

Reuse of Huge Industrial Areas

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Abstract—Brownfields are one of the most important problems that must be solved by today's cities. The topic of this article is description of developing a comprehensive transformation of post-industrial area of the former iron factory national cultural heritage lower Vítkovice. City of Ostrava used to be industrial superpower of the Czechoslovak Republic, especially in the area of coal mining and iron production, after declining industrial production and mining in the 80s left many unused areas of former factories generally brownfields and backfields. Since the late 90s we are observing how the city officials or private entities seeking to remedy this situation. Regeneration of brownfields is a very expensive and long-term process. The area is now rebuilt for tourists and residents of the city in the entertainment, cultural, and social center. It was necessary do the reconstruction of the industrial monuments. Equally important was the construction of new buildings, which helped reusing of the entire complex. This is a unique example of transformation of technical monuments and completion of necessary new objects, so that the area could start working again and reintegrate back into the urban system.

Keywords—Brownfields, conversion, historical and industrial buildings, reconstruction.

I. INTRODUCTION

AFTER the end of the production there was in year 2000 a part of Lower Vítkovice area with Hlubina mine declared as a cultural heritage, two years after as a national cultural heritage and in 2008 the campus became a part of the European cultural heritage as a first Czech monument. Newly established national cultural heritage was defined by the government as approximately 14 huge mine area, blast furnaces, coking plant and others movable and immovable properties together with technical equipment including land.

This industrial heritage is a symbol of Ostrava and the whole Moravian-Silesian Region, therefore were historically protected visual corridors height levels of the new buildings. The production here operated continuously since the 20s of the 19th century. From the year 2007 there took place official guided tours there.

At the time of the blast furnaces production end, arose already a question what is going to be with the campus. There were made the territory analysis from the 90s, the strategies of monuments preservation were examined, convertibility and territory conception. Law, economic and ecological aspects were under analysis, there were judged the long-term sustainability and financing. In 2007 there was made a study of access and a new use of National cultural heritage of Lower

Vítkovice area for the possibility of drawing funds from ministry of culture Integrated Operating Programme and also therefore in the same year there was made a nonprofit organization called Association of Lower Vítkovice area legal entities.



Fig. 1 Vítkovice area



Fig. 2 The corner of The World of Technology

II. NEW CONCEPTION OF THE AREA

The New world of technology is Josef Pleskot's studio work and it is the only new building in restored area and it gained the prestigious award of Society for old Prague in 2014. There was made a clear conception of the transformation project of the industrial area's historical object by an architect Josef Pleskot, with a project called New Vítkovice, which was based on the reactivation of three objects of national cultural monuments; gasometer conversion into a congressional and social-center the fourth energetic switchboard reconstruction and a blast furnace No. 1 reactivation.

The renewal process began with so called 0 stages, when the territory was cleaned from the objects, which were not marked as a National cultural heritage. A considerable amount of excess tubing was also removed. Under zero phases there also took place geological works and sondes, this period was realized during the year 2010.

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In the same year there was introduced an urban study- the function transformation concept and new filling finding for each preserved buildings included territory completion of Big technological world new building, which should have an educational character. During the year 2010 there was prepared a project application for a grant on a Science and Technology Center project.

III. THE URBANISTIC CONCEPTION

The author of the urbanistic conception found in the processed location of historical- industrial campus during the territory analysis the first urbanistic conception of Vítkovice steelworks from the year 1876- 1893, the author was the former headmaster Paul Kupelweisser and his engineers. The territory has been consolidated through the regular square grid with a length of 125 m. The author found a link between urbanism structure of Vítkovice and Ostrava when he respected founded link of square network in the proposal. The campus is extraordinary in its complexity, which preserves the original technological processes from the coal mining; coke

production even for the iron production, all mining and processing technologies is concentrated in this locality, defined in urban structure based on a square net with a square of a side of 125 meters.

The building is situated on an imaginary axis of national cultural heritage of Lower Vítkovice Area- a historical monument that we can now consider as a part of the city and an area of still active industrial production of Vítkovice machinery group a.s.

IV. NEW WORLD OF TECHNOLOGY

The Science and Technology center project realization was backed by the Lower Vítkovice association. The construction began 1.12.2011 and it was finished 30.9.2014, it took place one year and a half. The new building was funded from the Ministry of culture integrated operating program (IOP). The total amount of funding for the project implementation was 19 million Euros, from EU (European Union) 16 mil. Euros and the contribution from the state budget 2,9 mil. Euros. Total project costs soared to 23,5 mil. Euros.

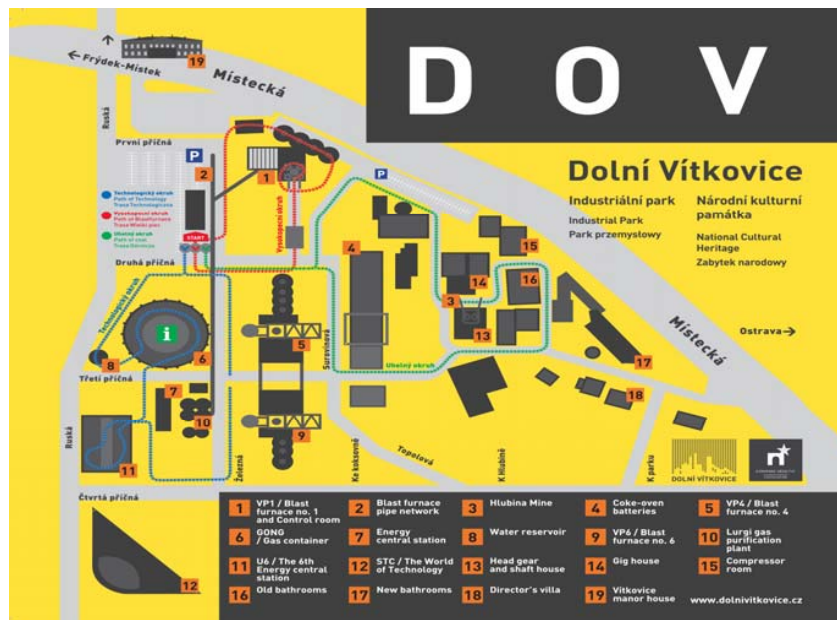


Fig. 3 Map of The Lower area of Vitkovice

The building is designed in the shape of an isosceles triangle with rounded rectangular corner on the zone borders of the new and respected part of the Lower Vítkovice area. New communications connect a historical renewed part with newly built. Communications connect the complex with traffic moves and provided the campus to visitors. The attractiveness of the land became his favorable position towards the planned arrival to Lower Vítkovice are from the roundabout with streets crossing of Vítkovická, Železárenská and Místecká. [1].

When designing the geometry of the ground plan of the outline of the building we were inspired by the magnetic field lines, which create the opposite poles between them. We can

say that if we had a giant magnet with one pole somewhere in the cinema and the second one in the entry amphitheatre then would the lines draw the basic building composition [2].

The object foundation was considerably complicated. There leads the main sewer regulations under the object there, the monolithic concrete skeleton is combined with additionally prestressed elements. The building combines an extensive construction program inside. On the area of 14000 square meters intended to the education there are four permanent exhibitions there, one changing exhibition, lecture hall, cinema auditorium and five schoolrooms. The big world of technology presents the region technical history, the science-

contemporary, past and future and it is a part of the international worlds of technology association.

V. THE NEW BUILDING ARCHITECTURE

The object is situated on a place of the terrain break, which is engaged in the building concept. On the main entrance floor there is one floor recessed below ground, which made possible to create a perfect reflecting surface.

In front of the building entrance, there is built a huge resting staircase similar to the center of Pompidou in Paris. The boarding area is formed with descending staircase on the way to the amphitheatre which should symbolize newly created paths lengthening on which crossing the new building is situated.

The frontal diagonal facade in the size of 125 x 12,5 m is the biggest of its size in the Czech Republic. The side facade is lined with anthracite bricks, which should remind the coal mining, which took place here together with a metallurgical industry.

The land, which harmoniously closes the complex of Lower Vitkovice area technological buildings, was chosen with regard to the optical interaction of neighbouring structures, which logically follow on didactical focus of the world of technology.

The building's facade was created by two basic elements first part is the mirror glazing. The glass is covered by metallized surface layer, which inhibits heat gains in summer, but also it has very high light transmittance. The exposition is lit by quality daylight. The second very significant element is on the facade reversed from the mirror is a lining of bricks which is done by the secondary suspended hanging facade of firebricks. Bricks are hung on stainless anchors anchored in a reinforced concrete wall.

Facade carried out in this way has significantly more plastic character compared to the compress. Individually baked bricks have variable coloring and joints are much deeper, the facade then doesn't caused compact impression.



Fig. 4 Mirror glazing

VI. BLAST FURNACE NO. 1

The blast furnace number one is a symbol of Vitkovice. "Oldest lady" or "Steel temple". Conversion to a sightseeing tower by architect Pleskot took place between 2011 and 2012. The surplus parts have been removed was mounted safety gates and two new elevators. The original construction of the

bridge was installed four-ton skip hoist with authentic propulsion engine. The car is in the top glass clear glass and the bottom glass black and is able to take up to sixteen persons. The tower is sixty meters high, allows a unique view of the Lower Vitkovice, and the panorama of Ostrava.



Fig. 5 Extension of the blast furnace

Now there is a superstructure of the blast furnace fifty feet, where it will be placed in a unique cafe, club and a rooftop terrace. The superstructure will offer an extraordinary view of the entire area.

The blast furnace became part of the tour route, which follows the journey of a former technological flow, which explains the entire process of production of pig iron. The route begins at the crane, where once was transporting scrap metal for recycling. Here Pleskot suggested starting point with a steel roof in the shape of wings outstretched Phoenix hanging on the ropes. Now there is a certain symbolism in Phoenix, as well as blast furnace rose from the ashes.

VII. GASOMETER MULTIFUNCTIONAL AUDITORIUM GONG

Gasholder has become a convention center, which seats up to 1500 seats, gallery, restaurant, lounge and locker rooms. In order to achieve this final form, it was necessary to use special construction technology. After the production of the gas tank is empty, the bell remained at a height of one and a half meters inside the entrance featured a hole burned in the mantle of size two times three meters.



Fig. 6 Gasometer Gong

Pleskot left to lift the bell gasholder for almost fifteen meters and a newly formed internal space divided into two floors, first find the foyer, gallery, dressing room and conference halls, the top floor is a large-capacity hall. Retained the original steel structure and interior materials

were used, such as exposed concrete or structural steel. The final form continues the industrial character of the building. Steel casing was left in its original form with authentic riveting, was blasted and painted metallic black paint. By building was cut out of the window to obtain natural lighting. The auditorium is artificially ventilated underground collector preheated or cooled air. Gasholder was first opened on May 1st, 2012, when it came to see more than forty thousand visitors.

VIII. THE SIXTH ENERGY PBX – SMALL WORLD TECHNOLOGY

Energy panel is used to manufacture compressed air using two piston blowers weighing together nine hundred tons, which even today are made interesting internal spaces of the building energy exchange. These "lungs smelter" were built in 1938 and in 2012 was converted into a museum called Small World techniques attracting visitors on an interactive tour of the history of technology. Children as well as adults here can try what it is to land a plane or drive a car, pedaling on a stationary bike can warm up the radio and to experience firsthand the production of electricity, they can look at the actual models of production facilities and there waits for them many other activities. The first floor was built viewing terrace from which you can see the entire exhibition together with blowers from above. The tour then continues after technical stairs to the catacombs, where they are installed technical attraction with water and steam. The ground floor of the building can be found, inter alia, refreshments, changing rooms, classrooms and a hall for educational lectures for students and teachers who are here to gain experience of new forms of teaching work undertaken through games, animations and so on. For conversion of energy exchanges stands architectural Studio Z - Helena and Václav Zemánek and architect Zdenek Franek, who participated in the final revised project.



Fig. 7 U6 – Small World Technology

IX. ENERGY CENTER

Electrical power supply to the first blast furnace gasholder, both small and large world of technology and the future and the fourth and sixth furnace ensures energocenter. "Located between the former gas tank and small world techniques where once stood a petrol station. Its modern technology, visitors can explore the Lower and get an overview of the entire system energy flow" [3]. How it works, it will also

show the interactive screen. This modern energocenter provides good energy management and uses of them all.

X. COMPLETED THE TRANSFORMATION

On a place which long served to heavy industry was newly created a spawn for the new creative industry formation developing education, cognition and intellectual growth.

The Lower Region of Vítkovice is an enormous phenomenon in the City of Ostrava - past and present. Preserving industrial monuments and converting them to make them a vital part of the city is a major challenge for all of us [4].

The campus newly transformed into the center of cultural, sports and social events, which abounds with unmistakable and distinctive genius loci evoking strong feelings.

The most important industrial heritage Lower Vítkovice area got through the extraordinary transformation, thanks that will be retained unique historical and technological monuments. According to the latest researches is The Lower Vítkovice area the fourth most visited monument in the Czech Republic.

The historical buildings conversion is usually a combination of several work methods with space and constructions. The intention usually requires building- historical research clearing up historically valuable constructions and object pieces and then the study works with a space filling and new functions [5].

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Martina Perinkova After her graduating Faculty of Civil Engineering at the Technical University in Brno she was working as a designer in an architectural office. In 2000 she completed doctoral studies at the Faculty of Architecture at the field of architecture at prof. Ing. arch. Ivan Ruller. In 2008 she defended at the Faculty of Civil Engineering, VŠB-TU Ostrava habilitation. Perinkova teach and supervise lectures at the Faculty of Civil Engineering VŠB-TU Ostrava. She completed training cycles at university in Brussels, Norway, Spain, Italy, Greece and Austria. In her publications and research activities continues to address topics of contemporary artwork in a historical setting, rehabilitation and conversion of buildings in terms of architectural design and construction technical issues. In projects and publications, she is working with colleagues from other disciplines such as art and architecture historians, engineers, sociologists, statisticians and others. Now in interdisciplinary collaboration sees the prospect of science and research in the field of architecture. She is supervisor of the study program Architecture and engineering on the Faculty of Civil Engineering VSB-TU Ostrava. In 2011 she published her own book named "Attic" in Grada.