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TRANSFORMATION OF AN INDUSTRIAL ZONE INTO AN URBAN PARK: RECONSTRUCTION OF BUILDINGS

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Statement of the problem. To solve the problem of shortage of land resources in the territory of modern cities, a promising direction is the redevelopment of derelict manufacturing plants, including the reuse of unexploited industrial buildings for cultural and commercial purposes. The main task of the Changchun Vanke Blue Mountain project (Jilin Province, China) presented in this article was to maximize the preservation of cultural heritage and the unique atmosphere of the industrial zone while creating an entertainment park.
Results. The article describes the technical solutions that made it possible to implement this concept as part of the buildings' reconstruction of the gear wheel manufacturer and the stamping shop with the technical office. Not only the preservation of ruins was implemented, but also the maximum possible rehabilitation of buildings using original building materials, along with the addition of new annexes built in a modern style. The features of the main street design with an emphasis on the architectural components of reconstructed buildings are provided.
Conclusions. The implementation of the Changchun Vanke Blue Mountain project made it possible to popularize the history of the former plant, to show its crucial role in the formation of the city. At the same time, it was possible to create original architectural solutions using modern methods of architectural reconstruction of industrial facilities.

Keywords: reconstruction, reuse, industrial buildings, city park, cultural heritage, industrial areas.

Introduction. The decline of particular industries in urban areas is a global phenomenon, leaving cities with abandoned sites and vacant land [12, 14]. There is currently an increasing tendency to repurpose old buildings and structures for a variety of applications.

According to [2], the most promising are the following areas: repurposing an industrial building into a public or residential building; a public building into a residential one; a residential building to a public one. The transformation of decommissioned industrial facilities is especially relevant these days as we are talking about large-area buildings and structures with specific design features whose presence enables one to adopt and implement original architectural solutions by means of modern

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methods of architectural reconstruction of industrial facilities [4]. Additionally, as cities develop, industrial zones that used to be situated on the outskirts of cities become part of vibrant urban areas as time goes by. In global practice, there have already been a lot of examples of such repurposing: the project for the development of the territory of the former Likhachev plant (ZIL, Russia) [3], the renovation of brick buildings of the old Winterslag coal mine (C-Mine, Belgium), reconstruction of the naval shipyard complex (Theater de Kampanje, the Netherlands); transformation of the former Palencia prison into a cultural center (Rehabilitation of Former Prison of Palencia as Cultural Civic Center, Spain) [1]; reconstruction of a former sugar factory in the DUMBO area into an office building (USA); transformation of three gas holders into a residential complex with an office block and a park (Gasholder, UK).

One of the major problems addressed during the reconstruction of unused industrial buildings is the choice of the optimal organizational and technological solution [6, 15]. Reconstruction with a change in the functional purpose of buildings makes it possible to use the investment-profitable large areas of decommissioned factories to create multifunctional facilities smartly. Following an initial phase of mass demolition and mass new construction, the rehabilitation of abandoned sites has shifted to a more cautious approach to the existing structure whose strategy is focused on the reuse of buildings for business, commercial and cultural purposes (design of so-called creative and industrial parks) [5, 7—10 , 16, 18].

However, in world practice, quite often in the process of reconstruction, the historical past of the territory being reconstructed is ignored or is not highlighted.

The Changchun Vanke Blue Mountain project[1] is a compelling example of the implementation of the concept of an urban entertainment center [14] with the major task to preserve the cultural heritage and historical significance of this place.

The author of this article, Liu Fang, was a designer in the design department of Vanke Development, which was primarily responsible for the construction and landscaping of the project throughout the entire process of this project. On top of that, she was directly involved in the design of art installations. Liu Fang took all the photographs presented in the article herself (nearly 10,000 photographs were taken throughout more than three years she had spent in charge of the project).

1. General characteristics of the Changchun Vanke Blue Mountain project. The territory of Changchun Vanke consists of a rich layering of natural and cultural landscapes. The Jilin Diesel Engine Plant, founded in 1950, was previously located in this territory, but as the plant had had a negative impact on the environment over the years, it was decided to place it outside the city center.

[1] https://mooool.com/en/vanke-lanshan-community-pocket-park-by-pds.html.

As a result, the territory of the former factory was turned into a lively center of urban life.

Changchun Wanke is located at 666, Dongsheng Street, Erdao District, Changchun City, Jilin Province in China. The total area to be reconstructed is about 250,000 sq. m, the total area of the building is about 500,000 sq. m (the area ratio is approximately 2.0), the landscaping factor is approximately 42.1% (Fig. 1).

Fig. 1. Aerial photograph of the Wanke Changchun territory

The major concept of the project during the development of the design project of the park was as follows: preserve, where possible, existing trees and factory relics, organically fit them into the design project, and at the same time provide for public and private zones, squares and yards adjacent to the main street .

The project was developed by *Changchun Vanke Real Estate Development Co., Ltd.* The Rheinland Design Group developed architectural and landscape design in collaboration with teams of designers for the organization of lighting, art installations and landscaping (the author of the article, Liu Fang, was part of the group of designers working on the project at all the stages of its development). The objective of the project was to preserve and popularize the history of this place, its unique atmosphere. Therefore the most difficult task for the designers while developing the project for the reconstruction of the factory in Changchun was the need to sustainably and rationally combine the character and color of the original purely industrial zone with the requirements for the creation of a social and cultural center where a lot of people will be able to enjoy themselves.

Following a series of studies, discussions, debates and revisions, the team of designers finally decided to preserve the original architecture of the plant as much as possible and make use of old elements for new functions. While developing the project, methods of juxtaposition, interspersion and superposition of the old and the new were used. When the architectural design was being deve-loped, it was decided to preserve part of the old buildings and turn the area where they are located into an urban landscape garden that can be opened to the public. At the same time, the emphasis should be placed on the preserved elements of old houses, designed to remind visitors of the history of this place.

It was decided that the position of simply preserving the ruins of the original industrial enterprise should not be adhered to. It was considered more valuable to force old buildings to be "revived" in a new environment. Therefore, the designers decided, after changing the functional purpose of the building, to also add additional volumes in order to create a feeling of a large space for visitors. For each specific building, the completed part is entirely different from the reconstructed part and contrasts with it in architectural design.

2. Reconstruction of the building of the workshop for the production of gear wheels. There was a large industrial building in the territory of the plant. Following a comprehensive study and analysis conducted by a team of experts, it was found that there are only two buildings that, based on the degree of their physical wear and tear, should undergo reconstruction and restoration. One of them is a workshop for the production of gears with a supporting reinforced concrete frame. The building had a built-up area of about 4,000 square meters considering the adjacent territory. m (Fig. 2), and was completely preserved in the process of reconstruction.

Fig. 2. General views of the eastern and northern facades of the workshop building on the production of gears before reconstruction (photo by Liu Fang)

As part of the implementation of the project, this was the only building transformed from an industrial facility into a public cultural and entertainment center open to the public and combining the functions of

leisure and entertainment, as well as used for exhibitions. During the reconstruction, the original red brick facade was preserved, and old red bricks were used to fill the destroyed sections of the walls. The eaves and corners of the original building are made of normal weight concrete on dense fillers, and the windows are framed with black steel plates (Fig. 3).

Fig. 3. Southern facade of the workshop building is in the process of reconstruction (photo by Liu Fang)

The architectural expressiveness of the building relies on three colors — black, gray and red, which are harmonious, simple and reflect a contrasting combination of industrial and modern styles. The building has been preserved as a whole, the original symmetrical entrances and exits on the north and south sides are still used as the main entrances and exits. The northern entrance to the building is made in a restrained, minimalist style (Fig. 4).

The southern entrance was enlarged by adding an additional volume in the form of a cube and decorated with steel plates covered with a continuous layer of rust, which enable the whole building to acquire an industrial look (Fig. 3). In order to create the desired effect, steel plates made of weather-resistant steel are used. The surface of such steel oxidizes naturally to a depth of up to 0.5 mm, and then the corrosion process stops. Such plates are considered environmentally friendly and do not cause environmental pollution due to the ingress of corrosion products into the soil as a result of exposure to sunlight and rainwater [11, 13, 17, 19, 20]. This modern construction material has essential features that had to be considered during installation: there should be no solid welds on the surface; the flatness of the surface of the steel plate must be guaranteed, and the curvature must be controlled within ±3 mm. It was already in the process of production of construction works that in order to achieve the desired effect, design solutions were repeatedly corrected, and finally, the method of spot welding was utilized for fastening the plates to the internal steel supporting frame making it possible to solve the technological difficulties associated with the use of such plates as protective structures. Modern stainless steel metal elements were also used in the decoration of the building to render it a sense of new and strong industrial vitality.

a)

b)

Fig. 4. Entrances to the workshop building on the northern (a) and southern (b) facades of the workshop building following reconstruction (photo by Liu Fang)

At the outset of the work on the project, a professional team of lighting designers was created for executing targeted lighting design for preserved buildings (Fig. 5), ecological landscapes, roads, reservoirs, decorative structures, etc.

Fig. 5. View of the southern facade of the workshop building following reconstruction at night (photo by Liu Fang)

3. Reconstruction of the stamping shop building with technical office. Another building that was preserved and transformed as part of the project is the building that originally housed the stamping shop and technical office. Premises with different functional purposes have different volume and height. Hence the building has a height difference. The lines of the facade of the building are very typical (Figs. 6, 7), so the designers made a lot of effort to preserve them.

Fig. 6. Views of the stamping shop building (photo by Liu Fang)

Fig. 7. Views of the building at the location of the technical office (photo by Liu Fang)

The main facade of the building with a height difference is located along the main street of the park and creates a chaotic and fragmented image. Thus in the general concept of the reconstruction, it was supposed to clearly define the boundaries of the building with an integrated interface, so that various structural additions were located within these boundaries, but at the same time, the original facades of the old buildings were presented in the foreground, being the highlights of the composition (Fig. 7, 8). An additional volume with a load-bearing steel frame was added to the existing building with load-bearing brick walls (Fig. 9) making it possible to render the silhouette of the building a modern and dynamic look. The load-bearing brick walls of the existing building were to be strengthened with unloading steel elements (Fig. 10). After that the existing building was combined with the attached

volume. The old plaster layers were removed from the facade of the building that was restored using the original red brick (Fig. 11). Window and door openings were framed with black sheet steel (Fig. 11, 12).

Fig. 8. Visualization of the reconstructed building of the stamping shop with a technical office in combination with the construction of new buildings (visualizations were carried out as part of the work on the project by the design team, visualization for the article provided by Liu Fang)

Fig. 9. Adjustable additional volume with a supporting steel frame (photo by Liu Fang)

Fig. 10. Strengthening of load-bearing brick walls building of a stamping shop with a technical office (photo by Liu Fang)

Fig. 11. Restored facade of a red brick building (photo by Liu Fang)

Fig. 12. View of the building after reconstruction (photo by Liu Fang)

Hence in the process of reconstruction of the building of the stamping shop with the technical office, the team of designers used the method of partial conservation, partial restoration and partial reconstruction to give the building a completely new look (Fig. 12). Ultimately, the exterior of the building after restoration is still a combination of red brick, concrete and steel.

Conclusions. Implementation of the Changchun Vanke Blue Mountain project has enabled us to show that the reconstruction of industrial facilities is a promising way of developing urban infrastructure: provided there is a complete change in the functional purpose of the building, the architectural features and historical significance can be preserved.

The reconstruction project attracts more potential investment, as most of the load-bearing structures and three-dimensional characteristics of the building are preserved. At the same time, non-operational buildings or their parts that can be preserved and seamlessly incorporated into a new look of the object and eventually become its highlight reminding of the history of a reconstructed object and create a special atmosphere.

The transformation of abandoned industrial zones into similar parks indicates awareness of the importance of cultural identity and preservation of heritage.

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