Böse.⁶ In 1867 (1868), the glassworks became the property of Franz Zahn, who commenced fundamental reconstructions and modernization of the company. The adaptations related to the installation of new melting furnaces of the Nehse type heated with producer gas generated by the gasification of wood. This glassworks adaptation, which took place in 1869–1870, was reportedly the first in the whole Bor – Šenov area. An adaptation of the eight-pot melting furnace for brown coal heating is mentioned as of 1873–1874.⁷

The glassworks went under the Michel & Mayer company in 1882.⁸ The glassworks master's house was rebuilt at that time and got the existing impressive historicizing façade on the exposed sides. The same form was used also for a new grinding mill, the enclosure wall of the glassworks hall and the gatehouse. According to an 1887 address book, a Nehse type furnace was replaced by a Sie-

1 CHMELÍK 1999, pp. 16–19. CHMELÍK 2001, pp. 83–101.

2 SACHER 1964, unpagued.

3 LNĚNIČKOVÁ 1997, pp. 206–207.

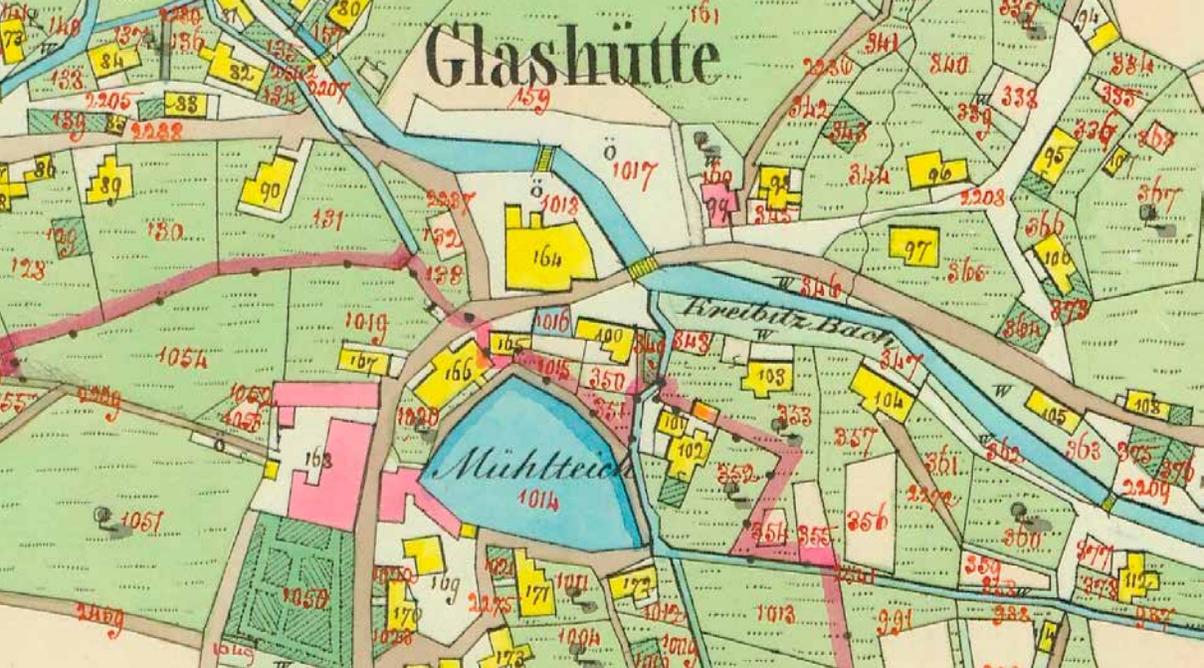
4 SACHER 1964, unpagued. ZUMAN 1947, pp. 133–143.

5 Stable Cadastre, cadastral area Horní Chřibská, <https://ags.cuzk.cz/archiv/>.

6 No direct sources concerning the construction of the new glassworks hall have been found yet. Information about the reconstruction of the glassworks is provided in SOKA Děčín, AO Horní Chřibská, municipal chronicle, 1889–1937, p. 23. SACHER 1964 (unpagued) says that the reconstruction reportedly took place in 1847.

7 SOKA Děčín, AO Horní Chřibská, municipal chronicle, 1889–1937, pp. 97–99. FAHDT 1879.

8 SOKA Děčín, AO Horní Chřibská, municipal chronicle, 1889–1937, pp. 26–30, 97–99. HAIS 2014b, p. 247.



Horní Chřibská, section of the imperial imprint of the Stable Cadastre from 1843; the red line is the boundary of the subsequently separated cadastral area of Krásné Pole; the glassworks is located under the Glashütte inscription; glassworks master's house No. 5 left of the Mühlteich Pond on building plot No. 168; grinding mill, house No. 3, under the pond dam; raceway from the Chřibský Stream is visible in the right. Czech Office for Surveying, Mapping and Cadastre Prague, Stable Cadastre.

mens-Siebert melting furnace with eight pots; heating by brown coal producer gas remained.⁹ The company was divided in 1902; after that, the Horní Chřibská glassworks operated under the firm Mayer & Sohn. A ten-pot melting furnace was in operation in 1904–1908; the grinding mill housed a 10 HP steam engine, two grinding benches and one cracking-off engine.¹⁰ The development of the company was supported by the construction of a new glassworks hall in 1910. Two worker houses, smaller (No. 106) and larger (No. 104 and 107), were built west of the courtyard behind the glassworks master's house in 1906. An important adaptation was the construction of two smaller three-pot furnaces with a ceramic recuperator of the IMAG system in the older glassworks hall. Their installation was related to the testing of the use of long-distance gas heating from Záluží u Mostu.¹¹ A vocational glass school was founded in Chřibská in 1947; until 1959, it used the younger glassworks hall with a mixing chamber, sand drying and cracking-off facilities and grinding works. The old glassworks hall was replaced by the existing building around 1950. The replacement of IMAG type furnaces in the southern hall by a new experimental four-pot high-flame furnace of the Jindra system is listed as of 1956. The production of glasshouse-shaped glass designed by many prominent glass artists (Josef Hospodka) and of semi-finished products for finishing plants was introduced in the glassworks. The glasshouse was privatized in 1993. Since the bankruptcy in 2003, the operations were gradually wound down and ended in August 2007.¹²

9 FAHDT 1887, p. 42.

10 GRISA 2017, pp. 174–175, 182–183.

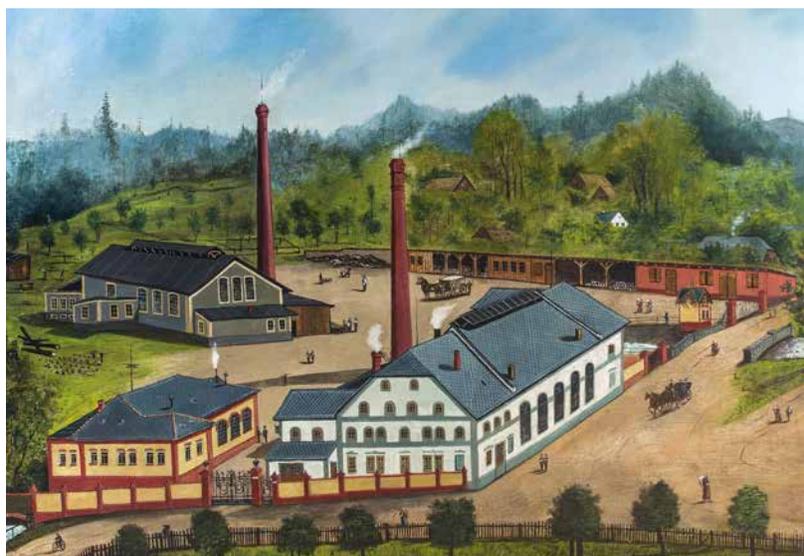
11 SOKA Děčín, AO Horní Chřibská, municipal chronicle, 1889–1937, pp. 26–30, 97–99. HAIS 2014b, pp. 247–249. FAHDT 1907, p. 42. *Adressbuch der Glas- und Keram-Industrie der Tschechoslowakei* 1926. *Adressbuch der Tschechoslowakischen Glas-Industrie* 1928/29, p. 120. *Adressbuch der Glas-Industrie* 1929, p. 197.

12 HAIS 2014b, pp. 249–256. RASOCHA 1989, pp. 16–20, 64–67, 74, 79, 82, 87, 116. SAJDL 2009, pp. 73–79.

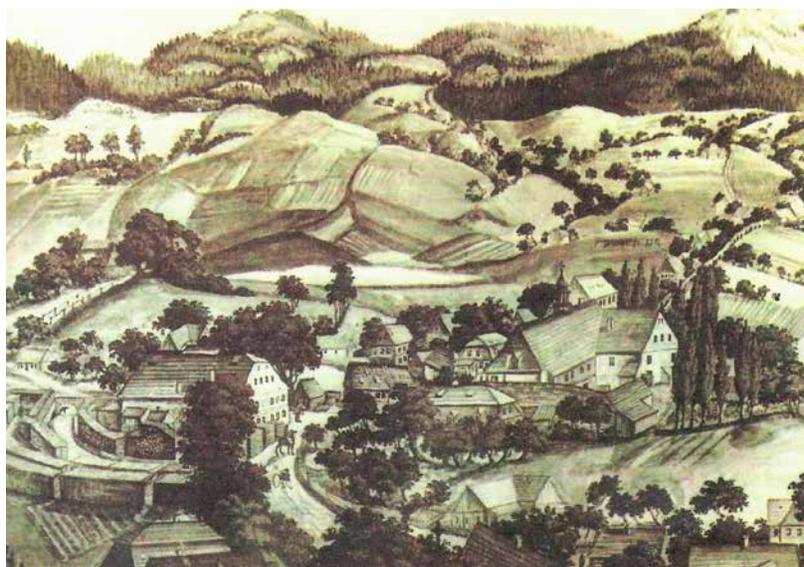
Horní Chříbská, glassworks, house No. 180; the drawing depicts the glassworks already after the transition to melting furnaces heated by producer gas, as documented by the smokestack and new annexes in the left courtyard part (after 1870). Taken over from Hais 2014.

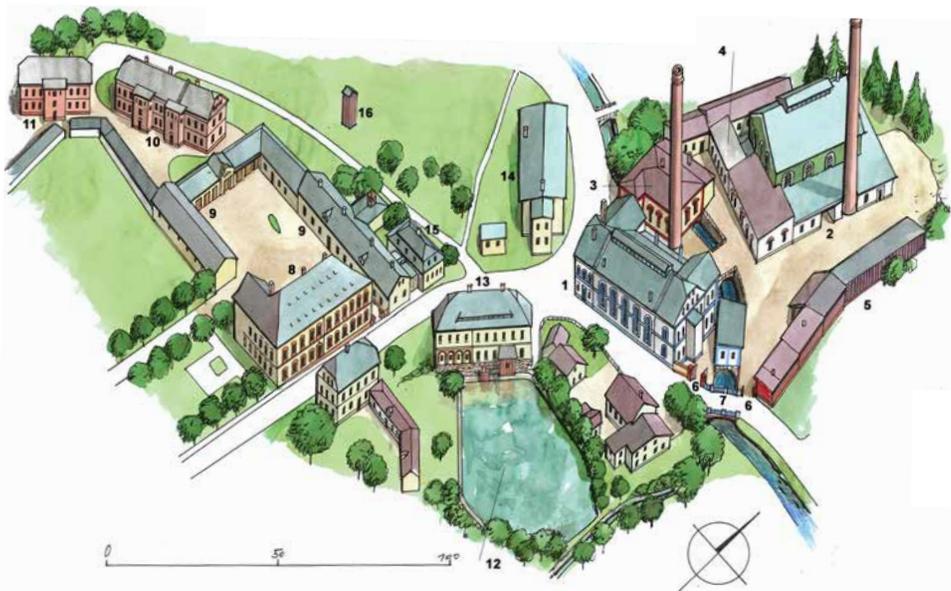


Horní Chříbská, glassworks, house No. 180; the drawing depicts the glassworks after the construction of the second (left) glassworks hall in 1910. Glass Museum Nový Bor, photo: Gabriel Urbánek.



Horní Chříbská, glassworks, house No. 180; the drawing depicts the glassworks apparently shortly after the construction of a new glassworks hall around 1846; the melting furnace was evidently heated by wood, as documented by the stacks of wood; the glassworks master's house is on the right. Taken over from Urbancová 1989.

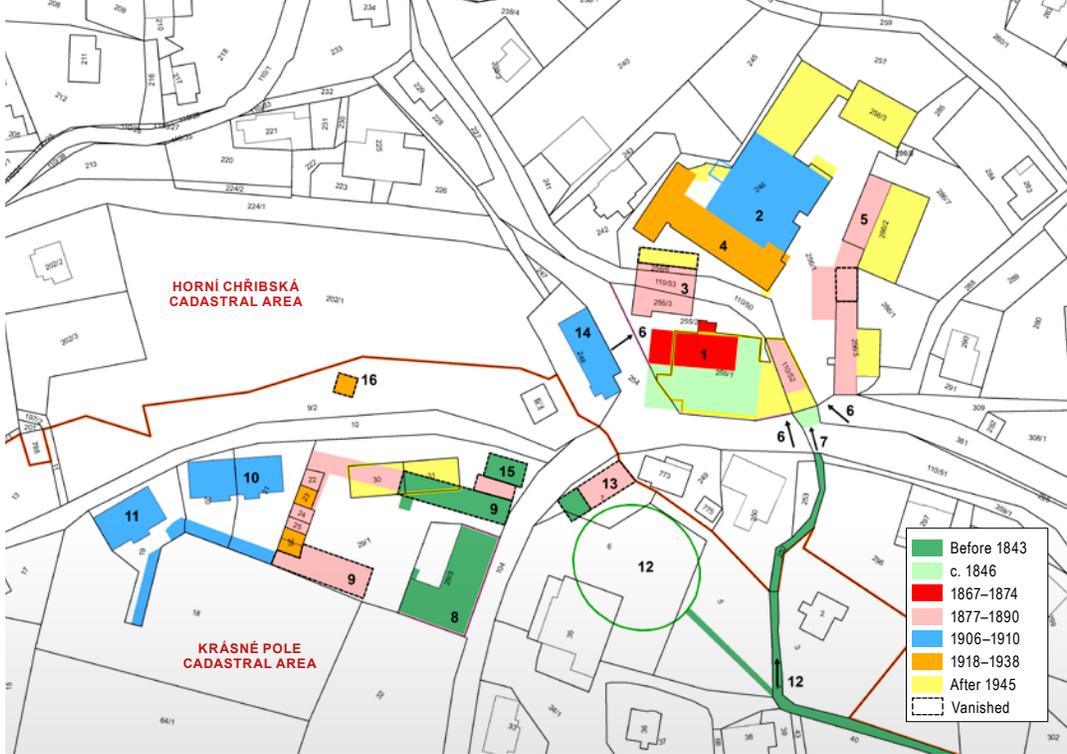




Horní Chřibská, broader glassworks complex, house No. 180, reconstruction of the situation as of 1945, view from the south. Drawing: Jaroslav Staněk 2021.

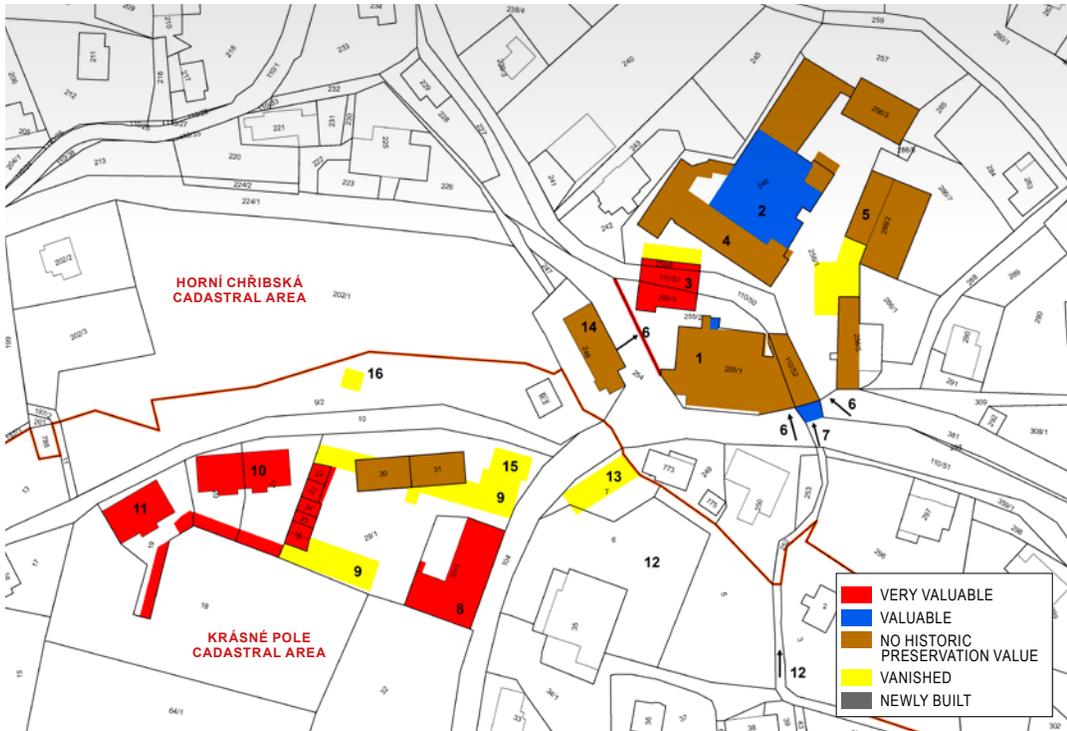
- | | |
|--|--|
| <p>1 glassworks hall, newly built c. 1846; perpendicular annexes with producer station and smokestack c. 1870; completely replaced by a newly built building probably c. 1950</p> <p>2 glassworks hall with producer station and smokestack annexe, 1910</p> <p>3 glass grinding works, 1877–1900</p> <p>4 later glassworks hall annexes (mixing chamber, storages and more), 1918–1938</p> <p>5 sheds, storages, 1877–1900</p> <p>6 original entrance gates, brick enclosure wall, gatehouse near the southeast gate, 1877–1900</p> <p>7 arched bridge across the Chřibský Stream, after 1843</p> <p>8 glassworks master's house No. 5 (Krásné Pole), before 1843; reconstruction 1877–1900</p> | <p>9 farm court belonging to the glassworks master's house; north wing before 1843; extension, addition of west and south wings 1877–1900; reconstructions into garages 1918–1938</p> <p>10 worker houses No. 104 and 107 with sheds, 1910</p> <p>11 worker house No. 106 with sheds, 1906</p> <p>12 raceway from the Chřibský Stream, vanished reservoir, waste drainage, before 1843</p> <p>13 mill, house No. 3 (Krásné Pole), before 1843; 1885 Hampel & Worm, extension and reconstruction into glass grinding mill</p> <p>14 Hampel & Worm finishing works, trade house No. 184, 1910; 1912 – newly built after fire; 1947 vocational glass school lunchroom</p> <p>15 residential house No. 4 (Krásné Pole), before 1843</p> <p>16 hose dryer</p> |
|--|--|

The whole complex of the Horní Chřibská glassworks has an undoubted culturally-historical significance; until 2007, it was the oldest continual glass operation in the Bohemian lands with a tradition dating back before 1504. Of the still standing production buildings, the younger glassworks hall with a smokestack and the smokestack remaining of the vanished older glassworks hall are very valuable. Architecturally, they are even surpassed by the grinding mill building, the glassworks master's house with a small torso of an outhouse in the farm court and both worker houses from 1906 and 1910 with their background. For the time being, all the buildings are preserved in a very authentic condition and clearly have a potential for inclusion among cultural monuments. The melting furnaces and other equipment whose operation was discontinued in 2007 were apparently dismantled completely.



Horní Chříbská, broader glassworks complex, house No. 180, building-history assessment.
 Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.

Horní Chříbská, broader glassworks complex, house No. 180, historic preservation assessment.
 Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.





Horní Chříbská, glassworks, house No. 180, grinding works, view from the west. Photo: author, 2020.



Krásné Pole, glassworks master's house No. 5, view from the northeast. Photo: author, 2020.



Krásné Pole, worker house No. 106, view from the west. Photo: author, 2020.



Svor, glassworks complex, house No. 162, view from the south; front: destroyed house No. 162 (former dye works); right from it, clerk house No. 38 with a gatehouse annexe; near the road, the earliest glassworks hall; next to the smokestack, the torso of the second hall; behind them, the modern finishing plant building and the torso of residential house No. 215; right: smokestack (remnant of the third glassworks hall).
 Photo: Jiří Vidman 2020.

No. 162 Svor – Theresienhütte, Balle & Reim, Münzel & Palme, Karl Münzel, Josef Riedel glassworks

The earliest part of the industrial complex is comprised of the buildings of a red dye works, house No. 162, built by Anton Balle in 1826. Gustav Balle built a glassworks with a melting furnace with direct coal heating in the complex in 1872. The operation started early the following year under the firm Balle & Reim. However, the furnace was reportedly extinguished after three months. The Münzel & Palme company restored the glassworks in 1878.¹³ At that time, it already used three melting furnaces with 24 pots; direct coal heating remained. The reconstruction of furnace heating to producer gas took place reportedly in 1893.¹⁴ The melting furnaces were situated in two glassworks halls. The earlier (from 1872) adjoined the former dye works complex from the north. Three Siemens-Siebert furnaces with 24 pots heated by producer gas remained in operation in 1904–1907, along with a cracking-off engine and fifteen engines in the grinding works driven by

13 SACHER 1968, pp. 115–123. The dating of the beginnings of the glassworks and the formation of the Münzel & Palme company in 1881 in this work is incorrect, see *Die Gross-Industrie Österreichs* 1908, part 2., p. 127. On the glassworks staff and the arrival of glassmakers of Czech nationality, see ASCHENBRENNER 2021, pp. 225–230.

14 *Die Gross-Industrie Österreichs* 1908, part 2., p. 127. In contrast to later data, three furnaces, each with 14 pots are listed here. Three furnaces with 24 direct-heating pots are listed in FAHDT 1887, p. 46 and surprisingly also in *Adressbuch der Glas-Industrie in Deutschland und Oesterreich-Ungarn* 1895, p. 128.



Svor, glassworks complex, house No. 162, top drawing (view from the southwest); bottom: Marienhütte glassworks in Falknov. Taken over from *Die Gross-Industrie Österreichs*, part 2, Wien 1908.

a 6 HP petrol engine.¹⁵ The glassworks was operated under the firm Karl Münzel from 1907. At that time, the assortment included also more illumination glass and especially so-called Jablonec goods (rods, bangles).

In 1919, the glassworks was leased to Josef Riedel, the owner of a glasshouse residing in Dolní Polubný. The company bought the Svor glassworks in 1926, added a third glassworks hall and extended finishing operations. As many as four Siemens-Siebert melting furnaces worked in the company at that time, plus six mechanical glass sandblasting engines in the finishing works.¹⁶ In 1933–1938, the glassworks were operated by lessee Josef Reiner, who newly introduced the production of semi-optical glass (clear and coloured spectacle glass, watch glass, glass spheres). Zone melting furnaces of the Knoblauch system were installed in connection with that. Semi-optical glass production continued after nationalization and eventually under the Severosklo stock company until the 1990s. Long-distance gas was installed in the company in 1947. The company was privatized in 1992. The production in Svor was definitively discontinued in 1998.¹⁷ The buildings are used as warehouse space today; a considerable part has been demolished.

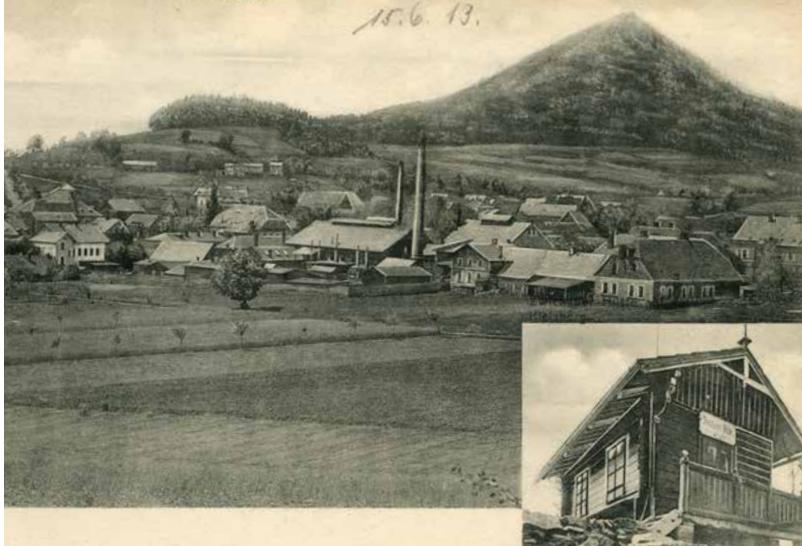
The importance of the Theresienhütte glassworks complex rests in the fact that it is the first industrial glass plant in the Bor – Šenov area, which stood at the start of a wave of massive production of new glassworks in 1872. Another interesting fact is represented by its link to earlier

15 GRISA 2017, pp. 174–175, 182–183. FAHDT 1907, p. 44.

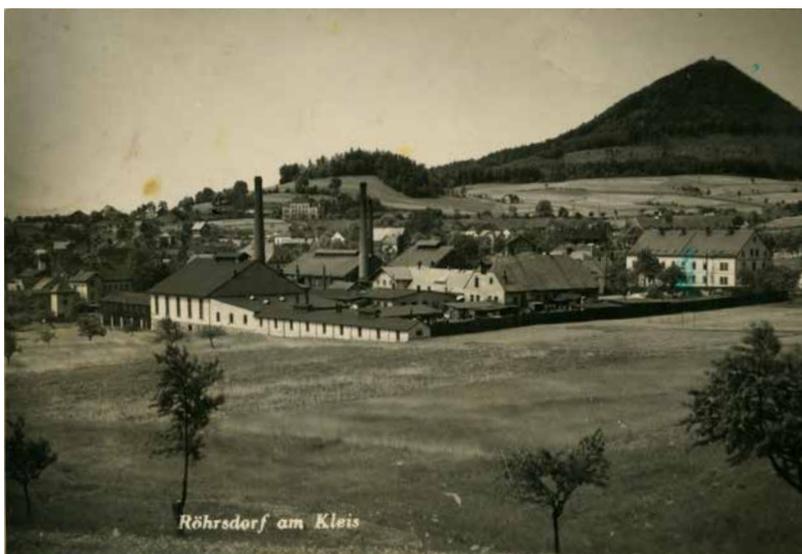
16 ASCHENBRENNER 2020, pp. 107–108. *Adressbuch der Glas-Industrie* 1929, pp. 194–195. SOKA Česká Lípa, fonds OÚ Jablonné v Podještědí, Inv. No. 135, sign. 11 5/120, carton 76 (water offtake for glassworks, house No. 168 in Svor).

17 SACHER 1968, pp. 118–120. BERAN – VALCHAŘOVÁ 2007, p. 29. ASCHENBRENNER 2020, pp. 151–154, 181, 188.

Svor, glassworks complex,
house No. 162, view from
the northeast (c. 1913).
Tomáš Novák's collection.



Svor, glassworks complex,
house No. 162, view from
the northeast again (1930);
the third glassworks hall
with a smokestack has
been added compared
to the earlier situation.
Tomáš Novák's collection.



Svor, glassworks complex,
house No. 162 on the left
side of the image (rear);
view from the southwest
(c. 1929) from a hillock
above the railway station.
Tomáš Novák's collection.



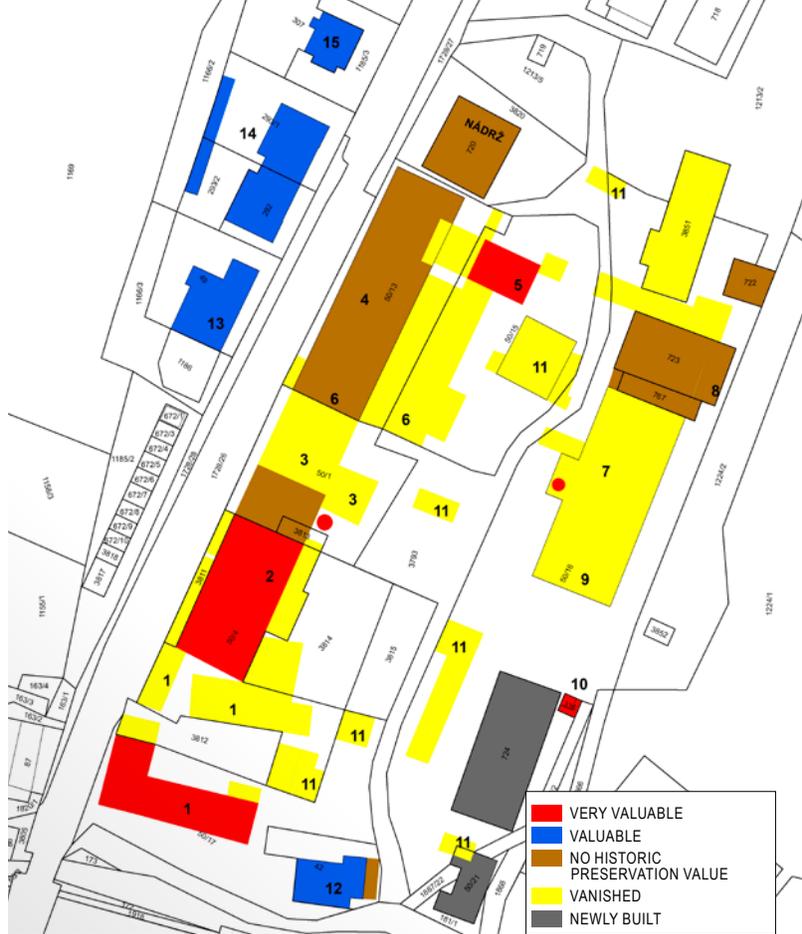
- 1 red dye works, house No. 162, 1826 Anton Balle; residential and production wing, two production buildings in the courtyard; after the glassworks came into existence, included into the operations
- 2 glassworks hall, annexes with smokestack near the road, 1872 Balle & Reim
- 3 glassworks hall with producer station and smoke-stack annexe, 1878
- 4 residential house No. 39, before 1843
- 5 residential house No. 215, c. 1850
- 6 annexes near residential houses, apparently glass finishing works (grinding works?); two wings 1878–1900; later courtyard annexe 1933–1938
- 7 glassworks hall with producer station and smoke-stack annexe, 1926–1928
- 8 annexes, apparently glass finishing, 1926–1928
- 9 shed annexe, 1926–1928
- 10 transformer, 1926–1928
- 11 storages and sheds in the courtyard, 1878–1900 and 1926–1928
- 12 clerk house No. 38, 1878–1900
- 13 residential house No. 163, before 1843; annexe 1901–1915
- 14 worker houses No. 211 and 212 with sheds, 1901–1915
- 15 villa of glassworks master Alois Fuchs, house No. 234, 1901–1915



Svoboda, glassworks complex, house No. 162, building-historical assessment. Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.

	1826
	Before 1843
	c. 1850
	1872
	1878–1900
	1901–1915
	1926–1928
	1933–1938
	1945–

Svor, glassworks complex,
house No. 162, historic
preservation assessment.
Vladimír Vrabec, 2022.
Map base © Czech
Office for Surveying,
Mapping and Cadastre.



Svor, glassworks complex,
house No. 162, reconstruction
of the situation as of 1945,
view from the southeast.
Drawing: Jaroslav Staněk
2021.





Svor, glassworks complex, house No. 162; view of house No. 162 (former dye works from 1826) from the southwest, situation before destruction. Photo: author, 2011.

dye works from 1826 whose buildings were incorporated into the new glassworks' operations. The more regrettable are the demolitions and destruction of disused buildings. They unfortunately affected the second glassworks hall from 1878, the third glassworks hall from 1926 and recently also architecturally valuable buildings of the former dye works. More buildings vanished already during the reconstructions in the 1950s and 60s. Only the earliest glassworks hall from 1872 is preserved to this day, albeit changed by modern adaptations, along with two of the three original smokestacks, a torso of the residential building No. 215 and a transformer. The background of the glassworks with the clerk house No. 38 and the villa No. 234 are preserved in a more complete manner.

No. 129, 959 Kamenický Šenov – Adolf Růckl glassworks

The earliest glassworks in Kamenický Šenov was built during 1885 and finished at the beginning of the following year by Anna Rücklová, the widow of the owner of a glasshouse in Preitenstein, Plzeň region. Land for the newly built company was bought in direct proximity to a concurrently built railway from Česká Kamenice to Český Šenov, which was put into operation in February 1886. The construction of the glassworks was headed by builder Ignác Dittrich of Nový Bor. The glass furnaces (both melting and cooling) were built by glassworks master Javůrek. The production began on 6 March 1886. The eight-pot melting furnace was heated from the beginning with producer gas from coal. However, two Siemens-Siebert furnaces with 20 pots are listed as early as 1887.¹⁸ The original glasshouse was smaller than the existing house No. 129. Worker houses, present-day No. 565, 1006, 1007, 672 and 630, were also built, comprising two wings enclosing a courtyard east of the glasshouse.

In 1890, master mason Gustav Lösel of Žandov made a project for an extension of the form works and the addition of a passageway on the northwestern side. The addition of a warehouse next to the passageway was ready in 1893 (design by Franz Eschler of Česká Kamenice, like in the following cases). According to another plan from 1902, a cracking-off facility with a 1 HP electric motor and a transmission driving the individual machines was to be established in a storage room in the north corner and a neighbouring room. Two lathes with a 2 HP electric engine, a band saw, a grinding stone and a grinding machine with a 4 HP electric motor were to be installed in

18 JECH 1965, pp. 3–6. ARNOŠT – DVOŘÁK – KARPÍŠKOVÁ – KIRSCH – MARTÍNEK – ŠTROJSA 1996, p. 5. FAHDT 1887, p. 60. No direct sources or plan documentation to the earliest building phase are preserved.

Kamenický Šenov,
glassworks complex, house
No. 129, view from the east
(1905); the glassworks hall
with a smokestack is in the
background; left of it,
a storage; in front of it,
worker houses No. 672, 630,
565, 1006 and 1007.
Petr Joza's collection.

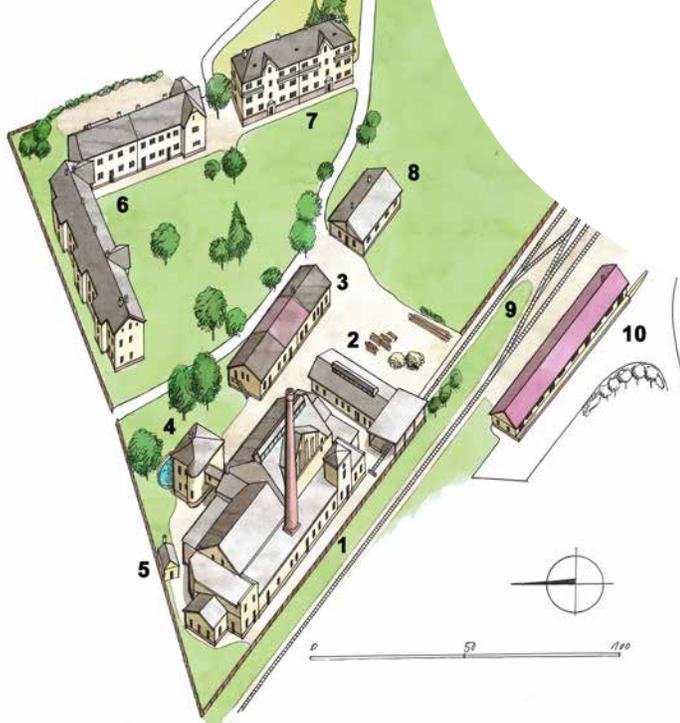


Kamenický Šenov,
glassworks complex,
house No. 129,
view from the south.
Photo: Jiří Vidman 2020.



Kamenický Šenov,
glassworks complex,
house No. 129, view from
the southwest.
Photo: Jiří Vidman 2020.





Kamenický Šenov,
glassworks complex,
house No. 129,
reconstruction of the
situation as of 1945,
view from the northwest.
Drawing: Jaroslav Staněk
2021.

the form works. A new grinding mill with package and storage facilities and a work hall housing a cracking-off machine, a cutting lathe bench and four grinding benches with the respective transmissions was built in 1906.¹⁹ One of the first major post-war investments was the construction of another worker house, No. 732 and 731. A modernization and extension of half of the glassworks hall following plans by W. Lang & Co. of Podmokly (Děčín) took place in 1926. The hall's supporting steel structure was designed by the Teplice machine works (Teplitzer Maschinenfabriks A. G. Teplitz-Schönau). The glassworks was the first in the region to be connected to long-distance gas in 1943. A new melting furnace was installed in the nationalized glassworks in 1950; the production of utility glass was replaced by optical glass. Reconstruction for the production of welding filters with new technological facilities and a tank aggregate was carried out in 1974. The glassworks remains in operation after the privatization, producing the same assortment.²⁰

The Adolf Rückl glassworks together with the adjacent worker houses, the neighbouring Braňi Jílkové glassworks and a railway station form one of the most valuable industrial complexes in the Bor – Šenov area. Regrettably, the distinctive panorama of the buildings and complexes in the lower northern part of the town was suppressed in connection with the construction of the glassmaking combined plant, national company Lustry. Despite continuous modernizations and building adaptations, the glasshouse itself is very well preserved and remains in operation. The core of the building including the smokestack comes from the first building phase in 1885; it was adapted into the current mass in 1926. The steel roof structure comes from that year as well. The worker houses, the office building and, basically, also the more considerably adapted buildings of the grinding mill and coal and grog warehouse are valuable as well.

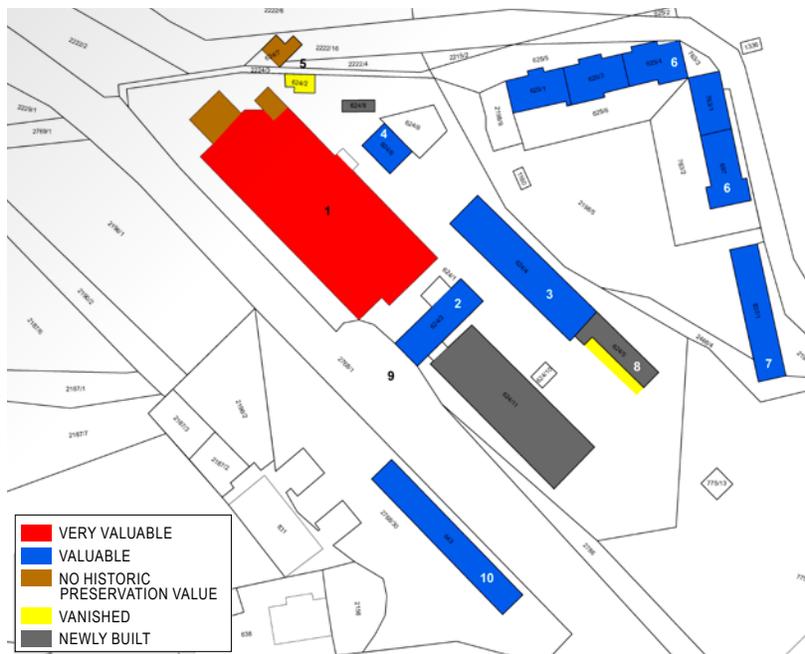
19 SOKA Č. Lípa, AM K. Šenov, Inv. No. 1187, carton 13. SOKA Děčín, OÚ Děčín, Inv. No. 160, sign. 11 44/565, sign. 11 44/904, 11 44/1086, Inv. No. 161, sign. 11 44/1521. Kamenický Šenov Building Authority, Building Archives, file of house No. 129. GRISA 2017, pp. 176–177, 182–183. FAHDT 1907, p. 59.

20 SOKA Děčín, OÚ Děčín, Inv. No. 1836, sign. 11 44/458. Kamenický Šenov Building Authority, Building Archives, file of house No. 129. ARNOŠT – DVOŘÁK – KARPÍŠKOVÁ – KIRSCH – MARTÍNEK – ŠTROJSA 1996, pp. 6–7. SACHER 1968, p. 122. BERAN – VALCHAŘOVÁ 2007, p. 21.

Kamenický Šenov,
glassworks complex,
house No. 129, building
-history assessment.
Vladimír Vrabec, 2022.
Map base © Czech Office
for Surveying,
Mapping and Cadastre.



Kamenický Šenov,
glassworks complex,
house No. 129, historic
preservation assessment.
Vladimír Vrabec, 2022.
Map base © Czech Office
for Surveying,
Mapping and Cadastre.



- 1 glassworks hall, annexes with smokestack, 1885–1886, reconstruction and extension 1926, annexe adaptations 1890, 1893, 1902
- 2 coal and grog storage, 1900, extension 1926
- 3 glass grinding works, 1906, adaptations 1910, extension 1926
- 4 office building, house No. 765, 1926
- 5 south: old gatehouse, 1885–1886; north: new gatehouse, after 1945

- 6 worker houses No. 565, 1006, 1007, 672 and 630, 1885–1886
- 7 worker houses No. 731, 732, 1920
- 8 warehouse, 1885–1886, replaced by a new building after 1945
- 9 industrial railway, 1885–1886
- 10 railway station warehouse, 1885–1886



Skalice, glassworks complex, house No. 416, view from the west; front, from the left: crate storage, barn, storages, grinding works, glassworks hall; in the background: residential house No. 415. Photo: Jiří Vidman 2020.

No. 416, 415, 435, 571 Skalice u České Lípy – Anton Rückl & Söhne glassworks

The glassworks was founded in a favourable place, near the Bakov nad Jizerou – Rumburk railway put into operation early in 1869, by Anton Rückl in 1893. The earliest sources list a single furnace, apparently of the Siemens-Siebert system, two cracking-off machines and twenty-two grinding benches in the glassworks hall.²¹ Single-storey masonry residential house No. 415 was built concurrently with the glassworks, and a gatehouse two years later. An address book from 1907 already lists two Siemens-Siebert furnaces with eighteen pots, sixteen grinding machines driven by 12 HP engines and finishing works with an engraving, painting and gilding workshop for the Skalice-based glassworks.²² More operating facilities were built in the complex between 1900 and 1906. The main one was a producer station on the other side of the industrial railway opposite the smokestack. The building was later repeatedly adapted and coal warehouses were added from both sides. Another new building was a two-storey grinding works with an engine room, storage and dispatch facilities adjacent to the glasshouse from the west. The courtyard was enclosed from the north near the road by an office building, No. 435, and a semi-finished product warehouse with dispatch facilities. A smaller barn (warehouse) stood near the industrial railway, while another large storage building was at the end of the industrial railway. In 1913, a new barn was built in the place of a burnt building on the northwestern edge of the premises. A form warehouse was added near the road in 1914.²³

21 SOkA Česká Lípa, AM Skalice, Inv. No. 39, carton 8V, municipal chronicle (part II), p. 257; Inv. No. 43, carton 9V, municipal chronicle (part V – pictorial supplements); Inv. No. 98, carton 15, building files 1873–1910. Plans are preserved only for later additions and adaptations that were, with a few exceptions, designed by local builder Gottfried Liebisch. See also SACHER 1968, p. 121. GELNAR 1996, p. 54. HANTSCHL 1911, pp. 250, 967.

22 FAHDT 1907, p. 60. GRISA 2017, pp. 176–177, 182–183.

23 SOkA Česká Lípa, AM Skalice, Inv. No. 98, carton 15, building files 1873–1910; Inv. No. 98, carton 16, building files 1911–1918.



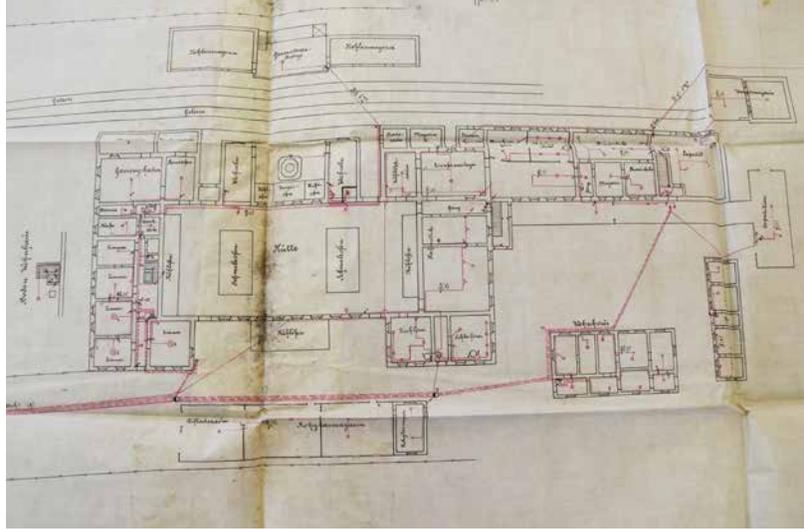
Skalice, glassworks complex, house No. 416, view from the south (c. 1900), glassworks hall with a smokestack and an earlier producer station; right: mixing chamber annexe. SOkA Česká Lípa, AO Skalice, Inv. No. 43, carton 9V, municipal chronicle (part V).

In 1920, one of the pot melting furnaces was replaced by a day tank; the other furnace had eight pots. More machinery in the grinding mill and the finishing works was driven by four electric motors with 18 HP. A 20 HP petrol engine was ready as a standby source. More medical glass and Jablonec goods (bangles) appeared in the assortment. More buildings were added near the end of the industrial railway next to the grinding works. Large warehouses were built there in 1926–1927. Guardhouse, No. 498, and a crate warehouse near the barn were built at the same time, along with the addition of an office building or a small annexe to the glassworks hall. In 1940, the circumference of the glassworks hall on the northeastern side was levelled off by the addition of a tempering furnace room. The glassworks hall reportedly got a new roof structure and roof in the following year. After the nationalization, the production reoriented above all to illumination glass. However, this programme was cancelled as early as 1948 and replaced by the production of semi-optical glass and later by machine production of pressed spectacle glasses. This assortment remained also after the glassworks was restituted to the descendants of the Rückl family after 1989. The operation ended in 2001.²⁴

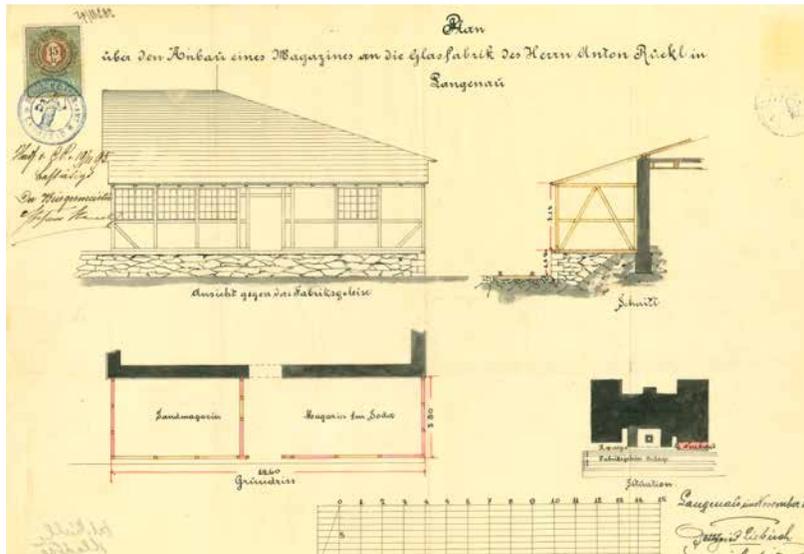
Anton Rückl in Skalice is one of the larger glassworks in the Bor – Šenov area. Its typical characteristic is a location linked to the nearby railway station. The glassworks hall with its annexes, a producer station with coal warehouses, the end of the industrial railway followed by the grinding works, finishing works and extensive warehouses have undergone numerous reconstructions and adaptations in the second half of the 20th century. A smaller part of the buildings vanished; this applies above all to the energy background (smokestack, producer station). The remaining buildings are rather well preserved in their mass, but their authenticity has been erased by adaptations. The glassworks hall with the grinding works and the earliest core of the office building No. 435 are relatively best preserved. Another positive is the very good preservation of the whole complex including the operating background with numerous storage buildings, guardhouse No. 498, residential house No. 415 and gatehouse. The overall form of the complex is partially disturbed by modern hall buildings.

24 SOkA Česká Lípa, AM Skalice, Inv. No. 39, carton 8 V, municipal chronicle (part II), p. 257; Inv. No. 155, carton 16–19, building files 1919–1938. SACHER 1968, p. 121. BERAN – VALCHAŘOVÁ 2007, p. 28.

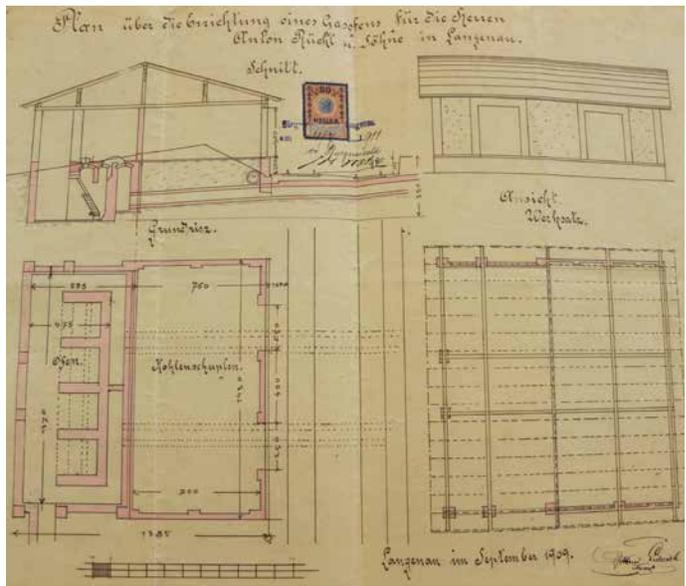
Skalice, glassworks complex, house No. 416, plan of the electrification (1913); centre: glassworks hall; annexes from the left: mixing chamber, sand storage, smokestack; right: iron form storage, pot room, joiner workshop and grinding works; in the subsequent wing: engine room, cracking-off facility or dispatch facilities. SOkA Česká Lípa, AO Skalice, Inv. No. 98, carton 16.



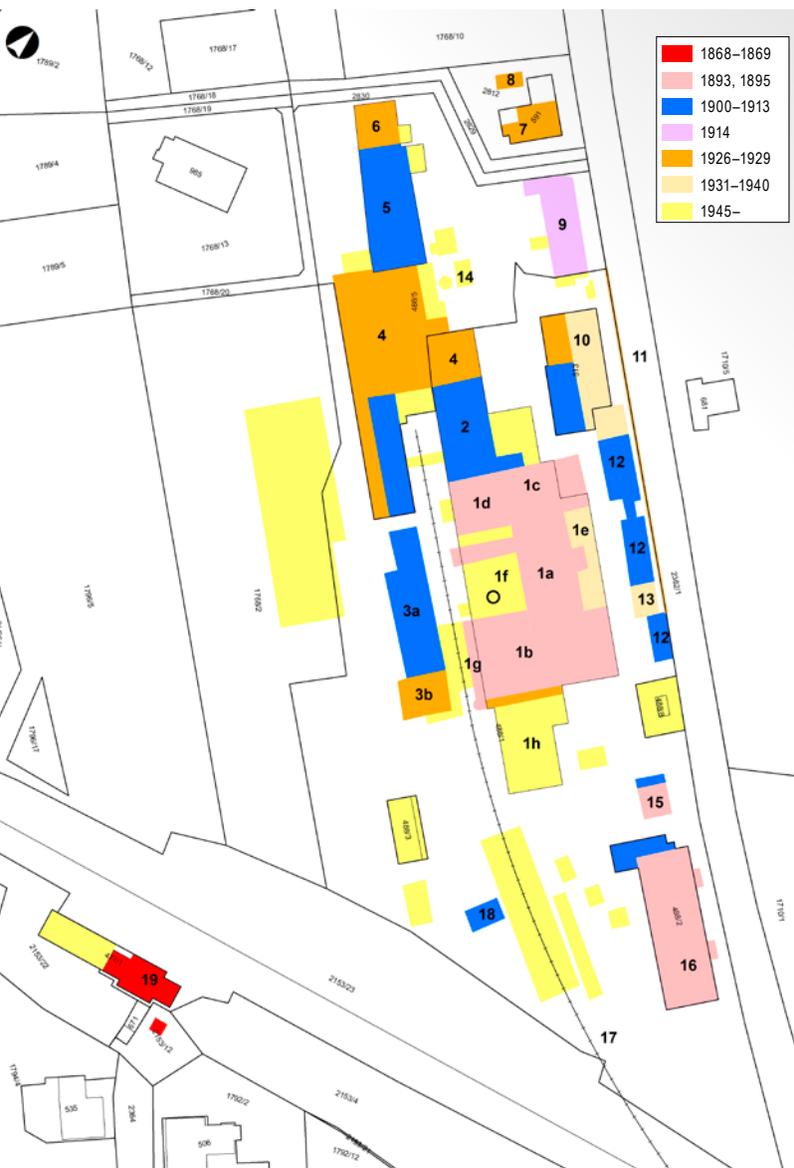
Skalice, glassworks complex, house No. 416, plan of the addition of sand and soda storage and with a half-timbered construction (1895), attached to the mixing chamber. SOkA Česká Lípa, AO Skalice, Inv. No. 98, carton 15.



Skalice, glassworks complex, house No. 416, plan of a new producer station with a coal shed (1909); it was built on the southwestern side of the industrial railway opposite the glassworks hall. SOkA Česká Lípa, AO Skalice, Inv. No. 98, carton 15.

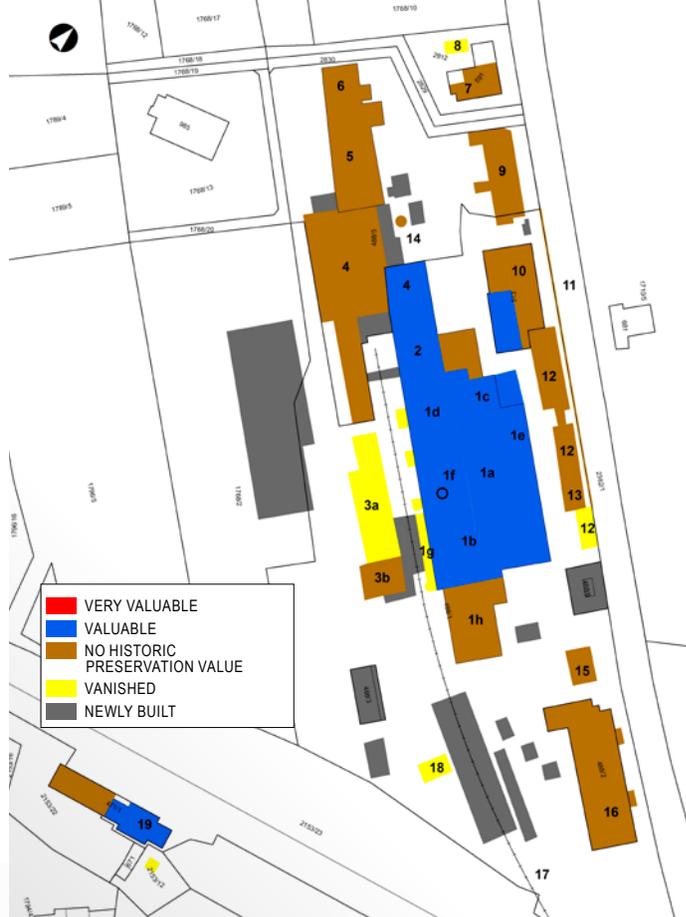


- 1a glassworks hall, 1893; numerous reconstructions, especially after 1945
- 1b mixing chamber, 1893; annexe 1927
- 1c pot room, 1893
- 1d iron form storage, 1893
- 1e tempering furnace room, 1940
- 1f smokestack and old producer station, 1893
- 1g sand and soda storage annexe, 1895
- 1h annexe, after 1945
- 2 glass grinding works, 1900–1906
- 3a producer station, 1909
- 3b coal storage, 1929
- 4 storages, 1900–1913; extension 1926, 1927
- 5 barn, 1913
- 6 crate storage, 1927
- 7 guard house No. 498, 1926
- 8 shed, 1926
- 9 form storage, 1914
- 10 office building, house No. 435, 1900–1906; extension 1926–1927 and 1940
- 11 enclosure wall, 1933
- 12 storages, 1900–1906
- 13 garage, 1931
- 14 smokestack, after 1945
- 15 gatehouse, 1895; annexe 1900–1913
- 16 residential house No. 415, 1893; annexe 1900–1913
- 17 industrial railway, 1895
- 18 storages/barn, 1900–1906
- 19 railway station; dispatch building, house No. 397; lavatories, 1868–1869; annexe after 1945



Skalice, glassworks complex, house No. 416, building-history assessment. Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.

Skalice, glassworks complex, house No. 416, historic preservation assessment. Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.



Skalice, glassworks complex, house No. 416, reconstruction of the situation as of 1945, view from the south. Drawing: Jaroslav Staněk 2021.



Kamenický Šenov, glassworks complex, house No. 687, view from the south; right: old glassworks hall with annexes and a smokestack; left: later glassworks hall; bottom left: railway station; top left: Adolf Rückl glassworks complex. Photo: Jiří Vidman 2020.

No. 687 Kamenický Šenov – Jílek & Vetter, Bratři Jílkové glassworks

Václav Jílek and Franz Vetter founded new Jílek & Vetter glassworks in close proximity to the earlier Adolf Rückl glassworks and the dispatch building of the railway station, from which an industrial railway was built. The building permit, the construction itself and the final approval all took place during 1905; the complex was ceremonially consecrated on 23 September 1905. The glassworks was built according to plans by Franz Eschler of Česká Kamenice. In the middle of a square glassworks hall stood a ten-pot Siemens-Siebert melting furnace. The furnace, heated by coal producer gas, was built by the renowned Heinrich Hopf company from Plössberg, Bavaria. Five cooling furnaces were also located in the glassworks hall. The producer station stood to the southwest of it, in the direction of the railway. Waste gas draw-off was secured by a nearby 32.5 m high smokestack that was built by the well-known chimney company Ant. Dvořák & K. Fischer, Letky near Libšice nad Vltavou (present-day Libčice nad Vltavou) according to its own plans. The pot room contained a sand drying furnace and two tempering (pot pre-heating) furnaces.²⁵ The first phase of the glassworks construction also included the office buildings, the toilets and worker house No. 688. The first minor adaptation took place as early as 1906 – the addition of a 1 HP electric motor that propelled a lathe to the equipment of the joiner workshop. The next one was the southeastern annex to the packaging works with a form warehouse and grinding works.²⁶ An important change was Anton Vetter's withdrawal from the company in 1914, which was subsequently renamed Bratři Jílek/Bratři Jílkové. More construction works are only registered as of 1921 when the pot room was extended and worker house No. 734 and 735 built.

25 JECH 1965. H AIS 2015, pp. 201–209. SOKA Děčín, OÚ Děčín, Inv. No. 399, sign. 11-37/414, carton 318.

26 SOKA Děčín, OÚ Děčín, Inv. No. 399, sign. 11-37/430, carton 318; Inv. No. 399, sign. 11-37/452, carton 318.

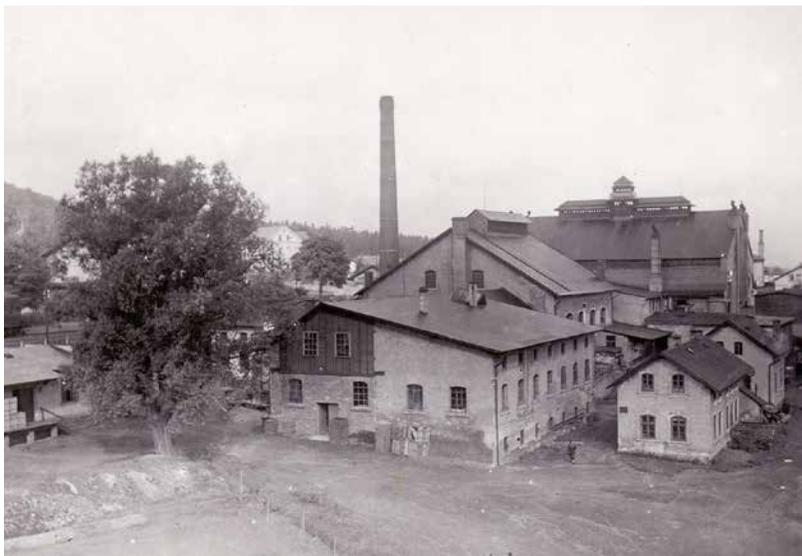
Kamenický Šenov,
glassworks complex,
house No. 687;
view of the roof structure
interior of the later
glassworks hall in the
direction of the
southwest wall.
Photo: author, 2019.



Kamenický Šenov,
glassworks complex,
house No. 687; view from
the northwest (1922)
of the construction of a new
glassworks hall; in front
of it, an almost completed
annexe with storage,
dispatch facilities and
cracking-off facility; in the
rear: old glassworks hall
with a smokestack.
SOKA Děčín, Photograph
Collection, Inv. No. 876.



Kamenický Šenov,
glassworks complex, house
No. 687; view from the
southeast (1941); front:
grinding works and
storages; behind them,
old glassworks hall with
annexes; right: office
buildings; left: painting
works and export storage.
Pavel Čech's collection.





Kamenický Šenov,
glassworks complex,
house No. 687, building
-history assessment.
Vladimír Vrabec, 2022.
Map base © Czech Office
for Surveying, Mapping
and Cadastre.

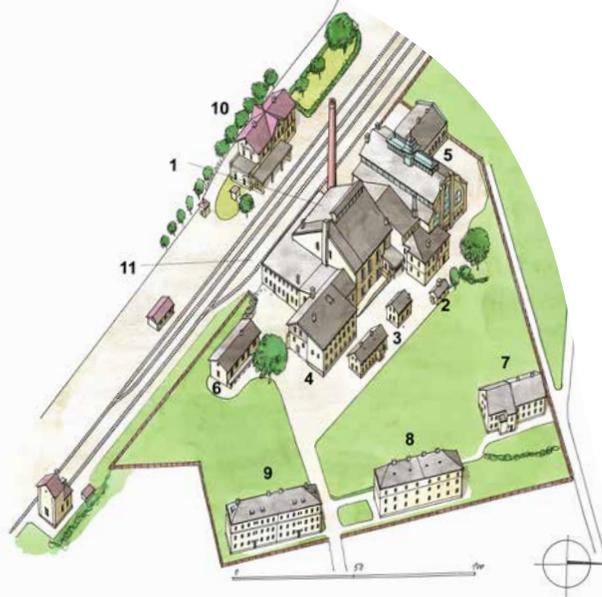


Kamenický Šenov,
glassworks complex,
house No. 687, historic
preservation assessment.
Vladimír Vrabec, 2022.
Map base © Czech Office
for Surveying, Mapping
and Cadastre.

- 1 old glassworks hall, annexes with smokestack, 1905, reconstruction 1922–1924 and after 1945
- 2 lavatories, 1905
- 3 office buildings, 1905
- 4 grinding works, storages and packaging room, 1906
- 5 new glassworks hall, annexes, 1922–1924
- 6 painting works and export storage, 1935

- 7 worker house No. 688, 1905
- 8 worker houses No. 760, 761, 1926
- 9 worker houses No. 734, 735, 1921
- 10 railway station, dispatch building, house No. 575, 1885–1886, annexe 1923, engine shed, waterworks and well, 1885–1886, annexe 1903
- 11 industrial railway, 1905

Kamenický Šenov,
glassworks complex,
house No. 687, reconstruction
of the situation as of 1945,
view from the south.
Drawing: Jaroslav Staněk
2021.

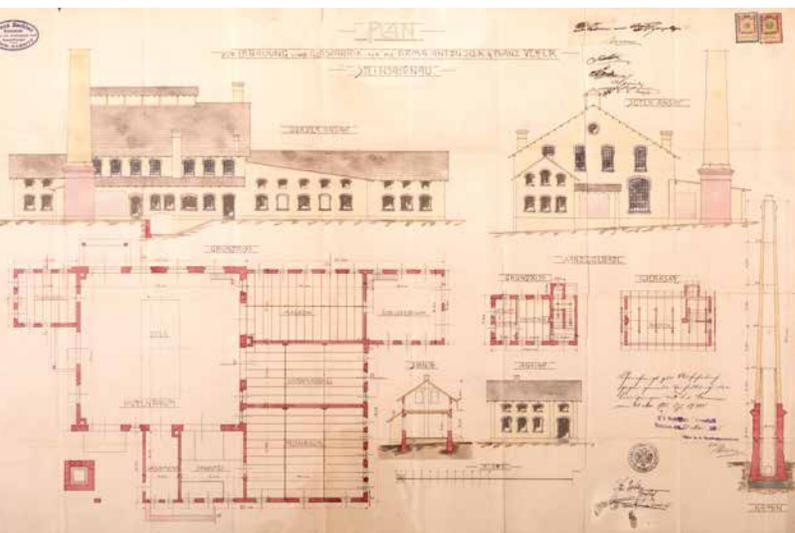


A quite fundamental reconstruction of the glassworks and the construction of a new glassworks hall was designed and for a larger part implemented in 1922. The crisis and minor official delays postponed the final approval of the construction until 3 March 1924 and the launch of the production until 8 September 1924. The reconstruction was designed once again by builder Franz Eschler, this time together with Max Eschler; the roof truss was designed by the Adolf Renger machine works and foundry from Česká Kamenice. A twelve-pot melting furnace stood in the middle of the hall. Six cooling furnaces were situated along the shorter walls, with draw-off into two smokestacks that formed distinctive structuring elements of the gable façades.²⁷ The last fundamental addition to the glassworks complex was the construction of the third worker house, No. 760 and 761, designed by V. Nekvasil office from Prague – Karlín. Glass furnace producers were rebuilt in 1931. Older stepped grates of the Siemens system were replaced by new revolving hollow cylindrical grates of the Sauvageot system designed by Škoda Plzeň (Hradec Králové gas branch, Ing. Zacharov, Zinduš). Connecting the glassworks to long-distance gas from Záluží near Litvínov was discussed at the end of the war.²⁸

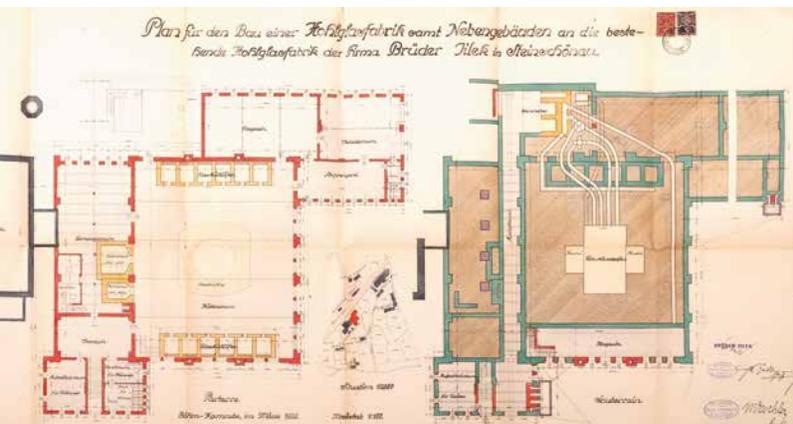
From the architectural, construction and authenticity perspectives, the new glasshouse from 1922 represents the most valuable glassworks hall building in the entire Bor – Šenov area. The structural elements and building design details used there are very unique in the context of other glassworks complexes. The existing technological installations, albeit modern, roughly represent the original layout and conception of the glassworks hall. It is especially thanks to this part that the whole complex has the potential to be declared a cultural monument. Worker houses No. 734, 735, 760 and 761, well preserved in mass and partially also in appearance, form an inseparable part of the historic preservation value of the whole complex. Later adaptations did not considerably interfere with the concept of the complex. Another undoubted value of the glassworks is represented by its link to the very well preserved railway station Kamenický Šenov with regular museum operation. Together, they form a remarkable glass industry unit in the lower part of Kamenický Šenov. A great asset of the whole locality is that both local glassworks remain in operation, which adds to its genius loci.

27 SOKA Děčín, OÚ Děčín, Inv. No. 1904, sign. 11-37/84, carton 1260; Inv. No. 1904, sign. 11-37/101, carton 1260. Kamenický Šenov Building Authority, Building Archives, file of house No. 687. HAIS 2015, pp. 201–209.

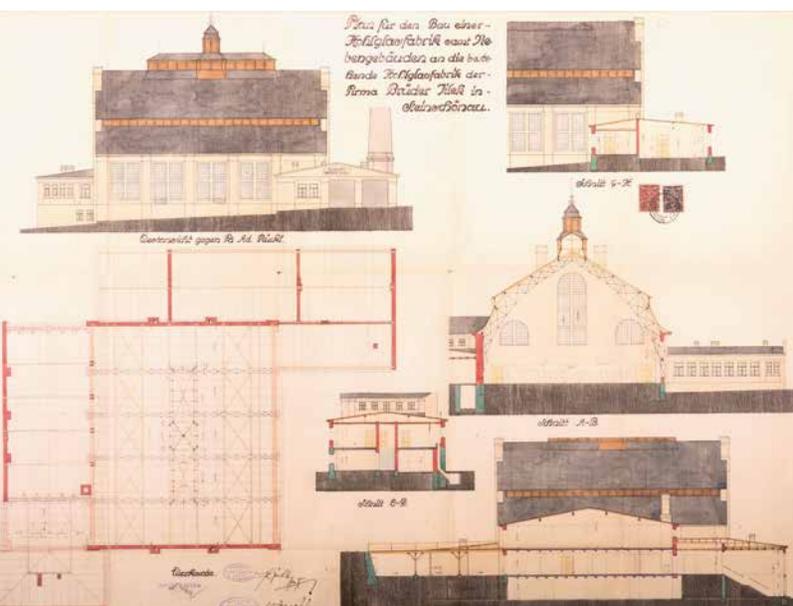
28 SOKA Děčín, OÚ Děčín, Inv. No. 741, sign. 15-J/635, carton 829. Kamenický Šenov Building Authority, Building Archives, file of house No. 687. HAIS 2015, pp. 201–209. JECH 1965.



Kamenický Šenov, glassworks, house No. 687; plan for the construction of the earlier glassworks hall (1905, Franz Eschler); top left: view from the railway; right: view from the northwest; bottom left: floor plan of the glassworks hall with annexes and a smokestack; bottom right: office building and smokestack section. SOKA Děčín, OÚ Děčín, Inv. No. 399, sign. 11 37/414, carton 318.



Kamenický Šenov, glassworks complex, house No. 687; plan for new glassworks hall (1922, Franz Eschler, Max Eschler); left: ground floor plan (hall with storage, dispatch facilities, cracking-off facility, mixing chamber and sand storage annexes); right: basement floor plan (channels from producer to melting furnace); centre: layout. SOKA Děčín, OÚ Děčín, Inv. No. 1904, sign. 11-37/101, carton 1260.



Kamenický Šenov, glassworks complex, house No. 687; plan for new glassworks hall (1922, Franz Eschler, Max Eschler); top left: view of the northwest façade; bottom: roof structure floor plan; left: sections through glassworks hall and annexes. SOKA Děčín, OÚ Děčín, Inv. No. 1904, sign. 11-37/101, carton 1260.



Polevsko, Klarahütte glassworks, house No. 175; view of the complex from the northeast; centre: glassworks hall with annexes from the second half of the 20th century; right: office and administrative buildings after modern reconstruction. Photo: Jiří Vidman 2021.

No. 175 Polevsko – Klarahütte, Karl Mühlbauer, Franz Vater, Sklářské družstvo Rudihut' glassworks

The glassworks was built by Karl Mühlbauer in 1907. From 1891, he had worked as the manager of Augustahütte in neighbouring Falknov and from 1900, as the manager and technical director of earlier glassworks in Polevsko, Annahütte, which was situated not far to the north. Klarahütte had an eight-pot melting furnace with direct coal heating, a very archaic system in its time; it retained it the longest of the whole Bor – Šenov area, until 1925. The owner built worker houses No. 174 and 180 north of the glassworks for the employees. In 1928, the new owner, Franz Vater, rebuilt the melting furnace to a twelve-pot one of the Siemens-Siebert system heated by producer gas from two Siemens shaft producers with an inclined grate. The producer station with a smokestack stood near the southeast corner of the hall. The glassworks' operation was discontinued in the early 1930s due to the economic crisis. The production was restored by the glassmaking cooperative Rudihut', which bought it in 1934. The Hantschel & Schiffner company acquired the glassworks and maintained production until the end of 1944.²⁹

Members of the glassmaking cooperative got the glassworks back into their possession and resumed operation in 1945, but the complex was nationalized four years later. The melting furnace was torn down in 1951/1952 and replaced by a regenerative continuous tank furnace heated with producer gas. Long-distance gas was already used to heat a conveyor cooling furnace; in 1956, it was installed also for a new regenerative continuous two-space tank melting furnace. The roof of the glassworks hall was hit by fire in 1964, but the consequences were removed quickly. In the

29 SOKA Č. Lípa, OÚ Polevsko, Inv. No. 2, carton IV, municipal chronicle 1837–1945, p. 255 GRISA 2017, pp. 174–175, 182–183. HAIS 2017a, pp. 199–200. HAIS 2021, pp. 9–10.



Polevsko, Klarahütte glassworks, house No. 175, building-history assessment. Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.

- 1a glassworks hall, 1907, melting furnace reconstruction and new producer gas heating 1928, reconstructions after 1945
- 1b glassworks hall smokestack, 1907, reconstruction 1928
- 1c glassworks hall annexes – mixing chamber, pot room, cracking-off facility, 1907, newly built after 1945
- 2 office and administrative buildings, 1930s



Polevsko, Klarahütte glassworks, house No. 175; view into the glassworks hall roof structure with a ventilation extension in the ridge. Photo Martin Ouhrabka 2012.

same year, a small glassworks hall with a fully electric melting tank furnace was established in the place of the producer station (experimental operation for the Crystalex glassmaking combined plant in Nový Bor that was under construction). In 1968, the glassworks was taken over by the State Glass and Ceramics Mechanization Research Institute in Prague and in 1980/1981, by the State Glassmaking Research Institute in Hradec Králové. An overall reconstruction of the complex took place in 1971; from that time, it was used to test various glassmaking facilities. The glassworks was privatized in the early 1990s (1991) and remains in operation.³⁰

Despite the numerous reconstructions within the complex, the glassworks hall with the original wooden purlin roof structure is relatively well preserved. A gas-heated six-pot melting furnace is situated in the interior. Modern annexes with a broader layout are situated in the place of the original mixing chamber, pot room and warehouses. The complex is as a cultural monument which, however, rather reflects the historical context of the development of the complex and the functioning of the glassmaking cooperative Rudihuť. The annexes to the glasshouse and the adjoining administrative building with a gatehouse above all are the result of utilitarian modern adaptations. Only the glassworks hall has thus retained a historic preservation value. Another negative is the absence of the smokestack and the adjacent producer station.



Polevsko, view of the lower edge of the municipality on the boundary with Horní Arnultovice from the southeast; centre: Annahütte glassworks; leftmost: Klarahütte, house No. 175; the photograph shows the glassworks hall with a smokestack; the adjacent single pitched roof covered the producer station; left: annexes (mixing chamber, pot room). Česká Lípa National History Museum and Gallery, photograph collection, Inv. No. ND 8179.

30 HAIS 2017a, pp. 199–208, 213. JINDRA – KOMŮRKA 2006b, p. 157. JINDRA – KOMŮRKA 2006a, pp. 45 and 100.



Prácheň, Štěpán Hrdina glassworks complex, house No. 178; view from the east, front: glassworks hall torso with a smokestack and annexes; left of it, modern production buildings; further left, near the main road, worker houses. Photo: Jiří Vidman 2021.

No. 178 Prácheň – Štěpán Hrdina glassworks

Štěpán Hrdina built the glassworks in 1907–1908. He came to the Bor – Šenov area from Preitenstein, Plzeň region. From 1885, he worked first as a form master in the Adolf Rückl glassworks in Kamenický Šenov. He left in 1905 and operated Augustahütte in Falknov under the firm Štěpán Hrdina & Co. He built a new glassworks in Šelty in the place of a syderlit (lacquered earthenware) goods factory, which burnt down in 1905 and was subsequently rebuilt into a worker house (No. 180). The building permit for the glassworks construction was issued on 14 August 1907 and the operation began on 12 October 1908. The glassworks was one of the first in the region to focus also on the production of finished products, making use of its own grinding works. More finishing techniques were contracted from local home craftsmen. The glassworks hall housed a twelve-pot melting furnace of the Siemens-Siebert system heated by Siemens brown coal gasification shaft producers. Grinding mill machines were driven by a 6 HP petrol engine of the Vienna-based Langen & Wolf company. The 30-metre smokestack with an upper clear width of 1 m was built by the Ant. Dvořák & K. Fischer chimney company from Letky near Libšice nad Vltavou.³¹

The two-wing office and residential building No. 181 and, to the east, the owner's villa, No. 176 and 177, came into existence soon after the glassworks was completed and put into operation, probably around 1910. The glassworks was rebuilt and extended as early as 1913. Plans by Adolf Richter of Kamenický Šenov laid out the addition of a grinding works following an earlier cracking-off/grinding facility and an adaptation of the producer station. The machinery equipment consisted of twenty-two grinding benches, a stopper machine, a cutting lathe and a cracking-off machine, all driven by a 60 HP traction engine.³² Worker houses No. 183–186 were built in 1923–1925. Modernizations of the operation in the late 1920s and early 1930s took place in cooperation with Dr

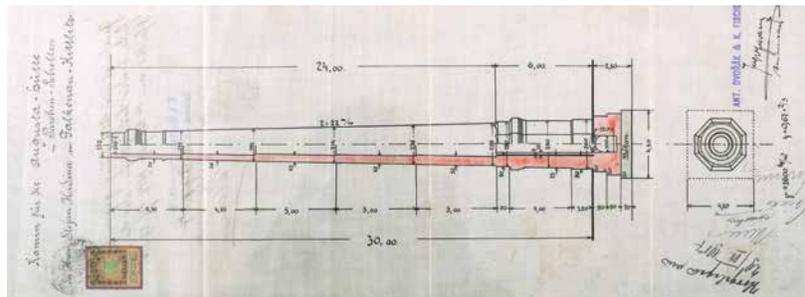
31 SOKA Děčín, OÚ Děčín, Inv. No. 161, sign. 11 36/2130. HAIS 2016, pp. 157–158.

32 SOKA Děčín, OÚ Děčín, Inv. No. 161, sign. 11 36/2130 and 11 36/2970.

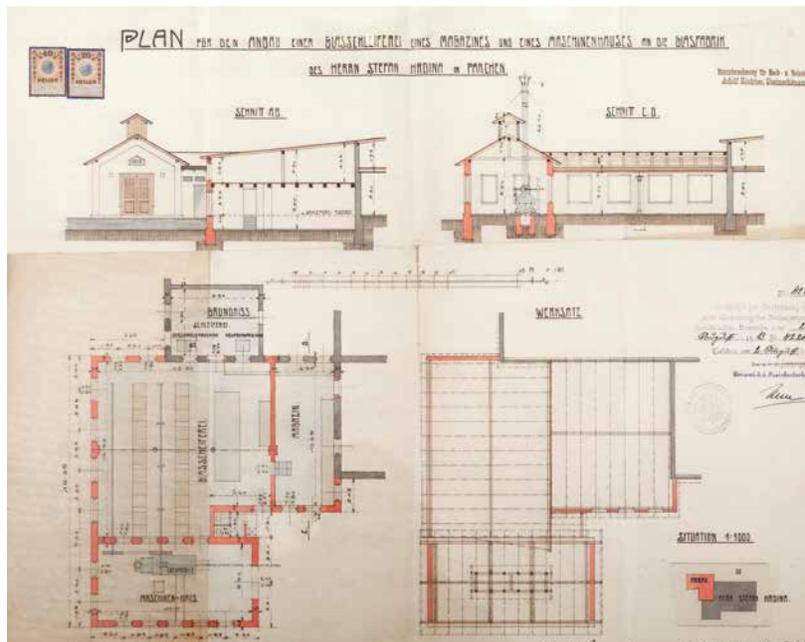
Prácheň, Štěpán Hrdina glassworks complex, house No. 178; view of the southeast façade of the new glassworks (1907, Franz Eschler, Česká Kamenice). SOKA Děčín, OÚ Děčín, Inv. No. 161, sign. 11 36/2130.



Prácheň, Štěpán Hrdina glassworks complex, house No. 178; detailed plan of smokestack construction (1907, Ant. Dvořák & K. Fischer, Libčice nad Vltavou). SOKA Děčín, OÚ Děčín, Inv. No. 161, sign. 11 36/2130.



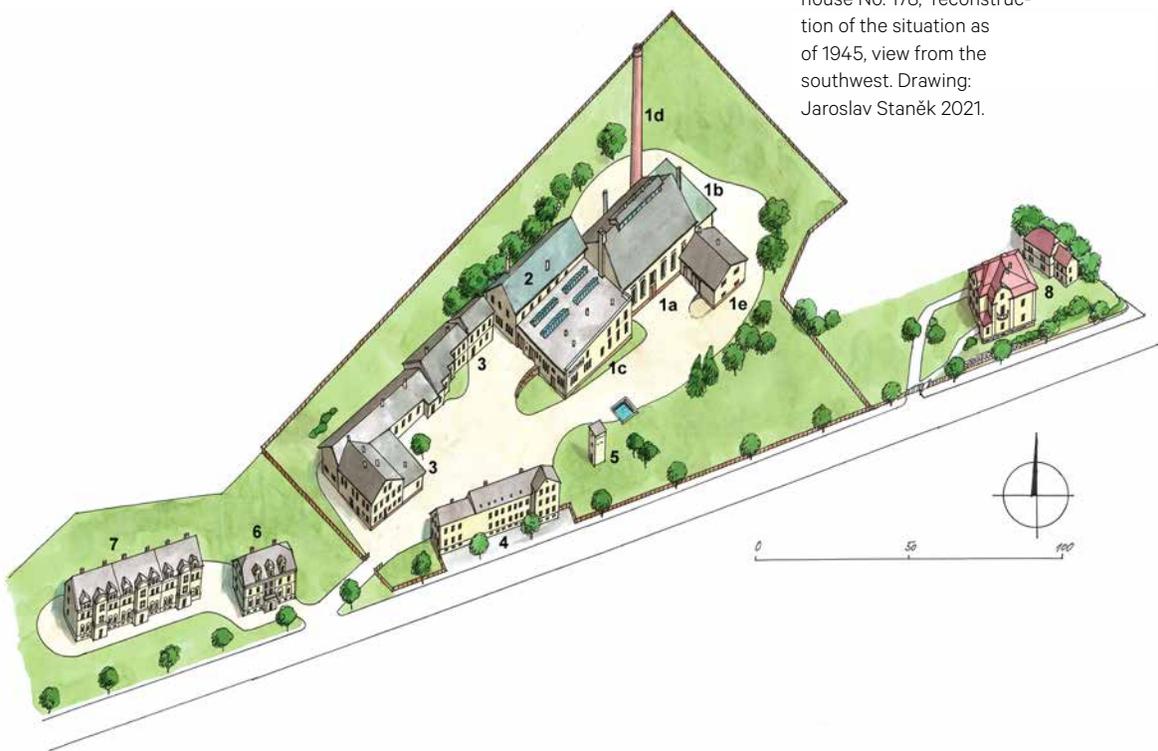
Prácheň, Štěpán Hrdina glassworks complex, house No. 178; plan of the addition of a grinding works (1913, Adolf Richter, Kamenický Šenov); a storage, sanitary facilities and an engine room were to be attached to the grinding works. SOKA Děčín, OÚ Děčín, Inv. No. 161, sign. 11 36/2130.





Prácheň, Štěpán Hrdina glassworks complex, house No. 178; view of the glassworks hall torso from the southeast. Photo: author, 2021.

The most valuable part of the glassworks is the torso of the glassworks hall with the smokestack. Regrettably, the additions of the mixing chamber, pot room and other parts were rebuilt more considerably or replaced by new buildings. Only parts of the perimeter walls are standing of the grinding works that follows to the southwest. Other glassworks buildings, except for the transformer, vanished. The complex of one of the most progressive and best-equipped glassworks in the Bor – Šenov area is made complete by preserved worker houses No. 183, 184–186 and the villa, No. 176 and 177. Interior and industrial light fittings production operates in the complex, using a new industrial hall.

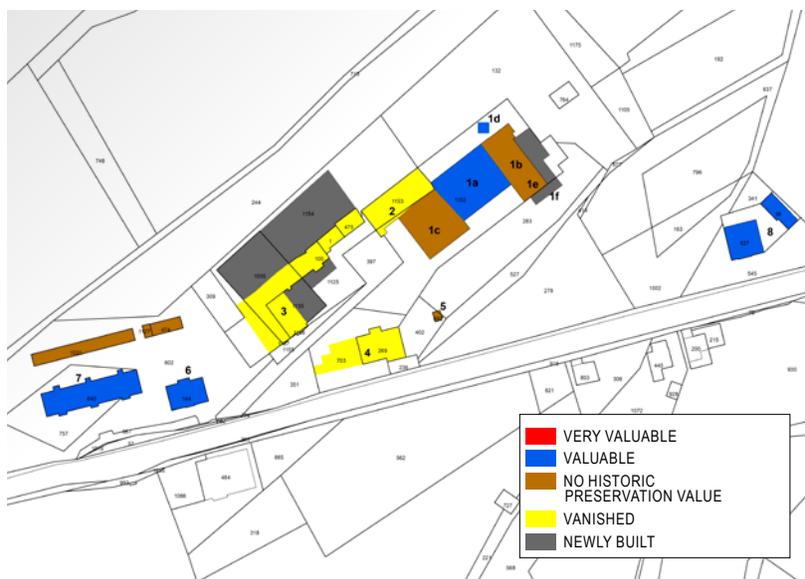


Prácheň, Štěpán Hrdina glassworks complex, house No. 178; reconstruction of the situation as of 1945, view from the southwest. Drawing: Jaroslav Staněk 2021.

Skalice, Štěpán Hrdina
glassworks complex,
house No. 178, building
-history assessment.
Vladimír Vrabec, 2022.
Map base © Czech Office
for Surveying, Mapping
and Cadastre.



Prácheň, Štěpán Hrdina
glassworks complex,
house No. 178, historic
preservation assessment.
Vladimír Vrabec, 2022.
Map base © Czech Office
for Surveying, Mapping
and Cadastre.



- 1a glassworks hall, 1907–1908
- 1b mixing chamber, pot room, 1907–1908
- 1c storages, dispatch facilities, vehicle shed, 1907–1908
- 1d smokestack, 1907–1908
- 1e producer station, 1907–1908, reconstruction 1913
- 1f glassworks hall annexes, after 1945
- 2 glass grinding works, cracking-off facility 1913

- 3 office and auxiliary buildings, house No. 181; c. 1910
- 4 worker house No. 180, rebuilt c. 1910 from a burnt down syderlit (lacquered earthenware) goods factory; after 1945, finishing and painting works
- 5 transformer, c. 1925
- 6 worker house No. 183, 1923
- 7 worker houses No. 184–186, 1925
- 8 villa, house No. 176 and 177, c. 1910



Nový Bor, Florahütte glassworks complex, house No. 399; view from the southwest; in the middle of the building, old glassworks hall, extended for a new hall to the left in 1965; on the right edge of the image, railway station. Photo: Jiří Vidman 2020.

No. 399 Nový Bor – Florahütte – Franz Ladisch, Glashüttenwerke W. Hantich & Co. glassworks

Bor's third glassworks, Florahütte, was built in 1912–1913. It was founded by Franz Ladisch, a former glass painter and the owner of a steam sawmill and a gilded moulding and frame factory in the neighbouring cadastral area of Arnultovice. The construction began in September 1912 and the operation started on 3 February 1913. The glassworks used a ten-pot Siemens-Siebert melting furnace heated with brown coal producer gas from two Siemens shaft producers with inclined grates. Furthermore, there were twelve chamber cooling furnaces and one twelve-pot tempering furnace, both heated by coal at first and later also by producer gas.³⁴ The First World War and economic crisis led to a reduction of production and, eventually, to the closure of the company as of 16 July 1931. Between 6 November 1933 and May 1934, the glassworks was operated by the Sklářské družstvo cooperative from Polevsko. Glashüttenwerke W. Hantich & Co. bought the company in 1935 and modernized and extended it. New diesel-driven small glory-hole furnaces were installed, along with form works machines, petrol cracking-off machines, water and electricity distribution. Finishing operations comprised of grinding and painting works, sanitary facilities and warehouse spaces were situated in a new building north of the glassworks hall. More adaptations of this building and the warehouses (sand storage and washer, crate storage) along the end of the industrial railway took place probably in the late 1930s (plans by Emil Hausmann and the Rösler & Glaser building office).³⁵

The nationalized company was connected to long-distance gas distribution in 1946. The complex burnt down on 7 September 1946, and the subsequent repair lasted until February 1947. The glassworks hall was raised by the addition of a parapet wall and got a new steel roof structure.

34 HAIS 2013a, pp. 258–259. Photographs from the collection of the Glass Museum Nový Bor.

35 Nový Bor Building Authority, Building Archives, file of house No. 399. HAIS 2013a, pp. 259–260. JINDRA – KOMŮRKA 2006b, p. 90.

Nový Bor, Florahütte glassworks, house No. 399; interior of the glassworks hall with a melting furnace in a drawing by Rudolf Görtler (1930s). Rudolf Hais's collection.



Nový Bor, Florahütte glassworks, house No. 399; view of the melting furnace heated by natural gas in the old glassworks hall, which has a new steel roof structure after reconstructions. Photo: author, 2018.

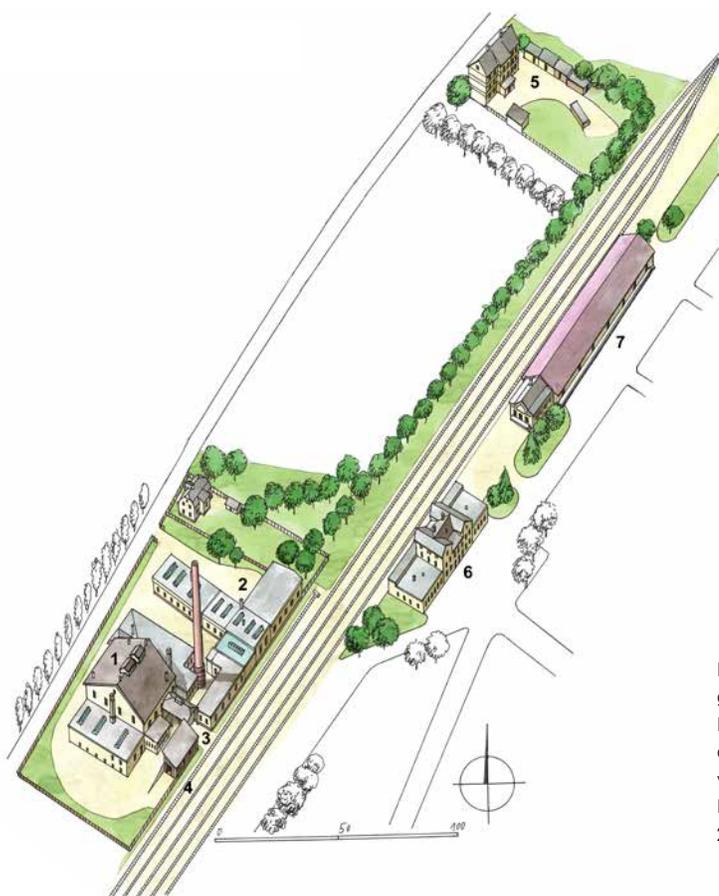


Nový Bor, Florahütte glassworks complex, house No. 399; grinding works with a detail of cutting lathes and the transmission system. Photo: author, 2018.



A newly built twelve-pot Siemens-Siebert melting furnace combined heating by producer gas and long-distance gas. The reconstruction concerned also the north building with glass refining operations, which got a new low-pitched gable roof. The first gas-heated conveyor cooling furnace was located in an interconnecting annexe that joined the glassworks hall and the north building in 1961. The operation of Siemens producers was discontinued at the same time. Another overall reconstruction took place in 1964 and 1965. A new glassworks hall with a six-pot high-flame furnace of the Jindra system was attached to the northwest perimeter of the old glassworks hall. The glassworks was operated by Egermann s. r. o. from privatization in 1993 until the end of operations in 2022.³⁶

Only the core of the glassworks hall, later rebuilt, without the roof structure and the roof itself, and the smokestack are preserved of the glassworks' buildings from 1912 and 1913. Other parts went through fundamental reconstructions in the 1930s and especially in the second half of the 20th century. The dominant mass of the glassworks hall was disturbed by the addition of the second glassworks hall in 1964 and 1965. Until recently, a positive feature was the continuation of operation that kept using the traditional type of a Siemens-Siebert pot melting furnace heated with natural gas and cracking-off and grinding machines from the second third of the 20th century.



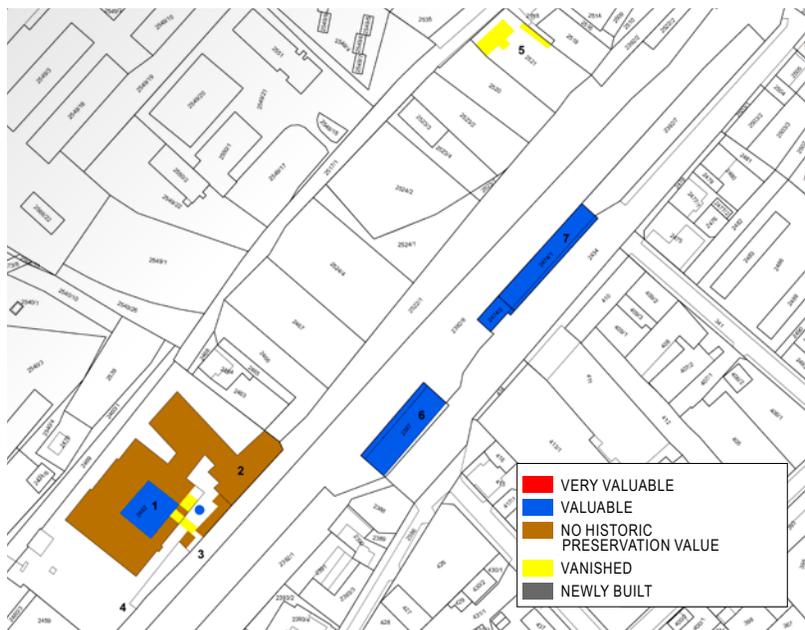
Nový Bor, Florahütte glassworks complex, house No. 399; reconstruction of the situation as of 1945, view from the south. Drawing: Jaroslav Staněk 2021.

36 H AIS 2013a, pp. 261–264.

Nový Bor, Florahütte
 glassworks complex, house
 No. 399, building-history
 assessment. Vladimír
 Vrabec, 2022.
 Map base © Czech
 Office for Surveying,
 Mapping and Cadastre.



Nový Bor, Florahütte
 glassworks complex, house
 No. 399, historic preserva-
 tion assessment.
 Vladimír Vrabec, 2022.
 Map base © Czech
 Office for Surveying,
 Mapping and Cadastre.



- 1 glassworks hall with annexes, producer station and smokestack, 1912–1913, annexe 1935, extension and new glassworks hall after 1945
- 2 grinding works and glass painting works, 1935, extension after 1945
- 3 sand storage, 1912–1913, coal storage 1935, rebuilt after 1945

- 4 industrial railway, 1912–1913
- 5 worker house and sheds, house No. 524, 1912–1913
- 6 railway station, dispatch building, house No. 228, 1868–1869, annexe and extension 1910
- 7 railway station, warehouse, 1868–1869, annexe and extension 1910



Nový Bor, Florahütte glassworks complex, house No. 399; view from the north; (probably 1920s); glassworks hall with a smokestack and annexes. Glass Museum Nový Bor.



Nový Bor, Florahütte glassworks complex, house No. 399; view from the southwest (probably 1920s); front: industrial railway from the adjacent railway station; next to it, coal storage; left: glassworks hall with an annexe (apparently mixing chamber and pot room); right in front of the smokestack: producer station with a ventilation extension in the roof. Glass Museum Nový Bor.



Nový Bor, Florahütte glassworks complex, house No. 399; view from the northwest (1946), glassworks hall and, on the left, finishing works building after a fire. Glass Museum Nový Bor.



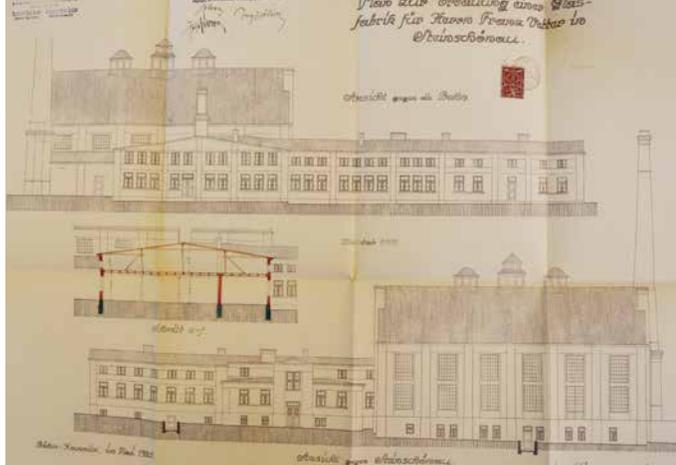
Kamenický Šenov, glassworks complex, house No. 970; view from the southwest; centre: glassworks hall; right: former railway station (rebuilt dispatch building and storage). Photo: Jiří Vidman 2020.

No. 744 Kamenický Šenov – Franz Vetter glassworks

The glassworks is situated in Tovární Street near the northeastern edge of the town. The complex is lined from the southeast by the vanished railway Kamenický Šenov – Česká Lípa that was put into operation in August 1903. The builder of the last glassworks in the Bor – Šenov area was Franz Vetter, the former partner in Jílek & Vetter. The project documentation was prepared by Franz Eschler and Max Eschler of Česká Kamenice, the plan of the smokestack by the Salfemeier & Schade company of Ústí nad Labem. The construction and final approval took place in 1925; the operation began in the following year. The glassworks was dominated by a rectangular glassworks hall with a gabled roof and a ventilation extension in the ridge. It was eventually built in the form of a wooden structure with a long small hipped roof, whereas the documentation planned for three extensions with oval roofs. In the middle of the glassworks hall stood a Siemens-Siebert melting furnace heated with producer gas; along the sides was a battery of cooling furnaces. Northwest of the glassworks, in Sklářská Street, the company built six worker houses No. 745–750. After nationalization in 1945, the company became part of the national company Borské sklárny. The operation ended around 1972, and the buildings were only used as storage spaces.³⁷

The mass layout of the glassworks hall and the annexes is preserved very well, but the vanished smokestack represents a significant flaw. The production building complex is partially disturbed by utilitarian modern additions and steel shacks along the perimeter of the plot. One of the most interesting worker colonies in the Bor – Šenov area is preserved relatively intact near the glassworks. On the contrary, the buildings of the adjacent railway station were considerably rebuilt and some vanished altogether.

37 SOKA Děčín, OÚ Děčín, Inv. No. 1836, sign. Kamnitz 11 50/34. *Adressbuch der Glas- und Keram-Industrie der Tschechoslowakei* 1926. RASOCHA 1989, pp. 58–59, 65–67, 71.



Kamenický Šenov,
glassworks, house No. 970;
views – top: southeast
façade; bottom: northwest
façade; centre: section of
the perpendicular wing
(1925, Franz Eschler, Max
Eschler, Česká Kamenice).
SOKA Děčín, OÚ Děčín,
Inv. No. 1836, sign. Kamnitz
11 50/34.



Kamenický Šenov,
glassworks, house No.
970; cross-section of the
glassworks hall; right: south-
western view of the annexes
(1925, Franz Eschler, Max
Eschler, Česká Kamenice).
SOKA Děčín, OÚ Děčín, Inv.
No. 1836, sign. Kamnitz 11
50/34.



Kamenický Šenov,
glassworks complex,
house No. 970, reconstruc-
tion of the situation as of
1945, view from the south.
Drawing: Jaroslav Staněk
2021.

Kamenický Šenov, glassworks complex, house No. 970, building-history assessment. Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.



Kamenický Šenov, glassworks complex, house No. 970, historic preservation assessment. Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.



- 1a glassworks hall, 1925, utilitarian annexes after 1945
- 1b pot room and mixing chamber annexe, 1925
- 1c smokestack and producer station, 1925
- 2 glass grinding works, cracking-off facility, storage, dispatch facilities, sanitary facilities, 1925, utilitarian annexes after 1945
- 3 worker houses No. 745–750, 1925

- 4a railway station dispatch building, house No. 667, 1902–1903
- 4b railway station storage, house No. 1020, 1902–1903
- 4c railway station lavatories, 1902–1903
- 4d railway station well, 1902–1903
- 4e railway station shed, 1902–1903
- 5 industrial railway, 1926



Kamenický Šenov,
glassworks complex, house
No. 970; view from the east;
front: perpendicular wing
with the grinding works and
dispatch facilities; behind it,
the glassworks hall;
left: annexe with the
mixing chamber,
pot room and smokestack.
Petr Joza's collection.



Kamenický Šenov,
glassworks complex,
house No. 970; top: view
from the northeast; right:
perpendicular wing with the
grinding works and dispatch
facilities; behind it, the
glassworks hall; left: railway
station; bottom: view of six
worker houses. Stanislav
Kopecký's collection.



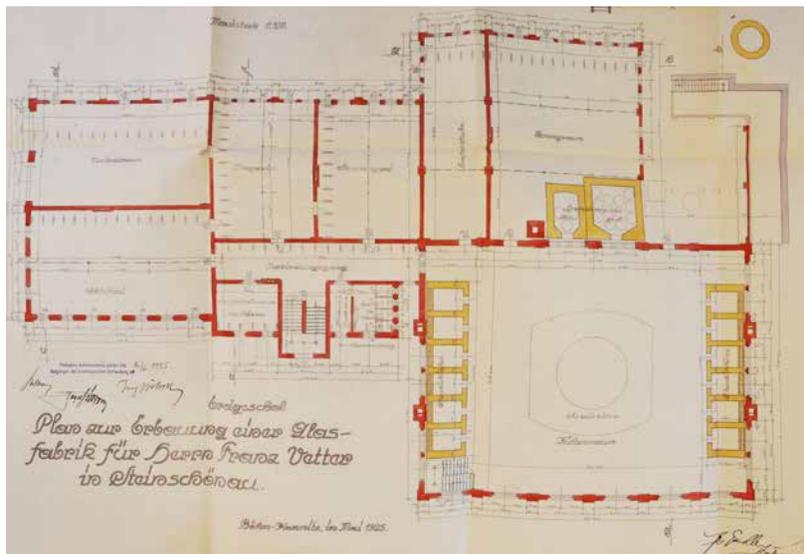
Kamenický Šenov,
glassworks complex,
house No. 970, view from
the east from Panská skála;
left: glassworks;
right: worker houses.
Petr Joza's collection.



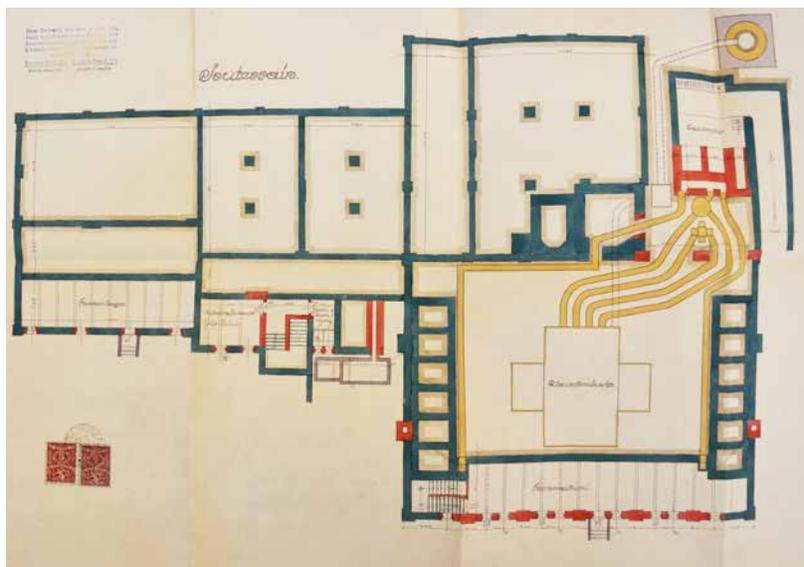
Kamenický Šenov, glassworks complex, house No. 970; layout plan of the location of the new glassworks and six worker houses (1925, Franz Eschler, Max Eschler, Česká Kamenice); top: railway station buildings. SOkA Děčín, OÚ Děčín, Inv. No. 1836, sign. Kamnitz 11 50/34.



Kamenický Šenov, glassworks, house No. 970; ground floor plan – right bottom: glassworks hall (melting furnace in the centre, six cooling furnaces along each side), followed upward by a producer station, smokestack, mixing chamber, pot room; left: perpendicular wing with a cracking-off facility, storage, dispatch facilities and grinding works (1925, Franz Eschler, Max Eschler, Česká Kamenice). SOkA Děčín, OÚ Děčín, Inv. No. 1836, sign. Kamnitz 11 50/34.



Kamenický Šenov, glassworks, house No. 970; basement floor plan – right bottom: form works and glassworks hall; top: producer station and chimney; channels from the producer to the melting furnace and the connection of all furnaces to the smokestack are visible (1925, Franz Eschler, Max Eschler, Česká Kamenice). SOkA Děčín, OÚ Děčín, Inv. No. 1836, sign. Kamnitz 11 50/34.





Okrouhlá, glass painting works, house No. 84; view from the southwest; right: sample house in the form of a Neo-Gothic chapel (restoration of the building's skin with ceramic shaped bricks and stained glass is under way); centre: painting workshop with a residential part under a temporary roof; left: residential house No. 93. Photo: Jiří Vidman 2020.

No. 84 Okrouhlá – Karl Meltzer glass painting works, church window production with a sample house

The complex is situated on the southern edge of the cadastral area of Okrouhlá near the road to Skalice. Karel Meltzer bought an earlier farmstead, house No. 1, for the painting works in 1879. The family operated a glass trade and finishing company Karl Meltzer & Co. in the nearby Skalice. In 1888, Karl Meltzer founded the First Czech Art Painting Workshop (I. Böhmisches Kunstglas-malerei). It focused above all on the production of church windows, stained glass with figural paintings and was situated precisely in farmstead No. 1 in Okrouhlá.³⁸ The workshop underwent a radical reconstruction in 1893 and was ceremonially consecrated and put into operation in the following year. The complex consisted of a two-storey, predominantly log house No. 1, which stood in the courtyard and apparently retained its residential and operating functions. A masonry retirement house stood near the road; as early as 1885, it received its own house No. 84. This building was adapted to painting works; on the southern side was added a dominant sample house in the form of a 24 metres high Neo-Gothic chapel with a polygonal layout and corner pillars. From the present state, it differed with a steeper pinnacle-shaped roof covered with slate. Ceramic facing built in the ceramics factory Ernst March Söhne in Charlottenburg (part of Berlin) was used for the first-floor façade, buttress roofs, window openings with traceries, pillars and sculptural decoration. A rebuilt part of the former retirement house served as a representative office and the background of the workshop. The painting workshop itself extended the building on the northern side. Residential house No. 93 was built in the place of a former barn probably as early as 1885. Southeast of the sample house stood another operating building with a smokestack that apparently contained firing furnaces.

38 SOKA Česká Lípa, AM Skalice, Inv. No. 39, carton 8V, municipal chronicle (part II), pp. 233–236. *Adressbuch der Glas-Industrie in Deutschland und Oesterreich-Ungarn* 1895, p. 275. The available archival sources are summed up completely in ROZINEK – LISCHKA – KOLKA – ZEMAN – ŠVEJNOHA – KYNCL 2017.

Okrouhlá, view of farmstead, house No. 1 from the southwest (c. 1895); centre: former retirement house No. 84, rebuilt into glass painting works; left part with a workshop and right part in the shape of a Neo-Gothic chapel with a church window sample house. Copy in the author's collection.



Okrouhlá, view of farmstead, house No. 1 from the southwest (c. 1895); right: residential house; left: church window sample house followed by painting workshop; front: another production building with a smokestack (apparently firing furnaces and product storages); the courtyard is enclosed in the rear by residential house No. 93 with an inscription on the façade. SOKA Č. Lípa, AO Skalice, chronicle IV – pictorial supplements, No. 000039.



Okrouhlá, view of the glass painting works and sample house No. 84 from the south; a production building with a smokestack is still standing in the right (second quarter of the 20th century). Ladislav Komůrka's collection.

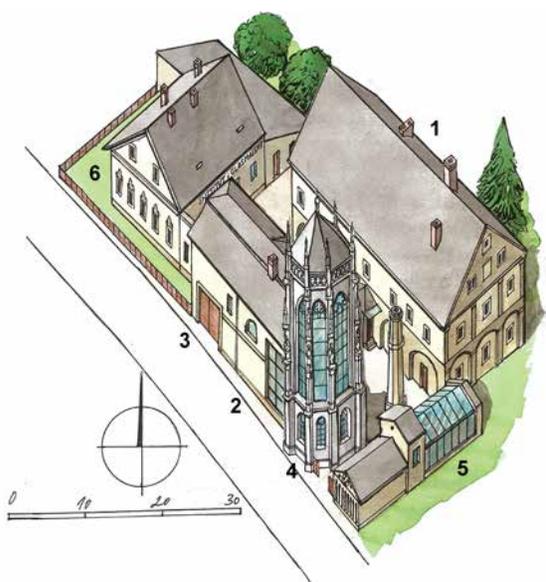




Okrouhlá, view (photograph from 1885–1893) from the southwest of farmstead, house No. 1; left: two-storey residential house; centre: retirement house No. 84; left: residential house No. 93. Jan Sýkora's collection.



Okrouhlá, photograph of glass painting works, house No. 84 after a fire in 1901; view of the south-west façade; right: church window sample house; left: residential house No. 93. SOkA Č. Lípa, AO Skalice, chronicle IV – pictorial supplements, No. 000039.

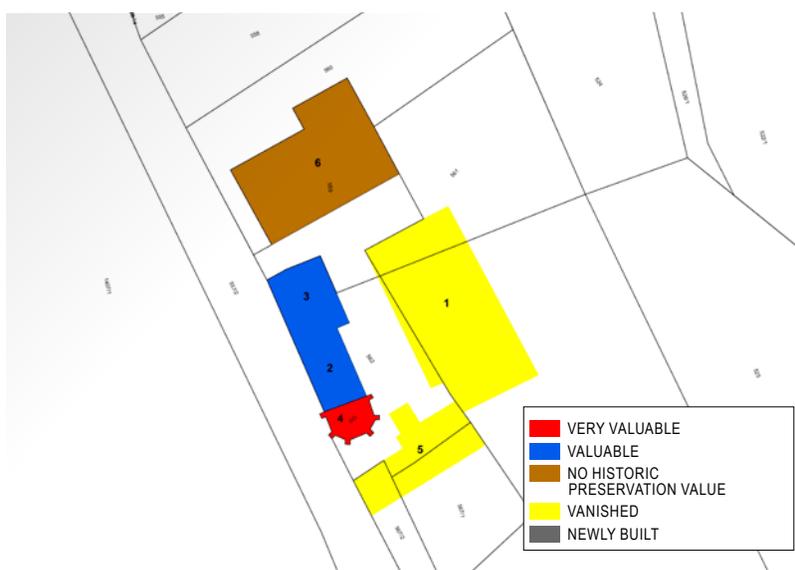


Okrouhlá, glass painting works, house No. 84; reconstruction of the situation as of 1945, view from the south. Drawing: Jaroslav Staněk 2021.

Okrouhlá, glass painting works, house No. 84, building-history assessment. Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.



Okrouhlá, glass painting works, house No. 84, historic preservation assessment. Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.



- 1 residential house No. 1, second half of the 18th century
- 2 retirement house No. 84, second half of the 18th century; reconstruction into glass painting works background 1892-1894; reconstruction after fire 1902-1904
- 3 glass painting works (workshop), 1892-1894; reconstruction after fire 1902-1904

- 4 sample house, 1892-1894; reconstruction after fire 1902-1904
- 5 glass painting works, storages, firing furnaces, smokestack, 1892-1894
- 6 residential house, 1885



Okrouhlá, section of reambulated cadastre from the first quarter of the 20th century; southern edge of the Okrouhlá cadastral area; red hachure: buildings newly built in farmstead, house No. 1 after its reconstruction into glass painting works in 1885–1895. SOKA Č. Lípa, fonds AO Okrouhlá, Inv. No. 17.

Church window production did not last long there, however. As early as 1900, it was relocated to Zittau for unknown reasons. Karl Meltzer, the founder of the company, died on 21 December 1906. Moreover, a devastating fire hit the complex in 1901. The workshop and the sample house were renewed with makeshift roofs, but residential house No. 1 ceased to exist. The workshop was newly lit by new factory windows with a segment relieving arch. More detailed information concerning the operation could not be found, however. The Hermann Keil company operated there around 1928. The building was reconstructed for residential purposes after 1945 at the latest and after that, the smokestack and the adjacent building vanished. The building gradually fell into disrepair and was in an emergency condition in the late 20th century. The roof of the workshop part collapsed in 2005. The complex has been gradually renovated in recent years.³⁹

The painting workshop with sample house No. 84 is a cultural monument. Its importance lies above all in the absolutely unique design of the church window sample house, which has the form of a dominant Neo-Gothic chapel. It was partially disturbed by the destruction of the original shape of the roof due to a fire in 1901 and considerable damage to stained glass from the time of the degradation of the building in the late 20th and early 21st centuries. The adjacent part of the complex with a workshop, a former office and a reception hall was rebuilt rather considerably after the fire, in 1902–1904, and above all in the second half of the 20th century and the early 21st century. Despite that, it contains numerous valuable structures and details, partly coming from the former retirement house from the second half of the 18th century and partly from the reconstructions into a painting workshop in 1892–1894 and 1902–1904. Regrettably, the whole complex lacks a vanished production building with a decoratively designed smokestack, the technologically most important part of the operations, and the main residential house No. 1, which comprised the historical core of the local farmstead.

39 Ibid., pp. 8–11. SOKA Česká Lípa, AM Skalice, Inv. No. 39, carton 8V, municipal chronicle (part II), pp. 261–273. TOMÁNEK 1989a, pp. 76–78.



Nový Bor, Gebrüder Zahn finishing plant, depicted in the centre bottom of the image on the intersection of present-day Kalinova and Dělnická Streets. Photo: Jiří Vidman 2020.

No. 315, 320, 328 Nový Bor – Gebrüder Zahn finishing works

The approximately rectangular area of the former finishing plant is built up in the north corner by the two-storey grinding works and glass polishing works No. 328, followed in the southwestern direction by the two-storey residential and production building No. 320. The two-storey residential house No. 315 is standing on the southeastern side of the courtyard. The historicizing Neo-Renaissance structure is preserved on the façades of all buildings. An enclosure wall with an entrance gate and a decorative attic between buildings No. 320 and 315 closes the courtyard between houses No. 320 and 315. The cut glass production company Gebrüder Zahn was founded in 1895. At that time, the grinding works operated 49 machines. An undeveloped area belonging to house No. 122, which stood in the northeastern corner of the present-day industrial complex (vanished around the middle of the 20th century), was chosen for the new complex. The cores of all three buildings, present-day houses No. 328, 320 and 315, came into existence in the first building phase around 1895. An enclosure wall with a gate enclosed the complex from the southwest in 1903.



Nový Bor, Gebrüder Zahn finishing plant; plan of the construction of a preserved enclosure wall with a gate between houses No. 320 and 315 (1903, Maxmilian Dittrich, Nový Bor). Nový Bor Building Authority, file of house No. 320.



Nový Bor, Gebrüder Zahn finishing plant; overall view of the corner of grinding and polishing works, house No. 328; residential house No. 320 follows to the right. Photo: author, 2020.

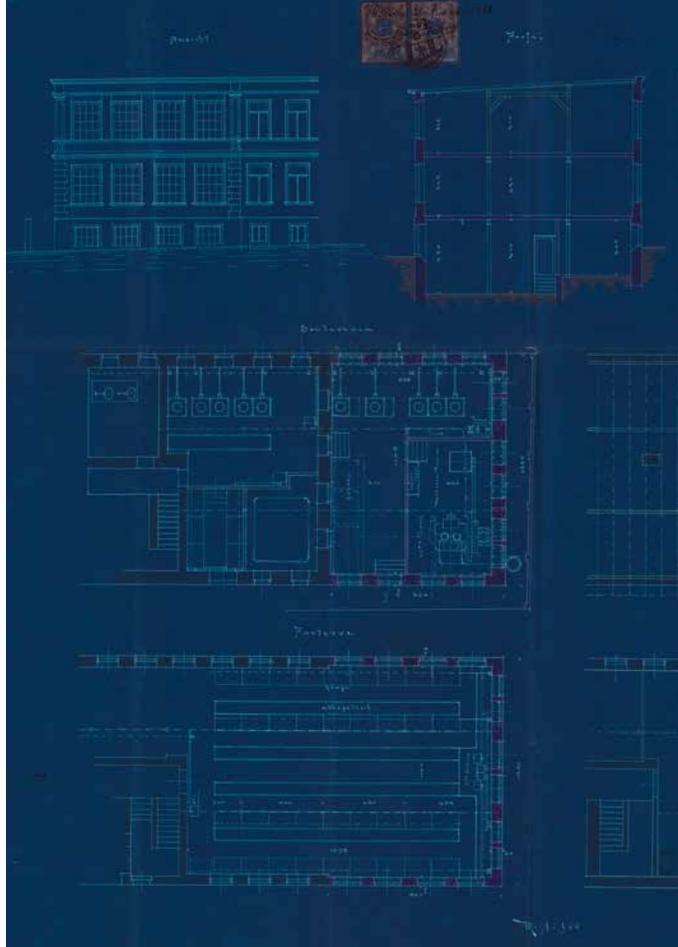


Nový Bor, Gebrüder Zahn finishing plant; interior of the basement of grinding and polishing works, house No. 328, the southeastern part added in 1910. Photo: author, 2017.



Nový Bor, Gebrüder Zahn finishing plant; interior of the first floor of grinding and polishing works, house No. 328, the part added in 1910. Photo: author, 2017.

Nový Bor, Gebrüder Zahn finishing plant; section of a plan for the extension of glass grinding and polishing works, house No. 328 (1910, Maxmilian Dittrich, Nový Bor). Nový Bor Building Authority, file of houses No. 328, 315.



In 1910, an annexe with four window axes extended the grinding and polishing works, house No. 328, to the east. In the basement, this extended the engine room with ferroconcrete ceilings and cast iron columns and on the ground floor, the grinding works with beam ceilings. At the same time, a courtyard annexe with handling premises on the ground floor and storage spaces on the first floor was added to residential house No. 315. The plans for all building adaptations were made by the local builder Maximilian Dittrich. Gebrüder Zahn ended production in the complex in 1926, and the finishing works were bought by the Gebrüder Rachmann company and added to its adjacent machine works, house No. 264. This production remained there also after nationalization in 1945 within Závody průmyslové automatizace (ZPA) Nový Bor; subsequently, the buildings were used by the Integrated Secondary School Česká Lípa. Some construction changes to buildings and courtyard annexes come from the second half of the 20th century.⁴⁰

At present, the complex is undergoing reconstruction into residential houses. The location of the important company's finishing plant in a vacant site on the outskirts of the contemporary built-up area is typical of Nový Bor. Smaller factory buildings comprise a valuable industrial enclave that is an integral part of the conservation area. The mass and structural design of all buildings and their overall appearance are very well preserved.

40 HANTSCHER 1911, pp. 261 and 264. FAHDT 1907, p. 126. RANŠOVÁ – HORNEKOVÁ 2001, p. 95. Nový Bor Building Authority, Building Archives, file of houses No. 315, 320 and 328. RASOCHA 1989, pp. 26–27.



Nový Bor; top centre: top centre: Gebrüder B. Oppitz finishing works, house No. 226; right, along Sloupská Street: house No. 137; left: Gebrüder Rachmann machine works and metal production complex, house No. 264. Photo: Jiří Vidman 2020.

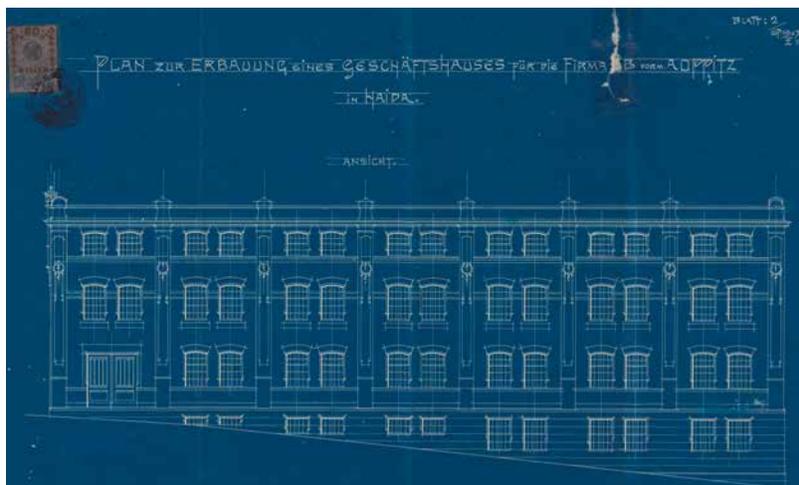
No. 226 Nový Bor – trade/export house B. Oppitz, vorm. A. Oppitz, Gebrüder Rachmann finishing works

A land plot beyond the late Baroque glassmaking house No. 137 (built c. 1783, old house No. 94) near present-day Sloupská Street was chosen for the construction of a new glass trade and export house. The existing building No. 226 came into existence in the place of an earlier building in 1907. The investor presented plans by builder Josef Schneider of Mimoň to the building authority in April of that year and gained the final approval at the end of December. The complex was built by Glasmanufactur-Export B. Oppitz, vorm. A. Oppitz, a company founded by August Oppitz in 1850. It resided first in Arnultovice and, from 1855, in Bor. The production focused on glass parts for lighting fixtures and later on cut utility glass – silvered or with metal assemblies (vases, drinking sets).⁴¹ Brüder Rachmann Glas und Metallwerke bought the complex probably in 1918. The company's beginnings date back to 1874 when brothers Wilhelm and Heinrich Rachmann founded a grinding workshop, house No. 1, in nearby Skalice. The company, successfully exporting a broad assortment of utility and luxury glass, relocated its activity to Bor in 1884. Later, it used the name Gebrüder Rachmann (1930). In 1919, the new owner built a vehicle shed (remise) in the rear courtyard according to plans by the Bor-based Rösler & Glaser office. An annexe between the main building and the courtyard building No. 137 was built according to plans by builder Josef Schneider of Mimoň in 1926. An adaptation of the right part of the remise according to plans by Rösler & Glaser took place in 1933. A partition with a chimney was built into the open remise to house a car garage. The national companies Borské sklo and later Crystalex used the building from the second half of the 20th century, above all as storage spaces and a cardboard factory.⁴²

41 HANTSCHÉL 1911, pp. 255–256, 260–261. RANŠOVÁ – HORNEKOVÁ 2001, pp. 83 and 87. Nový Bor Building Authority, Building Archives, file of house No. 226.

42 HANTSCHÉL 1911, pp. 255–256, 260–261. Nový Bor Building Authority, Building Archives, file of house No. 226. RASOCHA 1989, pp. 26–27.

Nový Bor, Gebrüder
 B. Oppitz finishing works,
 house No. 226; building
 construction plan (1907,
 Josef Schneider, Mimoň);
 façade oriented into
 present-day Křížíkova
 Street. Nový Bor Building
 Authority,
 file of house No. 226.

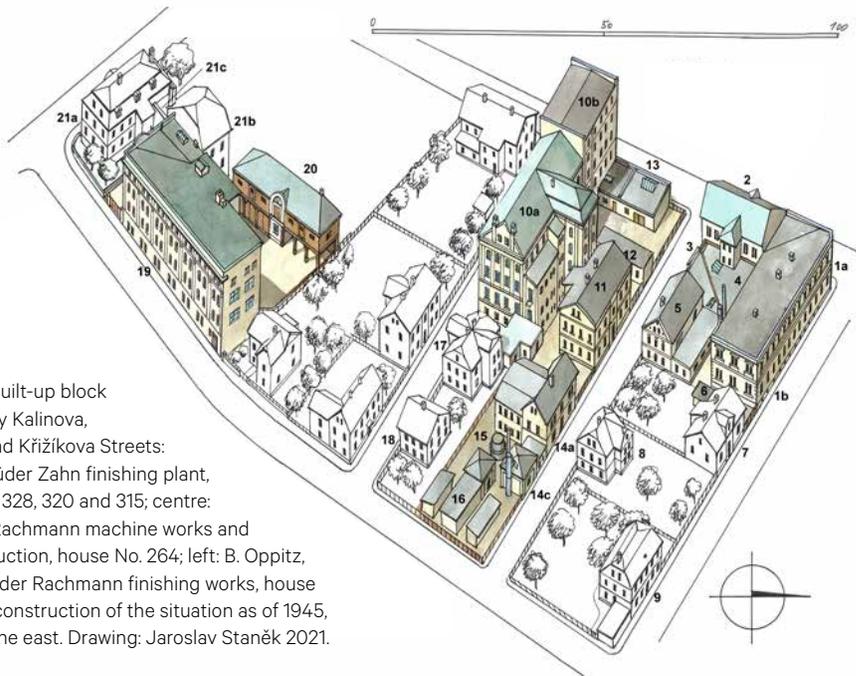


Nový Bor, Gebrüder
 B. Oppitz finishing works,
 house No. 226; building
 construction plan (1907,
 Josef Schneider, Mimoň);
 southwest façade and
 cross-section. Nový Bor
 Building Authority, file
 of house No. 226.



Nový Bor, Gebrüder
 B. Oppitz finishing works,
 house No. 226; building
 construction plan (1907,
 Josef Schneider, Mimoň);
 floor plans of the basement.
 Nový Bor Building Authority,
 file of house No. 226.





Nový Bor, built-up block delimited by Kalinova, Dělnická and Křížkova Streets: right: Gebrüder Zahn finishing plant, houses No. 328, 320 and 315; centre: Gebrüder Rachmann machine works and metal production, house No. 264; left: B. Oppitz, later Gebrüder Rachmann finishing works, house No. 226; reconstruction of the situation as of 1945, view from the east. Drawing: Jaroslav Staněk 2021.

Gebrüder Zahn finishing plant, houses No. 328, 320 and 315

- 1a glass grinding and polishing works, house No. 328, 1894–1896
- 1b glass grinding and polishing works extension, house No. 328, 1910
- 2 residential house No. 320, adaptation into finishing works, 1895
- 3 enclosure wall with a gate, 1903
- 4 courtyard roofing, c. 1934
- 5 residential house No. 315, 1895, handling and storage annexe, c. 1910
- 6 ash shed, c. 1910
- 7 residential house No. 281, does not belong to the finishing works
- 8 vanished residential house No. 289, does not belong to the finishing works
- 9 vanished residential house No. 122, does not belong to the finishing works

Gebrüder Rachmann machine works and metal production, house No. 264

- 10a production building, earlier three-storey core 1905–1906
- 10b production building, west five-storey annexe, addition of fourth storey to the earlier part, new roof, north annexe with staircase and lift, 1926–1928
- 11 residential and administrative house No. 264, c. 1895
- 12 vanished shed, 1913
- 13 shed, 1905–1906, gatehouse annexe, after 1945

- 14a residential house No. 288, c. 1895, workshop annexe (courtyard wing), 1896, sanitary facilities annexe, 1919
- 14b brass furnace annexe, 1919
- 14c coal storage, 1929, hydrogen producer with smokestack, 1934
- 15 vanished gas holder, 1928
- 16 vanished sheds and storages, 1920s, ash shed, 1940, production hall in the area, after 1945
- 17 vanished residential house No. 284, does not belong to the finishing works
- 18 vanished residential house No. 318, does not belong to the finishing works

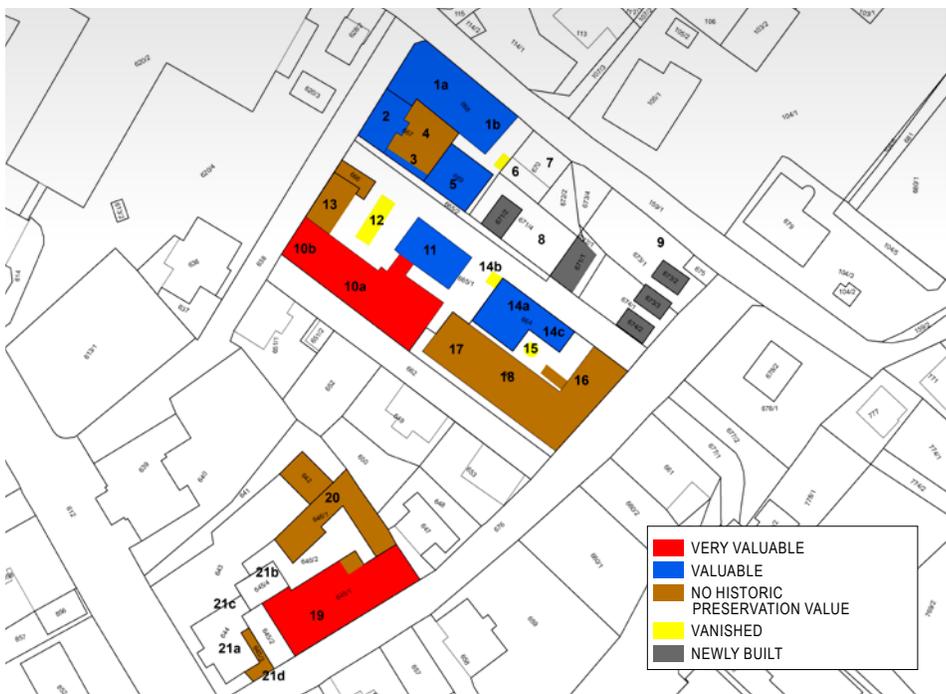
B. Oppitz, later Gebrüder Rachmann finishing works, house No. 226

- 19 trade house and finishing works main building, house No. 226, connecting annexe to court building of house No. 137, 1907, connection annexe extension 1926, annexes, after 1945
- 20 vehicle shed, 1919, garage in-building, 1933, reconstructions and adaptations, after 1945
- 21a residential house No. 137 (Josef Hanel glass trade), c. 1783, does not belong to the finishing works
- 21b courtyard building of house No. 137, second half of the 19th century, does not belong to the finishing works
- 21c connecting annexe between house No. 137 and courtyard building, second half of the 19th century, does not belong to the finishing works
- 21d gatehouse annexe, after 1945



Nový Bor, built-up block delimited by Kalinova, Dělnická and Křížkova Streets: top: Gebrüder Zahn finishing plant, houses No. 328, 320 and 315; centre: Gebrüder Rachmann machine works and metal production, house No. 264; bottom: B. Oppitz, later Gebrüder Rachmann finishing works, house No. 226; reconstruction of the situation as of 1945, building-history assessment. Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.

Nový Bor, built-up block delimited by Kalinova, Dělnická and Křížkova Streets: top: Gebrüder Zahn finishing plant, houses No. 328, 320 and 315; centre: Gebrüder Rachmann machine works and metal production, house No. 264; bottom: B. Oppitz, later Gebrüder Rachmann finishing works, house No. 226; reconstruction of the situation as of 1945, historic preservation assessment. Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.





Nový Bor, Gebrüder
B. Oppitz finishing works,
house No. 226; overall
view from the south from
Křížíkova Street.
Photo: author, 2020.

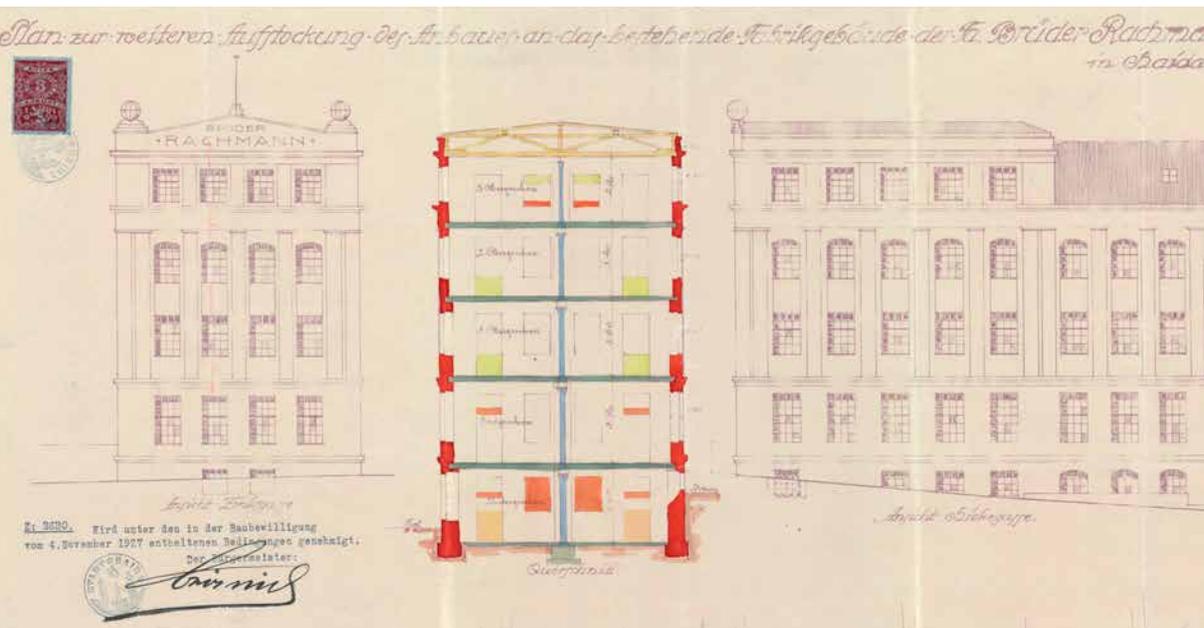
The intactly preserved main finishing works building from 1907 is one of the most valuable industrial buildings of this type in the Bor – Šenov area. It also represents one of the most important glassmaking companies in the area. The same type of production has operated in the complex, with interruptions, in recent years. Regrettably, a vehicle shed of an interesting design in the courtyard has gone through major building adaptations that wiped away the original design for a large part. The finishing works are part of the Nový Bor conservation area and of the valuable complex of industrial buildings in the built-up blocks delimited by Kalinova, Dělnická, Křížíkova and Sloupská Streets and follows in a suitable manner earlier late Baroque glass trader houses along Sloupská Street (N. 137 and 135).

No. 264 Nový Bor – Wilhelm Rachmann Metallwerke machine and metal works

The company's beginnings date back to 1874 when brothers Wilhelm and Heinrich Rachmann founded a grinding workshop in nearby Skalice, in which they also carried out metal assembly works (silver, argentan, bronze). The production was relocated to Bor in 1884; at the same time, a metalworking factory equipped with mechanical machines was founded in Berlin. The Berlin-based factory was later also moved to Bor. The earliest parts of the complex are two residential and later administrative houses No. 264 and 288 from c. 1895. The main factory building was built in 1905–1906 according to plans by builder Maximilian Dittrich of Bor. The building had three storeys, ten window axes and a low-pitched gable roof. The production under the firm Brüder Rachmann Glass und Metallwerke concentrated on metal assemblies for sprayers. The factory comprised a modern-equipped zinc foundry, a tinsmith workshop and a workshop with a galvanic bath for electroplating. Fundamental reconstructions that resulted roughly in the present-day form of the factory building took place in 1926–28 according to plans by Bor-based architect F. Doleschal. Plans for the addition of two storeys and a short perpendicular courtyard wing with a lift, a staircase and a mansard roof came into existence in 1926. The ground floor had a more complex layout with an engine room, work halls, storage and other areas; the following storeys consisted of large halls. The addition of three more storeys and an extension of the building with a two-storey annexe in the direction of Dělnická Street followed. A crude oil engine of the Dentz system was installed



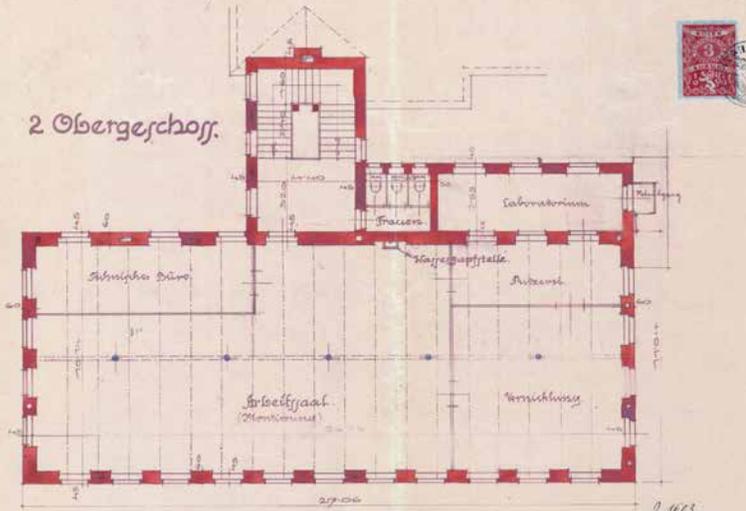
Nový Bor; left: W. Rachmann Metallwerke machine works and metal production complex, house No. 264; right: Gebrüder Zahn finishing works complex. Photo: Jiří Vidman 2020.



Nový Bor, Gebrüder Rachmann machine works and metal production, house No. 264, plan for the extension of the building to the northwest (1927, F. Doleschal, Nový Bor); left: northwest gable front façade; centre: cross-section; right: southwest longitudinal façade. Nový Bor Building Authority, file of house No. 264.

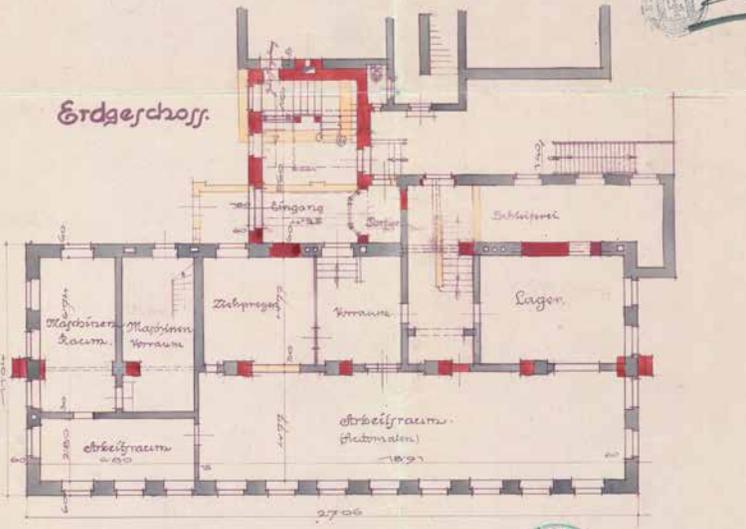
Plan zum Aufbau der bestehenden Fabrik

2 Obergeschoss.



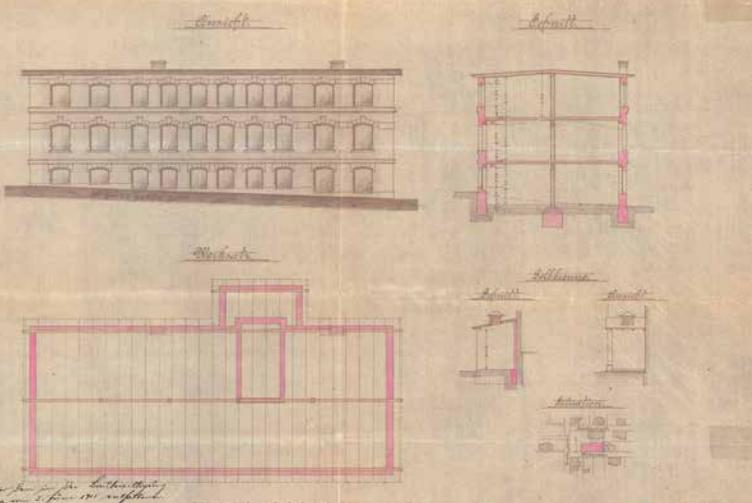
Nový Bor, Gebrüder Rachmann machine works and metal production, house No. 264, plan for the reconstruction of the building and the addition of two more storeys (1926, F. Doleschal, Nový Bor); bottom: floor plan of the earlier ground floor (new structures in red); top: ground plan of the new third storey.

Erdegeschoss.



Beide Pläne:

Entwurf: DOLESCHAL



Nový Bor, Gebrüder Rachmann machine works and metal production, house No. 264, building construction plan (1905, Maximilian Dittrich, Nový Bor); left: roof structure view and floor plan; right: cross-section and details of brass furnace (section and view); bottom: layout.

Nový Bor, W. Rachmann
Mettalwerke machine works
and metal production,
house No. 264, view of the
main production building
from the southeast from
Železná Street.
Photo: author, 2018.



Nový Bor, W. Rachmann
Mettalwerke machine works
and metal production,
house No. 264, view of the
main production building
from the north from
Dělnická Street; the
perpendicular avant-corps
contains a staircase.
Photo: author, 2021.



Nový Bor, W. Rachmann
Mettalwerke machine works
and metal production,
house No. 264, work hall
in the interior of the main
production building. Photo:
author, 2017.





Nový Bor, W. Rachmann
Mettalwerke machine works
and metal production,
house No. 264, staircase
in an avant-corps added
to the main building.
Photo: author, 2017.

in the engine room during the final approval in 1928. Barber and hairdresser products (shavers, hairdryers, etc.) were added to the assortment in the 1920s at the latest. The firm changed to Wilhelm Rachmann Metallwerke probably in the 1930s. The described production was maintained also after the nationalization in 1945 and the incorporation into Závody průmyslové automatizace (ZPA) Nový Bor. Some of the building adaptations and courtyard annexes, including the gatehouse and a new hall on the southeastern side of the complex, come from the second half of the 20th century.⁴³

The complex represents one of the most important companies in the Bor – Šenov area, which focused, besides glass finishing, also on the production of metal assemblies. The production plant was inserted in a built-up block between two finishing plants that the Brüder Rachmann company also gradually acquired. Together, they comprise the most valuable industrial whole in the territory of the Nový Bor conservation area. The intactly preserved complex and above all the main factory building are among the most valuable industrial structures in the area. Utilitarian modern structures are placed in such a way that they do not disturb the mass layout of the complex and the most important views. Regrettably, the production was discontinued c. in 2017.

43 Nový Bor Building Authority, building archives, file of house No. 264. HANTSCHHEL 1911, pp. 255–256, 952. RANŠOVÁ – HORNEKOVÁ 2001, p. 87. JINDRA – KOMŮRKA 2006b, p. 19.

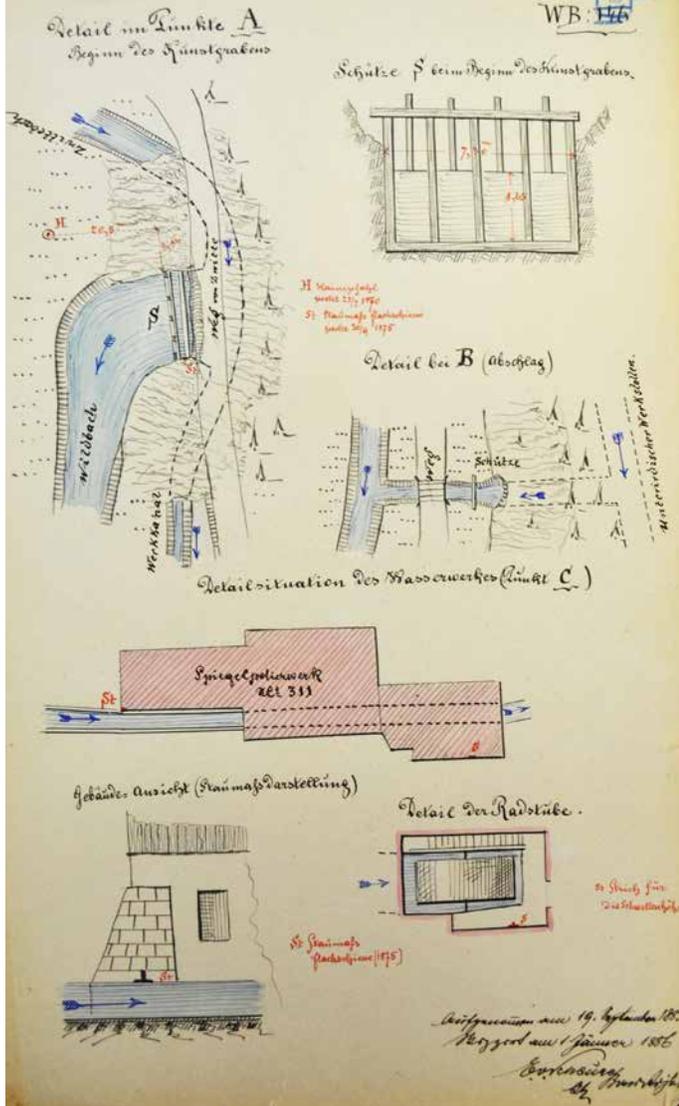


Lindava, mirror grinding and polishing works, houses No. 309 and 311, view from the southeast; the western part of the complex, probably used as the administrative, residential and operating background, is preserved; a torso of the raceway with low walls is visible in front of the south façade; more production buildings stood to the right. Photo: Jifí Vidman 2020.

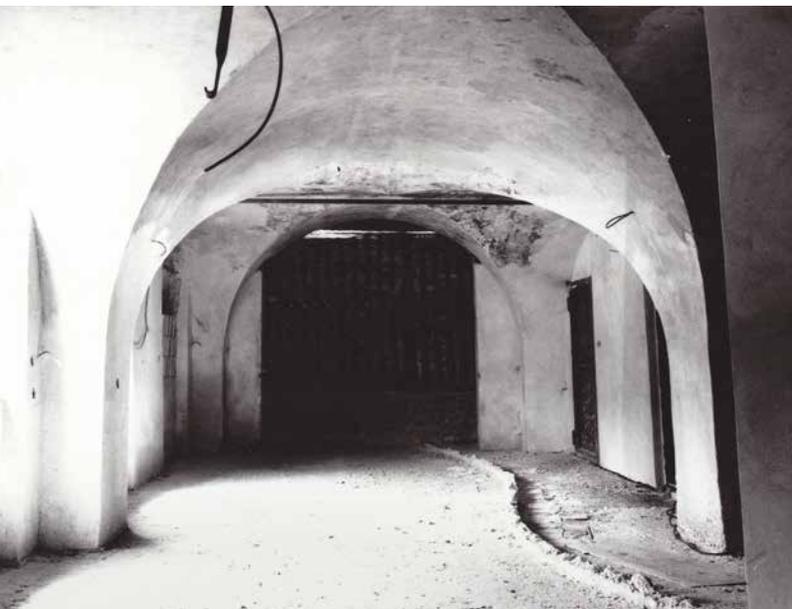
No. 309, 311 Lindava – mirror grinding and polishing works (Velenice Business) – Kinský mirror works (Graf Kinsky’schen Spiegel und Rahmenfabrik, Kais. königl. Privilegirte Spiegel und Rahmen Fabriken der Carl Graf Kinsky Erben)

The mirror works with a hydraulic structure are situated in the southern edge of the Lindava cadastral area. The raceway is led from the small River Svitávka. A weir and the beginning and end sections of the raceway are uniquely cut into the sandstone masif on the bank of the small river. Dating 1798 is engraved on a wall near the weir, above the inlet into a rock gallery. A floodgate weir from 1917 is of a steel construction, with a ferroconcrete footbridge. The raceway also begins with a rock gallery, with 1779 and 1878 and the initials J. K visible above its outfall. Further on, the raceway leads through an open channel. After about 500 metres, it runs into another cut gallery, about one kilometre long. At the end of the gallery, the raceway passes through a masonry barrel-vaulted culvert built of sandstone blocks under the Svitava – Velenice road. Beyond the road, an open channel continues all the way to the southern façade of the mirror works. Foundation parts of the masonry are preserved from the waterwheel chamber and the later turbine house. The drainage channel is vaulted with sandstone on the plant’s premises. The mirror works themselves, house No. 309 and 311, is a distinctively rectangular two-storey building with a masonry, mostly vaulted ground floor and a half-timbered first floor.

The mirror grinding and polishing works were built by Count Josef Jan Maxmilián Kinský, the owner of the Sloup manor, in 1767. This is confirmed also by dendrochronological analysis of elements of the roof truss and ceiling beams; it says that the wood was felled in the 1765/1766 winter season, which corresponds well with the above-mentioned date of the completion of the construction. At the beginning, the facility was reportedly equipped with eight polishing machines driven by an “ingeniously built water-driven machine”. The grinding and polishing works were part of a larger manorial manufactory whose main seat was in a former farm court under the so-called Rock Castle

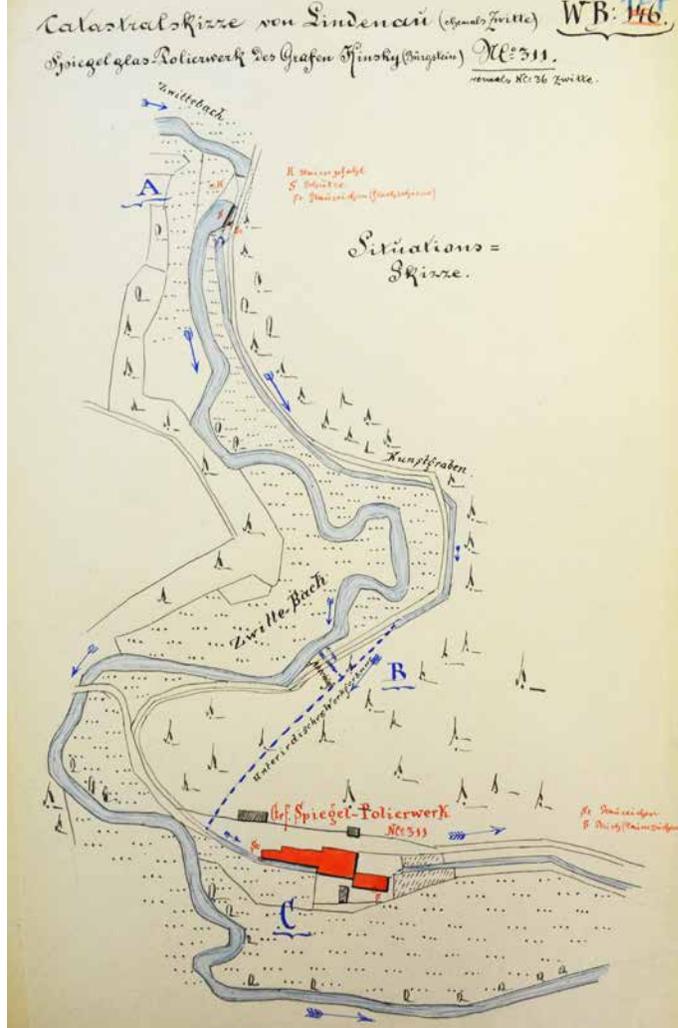


Lindava, mirror grinding and polishing works, houses No. 309 and 311, drawings of details for a layout plan of the hydraulic structure (1885); top (A): weir; top right: drawing of the flood-gates; below that (B), detail of waste drainage from the rock part of the raceway; bottom: sketch of the residential and production building with a drawing of the waterwheel chamber and the position of a water law mark on the southwest corner pillar. SOKA Č. Lípa, OÚ Č. Lípa, Inv. No. 1156, carton 85.



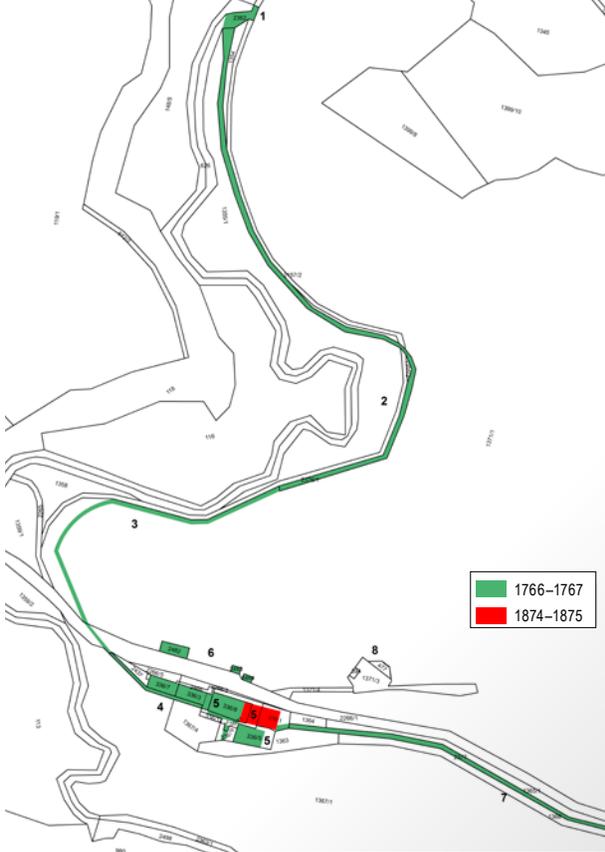
Lindava, mirror grinding and polishing works, houses No. 309 and 311, communication space with a barrel cross vault. Photo: Ludmila Skokanová 1992, National Heritage Institute, Liberec Territorial Workplace, photograph collection, Inv. No. 98078.

Lindava, mirror grinding and polishing works, houses No. 309 and 311, layout plan of the hydraulic structure (1885); top: weir with the position of water law marks; bottom: the passage of the raceway through a rock gallery is marked schematically by a dashed line. SOKA Č. Lípa, OÚ Č. Lípa, Inv. No. 1156, carton 85.



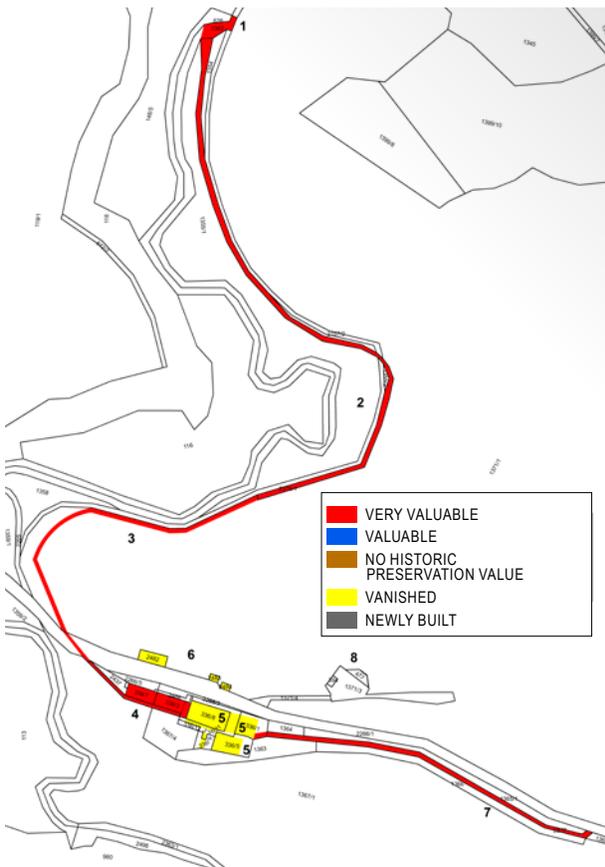
Lindava, mirror grinding and polishing works, houses No. 309 and 311, torso of a masonry production building (grinding mill) in the eastern part of the complex. Photo: Ludmila Skokanová 1992, National Heritage Institute, Liberec Territorial Workplace, photograph collection, Inv. No. 98081.





Lindava, mirror grinding and polishing works, houses No. 309 and 311, building-history assessment. Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.

- 1 weir on the Svitávka, c. 1767
- 2 raceway, open part, embankment, c. 1767
- 3 raceway, rock gallery part, c. 1767
- 4 grinding and polishing works, administrative, residential and operating part, c. 1767
- 5 grinding and polishing works, production part, c. 1767, completion 1874-1875
- 6 sheds, c. 1767, repeatedly rebuilt
- 7 drainage channel, c. 1767
- 8 sand mine (for glass grinding), probably c. 1767



Lindava, mirror grinding and polishing works, houses No. 309 and 311, historic preservation assessment. Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.

Lindava, mirror grinding and polishing works, houses No. 309 and 311; the final part of the raceway leads below a road, rock gallery smoothly followed by a barrel vault of sandstone blocks. Photo: author, 2020.



Lindava, mirror grinding and polishing works, houses No. 309 and 311, view of the torso of a floodgate weir built into the outfall of the hewn rock gallery; the stream flows through the gallery from the left, the raceway turns to the right through another gallery (in this view, behind the floodgates). Photo: author, 2020.



(Skalní hrad) in Sloup v Čechách.⁴⁴ The Velenice Business (Welenitzer Werk) was originally registered in the cadastral area of Svitava, where it had house No. 36, later as No. 311 in Lindava. Stable Cadastre maps from 1843 depicted the layout of the mirror works in the form of three flammable rectangular parts extending towards the east. The preserved part was probably used as a residential and office section, the vanished part as the polishing works, followed by the waterwheel chamber and the non-flammable grinding works.

A plan documentation from 1873 and 1874 describes the addition of new buildings and new machinery equipment from the Carolinenthaler Maschinenbau Actien-Gessellschaft company. However, only the construction of new polishing works did eventually take place in the eastern part of the complex, left of the raceway opposite the old polishing works. Shortly after 1870, the water law

44 ANSCHIRINGER 1981, pp. 103–104. PAUDLER 1885, pp. 24–27. KLÍMA 1955, pp. 419–423. HANTSCHL 1911, pp. 261–262, 972–973.

agenda registers that the machines were still driven by one overshot waterwheel with a diameter of 4.46 m and a width of 2.29 m. According to information from 1888, the waterwheel had been replaced by a Girard turbine (max. power: 25.47 HP, effective power: 16.56 HP, gradient: 3.48 m). An inventory of the Kinský mirror works from the following year also lists new machinery equipment: a cylindrical grinding machine (*Rundschleifapparat*) by Bearnshaw & Co. Nürnberg, a stone cylinder, a large and small iron cylinder, a polishing machine with 72 blocks and 16 extrusion blocks, a gypsum mill and mirror retouching and underlaying workshops. Besides the production areas, there was also a warehouse, a packaging room, a residential part, sheds, a rock storage area, “*Sandhöflein*” for the preparation of glass sand and a gypsum furnace in the rock. From 1913, the mirror works operated under the name Johne & Breuer, Spiegelfabrik in Bürgstein and later Johne & May and Johne & Geisler (1928). Franz Buresch became the owner in 1931 and Wilhelm Paul Grube in 1944. At that time, the grinding and polishing works machinery was driven by a Francis turbine. The precise date of the discontinuation of the operation in Lindava has not been ascertained yet, but it probably happened during the Second World War. The buildings on the eastern side of the complex were subsequently demolished.⁴⁵

The preserved part of the former grinding and polishing works is exceptional in the nationwide context and certainly has the potential to be declared a cultural monument. The only regrettable but considerable imperfection is that a larger part of the production buildings in the complex no longer exist. Only the foundation parts of the masonry remain of the waterwheel chamber, the later turbine house at the end of the raceway and the adjacent grinding and polishing works buildings. On the contrary, the value of the complex is considerably increased by the very well preserved hydraulic structure of a unique design with rock galleries, as well as the location of the buildings in a meander of the Svitávka accompanied by sandstone massifs and glass sand mines.

No. 308 Lindava – mirror grinding and polishing works (Rabštejn Business) – Kinský mirror works (Graf Kinskyšchen Spiegel und Rahmenfabrik, Kais. königl. Privilegirte Spiegel und Rahmen Fabriken der Carl Graf Kinsky Erben)

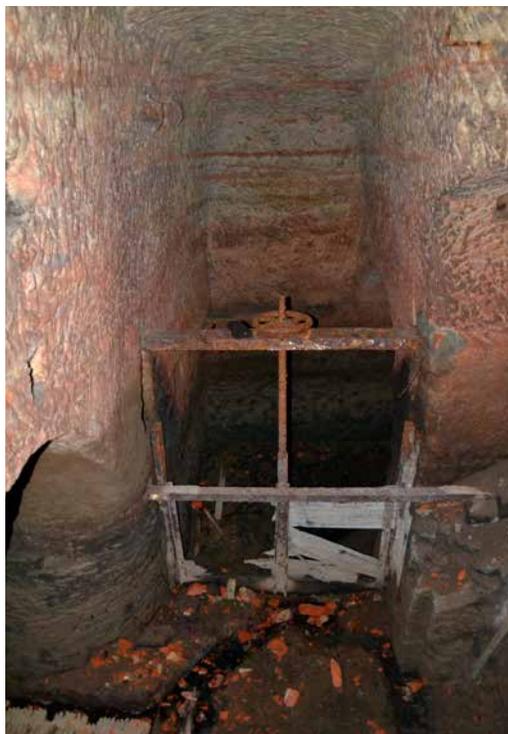
To the mirror works belongs a large hydraulic structure on the Svitávka that follows the drainage channel of the so-called Velenice Business, house No. 309 and 311. The raceway passed under a road west of a rock chapel and continued to the northeast in a rock gallery. Its outfall is in a rock massif adjacent to the mirror works building. There a massive rock waterwheel chamber is cut on the basement level with an opening for the waterwheel shaft, a waste weir with a torso of the floodgates a drainage channel. The mirror works themselves have a distinctively rectangular layout; it is full masonry and it was originally fully plastered. The interior layout is divided into three parts on the ground floor. The entrance hall (corridor) is in the middle of the ground floor, followed by the engine room in the rear section with a torso of the transmission mechanisms from the turbine. Large halls (mirror grinding and polishing works) with eight sail vault bays vaulted asymmetrically to three prismatic pillars with Tuscan capitals are situated in the side parts. The whole flat-ceilinged first floor is residential, with a corridor in the rear section (along the rock wall), which provides access to the rooms in the front section.

45 SOA Děčín, Vs Sloup, Inv. No. 306, carton 144 (mirror works), Inv. No. 330, sign. XVI/B, carton 151 (water law affairs); Inv. No. 957 (mirror works building plans). SOKA Česká Lípa, fond OÚ Č. Lípa, Inv. No. 9, carton 1V, Water Book for the judicial districts Česká Lípa and Nový Bor (insert No. 127); Inv. No. 1156, sign. W.B.127 (W.B.146), 11 54/25, carton 85. FAHDT 1887, pp. 99–100. *Adressbuch der Glas-Industrie* 1929, p. 474.

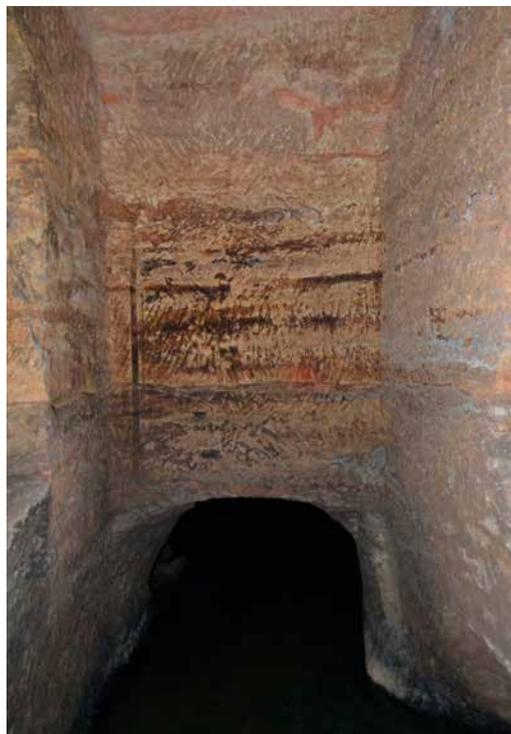


Lindava, mirror grinding and polishing works, house No. 308, view from the southwest. Photo: Jiří Vidman 2020.

Lindava, mirror grinding and polishing works, house No. 308; the rock area behind the building, a view of the torso of waste weir floodgates; the raceway flows in here through the opening on the left; the waterwheel chamber is to the right, out of shot. Photo: author, 2020.



Lindava, mirror grinding and polishing works, house No. 308, view into the waterwheel chamber with an opening into the drainage channel; the shaft passed into the engine room through an opening in the right wall. Photo: author, 2020.





Lindava, mirror grinding and polishing works, house No. 308, torso of the transmission mechanisms from the turbine in the engine room on the ground floor next to the rock waterwheel chamber. Photo: author, 2020.

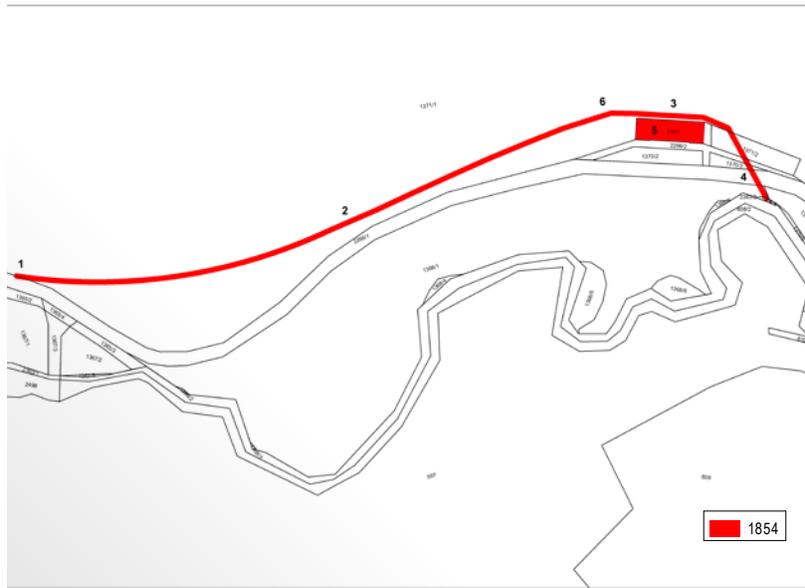


Lindava, mirror grinding and polishing works, house No. 308, west work hall; the transmissions entered the hall from the engine room in the area of the left edge of the image; traces of polishing red (potée) are visible on the walls and pillars. Photo: author, 2020.

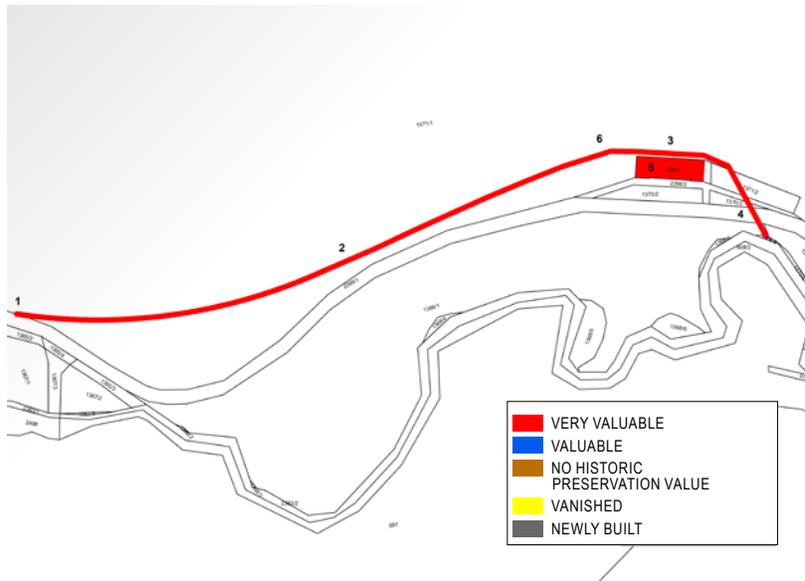


Lindava, mirror grinding and polishing works, house No. 308, east work hall; the rear part was separated later by brick partitions; the location of the transmission mechanisms is visible in the floor and on the walls in the left part. Photo: author, 2020.

Lindava, mirror grinding and polishing works, house No. 308, building -history assessment. Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.



Lindava, mirror grinding and polishing works, house No. 308, historic preservation assessment. Vladimír Vrabec, 2022. Map base © Czech Office for Surveying, Mapping and Cadastre.



- 1 position of vanished raceway inlet floodgates from the Svitávka, 1854
- 2 raceway, rock gallery, 1854
- 3 position of waterwheel chamber in the rock space, galleries with waste weir and outflow, 1854

- 4 covered drainage channel, 1854
- 5 grinding and polishing works, 1854
- 6 operations and auxiliary buildings (storages, sheds), partially cut into rock massif, 1854



Lindava, mirror grinding and polishing works, house No. 308, view of the building's south façade.
Photo: author, 2020.

The so-called Rabštejn Business was built by Count Karel Kinský Jr in 1854. The new building of imposing dimensions, attached to a visually dominant rock wall called the Fox's Tail (*Fuchsschwanzfelsen*), was equipped with a Neo-Gothic façade. The interior was probably used from the beginning for production purposes on the ground floor and for apartments on the first floor. The business included also rock spaces used as storage for fine silica sand, for example. The machinery was originally driven by a waterwheel (apparently of the breastshot type). A Jonval turbine is already listed as of 1888 (power: 9.06 HP, effective power: 6.33 HP). The Kinský mirror works inventory (probably from 1889) lists the turbine once again, along with eight grinding machines and polishing machines with 116 blocks. The building's inventory from 1898 confirms the functional division of the layout preserved to this day. A sand pit (*Sandloch*) and a sand shed were located near the building. Another inventory from 1912 lists 47 polishing stones (*Poliersteine*) and 113 polishing blocks (*Facetten Polierblöcke*). The operation ended apparently during the Second World War.⁴⁶

The building of an exceptional architectural design with an extraordinarily impressive location near a high rock wall is a cultural monument. No similar layout is documented from any other mirror works in the Czech Republic's territory. The building is preserved in a very authentic condition, but regrettably without the machinery equipment. The related hydraulic structure is almost all uniquely hidden in the sandstone bedrock. Besides the raceway and the drainage led through a rock gallery, a design that is rather common in the region, the waterwheel chamber with the waste weir was cut into the massif as well.

⁴⁶ PAUDLER 1885, pp. 24–27. HANTSCHHEL 1911, pp. 261–262, 972–973. SOA Děčín, Vs Sloup, Inv. No. 306, carton 144 (mirror works), Inv. No. 330, sign. XVI/B, carton 151 (water law affairs). Ownership changes and other information are identical with the Velenice Business.

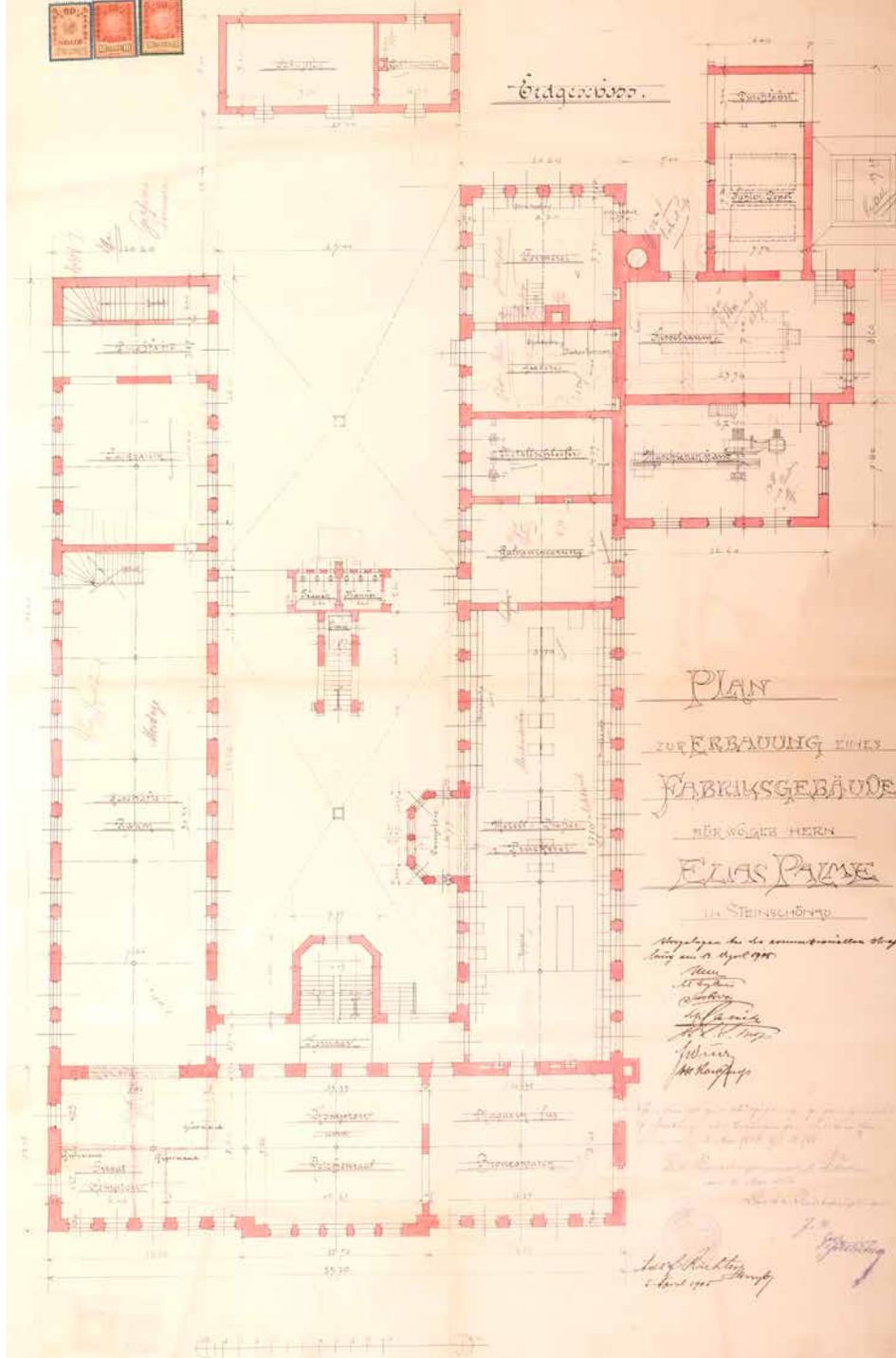


Kamenický Šenov, Elias Palme chandelier factory, house No. 686, view from the south; left: form works and foundry with a smokestack; right: main building; Photo: Jiří Vidman 2020.

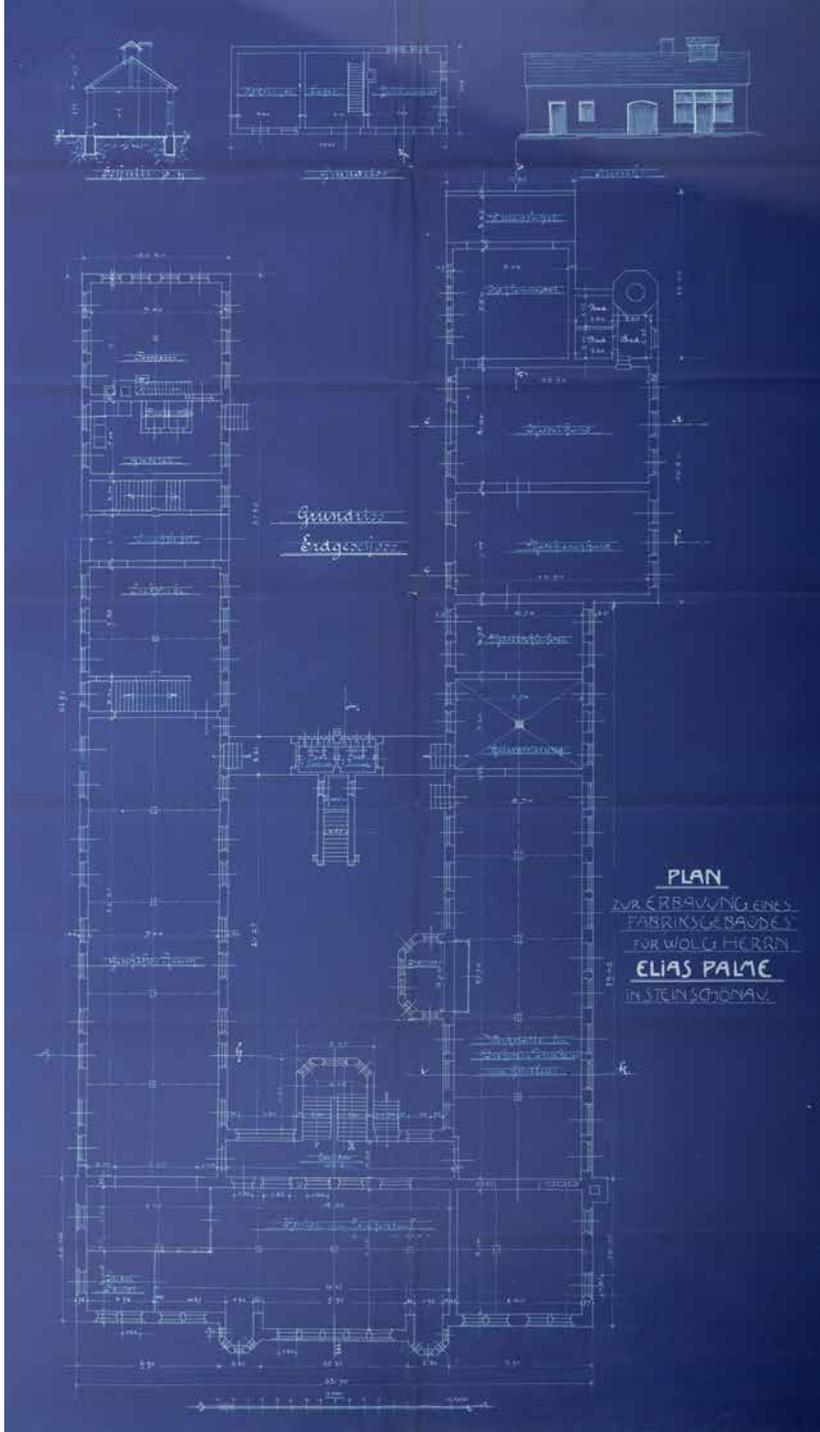
No. 686 Kamenický Šenov – Elias Palme chandelier factory

Chandelier production under the Elias Palme firm dates back to 1849. The original production complex, house No. 168, is situated east of the new factory between Dlouhá and Lidická Streets. Due to its insufficient capacity, the company decided to build a new factory in 1904. The construction took place in 1905 according to plans by builder Adolf Richter of Kamenický Šenov and received the final approval early in 1906. The preserved building plans and construction agenda make it possible to investigate the differences between the design and the implementation, as well as the planned use of the individual spaces. Changes in the implementation concern both the façade and the interior layout. The individual floors of the building's front wing were accessed via a staircase in the courtyard section. The basement was used for storage and sanitary facilities, along with a tinsmith workshop, a soldering workshop and an acid storage in the right wing. On the ground floor was an office, the drawing room and a bronze ware storage in the front wing. In the left wing was a large trading (sales) room with a staircase to the first floor, a package room, a passageway, a foundry with furnaces and the form works. More than half of the right wing's length was occupied by a lathe and printing workshop with a five-sided annexe into the courtyard and girdler works, followed by smaller rooms of the galvanizing workshop, metal grinding works and, at the end, the engine room, coal storage and a passageway. In the front wing of the first floor was an exhibition hall accompanied by two storages, followed in the left wing by a large room for cut glass, a semi-finished product storage and other storages, a photographic atelier with a darkroom and a modelling chamber. A glass grinding workshop and a grinding stone and sand storage were eventually located in the right wing.⁴⁷

47 SOKA Děčín, OÚ Děčín, Inv. No. 160, sign. 11 43/951. Kamenický Šenov Building Authority, Building Archives, file of house No. 686. BERAN – VALCHAŘOVÁ 2007, p. 23.



Kamenický Šenov, Elias Palme chandelier factory, house No. 686, main building construction plan (1905, Adolf Richter, Kamenický Šenov), ground floor plan (approved version); bottom: main wing with offices, drawing room and bronze ware storage; staircase in the courtyard section; right wing: lathe and printing workshop, electroplating workshop, metal grinding works, foundry and form works; adjacent to them: engine room, boiler room, smokestack and coal storage with a passageway; left wing: trade premises, packaging room and passageway. SOKA Děčín, OÚ Děčín, Inv. No. 399, sign. 11 43/951.



Kamenický Šenov, Elias Palme chandelier factory, house No. 686, main building construction plan (1905, Adolf Richter, Kamenický Šenov), ground floor plan (real implementation); change to the layout is visible above all in the right wing where the energy background was moved to the courtyard section, the foundry and form works to the left wing, which was made slightly longer; topmost: storage with brass furnace. SOKA Děčín, OÚ Děčín, Inv. No. 399, sign. 11 43/951.



Kamenický Šenov, Elias Palme chandelier factory, house No. 686, view from the northeast; front: main building with two courtyard wings; rear: foundry with a smokestack. Photo: Jiří Vidman 2020.

The chandelier factory's machinery equipment was driven by an 80 HP steam engine. There were 36 machines in the grinding workshop. The first construction adaptations and various annexes followed shortly after the final approval of the new factory. A warehouse with a brass furnace and a storage with a sand washing room were built in the courtyard as early as 1905. More annexes followed in 1910, including a packing house near the courtyard façade of the left wing. More buildings were built at the southwestern edge of the complex in 1912 – a single-storey workshop and storage building along Lustrárenská Street and new a form works and foundry on the very edge of the factory premises. More changes are only registered from 1920. The most extensive project was the addition of a ground-floor wing next to the north courtyard in 1925 according to plans by Franz and Max Eschler of Česká Kamenice. The courtyard was then enclosed by another two-winged building with storage facilities. After the nationalization in 1945, the factory went under the national company Lustry. Modern reconstructions affected the left wing above all; the demolition of the engine room, the boiler room and the adjacent smokestack was a considerable loss. The production ended in 1972 after the construction of a new glassmaking combined plant in the lower part of the town. The premises then started to dilapidate, a process that was considerably deepened rather than stopped by the unsuccessful privatization in the 1990s. Most buildings and parts thus gradually got into a critical condition with falling roofs and load-bearing structures, and some parts are already within a destruction horizon.⁴⁸

48 SOKA Děčín, OÚ Děčín, Inv. No. 1836, sign. Kamnitz 11 43/408 and 11 43/575. Kamenický Šenov Building Authority, Building Archives, file of house No. 686. FAHDT 1907, p. 146. *Adressbuch der Glas-Industrie* 1929, p. 536.



Kamenický Šenov, Elias Palme chandelier factory, house No. 686, view from the southwest into the courtyard of the main building during its construction; centre: main staircase; left: boiler and engine wing. Stanislav Kopecký's collection.

Kamenický Šenov, Elias Palme chandelier factory, house No. 686, view of the main building from the northeast during its construction; the boiler house smokestack is already standing in the background. Stanislav Kopecký's collection.





Kamenický Šenov, Elias Palme chandelier factory, house No. 686, view of the main building from the northeast; front: the most imposing front wing; the new foundry's smokestack is already standing in the background to the left; the old foundry is situated at the end of the left wing. Petr Joza's collection.

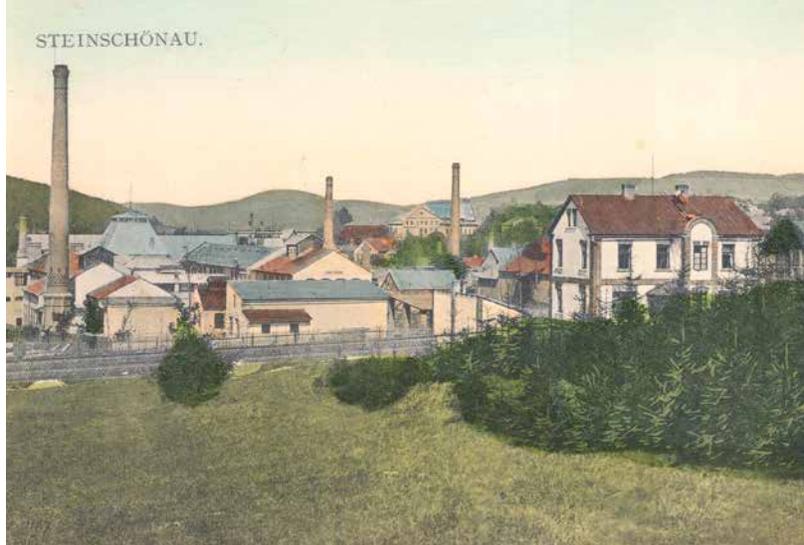


Kamenický Šenov, Elias Palme chandelier factory, house No. 686, view of the front wing of the main building from the north. Photo: author, 2014.



Kamenický Šenov, Elias Palme chandelier factory, house No. 686, first floor of the front wing of the main building; former exhibition hall; view through the ceiling into a tower-like extension; dropped ceilings of gypsum boards with rich stucco decoration. Photo: author, 2016.

Kamenický Šenov, Elias
Palme chandelier factory,
house No. 686, view from
the west; the foundry is still
missing in the front (built
1912); left: boiler house with
a smokestack, engine room
and coal storage; right, at
the end of the wing: old
foundry with a smoke-
stack. Ladislav Komůrka's
collection.



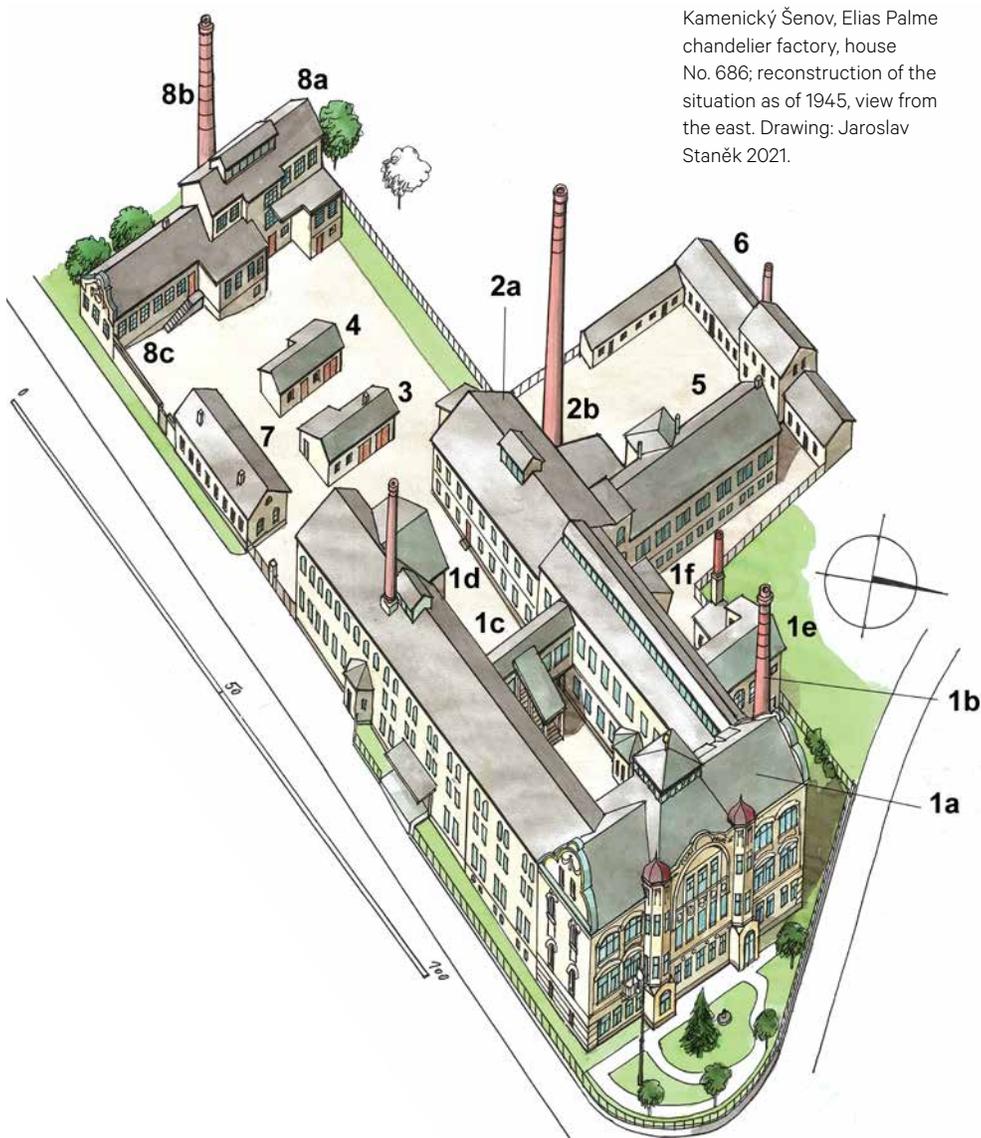
Kamenický Šenov, Elias
Palme chandelier factory,
house No. 686, view from
the staircase of the front
wing of the main building
into the courtyard; the side
wings are connected by
an annexe with a staircase.
Photo: author, 2016.



Kamenický Šenov, Elias
Palme chandelier factory,
house No. 686, view of the
foundry (from 1912) from
the courtyard from the
northeast; the form works
follow to the left. Photo:
author, 2014.



The chandelier factory complex was declared a cultural monument for its undoubted architectural qualities and culture-history significance. Its importance lies above all in the location of the finishing technique workshops and the following chandelier production, completion and dispatch operations in a single self-contained whole. The chandelier factory is undoubtedly the most important glass refining complex in the Bor – Šenov area. The main building and especially its front wing became a new dominant of the town in 1905 and properly represented the most important chandelier factory in the Bohemian lands of world renown. The current repeated sales of the premises are speculative and do not lead to the rescue of the monument. Before the time of destruction and stealing, the local buildings had been preserved in a very authentic condition with many valuable structural elements and details such as the stucco decoration, metal grilles, joinery elements or ceramic facing.

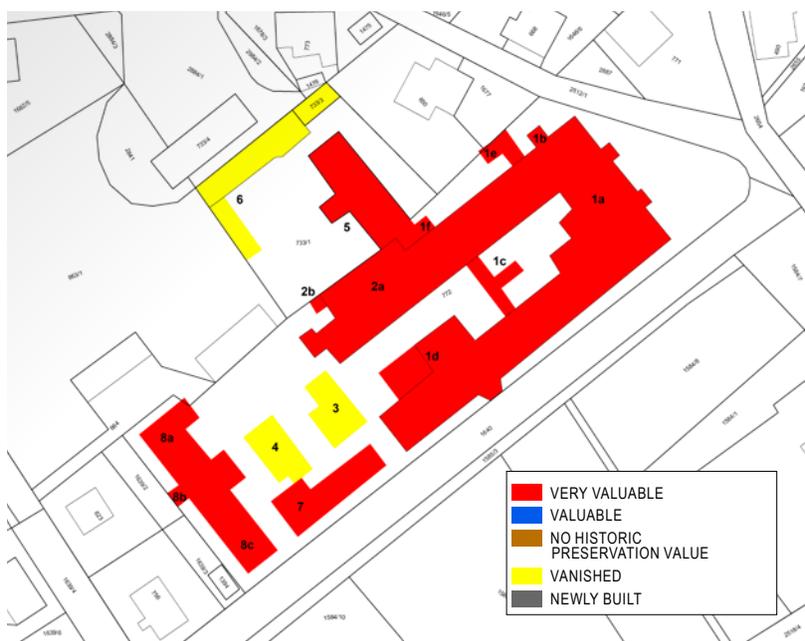


Kamenický Šenov, Elias Palme chandelier factory, house No. 686; reconstruction of the situation as of 1945, view from the east. Drawing: Jaroslav Staněk 2021.

Kamenický Šenov,
Elias Palme chandelier
factory, house No. 686,
building-history
assessment.
Vladimír Vrabec, 2022.
Map base © Czech
Office for Surveying,
Mapping and Cadastre.



Kamenický Šenov,
Elias Palme chandelier
factory, house No. 686,
historic preservation
assessment.
Vladimír Vrabec, 2022.
Map base © Czech
Office for Surveying,
Mapping and Cadastre.



- 1a main building, 1905
- 1b smokestack, 1905
- 1c connecting corridor with staircase and lavatories, 1905
- 1d packing room reconstruction, 1910 and 1928/29
- 1e annexe, 1906, brass furnace, 1928/29
- 1f etching works annexe, 1928/29
- 2a boiler room, engine room, coal storage, 1905, rebuilt after 1945
- 2b smokestack, 1905

- 3 storage, 1905, brass furnace annexe, 1906
- 4 storage, sand washer, 1905, annexe, 1906
- 5 north courtyard, storage and work hall annexe, 1925
- 6 north courtyard, storages, 1925
- 7 workshop and storages, 1912
- 8a foundry, 1912
- 8b smokestack, 1912
- 8c form works, 1912

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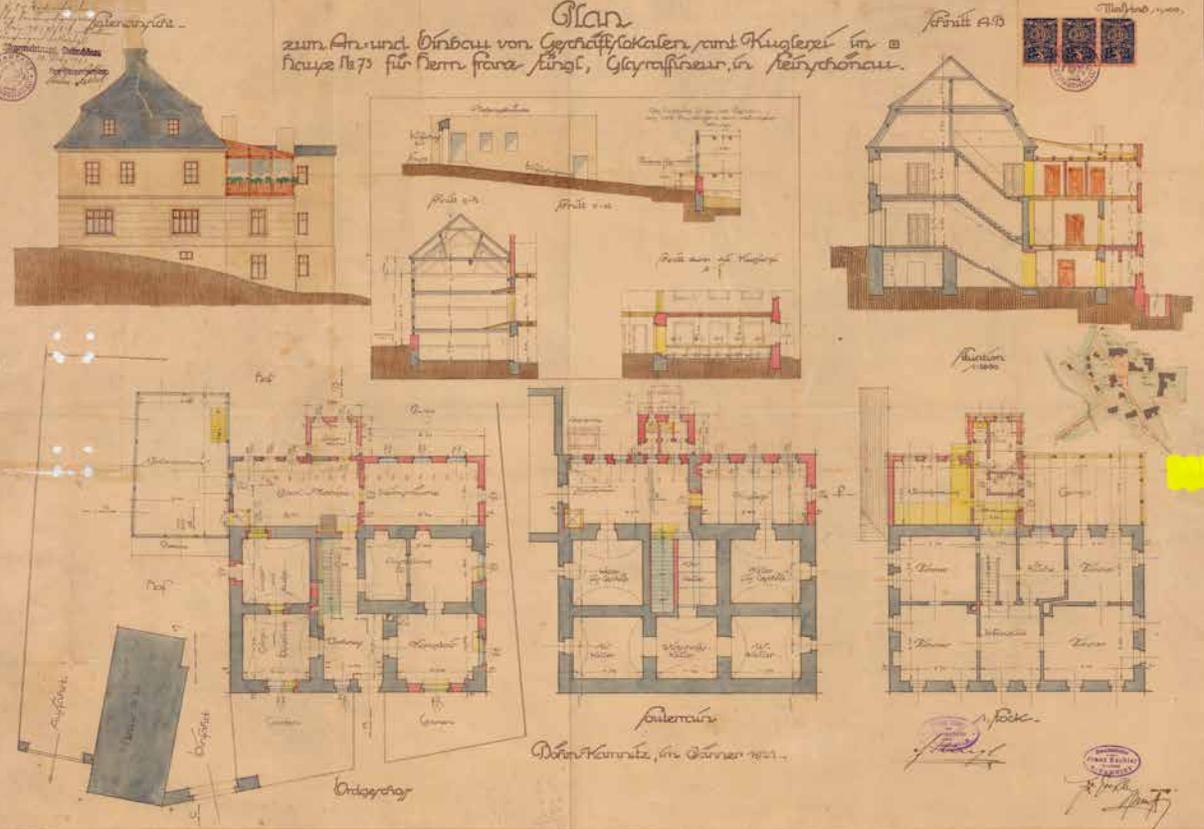
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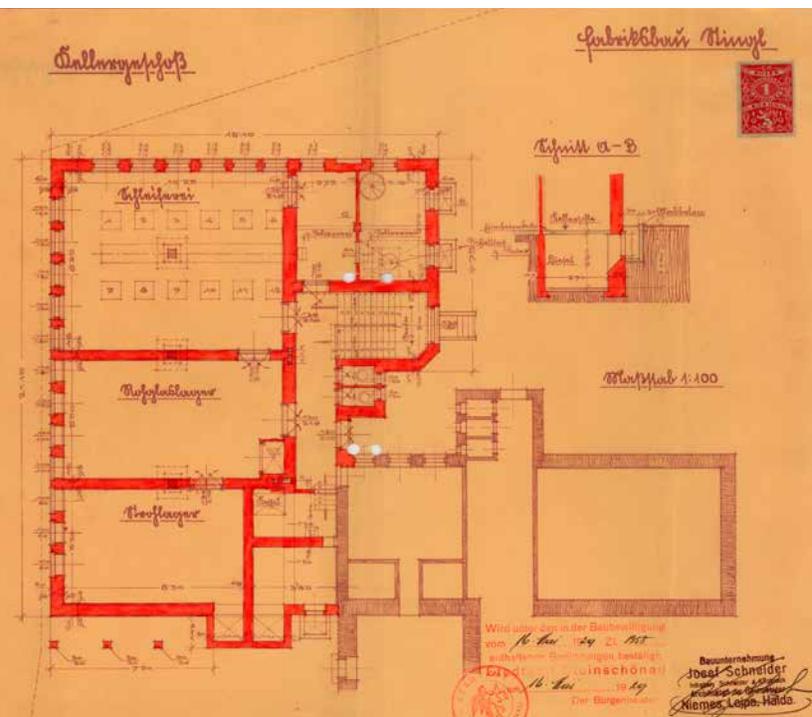
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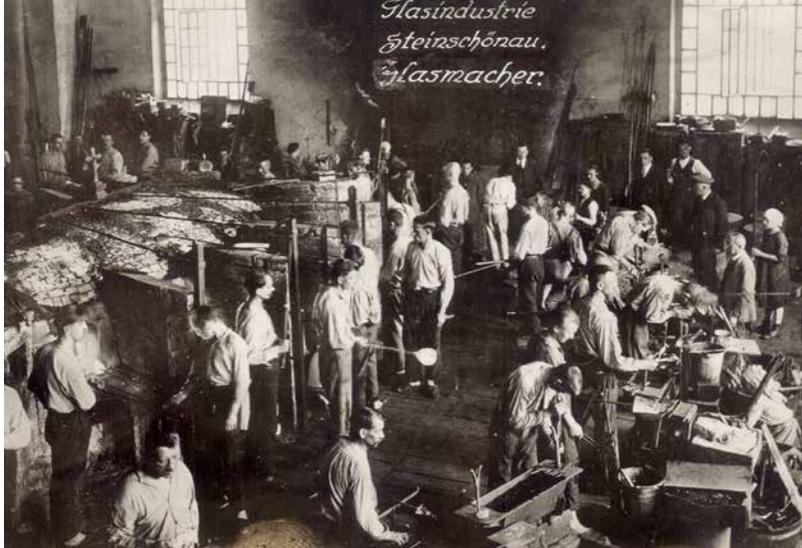


Kamenický Šenov, plan for the extension of earlier Classicist building, house No. 73, Franz Stingl finishing works (Franz Eschler, 1921). Bottom from the left: ground floor plan (in the original building: hall; right: trade and sample room; left: storages; red: new courtyard annexe with packing room and handling room); basement floor plan (storages; in a new annexe: cutting lathe workshop with five machines, sand washing room and lavatories); right: first floor plan (residential areas with background). Kamenický Šenov Building Authority, Building Archives, file of house No. 73.

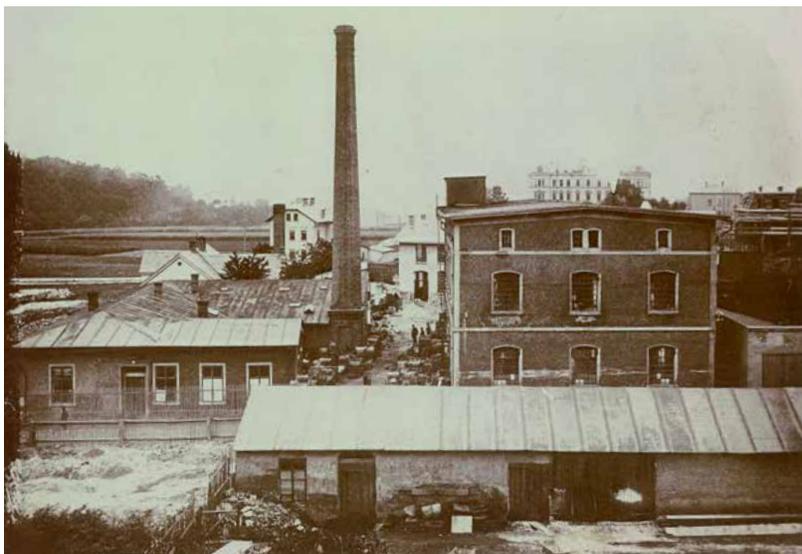


Kamenický Šenov, plan of the basement of a new factory building of house No. 73, Franz Stingl finishing plant (Josef Schneider, 1929). Top: grinding works with twelve machines; middle: semi-finished product storage; bottom: straw storage; right in the courtyard section: two polishing works rooms, staircase and lavatory. Kamenický Šenov Building Authority, Building Archives, file of house No. 73.

Kamenický Šenov,
 glassworks complex, house
 No. 687, view into the
 interior of the glassworks
 hall with a Siemens-Siebert
 melting furnace. Stanislav
 Kopecký's collection.



Nový Bor, view from
 the northeast (from
 B. Eggermanns Street) of
 Brüder Mechold finishing
 works, house No. 302
 along present-day Sklářská
 Street (the buildings
 were considerably rebuilt
 later); left: boiler room with
 smokestack (vanished);
 in the background: glass
 school, house No. 316. Glass
 Museum Nový Bor.



Nový Oldřichov, view from
 the south (c. 1910) of Müller
 & Friedrich finishing works,
 house No. 2, façade with
 distinctive structure of Art
 Nouveau character.
 Petr Joza's collection.



Glasraffinerie: Müller & Friedrich, Ullrichsthal



Kamenický Šenov, the drawing (Josef Palme, second third of the 19th century) depicts house No. 69, used as finishing works of Josef Zahn & Comp., from the north; left: vanished wagon sheds. Česká Lípa National History Museum and Gallery, sign. V-1431.

RESÜMEE

INDUSTRIELLES ERBE. GLASHERSTELLUNG IN DER REGION BOR – ŠENOV

MIROSLAV KOLKA

Die Publikation widmet sich primär Bauwerken und technologischen Einrichtungen, die mit der Glasherstellung zusammenhängen. Der Prozess der Glasproduktion und Glasveredelung umfasst eine breite Skala von Betrieben, von der Vorbereitung der Rohstoffe über die Glashütten bis zu den Raffinerien. Diese Betriebe sind mit Gebäuden repräsentiert, in denen mehrere oder auch nur eine Veredelungstechnik vertreten war. Typische Beispiele der zweiten Art sind Glasschleiferei oder Glasmalerei. Bei Betrachtung des komplexen technologischen Ablaufs gilt die Aufmerksamkeit auch der Gewinnung der Rohstoffe für die Glasindustrie, deren Transport, der Energieversorgung für die Produktionsgebäude (Wasserantrieb, Versorgung mit Wasser, Strom und Gas), dem spezifischen Maschinenbau für die Glasindustrie, sowie der Produktion von Komponenten für das Glas (Herstellung der Rahmen, Metallelemente, Kisten, Holzwolle u. ä.). Räumlich konzentriert sich die Arbeit auf das Produktionsgebiet Bor-Šenov, das zu den bedeutendsten Regionen dieser Branche in der Tschechischen Republik zählt. Es liegt in Nordböhmen in der Umgebung der Städte Nový Bor, Kamenický Šenov, Česká Kamenice und Chřibská, d. h. auf dem Gebiet der heutigen Kreise Česká Lípa (Bezirk Liberec) und Děčín (Bezirk Ústí). Seit dem 17. Jahrhundert findet hier insbesondere eine große Konzentration von Glasraffinerien und des Glashandels statt. Im Kern des Gebiets hat der überwiegende Teil der Gebäude irgendwie mit der Glasproduktion zu tun. Zeitlich liegt der Schwerpunkt der Arbeit vor allem von der 2. Hälfte des 18. Jahrhunderts bis zur Mitte des 20. Jahrhunderts, d. h. während der protoindustriellen und industriellen Produktion. Erkenntnisse zur älteren Entwicklung der Problematik werden nur in notwendigen Zusammenhängen angeführt, weil sie sich bis auf Ausnahmen nicht auf die erhaltenen Gebäude der Glasfertigung beziehen. Als Rahmen der Forschung kann man das Jahr 1945 und die Verstaatlichung der einzelnen Betriebe setzen. Die Entwicklung danach, die im Hinblick auf die Bedeutung der Glasindustrie ein anspruchsvolles Studium von Archivquellen, der institutionellen und technologischen Entwicklung verlangt, wird nur in Grundzügen verfolgt.

Das erste Kapitel wird den charakteristischen Merkmalen des Gebiets gewidmet. Dieser Teil möchte auf die geologische Besonderheit des Lausitzer Gebirges, dessen Vorlandes und des anschließenden Elbsandsteingebiets und des Böhmisches Mittelgebirges hinweisen, die das Ansiedeln der Glashütten infolge geeigneter Bedingungen in den hiesigen weiten Wäldern vorbestimmte. Im Mittelalter und der frühen Neuzeit waren die notwendigen Voraussetzungen für die Konzentration von Glasbetrieben ausreichende Holzvorräte zum Beheizen der Glashütten und zur Herstellung von Pottasche und außerdem auch das Vorkommen von Quarz, Quarzsand und Kalkstein. Die erwähnten Rohstoffe und einen qualitativ wertvollen Sandstein konnte man insbesondere entlang der sog. Lausitzer Verwerfung gewinnen, die im betrachteten Gebiet in einer Linie von der deutschen Grenze über Kopec, Brtníky, Vlčí Hora, Doubice, Jiřetín pod Jedlovou, Dolní Podluží und dann wieder auf der deutschen Seite der Grenze verläuft. Die rasche Entwicklung der Glasindustrie im 17.–20. Jahrhundert wurde wesentlich beeinflusst durch das Engagement der Besitzer der hiesigen Domänen, die gesamte wirtschaftliche und demografische Entwicklung der Siedlungen sowie deren Lage an zahlreichen, zur Nutzung der Wasserenergie geeigneten Wasserläufen im Gebirge oder dem Vorland.

Das nächste Kapitel fasst die Grundzüge der historischen Entwicklung der Glasherstellung auf diesem Gebiet zusammen und versucht dabei die wichtigsten Meilensteine hervorzuheben, die einen Einfluss auf die Entstehung und die räumliche Verteilung von Glashütten, Glasveredelungsbetrieben und dem Glashandel insbesondere in der Zeit des rapiden Aufschwungs im Laufe des

17. bis 20. Jahrhunderts hatten. Die Geschichte der Glasfirmen, die Entwicklung ihrer Vermögenslage, die kunsthistorische Entwicklung des Glases sowie weitere Zusammenhänge werden nur im notwendigen Umfang im Bezug zu den eigentlichen Produktionsgebäuden erwähnt. Im Lausitzer Gebirge und dem anschließenden Teil des Dečiner Hügellands sind Glaswerke bereits seit der 2. Hälfte des 13. Jahrhunderts archäologisch belegt. Es handelt sich dabei, zusammen mit dem Erzgebirge, um die ältesten Belege von Glasproduktionsstätten in Böhmen. In der Zeit vom 13. bis zum 15. Jahrhundert sind mehrere Dutzend Standorte von Glashütten auf dem Gebiet Bor-Šenov belegt, weitere Standorte wurden im Gelände auch für das 16.–18. Jahrhundert gefunden, deren Anzahl ist jedoch geringer. Der älteste schriftliche Beleg ist die Erwähnung einer Glashütte im Daubizer Wald aus dem Jahr 1457. Eine wesentliche Rolle in der Region spielte die Glashütte in Horní Chřibská, die wohl zwischen den Jahren 1457 und 1504 gegründet wurde und bis zum Anfang des 21. Jahrhunderts ununterbrochen im Betrieb war. Die zweitwichtigste Hütte war die Glashütte in Falknov, die von 1530 bis zum Anfang der 1750er Jahre betrieben wurde. Um diese beiden Betriebe konzentrierten sich Glasveredelungsbetriebe, die in der 2. Hälfte des 17. Jahrhunderts durch die Gründung der Glasmacherinnungen gefördert wurden. Seit dieser Zeit wurde das Gebiet Bor-Šenov zum einem der bedeutendsten Zentren der Glasveredelung und des Glashandels. Wichtige Zentren waren Polevsko, Kamenický Šenov, Skalice, Falknov und Kytlice und nach der Hälfte des 18. Jahrhunderts Haida (Nový Bor), das zur Stadt erhoben wurde. Zu bedeutenden Branchen wurden die Herstellung von Kronleuchtern (Prácheň, Kamenický Šenov) und von Spiegeln (Spiegelfabriken von Kinsky in Sloup, Lindava und Umgebung). Eine wesentliche Verwandlung erlebte die Hüttenproduktion im letzten Viertel des 19. und ersten Viertel des 20. Jahrhunderts. Die letzten funktionierenden alten Glashütten in Horní Chřibská und Nová Huť (Hier wurde der Betrieb 1875 stillgelegt) wurden damals in mehreren zeitlichen Wellen durch achtzehn neue Glashütten mit modernen Schmelzöfen ergänzt. Zur Beheizung der Öfen wurde statt der Mangelware Holz Braunkohle und daraus produziertes Generatorgas verwendet. Neue Betriebe konzentrieren sich typisch in der Nähe der entstandenen Eisenbahnstrecken.

Der folgende Teil der Arbeit wird der technischen und baulichen Entwicklung der Objekte gewidmet, die mit den komplexen technologischen Abläufen der Glasproduktion verbunden sind. Wir präsentieren hier übersichtlich die festgestellten angewendeten Technologien und die dafür bestimmten maschinellen Einrichtungen. Zusammengefasst werden auch Material sowie Konstruktions- und Dispositionsmerkmale der einzelnen Bauten und Gelände. Zuerst wird die Aufmerksamkeit der Rohstoffvorbereitung gewidmet, dann den Objekten der Primärproduktion, d. h. den Glashütten, deren Öfen und der Herstellung der Glashäfen und Formen, danach den Raffinerien (insbesondere Glasschleifereien und Malereien), der Herstellung von optischem Glas, Tafelglas, Spiegeln und Leuchtern und schließlich dem Glasmaschinenbau und dem Transport (vor allem mit der Bahn).

Dann folgt das Register der Orte mit Glasbetrieben, in welchem kurz die wesentlichen Angaben zu allen Siedlungen in dem jeweiligen Glasmachergebiet genannt werden. Bei jedem Ort wird die Spezialisierung auf einen konkreten Typ der Glasproduktion angeführt, die Folgen der Konzentration dieser Bauten auf die urbane Entwicklung des Ortes und die Aufzählung der lokalisierten Bauten mit wichtigen Informationen über jeden Betrieb angeführt. Die Aufmerksamkeit richtet sich vor allem auf Anlagen und Objekte, die einen ausgeprägten Produktions- oder Industriecharakter aufweisen. Die Tatsache, dass man in vielen Siedlungen den überwiegenden Teil der Bauten mit der Branche in Verbindung setzen kann, macht es nicht möglich, eine komplette Aufzählung aller hier wirkenden Firmen zu erstellen. Das würde den Rahmen dieser Publikation sprengen. Das Register der Orte ist alphabetisch nach Katastergeländen und im Rahmen dieser Gebiete nach Branchen geordnet. Zur Übersicht ist jeweils eine Karte mit Lokalisierung der durch die Untersuchung erfassten Bauten beigefügt.

Die wertvollsten Anlagen werden im Katalog der Kulturdenkmäler und des Kulturerbes ausführlich beschrieben. Allgemein wird hier auch auf die Problematik des Denkmalschutzes der verfolgten Branche eingegangen. Die wichtigsten Parameter für die Einordnung einer Anlage in den Katalog sind Authentizität der Bauten, die Komplexität der Erhaltung der Produktionsanlage und deren Besonderheit hinsichtlich Konstruktion und Technologie. Zu den bedeutendsten Industrieanlagen des Gebiets zählen vor allem die authentisch erhaltene und bis heute betriebene Glashütte der Gebrüder Jílek in Kamenický Šenov, die benachbarte und ebenfalls funktionierende Glashütte Adolf Rückl, die anschließenden Arbeiterhäuser und die Bahnstation. Von den Glashütten sei die mit der ältesten Geschichte in Horní Chříbská erwähnt, das authentisch erhaltene Haus des Hüttenmeisters und die Arbeiterhäuser, die Glashütte in Svor mit einem ähnlichen Ensemble, die Glashütte Anton Rückl in Skalice und Franz Vetter in Kamenický Šenov oder auch die noch heute funktionierenden Glashütten in Polevsko (Klára) und Nový Bor (Flora, später Hantich). Von den Glasveredelungsbetrieben sind als Denkmal am wertvollsten die Raffinerien Gebrüder Zahn und Gebrüder Rachmann in Nový Bor sowie die einmalig gestaltete Malerei mit Musterraum der Firma Karl Meltzer in Okrouhlá. Zu einem ikonischen Bauwerk der hiesigen Glasindustrie wurde die Lüsterfabrik der Firma Elias Palme in Kamenický Šenov, die sich trotz ihrer unbestrittenen Bedeutung und dem Denkmalschutz heute in einem Havariezustand befindet. Dank der Untersuchung wurden auch sehr wertvolle Objekte kleinerer Schleifereien oder Malereien entdeckt, häufig mit erhaltenen Wasserwerken und Resten der maschinellen Einrichtung. Außerordentliche Bauten stellen auch die Spiegelfabriken von Kinsky dar, von denen die monumentale, historisierende Rabensteiner Spiegelschleiferei und –poliererei und die ältere barocke sog. Wellnitzer Spiegelschleiferei und –poliererei mit einem einzigartigen Wasserwerk hervorzuheben sind. Von den Glasmaschinenbaubetrieben ist zweifellos das Gelände der Firma Gebrüder Rachmann in Nový Bor als das Wertvollste zu bezeichnen. Die verfolgten Themen werden von Kartenanlagen, Zeichnungen, Reproduktionen der historischen Plandokumentation, der historischen und gegenwärtigen Fotografien illustriert.



Kamenický Šenov, view from the west across the trackage to the premises of the Bratři Jílkové glassworks, No. 687, second quarter of the 20th century. Pavel Čech's collection.

PODSUMOWANIE

DZIEDZICTWO PRZEMYSŁOWE. PRODUKCJA SZKLARSKA NA OBSZARZE BORSKO - ŠENOVSKIM

MIROSLAV KOLKA

Publikacja jest poświęcona w pierwszej kolejności budowom i urządzeniom technologicznym powiązanych z produkcją szklarską. Proces produkcji szkła i jej udoskonalania (rafinacja) zawiera różnorodną skalę zakładów począwszy od transportu surowca, hale hutnicze i rafinerie, reprezentowane budynkami zawierającymi więcej technik rafineryjnych, lub tylko jedną z nich. Typowym przykładem drugiego typu są szlifiernie lub malarnie szkła. W ramach badanego kompleksowego toku technologicznego uwaga jest poświęcona również pozyskiwaniu surowca do produkcji szklarskiej, jego transportowi, zapleczu energetycznemu budynków produkcyjnych (wzrostki wodne, zaopatrywanie w wodę, energię elektryczną, gaz), zakładom maszynowym ukierunkowanym na produkcję maszyn do produkcji szkła jak również produkcji komponentów do kompletowania produktów (produkcja ramek, akcesoriów metalowych, pudeł, wełny drzewnej itp.). Praca jest terytorialnie ograniczona obszarem produkcji szklarskiej borsko – šenovskim, który w kontekście ogólnokrajowym należy do najbardziej znaczących regionów w tej branży. Jest on usytuowany w Czechach Północnych w okolicy miast Nový Bor, Kamenický Šenov, Česká Kamenice i Chřibská, to znaczy na obszarze obecnych powiatów Česká Lípa (Kraj Liberecki) i Děčín (Kraj Ústecki). Przede wszystkim koncentracja rafinerii szkła i handlu ze szkłem jest tu wyjątkowa od XVII wieku do czasów ówczesnych. W centrum obszaru można w jakiś sposób łączyć ze szkłem przeważającą część budowli. Centrum pracy jest czasowo ukierunkowane przede wszystkim na okres od 2. połowy XVIII wieku do połowy wieku XX, to znaczy na produkcję proto-przemysłową i przemysłową. Informacje dotyczące starszego rozwoju problematyki są wymienione tylko w niezbędnych powiązaniach, ponieważ oprócz wyjątków nie dotyczą one dochowanych budynków przemysłu szklarskiego. Ramowo można badania ograniczyć rokiem 1945 i znacjonalizowaniem poszczególnych firm. Rozwój po wymienionej dacie, który ze względu na znaczenie przemysłu szklarskiego jest trudny do przestudiowania źródeł archiwalnych, instytucjonalnych i rozwoju technologicznego, jest badany tylko w rysach podstawowych.

Pierwszy rozdział jest poświęcony charakterystyce obszaru. Zamierzeniem tej części jest przejrzyste prezentowanie specyfików geograficznych Gór Łużyckich, ich podgórze i nawiązujących Piaskowców Łabskich u Wśródgórze Czeskiego, które przyczyniło się do wytyczenia umiejscowienia hut szkła na tutejszych rozległych przestrzeniach leśnych. W średniowieczu i wczesnym nowym wieku na koncentracje zakładów szklarskich niezbędną przesłanką był dostatek drewna na opał w piecach szklarskich i do produkcji potażu jak również występowanie kwarcu, piasku kwarcowego i wapienia. Wymienione surowce i wyższej jakości piaskowiec można było eksploatować przede wszystkim wzdłuż tzw. złomu łużyckiego”, który biegł przez dany obszar mniej więcej w linii od granicy niemieckiej przez Kopec, Brtníky, Vlčí Hora, Doubice, Jiřetín pod Jedlovou, Dolní Podluží a dalej znów na niemiecką stronę granicy. Silny rozwój przemysłu szklarskiego w XVII – XX wieku wpłynął również w znacznym stopniu na właścicieli tutejszych posiadłości, ogólny rozwój gospodarczy, rozwój demograficzny tutejszych siedlisk i ich usytuowanie na czeskich górskich i podgórskich tokach wodnych, odpowiednich do wykorzystania energii wodnej.

Następny rozdział podsumowuje podstawowe rysy rozwoju historycznego produkcji szklarskiej w danej okolicy z uściłowaniem o utrzymanie ważnych znaków wytycznych, które miały wpływ na powstanie i umiejscowienie hut szkła, zakładów rafineryjnych i handlu szkłem, przede wszystkim w okresie ich burzliwego rozkwitu w ciągu od XVII do XX wieku. Historia firm szklarskich, rozwój ich stosunków majątkowych, artystyczno - historyczny rozwój szklarstwa i dalsze powiązania są

wspominane tylko w niezbędnym rozmiarze w stosunku do budynków produkcyjnych. W Górach Łużyckich i nawiązującej na nie części Děčíńskiej Krainy Pagórkowatej są archeologicznie udokumentowane zakłady szklarskie już od 2. połowy XII wieku. Wraz z Rudawami chodzi tu o najstarsze przykłady obiektów produkcji szkła w Czechach. Za okres od XII do XV wieku jest na obszarze borsko-šenovskim udokumentowano kilkadziesiąt miejsc z hutami szkła, dalsze miejsca były odzyskane na tym terenie i z okresu XVI-XVII wieku, których ilość jest jednak mniejsza. Najstarszą wzmianką pisemną są informacje o hucie szkła w Lesie Doubickim z roku 1457. Kluczową rolę w regionie miała huta szkła w Horní Chříbské, założona najprawdopodobniej między latami 1457 i 1504 i funkcjonująca bez przerwy aż do początku XXI wieku. Drugim najważniejszym obiektem była huta szkła w Falkovie, eksploatowana od roku 1530 do początku lat pięćdziesiątych XVIII wieku. Wokół tych dwóch zakładów koncentrowały się stopniowo centra rafinacji szkła, wsparte w 2. połowie XVII wieku cechami szklarskimi. Od tego czasu obszar borsko-šenovski stał się jednym z najbardziej znaczących ośrodków rafinacji szkła i handlu z tymi artykułami. Ważnymi centrami stały się Polevsko, Kamenický Šenov, Skalice, Falknov i Kytlice a po połowie XVIII wieku Haida (Nový Bor), która uzyskała prawa miejskie. Ważną branżą stała się też produkcja żyrandoli (Prácheň, Kamenický Šenov) i produkcja zwierciadeł (zakłady produkcji zwierciadeł rodu Kinských w Sloupie, v Lindavie i ich okolicy). Zasadniczą zmianę absolwowała produkcja hutnicza w ostatnim kwartale XIX i pierwszym kwartale XX wieku. Pozostałe funkcjonujące stare huty szkła w miejscowościach Horní Chříbská i Nová Hut (tu zakończono produkcję w roku 1875) były w kilku falach czasowych tego okresu dopełnione osiemnastu nowymi hutami szkła ze współczesnym typem pieców hutniczych. Do ogrzewania pieców wykorzystywano ze względu na niedostatek drewna też węgiel brunatny i produkowany z niego gaz generatorowy. Nowe zakłady są koncentrowane odpowiednio w pobliżu tras kolejowych.

Następna część pracy jest poświęcona rozwojowi technicznemu i budowlanemu obiektów połączonych z kompleksowym tokiem produkcji hut szkła. Są tu przejrzysto prezentowane wykorzystywane stwierdzone technologie i przeznaczone do tego urządzenia maszynowe. Są też podsumowywane charakterystyki materiałowe, konstrukcyjne i dyspozycyjne poszczególnych budynków i arealów. Uwaga jest najpierw poświęcona przygotowywaniu surowca potrzebnego dla huty szkła, następnie obiektom pierwotnych produkcji, to jest halom hutniczym i ich piecom, produkcji panwi szklarskich i form, następnie produkcji rafineryjnej (przede wszystkim szlifierniom i malarniom szkła), produkcji szkła optycznego, tafłowego szkła i zwierciadeł, żyrandoli i w końcu maszynom szklarskim i transportowi (przede wszystkim kolejowemu). Następnie umieszczono Register miejsc z eksploatacją hut szkła, w którym są zwięźle podane podstawowe dane dotyczące siedlisk danego obszaru szklarskiego. Przy każdym jest podana specjalizacja na konkretny dany typ produkcji szkła, wpływ koncentracji tych obiektów na rozwój urbanistyczny miejsca i ilość lokalizowanych budowli z podaniem podstawowych informacji o każdej eksploatacji. Uwaga jest skierowana przede wszystkim na arealy i obiekty, które mają jasny charakter produkcyjny lub przemysłowy. Fakt, że w wielkiej ilości siedliskach można z daną dziedziną połączyć przeważającą część budynków, nie umożliwia wykonanie zupełnego spisu wszystkich działających tu firm. Byłoby to zupełnie poza możliwościami niniejszej publikacji. Rejestr miejsc jest umieszczony w kolejności alfabetycznej według umiejscowienia a w ramach tego według branż. Ze względu na przejrzystość zawsze jest umieszczona mapa z umiejscowieniem zawartych tu budowli.

Najcenniejsze arealy są analizowane bardziej szczegółowo w Katalogu Zabytków i Dziedzictwa Kulturowego. Ogólnie jest tu również oceniana problematyka ochrony zabytków danej branży. Kluczowym parametrem umieszczenia arealu w katalogu jest autentyczność budowli, kompleksowość utrzymania całości produkcyjnych i ich wyjątkowości konstrukcyjnej i technologicznej. Do najcenniejszych arealów przemysłowych obszaru można zaszeregować przede wszystkim autentycznie dochowaną i dotąd eksploatowaną hutę szkła Braci Jílków w Kamenickim Šenovie, sąsiadującą i również funkcjonującą hutę szkła Adolf Rückl, nawiązujące domy robotnicze i stację kole-

ową. Można tu również umieścić hutę szkła w miejscowości Horní Chřibská z najstarszą historią i autentycznie dochowanym domem mistrza hutnika i domami robotniczymi, hutę szkła w miejscowości Svor z podobnym zapleczem, hutę szkła Anton Rückl w Skalicy i Franz Vetter w Kamenickim Šenovie lub funkcjonującą dotąd hutę szkła w Polevsku (Klára) i Novým Borze (Flora, później Hantich). Z zakładów rafineryjnym można podać jako zabytkowo najcenniejsze rafinerie Gebrüder Zahn i Gebrüder Rachmann w Novým Borze i unikatowo rozwiązana malarnię i wzorcownię firmy Karl Meltzer w Okrouhlejš. Ikoniczną budową tutejszego przemysłu szklarskiego stała się fabryka żyrandoli firmy Elias Palme w Kamenickim Šenovie, która pomimo bezsprzecznego swego znaczenia i ochrony zabytkowej znajduje się obecnie w stanie awaryjnym. Badaniami identyfikowano również bardzo cenne obiekty drobniejszych szlifierni i malarni szkła, często z dochowanymi dziełami wodnymi i pozostałościami urządzeń maszynowych. Wyjątkowymi budowami są Zakłady Zwierciadeł Kinských, z których należy podkreślić monumentalnie historyzującą tzw. Rabštejnską Szlifiernię i Polerownię Zwierciadeł i starszą barokową tzw. Velenicką Szlifiernię i Polerownię Zwierciadeł z unikatowym dziełem wodnym. Najcenniejszym areałem przemysłu szklarskiego jest bez wątpienia zakład firmy Gebrüder Rachmann w Novým Borze. Oceniane tematy ilustrują załączniki mapowe, schematy, rysunki, reprodukcje planowych dokumentacji historycznych, fotografie ówczesne i obecnie istniejące.



Kamenický Šenov, Elias Palme chandelier factory, house No. 686; view from the northeast, after 1912. Stanislav Kopecký's collection.

INDUSTRIAL HERITAGE

GLASSMAKING IN BOR – ŠENOV AREA

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