

Redesign of Industrial Heritage Space Based on Spatial Experience

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Keywords: Industrial heritage, Spatial experience, Architectural reconstruction.

Abstract: In today's rapid urbanization process, more and more industrial buildings are gradually withdrawing from the historical stage in the evolution of "suppress the second industry and develop the third industry". This work mainly elaborated how the industrial architectural heritage that has been left over and bears the historical memory of the city is integrated into the modern architectural life through redesign and utilization. In order not to cause erosion of industrial architectural heritage and waste of social resources, the design is guided by spatial experience, and the workshop space is redesigned to restore its due architectural vitality. This work mainly analyzed the potential value of modern industrial heritage and how it can be "beneficial renewal" in contemporary urban functions through the investigation of Jing'an Xinye Square, an excellent case of Shanghai industrial heritage renewal, and the research of Minsheng Art Museum, a renewal project.

1. Introduction

The reuse of industrial architecture is the most mainstream solution to the problem of how to protect and explore the potential value of many abandoned and idle industrial heritage in modern society. Therefore, how to transform the industrial plant space into a way that can be integrated into modern life has become the top priority to solve this problem.

First, the buildings or sites with their own style and culture, such as industrial architectural heritages, should retain their own style characteristics and historical context, and they will have the spirit of the place when they are utilized and transformed. Second, it is necessary to define the future use objects of the place - people in modern life, then the physical experience of people in the new space should become the first orientation of architectural space redesign. After designing the spatial scale suitable for human public activities, how to combine these spaces to make them interesting, pluralistic, and intelligent is an important way to improve the quality of space. After getting a series of combined space, the space itself should be rendered with a certain atmosphere. The atmosphere can be created through interior design, or the space art installation can be placed to give a specific spatial feeling, or certain functions can be placed to make it have a specific personality.

On the road of exploration and application of the reconstruction and reuse of industrial architectural heritage, it only focused on the texture and spatial design of the factory in the beginning, now it pays more attention to the spatial experience of people based on combining the two. Jing'an Xinye Square, as an excellent case of historical renewal in Shanghai, uses a variety of different techniques in the transformation design of the whole park. This work selected the representative reconstruction buildings of Jing'an Xinye Square in Shanghai for a brief analysis.

2. Site Overview

2.1 Value of industrial architecture

Compared with other types of architecture, industrial architecture is relatively simple and natural. There are not too many deliberate elements, but more space forms to meet the requirements of their own production and development. The combination of space is also very simple. It pursues the

function priority and the shortest streamline. Just because of this, this kind of architecture can jump out of the constraints of various styles and freely express its own unique beauty.

This strong construction and flexible distribution characteristic is designed to satisfy production function, which makes it more valuable in development and utilization than other types of modern buildings. As its form is relatively simple, it is more conducive to space reconstruction and continued growth.

If the potential reuse value of industrial architecture is ignored and treated as a simple modern architectural heritage, then many existing industrial buildings will gradually lose their own style, and then decay and even abandoned and demolished, which will cause a huge waste of social resources. This is not only inconsistent with the current values of sustainable development, but also difficult to realize the real combination of industrial building protection and development.

2.2 Historical evolution of Jing'an Xinye Square

The predecessor of Jing'an Xinye Square is Shanghai Metallurgical Mine Machinery Factory. The development history of the factory reflects the development history of Zhabei District, Shanghai City and even the whole modern Chinese national industry. This machinery factory has carried a very important history in Shanghai, witnessed the rise and fall of Shanghai metallurgical industry, and has great historical and cultural value. After the factory was shut down in 2009, rust-red discarded machine tools, blue-white exterior walls of the workshop, and some old industrial waste parts were scattered throughout the factory. The factory has been facing the risk of demolition.

It was not until the first Party Congress in Jing'an District put forward the regional development strategy of "one axis and three zones" that the traces of the old history of Shanghai Metallurgical Mining Machinery Factory absorbed the gurgling development vitality and stood again in front of the times. Nowadays, Jing'an Xinye Square is building a new media film and television industry base, which has a lot of contracted customers.

2.3 The current situation of Jing'an Xinye Square

Jing'an Xinye Square covers a total area of about 200,000 square meters. The renovated red-brick factory building in the park has a beautiful facade, a facade with a pitched pointed roof, and retains the original truss structure of the industrial plant, which is very distinctive. Although compared with other forms of modern architecture, the form of factory building is too rigid and rough, but its simple material, and the combination of highly rational machinery, freely express its own structure and material reasonable combination of beauty. At the same time, the firm structure and long span of the factory building are full of the possibility of infinite transformation. Besides, the historical and cultural value of the plant itself makes it have great value for development and reuse, which is more valuable for material and functional reuse than other types of modern buildings.

After the reconstruction of the park, the single ordinary workshop space structure is transformed into different space forms, and different space forms are combined, which brings different space experience. At present, the factory has a LOFT structure with a height of 5.5 meters for the first floor and 3.5 meters for the second floor. There are also new beam and plate structures with a height of 3.5 meters to 5.5 meters. At present, the signing customers include SMG (entertainment program recording), Vango Fencing, Character License Animation, and Wu Xiaobo media studio.

3. Jing'an Xinye Square Reconstruction Project - Spatial Experience Analysis of Minsheng Art Museum

3.1 Overview of the Shanghai Minsheng Art Museum

Shanghai Minsheng Modern Art Museum covers an area of nearly 7000 square meters, of which the exhibition area is about 3800 square meters, the largest single exhibition hall "core tube" space is about 800 square meters, and the floor height is up to 8 meters. Professor Xie Tian of China Academy of Art and his team oversee the transformation of the museum. Faced with this industrial relic, the design team extracted the spiritual core from the traditional culture and decided to express it with an

intentional spatial language. Finally, the concept of "knowing white but keeping black, and keeping the original color" is extracted to design and rebuild the site.

3.2 Spatial reconstruction techniques

3.2.1 Creating diversified space

Compared with the traditional art, the expression of contemporary art is more diverse, correspondingly, the space to accommodate these forms of expression also presents the characteristics of diversity. Minsheng Art Museum is to transform the single and uninteresting spatial pattern of industrial plants into diversified space. The main space of the museum is an entrance space with a clear height of about 5 meters. There are spaces of different shapes, sizes and layers with significantly different volumes. These spaces are like boxes with different functions placed in them. The classical space at the entrance, the open courtyard display and exhibition space, as well as a variety of multi-function halls and conference halls all carry different artistic needs, and present the contemporary art form in a more concrete way. The organic combination of these interesting box spaces in a single boring factory space, together with the landscape sketch, installation art, central courtyard and other public open space set outside the museum, constitutes a set of rhythmic spatial combination.

3.2.2 Organizing tour routes

For the contemporary art exhibition hall, in addition to the static streamline that people watch in front of art works, the space experience is equally important when people visit the museum. Sometimes the museum itself is also a work of art. The space of the traditional art museum is mainly to serve the work itself, and its space is static, while the space of the contemporary art museum is more designed and created based on people's visiting experience, and its space is more dynamic. The dynamic of Minsheng Art Museum is formed through the interlacing, interweaving, combination and integration of spaces of different sizes and shapes. Through a series of passageways shaped inside the building, people can walk around the museum and feel its spatial charm in all aspects.

3.2.3 Connecting the atrium space by using stairs

In the museum, people can ascend the steps of the exhibition platform. The wide staircase is interspersed throughout the space, forming an angle of about 45 degrees with the space. The use of huge broken line forms can break the monotony of the large space, and at the same time, can integrate the vertical traffic space with the tour space naturally. The eye-catching staircase not only guides people's imagination to the next floor, but also provides an open and natural auditorium. Its form is full of uncertainty and its function is possible, which increases the possibility that tourists and artists can give it the use function. This atrium seems to be a public space for sightseeing and rest. In fact, its function is not accurately defined, so it gives rise to more possibilities. In the future, it may be a foyer, a place for public performance, and a place for art installations.

3.3 Utilization of material

3.3.1 Plant reconstruction material

The facades are made of orange materials to retain the charm of the past as much as possible. The local reconstruction of the building is also matched with the use of corroded steel plates, making the whole park look like the shadow of the past. The interior space of the museum is a modern interior space created by the combination of white walls and the original clear water concrete. The original fair-faced concrete material is added to make the whole building look less dull and better blend into the surrounding environment. The choice of this material originated from a casual trip to the construction site, when seeing workers processing air conditioning pipes. The seemingly ordinary and common aluminum and manganese plates presents soft, elegant, and silk-like feeling under the sunlight. This material, which is usually only used out of sight, can create surprising and unexpected feelings.

3.4 Detail design and modification

3.4.1 Logo design

The logo of Minsheng Art Museum echoes the initial letter of "Minsheng Banking Group", that is "M", and at the same time, it fits the exterior form of the gallery formed by the combination of the three double sloping roof factories.

3.4.2 Landscape sketch design

In the outdoor rest space of the park, many corroded steel plates are used as the constituent elements, and the mottled rusty iron sheets can well arouse people's memory of the past factory buildings. The floor of the square, the fences of the flower beds and the street lights are not the usual materials and forms, which use rusted steel plates as the main decorative elements. This design techniques and elements run through the entire design of the park, together with the preservation of some unique primary colors of the original plant, which can make people feel the industrial atmosphere of the past again.

3.5 Spatial experience after transformation

The industrial factory building with a strong historical atmosphere collides with the modern art museum with contemporary characteristics, and the old factory building is revitalized by the art museum. After the transformation of the plant, for one thing, it presents a diversified space, open character, and flexible functional layout, breaking the singleness of the old factory; for another, it uses simple materials and techniques, but it can bring a special space experience.

When entering the Minsheng Art Museum, the modern interior device can instantly pull people from the industrial atmosphere of the past to the modern art space. The black folding staircase located in the atrium with a strong sense of form brings a strong visual impact and physical experience. The original monotonous factory space no longer exists, but is replaced by the art space with different spatial levels, which makes the whole space become more vivid. The whole space became smart. When people are in it, there will be subtle changes in perception, emotion, and psychology in the process of entering from one space to another. Space is not space itself, but brings people great sense of visual impact and satisfaction in heart. Every time people leave a space, they will have a sense of anticipation for the next one. At the same time, the indoor atmosphere and functional layout is very consistent. In a human-sized space, light creates a cozy atmosphere where people can relax, read, watch and chat; in the art exhibition space, the atmosphere of the space is focused and dignified, which makes people focus on the art work itself; in some public open areas, the original clear-water concrete structure of some factories is exposed and the story of history is told silently, as if the old factories were growing in the new environment. People are immersed in it, the scene is blended, and the relationship between people and architecture is closer.

4. Summary

The rational transformation of industrial building factory area is the mainstream solution to the problem of protecting industrial building heritage. In the process of transformation, how to create the human comfort of space is the first consideration in the design process. The scale of industrial workshop space is quite different from that of people's living. In space design, it is necessary to break down the original space form, so that the new space form can adapt to the new function, and then arouse the attention of the contemporary people, thus enhance the vitality of the whole space, so that industrial buildings no longer face the fate of ruin, idle or even demolition. Additionally, it is necessary to make use of the unique spatial character of industrial plant space: the towering structure can form different spatial forms through different segmentation, and obtain diversified space through different combinations of space. Therefore, the functions implanted in it have become diversified, and this combination form is more efficient and convenient when people use it. In addition to the transformation of spatial scale, the creation of spatial atmosphere also affects the experience of people

and architecture. Under the modern decoration, the original plant is indeed removed from the sense of loneliness, but too modern decoration will make people lose the communication with the building itself when using the building, so many buildings will generally retain and expose some structures of the original plant. For example, the fair-faced concrete wall and the large steel truss structure, the two styles coexist in the same space, forming a contrast and merging with each other, as if the present and the past are talking, and the story of the building itself is enhanced. On the facade of the building, whether the new building or the reconstruction of the building is a continuation of the historical style. Each plant is carrying the area own story, people should pay attention to the sense of history when transforming and redesigning the old industrial plant, and combine with the needs of users and the blank space for the future, to design a space that can bring people a better sense of spatial experience, and the industrial heritage can regain its vitality.

References

- [1] Chen Daohui, Jin Rongke, Fu Kai, Li Ruilin. Research on the Renewal Design of Old Industrial Plant - Taking Shanghai Shipyard (Pudong) as an Example. *Urban Architecture*, 2019, 16 (11), 55 - 56.
- [2] Zang Li, Lin Feng. Study on the Returability of Single-storey Factory Building in Shanghai Creative Park [J]. *Huazhong Architecture*, 2008 (06): 133 - 137.
- [3] Cheng Jing, Zhou Junqing. Brief Discussion on the Renovation of Old Industrial Plant [J]. *Sichuan Architecture*, 2007 (01): 17 - 18.
- [4] Wang Yueqi. Research on the Transformation Method of Old Industrial Factory Building in the City. *Modern Decoration (Theory)*, 2017, (02), 208
- [5] Zhou Quan, Zhou Xiaoru. Reclaimed Design of Old Industrial Plant from 798 Art Museum [J]. *Design*, 2017 (19): 146 - 147.
- [6] Zhang Yonghe, Yin Shun. City Spreading and China [J]. *Architectural Journal*, 2017 (08): 1 - 7.