Construction of the alumina and aluminum plant, Kidričevo, early 1950s. © Miran Kambič.

Slovenian industrial heritage — complexity of meanings, their preservation and regeneration

BY SONJA IFKO

Industrialization caused the biggest technological changes in human history, which called for not only new ways of working but also of living, education, and life as a whole. Eventually the world became the global market that we know today, when we are on the threshold of 5.0 Industry, when utopia is becoming reality. Despite its peripheral role, Slovenia started to change quite early under the influences of industrialization; these changes accelerated in the 19th century and gained momentum during socialist industrialization, when organized heritage protection started to develop extremely quickly – first it was used for socialist propaganda and then increasingly for concrete protection actions and regenerations.
In parallel, relevant domestic knowledge was developed and, particularly, awareness was raised about the significance of industrial heritage, testifying to the transformation of its value in space and time. The understanding of this is necessary for an effective, development-directed protection.

At the outset, this essay focuses on determining the values of Slovenian industrial heritage through the lens of understanding its development significance as the underlying rationale of construction and urbanization over the last 200 years, to provide guidelines for protection and regeneration of the heritage of industrial sites. As industrialization also involves socially, rather than only technologically, complex and spatially extensive processes, they should be addressed comprehensively, as these interactions are crucial to preserve its complex authenticity. Here, we need to stem from the essence of industrialization – its efficiency and rationality, which I understand as the fundamental intangible heritage component of industrialization. As Sir Neil Cossons put it, "industrial heritage is, arguably, a unique cultural discourse; it brings challenges found nowhere else in the heritage sector and requires new answers"[1].

Characteristics of industrialization as the basis for designing protective measures

To have a well-reasoned discussion on approaches to the protection and significance of a comprehensive evaluation of industrial heritage for steering its regeneration in the case of Slovenian industrial heritage, the most important development characteristics of industrialization and industrial construction from the mid-19th century onwards will be presented.

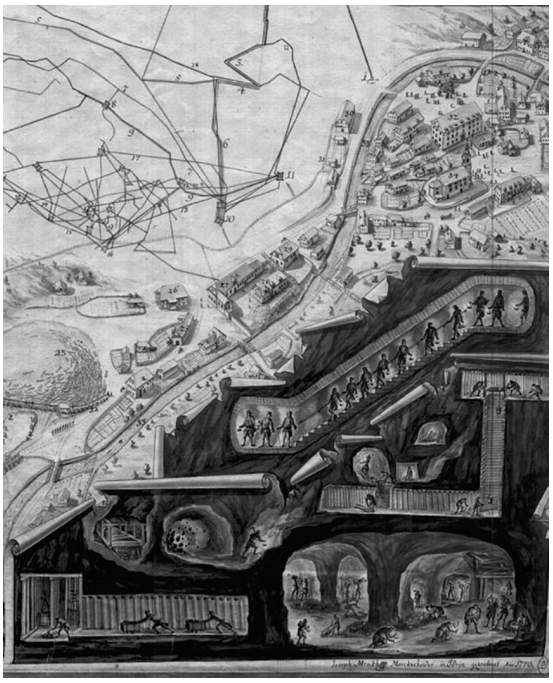
Early beginnings and the mercury mine in Idrija

Slovenian lands, which were under Austrian rule for a long time, eventually also became part of the Austro-Hungarian Empire (1876–1919). In 1919, Slovenia was united in the first South Slavic state, the Kingdom of Serbs, Croats, and Slovenes and received, for the first time in its history, the power of independent management of the national economy within its own territory. The Empire's periphery became the new national center, whose industrialization and urbanization, however, was never as strong as those in the centers of the Empire at the turn of the century.

Nevertheless, with its mercury mine, Slovenia importantly helped to shape industrialization and the world economy, practically from the 17th century onwards. Idrija Mercury Mine was the world's second biggest mercury mine. By exporting the mercury to South America, where Western European owners would extract silver from the ore with the help of mercury and then launch it on the global market, it became part of early globalization processes that gave rise to the growth of European capital and favorable conditions that culminated in a series of technological innovations, allowing for industrialization, first in Great Britain, then in Continental Europe, and beyond.

The Idrija mine, which was under direct rule of the Empire, brought to Idrija many experts from the center of the Empire, while urban life in this remote, difficult to reach town, squeezed in a small basin, developed much more intensively than in other regional centers. Around 1770, Idrija was the first town in Slovenia to have a theater, an administrative building, and a mercury storage facility, built between 1522 and 1533, whose design imitated castle architecture. During the time, many important mining technical structures were built, particularly the Idrija *klavže* from the 18th century – monolithic stone water barriers to enable the transport of wood, also called Slovenian pyramids.

Until the mid-19th century some important iron works and a few textile factories emerged, mostly built by foreign



01 Idrija with its mercury mine, as presented in 1770 by Jožef Mrak, the head cartographer, speleologist, and designer of the ***klavže*** water barriers, ore roasting plant, and other facilities both in Idrija and other parts of Austro-Hungarian Empire (e.g. smelting plant in Banska Štiavnica). © *Zgodovinski arhiv Ljubljana, Enota Idrija.*

investors and partially by the domestic nobility. The paper industry, led by domestic capital, saw good progress.

Growing industrialization along the *Suedbahn* Railway

Given its scope of industrialization, Idrija was a Slovenian exception until the mid-19th century when the Austro-Hungarian Empire decided to intensify industrialization by railway construction. First the *Suedbahn* [Southern] Railway was built between Vienna and Trieste (1840–1857) to link the center with the port and beyond.

The *Suedbahn* Railway that stretched practically along the entirety of Slovenia in the northeast-southwest direction was the lifeline of industrialization, while the centers excluded from it lost their power. The towns and cities along the railway grew considerably faster, particularly those that were directly attached to it, e.g. Maribor, where the *Suedbahn* Railway company decided to set up major railway depots and workshops on an area exceeding 83,000m².
The Zasavje coal mining basin in Central Slovenia was developed to provide the fuel. Both remained key industrial centers in the 20th century of Slovenia and Yugoslavia alike. Along the railway, the state built its monopoly companies, e.g. *Tobačna Tovarna* [Tobacco Factory] in Ljubljana. The railway attracted foreign capital that increasingly spread, particularly through the ports of Trieste and Rijeka (Croatia) – mostly as textile companies. Investors brought their own designs, new working methods and, as a result, urbanization.

Electrification at the turn of the centuries

In Slovenia, the first light bulb was switched on in Maribor's industrial grain mill back in 1883, only three years after Edison's invention. Industrial plants were linked to early energy generation. The oldest, still operational, was built in 1893. The electrical energy from the Fala power plant, whose construction began before the WWI to supply the industrialization in Graz (today's Austria) became, after the changes in borders, crucial to industrialization of Maribor between the wars and the entire northeast of Slovenia, while the Završnica hydro power plant in the Gorenjska region played an important role in the industrialization of Kranj. The Fala HPP, designed as a hydraulic structure in reinforced concrete, has an extremely interesting inner shell above the power house spanning between arched girders, and is only 5 cm thick.

In particular, the textile industry developed in both towns, while Germans who came from the newly established Czechoslovakia prevailed among the investors. If pre-war factories followed the design of neo-historical styles with a growing reduction in decoration, the post-war period was characterized by not only functional adaptations of layouts to manufacturing but it followed modernist principles in design as well. The designs of the manufacturing parts are rather innovative, in line with the times. The plans were developed by construction companies, inspired by foreign examples, or foreign investors brought their own designs.

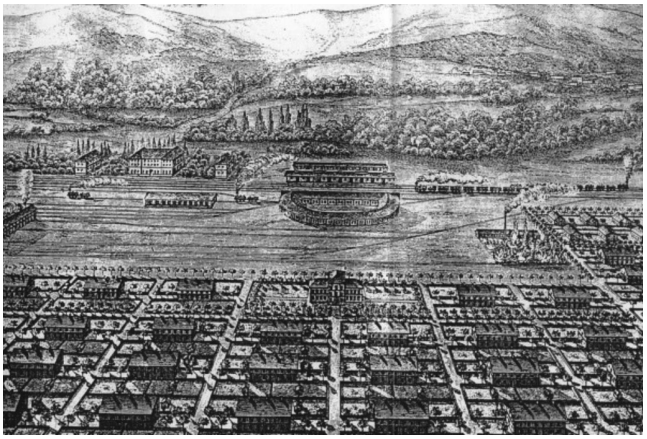
This is the time when Jože Plečnik returned from Prague to Ljubljana. Although he personally was not involved in industrial architecture, his approaches and his leading position at the newly established faculty, where he lectured, drew the path and approaches of the generations of architects to come. Some key architects parted ways with their teacher and started to follow new modernist principles, which did not correspond with Plečnik's unique architectural vocabulary. Many of them went to work or even study abroad. They mostly studied in Vienna, Prague, and Turin, and brought home functionalist and modernist principles.

In 1929, the Hennebique system of construction was introduced for the first time in Slovenia in the renovation of the tannery in Ljubljana, as used by Alois Kral, a Czech-born engineer, who joined the teaching staff at the university. The reinforced concrete frame was used already earlier, in the construction of the Catholic Printing House in 1907.

Socialist industrialization and design of industrial towns

As elsewhere in Europe, a key development milestone was WWII. The establishment of the socialist regime under the communist party, headed by Josip Broz Tito, was a complete turnaround. The new socialist state, the Socialist Federal Republic of Yugoslavia (SFRY), was a federal association of six relatively independent republics, brought together by the central federal government in Belgrade.

This was an era that strongly influenced the present time, both in terms of industrial construction as well as our relationship to it and its heritage. Let me first briefly present the historical, political, and economic conditions that in Slovenia and Yugoslavia shaped a different socialist past than in Eastern Bloc countries, which were under



02 Southern Railway workshops at the outskirts of Maribor were the basis of industrialization of the city and the region. As early as 1863 they covered an area of 83,000 m^2, they had their own workers' settlement, a kindergarten, and a school.

03 *Tobačna Tovarna* [Tobacco Factory], Ljubljana, 1873. Typical industrial architecture of the 2nd half of the 19th century, situated on the city outskirts, next to the railway. Built in a brick external structure, with an internal system of cast iron columns and beams. © Sonja Ifko.

04 E. Faesch, Power House, Fala hydropower plant, 1918, with an innovative inside shell ceiling, only 5 cm thick, has been renovated into a museum, partly still operating with new generators. This is a case of symbiosis between heritage protection and the industry. © Miran Kambič.

05 L. Marscio and R. Coppa, Fish canning factory Arrigoni, Izola, 1938, is a case of design between the two wars, when volumetric compositions came to the forefront, replacing the neo-historical design and decoration characteristic until WWI. © Miran Kambič.

06 Building for bauxite processing, Alumina and aluminum plant, Kidričevo, 1943-1954. © Miran Kambič.

direct control of the Soviet Union. After Tito's conflict with Stalin in 1948, when Tito refused to conform to Informbiro's requirements, he decided to take an "independent path towards socialism". This strengthened Yugoslavia's links with the west, and included the formation of self-management socialism (1950)— if speaking of internal affairs, and the Non-Aligned Movement (1961) on the international podium. By the early 1960s, the reorganization of the system within the Yugoslav state and the implementation of the self-management system was starting to show good results reflected in a very successful economic growth, great optimism and accelerated construction activities. However, this enthusiasm slowed down in the late 1970s, and later even more so. The main causes of this were the differences between the nations and their development priorities, and unequal development within the federation; the great oil crisis started, along with the growing demands of the International Monetary Fund, which made loans to the country that Yugoslavia was unable to repay. Already in a deep economic crisis, the death of Tito in 1980 was the beginning of the end of the state, while the growing number of frictions within Yugoslavia led to the withdrawal of Slovenia in 1991.

In the aftermath of WWII, the first economic goal of the socialist state had been electrification, which was still highly deficient in the southern republics as well as in Slovenian rural areas. In 1945 in Ljubljana, the Litostroj industrial complex for the production of turbines for hydropower plants was built, which was the central Slovenian economic and political project, also called Litostroj City. It was built accompanied by a residential area, a school, and a sports center. Its planning was based on the idea of a factory in a green setting, showcasing an innovative design and construction concept for the structures.

The main designers were Edo Mihevc and Miroslav Gregorič who studied in Turin and designed, despite the lack of materials in the post-war period, highly innovative structures with suspended roof structures, prefabricated construction elements, etc. The residential area also followed the functionalist postulate of living in greenery; further, the concept introduced the idea of a common canteen, which would relieve the working women from housework, but this was never realized.

Two further newly established industrial towns should be mentioned: Velenje and Kidričevo – the latter only in its preliminary form along the Alumina and Aluminum Plant, which Nazi Germany started to build during the war as part of an airplane production system in the framework of which the construction of a plane engine factory and a hydropower plant to supply the entire system started. After the war the socialist authorities decided to continue with the project and built a new town alongside the factory. The project was headed by Danilo Fuerst, Plečnik's pupil and a sophisticated functionalist.

The most successful one, looking from today's perspective, is Velenje which grew next to the mine, at a location outside the medieval village core. The goal of the project was, in line with the self-management doctrine, to provide workers and their families with a high-quality living environment. Supported by local politicians, an ambitious urban center with blocks of apartments surrounded by greenery, and positioned according to heliocentric principles, was designed by architects Janez Trenz, Ciril Pogačnik, and Franc Šmid. All the important structures – the administrative building of the mine, later the municipal headquarters building, the cultural center, and a workers' club – were designed and eventually built along the central communication axis with a square. Velenje was a well-designed city and mostly built according to plans – its design was consistent and it successfully preserves its original center to this day.

Expansion of the 1970s and slowdown in the 1980s

With good economic results, the 1960s and 1970s brought more investments into industries, some state architectural firms specialized in industrial construction and several high-quality structures were built. The Gorenjska oblačila factory, built in 1974, was awarded the Yugoslavian Borba prize for architecture.

At the time, industrial plants invested in the construction of residential areas and welfare projects – sports infrastructure, public swimming pools along with factories heated by industrial water, and companies built their own holiday homes in the mountains and on the Adriatic Coast. In people's consciousness this is still embedded as an important heritage, paired with nostalgia, when companies still "took care of their workers".

07 M. Gregorič and E. Mihevc, Litostroj turbine factory, Ljubljana, 1945–1953. The industrial complex design was based on the idea of "a factory in a green setting", providing workers with a high-quality working environment. © *Zgodovinski arhiv Ljubljana*.

08 J. Trenz, C. Pogacnik, F, Smid, Velenje, a new industrial and mining town, 1957. The image from 1964 shows one of the biggest Slovenian socialist urban projects. © Mestna občina Velenje.

09 Underground part of Mežica Lead and Zinc Mine Museum, where visitors can take a museum mine tour by miners' train, by bike, or in some parts by kayak. This is a way to showcase innovative cultural and tourist programs, presenting mining heritage to a broader public. The mine museum is included in the Geopark Karavanke a member of the UNESCO Global Network of National Geoparks. © Podzemlje Pece.

10 The creative co-working Poligon center set up in the preserved part of Tobačna tovarna in Ljubljana. © Poligon.

In this period the construction industry started to increasingly introduce prefabricated systems, which were mostly used for the construction of industrial plants. In the 1980s, with the growing economic problems, the number of investments gradually started to decline. Construction mostly involved reinforced-concrete prefabrication by domestic manufacturers; the dissolution of the old system resulted in the closing down of almost all major design offices. A breakthrough came only in the 1990s when, after the economic and political shifts, the restoration and development of new programs started.

Evolution of protection activities and attitudes to industrial heritage in Slovenia today

The care of industrial heritage started relatively early – back in the late 1940s and mostly in the 1950s, when workers' museums emerged in industrial centers. They were intended primarily for consolidation of communist authorities and their values, so they were primarily oriented towards history, the workers' movement, and the workers' fight for rights in capitalism; nevertheless, the fact remains that other important materials were collected as a result and that today precisely these museums are important protectors of industrial heritage. The Technical Museum of Slovenia was established in 1951, albeit in an abandoned monastery complex, but with many technical water-powered monuments, i.e. watermills, which were later supplemented by other monuments brought from locations at risk.

In 1953 at Dno above Kropa in the Gorenjska region, where later, due to the local iron ore deposits, nail making developed, archaeological excavations of the so-called Slovenian smelting furnace (dating back to the 12th century) started. The furnace was an important Slovenian innovation from the Early Middle Ages for smelting iron. As we can see, industrial heritage protection in Slovenia started practically at the same time as the efforts of British colleagues for the preservation of the cradle of industrialization in Ironbridge, Coalbrookdale, and introduction of the new term industrial archaeology. Up until the late 1980s, the Institute for the Protection of Cultural Heritage of Slovenia took care of technical heritage and in 1980 a curator for technical heritage was employed. Quite a few important monuments remained preserved, particularly older heritage, railway structures, water-generated facilities, and small plants.

With the split from Yugoslavia, 1991 brought intensive economic changes, along with political changes, as many previously state-supported companies closed down in the new market economy conditions. Vacant industrial sites were in need of solutions both in the economic and spatial sense. They were mostly perceived as brownfields, while preservation of industrial heritage sites was, except for a few cases, not addressed.

Slovenian mines were an exception, as they were among the first ones that were closed down, with the Idrija mine leading the way. As part of the closing down process, financed by the state, they also made sure to preserve parts of the mining structures. The first underground mining museum was opened in Idrija in 1994, which was followed by another two, in the Velenje Coal Mine and in the former Mežica Lead and Zinc Mine. Today, these three notable mining museums have become, together with their programs, have become central elements of the cultural and tourist activities of their regions.

In the late 1990s important restoration of two power plants took place – the Fala power plant at Maribor (1918) and the power plant Mestna elektrarna Ljubljana (1898). Initiators of the renovations were two state-owned companies, which attests to their recognition of the importance of heritage, while to a smaller scale quite a few other museum exhibits inside various companies were set up; nevertheless, the problems of preserving built structures remained and, except for the case of the aforementioned power plants, regeneration did not take place to the same extent elsewhere. The early 2000s saw the first extensive projects and implementation. The former Catholic Printing House in Ljubljana was renovated into the Faculty of Law of the University of Ljubljana and the City of Ljubljana purchased the then abandoned Rog bicycle factory to arrange there a contemporary arts center. However, when a site is occupied by civil society, particularly young people, the dynamics of change raise questions about the right to public good for everyone when the fact remains that the structure itself is deteriorating in the process. The question of social responsibility to the underprivileged is raised, which is an important topic also in the context of industrial heritage and the people who helped to create it.

Public interest in heritage, along with the promotion of, and exhibitions on, recent history, is growing, which is important also for its preservation, as the recent economic upturn brought about "regeneration" projects that were profit-oriented, while important heritage was demolished in the name of development. This has also been the case in many cases abroad. In Slovenia, the competition for the regeneration of the abandoned Tobačna factory in Ljubljana stands out, which provided for construction of high-rise buildings in the place of the former factory, with only a small part of it preserved. The project was initiated but then stalled due to the recession, leaving behind demolished buildings and new excavated construction pits.

This, without doubt, contributed to awareness raising about the irrationality of such interventions and contributed to reactivation of such sites, with a temporary use of the undemolished part of the Tobačna complex as well as some other places in Slovenia.

Organization of professional and civil society took place at the same time and we can say that nowadays heritage is at least generally understood and recognized. However its protection continues to require, particularly during the recent economic upturn, more efficient legal protection measures and particularly new innovative solutions, for which it is necessary to establish the appropriate conditions, particularly in the context of sustainable urban planning and inclusion of heritage in development policies, as provided for by the recent European documents, e.g. the *European Heritage Strategy for the 21st Century* (2017), the first

strategy of common European policy on cultural heritage, and the *Davos Declaration, Towards a High-quality "Baukultur" for Europe* (2018).

Preservation of industrial heritage and its multitude of implications for the future

The fact is that there is likely no single answer as to how to regenerate industrial heritage, as these are extremely complex structures and interrelated systems, which is best summarized by the definition from the *Nizhny Tagil Charter for Industrial Heritage*, which defines industrial heritage as:

> *remains of industrial culture which are of historical, technological, social, architectural or scientific value. These remains consist of buildings and machinery, workshops, mills and factories, mines and sites for processing and refining, warehouses and stores, places where energy is generated, transmitted and used, transport and all its infrastructure, as well as places used for social activities related to industry such as housing, religious worship or education*[2].

To be able to preserve the most important parts of industrial heritage as a cultural discourse of a certain place across time, we need to understand both the past as well as the significance of heritage for the future. Firstly, a comprehensive interdisciplinary analysis is necessary, which must be appropriately structured to take into account all heritage values and preserve them in regeneration processes. The methodological approach that is being gradually introduced in Slovenia was based on these starting points[3]. This is underpinned by a multi-level interdisciplinary analytical research basis. The basic element of analysis is the individual manufacturing unit – a factory, a mine, etc., which is treated in terms of its relationships: on the outside in the relationship to space that it belongs to (urban landscape); on the inside – the relationship between various structures that form it. Finally, individual relevant structures are addressed. For each level of investigation, analytical parameters and evaluation criteria were developed, which are the basis for determining heritage values, so that in the phase of construction protection baselines we could efficiently prepare guidelines for the project phase of regeneration, where, firstly, protection and project requirements for all three investigation levels are aligned – this is crucial as it allows for inclusion of interests of civil society and the interested public. This is followed by the planning and implementation phases. Keeping the public informed of project developments from the start across all implementation phases is crucial.

Industrialization and its growth were enabled by people, their work, and engagement. The inclusion of former workers in these processes is paramount. If they are appropriately included they can become the key generators of protection of basic heritage values and thus receive new work opportunities as industrial heritage sites are also places of difficult economic and social conditions. Participation of both former employees and interested members of the public is an important element of regeneration, allowing for inclusion of everyone and thus promoting social cohesion.

If we focus on the values of industrial construction and industrial architecture as the material framework of all processes, we first need to draw attention to the fact that often these modest structures, lacking special architectural and structural character, can be important because of their technical, historical, and other values. This is particularly characteristic in Slovenia, as there were, in fact, not many significant outstanding achievements in the architectural design of factories. But we speak of heritage of industrial sites as of objective witnesses to development ("unintentional monuments") whose significance was underlined already by Alois Riegel.

In Slovenia and beyond, the awareness about the meaning of industrialization as the key generator of change in the development from the 19th century onwards is rising, but it is still not considered everywhere. It is without doubt clear that we cannot be satisfied with likeable design solutions of individual cases, but rather we have to design comprehensive development solutions which should become the generators of revitalization, as industrial heritage sites have — due to their nature, their rational being — the potential to build a new, sustainable future.

Notes

1 Cossons, N., "Why preserve industrial heritage?", in Douet, J. (ed.), *Industrial heritage Re-tooled, The TICCIH guide to industrial heritage Conservation*, TICCIH by Carnegie Publishing, Lancaster, Great Britain, 6-16.

2 *The Nizhny Tagil Charter for Industrial Heritage*: http://ticcih.org/about/charter.

3 This methodology was presented in detail in the *A&U journal*, in a paper entitled "Industrial Architectural heritage – re-evaluating research parameters for more authentic preservation approaches".

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