

Aesthetic Research in Container Building Design - Take Common Ground Mall As An Example

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Abstract:

This paper discusses and analyzes the development process of container construction and the development status at home and abroad. Taking the architectural design of the Common Ground shopping mall as an example, combined with the design concept, space form, overlapping method, modeling characteristics, material application and other aspects of the building, based on the perspective of design aesthetics, research is carried out from the aspects of building function, structure, shape, material, etc. The architectural aesthetic characteristics of Common Ground shopping malls are summarized, and the unique artistic style characteristics and aesthetic connotations of container buildings are extracted.

Keywords:

Container Building, Design Aesthetics, Lap Method, Space Combination

1. Introduction

The progress of society has brought about the improvement of people's aesthetic standards. In addition to meeting the basic functional needs, people are more pursuing the beauty and personalization of objects, and the requirements for design aesthetics are getting higher and higher. Therefore, it is necessary to integrate aesthetic design into interior design, clothing design or architectural design. As a "solidified epic, comprehensive art", architecture is not only the precipitation of national history, but also the entity that demonstrates the unique imagination and way of thinking of mankind. In specific architectural design, designers usually use the application of aesthetic ideas to make a reasonable layout of architectural language such as space combination, body shape, size and texture, so as to reflect its diversified styles and artistic conception. With the rapid development of import and export trade and logistics and transportation industry, the use of recycled containers for building renovation has gradually entered people's field of vision, and the industrial chain of container house design, processing and manufacturing, and marketing and sales has begun to form and develop rapidly. It can be seen that strengthening the thinking of aesthetic laws in architectural design has become a new trend in the development of

architectural aesthetics [1]. Therefore, taking the Common Ground shopping mall as an example, the container building design is analyzed based on the theory of design aesthetics.

2. Origin and Development of Container Building

2.1. The origin of container building

As an emerging architectural form, container building has only appeared in people's field of vision for more than 30 years, however, this unique construction method has developed very rapidly, and is attracting more and more experts and scholars' attention, and is favored by more ordinary people.

At the beginning of the container freight terminal, a large number of containers that could not be used due to partial damage were used for workers' dormitories, offices, etc., and the function of container buildings as temporary housing came into being [2]. The role of the container building at this time is only to provide a simple shelter, and most of it is to use the space of a single box. In the late 1980s, due to the overdevelopment of the transportation industry, a large number of container terminals were left idle, in order to solve the recycling and utilization of waste containers and respond to the design concept of low-carbon and energy-saving, a number of designers and offices have emerged in western countries to study container buildings. At this time, most of the container buildings are a single box or a simple combination of a small number of boxes, and the building space is single and lacks changes, the design cases at this time mainly cover temporary houses, simple houses and small public buildings [3]. After 2000, the development of container construction has shown a new situation of blossoming. Container construction has developed rapidly, and many container manufacturers have begun to provide professional supporting services such as container transformation, transportation, installation and construction. At this time, container buildings were mostly used in post-disaster emergency reconstruction, and the government was also vigorously promoting the use of container temporary housing. Today, when the construction field emphasizes the sustainable development of low-carbon energy saving, container buildings are vigorously promoted in line with this trend. Container buildings are no longer synonymous with simple houses, but are developing in the direction of refinement and ecology. Its application fields have also expanded, covering almost all types of buildings such as residences, offices, commerce, hotels, schools, art galleries, and gymnasiums.

2.2. Development Status of Container Buildings

(1) Development status of container construction in China

The construction of domestic container buildings is largely a spontaneous transformation of the recycling and reuse of waste containers, most of these buildings are only a kind of low-cost temporary buildings, lacking in-depth research, design and factory construction technology with a high degree of prefabrication, poor living comfort, simple appearance and lack of beautiful detail design [3]. Most of the manufacturing enterprises for the renovation of container buildings are also aimed at foreign export or the renovation of residential units. The development opportunity of container building in China started from the post-disaster reconstruction after the

Wenchuan earthquake in 2008. Since then, this new form of rapid construction has attracted people's attention.

At the beginning of container construction, private individuals or groups used containers to assemble houses, generally small in scale, and because there was no professional guidance, the construction was simple, the physical performance was poor, and it was difficult to guarantee safety and comfort. With the rise and rapid development of container buildings, more and more professionals and designers in China have seen its potential and made great efforts for the development of container buildings in terms of style, scale, and functional type. In 2008, the annual output value of container construction projects in CIMC Group has reached about 100 million US dollars, with a total construction area of about 100,000 square meters, it has a relatively mature design, development, manufacturing and installation of a series of product services and the ability to solve overall project solutions, and established a container construction real estate company at the end of 2009. It has not only successfully completed a large number of container buildings in London, the United Kingdom and Amsterdam, the Netherlands, but also participated in the construction of large-scale domestic projects such as the container dormitory of Zhuhai Vocational and Technical College and the Wenchuan Container Combination Campus. In recent years, some new building types have emerged in the field of containers, such as container student dormitories in Zhuhai, commercial complexes in Sanlitun in Beijing, restaurant buildings in Tianjin Wharf, and so on.

(2) Current status of container construction in foreign countries

In foreign countries, container construction is a very mature product, and it has a rich and diverse product line for different user groups. According to the ISBU Association and the Container Housing Association, container construction is one of the fastest growing construction trends, especially in the United States. Initially, container buildings mainly attracted people from the design, fashion and architecture circles, but in recent years, more and more people from all walks of life have begun to appreciate the fashion sense of containers. In developed countries in Europe and the United States, from material suppliers, to designers or firms, to developers and builders, the industrial chain of container construction has been relatively complete, and the market is relatively mature.

Container buildings in developed countries in Europe and America are mainly used in various creative construction fields, such as shopping malls, budget hotels, holiday homes, art and exhibition centers, etc. Container buildings often have complex combined structures, unique and creative shapes, exquisite interior decoration, and are mainly commercial and fashionable building types, with different scales, and many successful examples have emerged. Container houses in Southeast Asia are mainly used in construction sites, factory dormitories and social public facilities. The demand is large, and the requirements for design, structure and appearance are low. Shipping containers can meet the needs of the local market after simple transformation. In Africa, the Middle East, Australia and Latin America and other regions, due to various reasons such as local economy and resources, the market for container construction is mainly in mining enterprises and industrial dormitory areas, and more is the use of its economic and environmental adaptability characteristics.

3. Design Analysis of Common Ground Shopping Mall

Common Ground is a four-storey mixed shopping center located in the commercial center of the west side of Konkuk University in eastern Seoul, South Korea. It covers an area of about 5,300 square meters and is the largest container commercial building in the world. The mall is made up of 200 blue containers in total. The square in the middle divides the entire space into Street Mark and Market Hall, and the left and right sides sell men's and women's clothing, among them, Street Mark is the form of department store space, and Market Hall is the form of store space. The first and second floors under the two areas are mainly clothing, while the third floor is the observation deck and restaurants. The Market Hall area is a container structure on both sides. The roof of the steel structure forms a large atrium space in the middle. The surrounding traffic is developed, and the subway Jiandae Station and Seongshui Station are nearby, which are very popular.

3.1. Design Concept

The Common Ground mall is designed and built to activate the unused land space in the city. By using prefabrication methods to produce multiple modules at the factory, and then transport them to the construction site and assemble them, the construction time of the 5,300-square-meter building can be reduced by five months. There are more than 70 stores in the mall, most of which are experimental and pioneering popular stores and brick-and-mortar stores of well-known online stores. Many emerging designers are presenting their works here. The success of these businesses is not unrelated to the overall positioning of Common Ground. What it wants to build is a cultural and creative building that combines culture and business. It is more like an exhibition hall for shopping and dining than a shopping mall, attracting tourists from all over the world to visit.

3.2. Structural characteristics and application of materials

The Common Ground shopping mall is located on the main traffic road. The building shape of stacked container modules is very attractive to people. The building on the side with more people is kept open, which allows people and surrounding buildings to flow into the building naturally. In order to maximize the use of the long rectangular base, the site plan consists of two buildings connected by a central plaza, both buildings, Street Market and Market Hall, are architectures formed by stacking container modules, but the architects gave the two buildings different characteristics: The Street Market has been placed in a prominent position, highlighting the individual container modules and bringing a stronger visual effect to the facade; The Market Hall is composed of 12-meter-long long-span containers as a separate shopping booth. The roof spliced by the containers on the third floor is a usable terrace space [4], see Figure 1.



Figure 1. Common Ground shopping mall exterior.

The Common Ground shopping mall is constructed of 40-foot containers with 200 containers in horizontal row, vertical stack, and partial staggered box overlap, the building materials it uses include custom container bodies, steel, tempered glass, wood, concrete, etc.

3.3. Spatial form and structural characteristics

(1) Spatial form

The space layout of the entire shopping center is divided into three parts: Street Market and Market Hall, the two main buildings, and the outdoor activity plaza Market Ground between them. The bottom two floors of the two buildings are the men's and women's fashion sales areas. Among them, the Market Hall is a large space commercial plaza. The two-story high atrium space is enclosed by the boxes on the north and south sides. The shops in the container box as a whole share the dominant atrium activity area; The Street Market is in the form of a characteristic commercial street. The internal space is in the form of an inner corridor. The shops are arranged on both sides, and some parts are changed. The spatial layout is relatively free and flexible. The north facade relies on the dislocation of the box to emphasize the entrance to the northeast corner. The size of the container's own mailbox also determines that the entire shopping mall is dominated by small and medium-sized businesses. "Small and refined" is the common feature of these stores. The Street Market building has a "J" shape, which echoes the Market Hall and encloses the Market Ground, an outdoor event plaza. The outdoor activity square is equipped with dining cars for catering services. The square, together with the popular food area terrace market on the third floor of the building, not only provides logistical support for the entire shopping center, but also undertakes open functions such as commercial program performance and weekend flea market, bringing more vitality and image space to the entire shopping center. The flexibility, contingency and popularity brought by outdoor activity space are also the most important factors to attract tourists from all over the world [4], see Figure 2.



Figure 2. Common Ground shopping mall exterior dining car.

(2) Structural characteristics

The square in the middle divides the whole space into street mark and market hall. The whole building of market hall adopts the container structure on both sides, and the steel roof in the middle forms a large atrium space. The street mark is a characteristic commercial street. The internal space is in the form of an inner corridor. The shops are divided into two sides, and the space layout is relatively free and flexible. On the North facade, the entrance of the northeast corner is emphasized by the concave convex dislocation of the box.

4. Aesthetic Features of Common Ground Mall Buildings

4.1. The beauty of function

For architects, function is generally the most important aspect. Although architecture can attract attention with its unique formal beauty, people's appreciation of formal beauty is only temporary, and after a period of time, they will naturally focus on function[5]. The most fundamental purpose of architecture is to meet people's living requirements. It is very different from pure artworks. Architecture needs to have complete functions. The Common Ground shopping mall building is constructed of 200 containers, which have the functions of good reducibility and little damage to the environment. When the container is used as a building component, the construction is fast and the disassembly and reorganization are convenient. The disassembled container body can still be recycled and reused, which largely avoids the generation of construction waste and damage to the environment. Container buildings are built under the policy of low-carbon environmental protection and green development. In addition to meeting the daily use of thermal insulation, water supply and power supply, they also meet the functions of culture and entertainment. In addition, its architectural outline is smooth, the shape is neat, the shape is simple, and the design is avant-garde. Make the building not only comfortable but also in line with the aesthetics of modern people, make the building feel more warm, and show the beauty of colorful functions.

4.2. The beauty of structure

The Common Ground shopping mall is constructed by using 40-foot containers to be horizontally arranged, vertically stacked, and partially staggered. It breaks through the traditional building structure and makes its building structure more novel, delicate and beautiful. The beauty of the building is not only reflected in its own structure, but also constitutes a harmonious and unified whole with the surrounding environment, reflecting the beauty of its inner meaning. The building is built with a custom-made container body, which reflects the concept of green development. The overall design is very simple, without any extra decoration, with the least material, the most reasonable structure, and the least investment to create the largest internal space. The full utilization of resources and the rational design of the structure show the beauty of the structure of the building[6].

4.3. The beauty of shape

The generation of architectural modeling beauty cannot be separated from the building itself. It depends on the needs of the aesthetic subject, that is, people, and is based on people's emotional life activities to the building [7]. Modeling beauty, as a kind of value, is a substantial existence, which is observable and accessible. The most praiseworthy beauty of the common ground shopping mall is the creation of color. Color itself has a strong desire for expression. It is the most direct and clear means of expression of the building and gives people the strongest visual impact. Those people who have lived in a gray city for a long time walk into the streets and there is a concrete world everywhere. The common ground shopping mall building breaks the traditional architectural color, and uses a large area of solid color, which is direct and clear. The building of common ground shopping mall is blue, which makes the building look so clear and makes people feel calm and at ease. It can remind people of the sea, sky, water, etc., giving people a feeling of beauty, purity, rationality, serenity and broadness, and narrowing the distance with nature. On the whole, the common ground shopping mall building is a symmetrical and balanced architectural form,

giving people a neat, dignified and rhythmic aesthetic feeling, forming a unique architectural beauty style. When it shows the perspective of "angled perspective", it is also amazed by its "body shape beauty" with multiple ratios. The building is composed of several horizontal and vertical interlaced composition, horizontal and vertical contrast, color and texture contrast, and light and shadow lighting, which makes the whole building appear both stable and bright [8]. See Figure 3.



Figure 3. Common Ground shopping mall building.

4.4. The beauty of materials

Common Ground mall buildings are constructed of custom container bodies, tempered glass, steel, wood, concrete and other materials. With the increase of my country's trade and transportation volume, a large number of containers have been eliminated due to local damage in the long-term transportation process, which can no longer be used to carry goods. As a new type of construction, container construction is a solution to the secondary utilization of waste containers. effective way [9].

The container building is simple but not simple. Compared with the traditional building form, the container building has the following characteristics: first, the construction waste is less. Compared with brick concrete structure buildings, the construction water consumption of brick concrete structure buildings is 30 times as much as that of container buildings, the concrete loss is 50 times, and the construction waste and decoration waste are reduced by about 99%; Second, the container building has lower requirements on the site construction technical conditions, and can improve the construction speed and reduce the impact and damage on the construction site environment; Third, the structure of the container has good integrity, and the building is durable and safe. The bearing capacity of the container building reaches 1.7 tons per square meter, the wind resistance reaches level 10, and the seismic grade is level 8. Even in case of severe natural disasters, the box module unit will not be crushed [9]; Fourth, energy conservation. After the physical performance of the container building was transformed by the factory through prefabrication and assembly production, the thermal insulation effect of the prefabricated thermal insulation decorative composite plate with a thickness of 50mm was basically the same as that of the 240mm brick wall, which greatly saved the use of energy. In addition to containers, tempered glass is the most widely used. Tempered glass gives people a modern sense and makes the building appearance simple and bright. The use of a large number of tempered glass can also make good use of light energy and adjust the indoor brightness. The simple and bright texture of tempered glass reflects the beauty of building materials. See Figure 4.



Figure 4. Common Ground shopping mall facade.

5. Conclusions

The rapid development of today's technology has made people have higher-level requirements for architecture, which also requires strengthening the transformation and supervision of design during construction, so as to achieve the coordination of building design and aesthetics [10]. The use of containers to build buildings provides a new way of utilizing the idle or decommissioned boxes. It has the advantages of efficient construction, environmental friendliness, and strong flexibility. It is a sustainable building form with ecological benefits. The development of architectural aesthetics and architectural design is a combination of mutual influence and unity. Cargo containers are valuable modular building materials worth considering in the process of urban development. They play an important role in both users and social development, and have certain design significance and value. The various aesthetic forms of container architecture are worth exploring and pondering. Beautiful architecture allows us to live in art.

Conflicts of Interest

The author declares that there is no conflict of interest regarding the publication of this article.

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