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Analyze the Application of Technical Performance in the Architectural Design

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Abstract: This article briefly discussed that the world today focus on the technical performance of the architectural design, clarify the history of advocating the technical sense of aesthetics and analyze the technology manifestations of architectural creation combining the Building Case.

Key words: Technical performance, aesthetic, building technology, architectural design

INTRODUCTION

In the field of architectural design at home and abroad, architectural design with various forms, many manifestations varied, these make people dizzying. But through these cultural phenomena, we can clearly discovered that the importance of science and technology in the field of architectural design and the current of pay more attentions on technical performance in the architectural design.

With the widely use of a variety of high-tech in architectural design, the status of technical factors in the field of architectural design is becoming more and more high, bring about some architectural forms along with these changing. New building technology provides a broader arena for architectural design, which meet the diverse psychological demands of the community tend to the architectural aesthetics and also give the building with a new external look at the same times, further improve their aesthetic sense. Therefore our society produce the architectural and cultural trends focusing on the technical performance at present.

ADVOCATING TECHNOLOGICAL AESTHETIC

Crystal Palace Exhibition in London as well as the Eiffel Tower in Paris came into being in the Industrial Revolution period, which were vigorously attacked by a variety of conservative forces at the time of that era but this approach that dare to show the internal structure and use modern building technology is accepted and appreciated (Cheng, 2006). The new ways was constantly heritage and develop. In the seventies of the last century, due to the rise of high-tech architecture concept, paying more attention to the technical performance has become the mainstream form of architectural aesthetic.

High Tech Schools specially emphasis on the application of technical performance in architectural

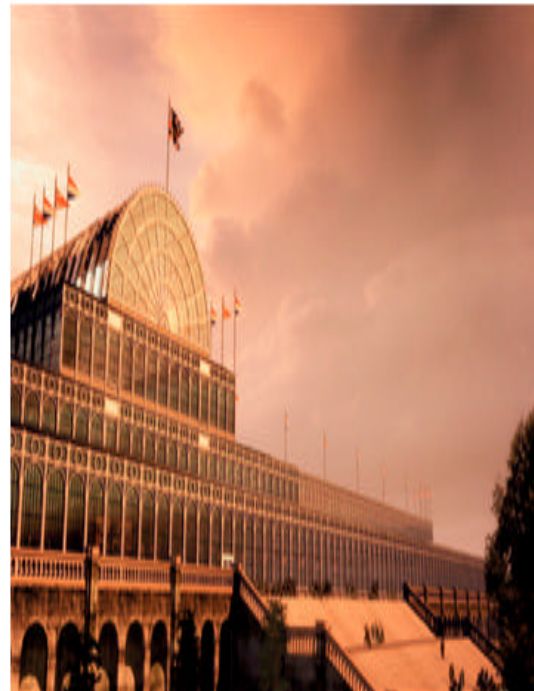


Fig. 1: Crystal Palace Exhibition in London

creation and introduce science and technology into the architectural design. These were widely used in various fields of design, construction. A number of high-tech architecture masters created some influential representative works at different times such as The Munich Olympic Games Stadium, built in 1972, Lloyd's of London insurance company and the bank building designed and built by Richard Rogers in 1986 etc (Guan, 2003).

It don't like Mechanical style architecture that was full of iron steel and rivet, High Tech Schools not only inherited the concept of the faithful performance of metal materials, structures and construction practices but also

more emphasis on exerting the characteristics of the material properties, structure and construction techniques, exposing electrical and mechanical equipment, highlight the important role of technology to inspire creative design ideas, sublimate technology for the arts and make it become the modeling means of expression with rich contemporary.

At the same time, by Wei Aole advocacy, through the Nervi development of structural expressionism style building, Attention has been paid in the long time. Especially performance is manifested in the works of the Spanish architect Calatrava which show structural modeling and aesthetics in perfect harmony, push the technology into the realm of aesthetic of plastic arts performance from the other side.

Structural expressionist attract people by the curve structure of fine shape, the shape of member section is also very challenging. Although the performance of this technique as a means of structural, it has changed structure into art. Although, it also pay more attention to mechanical or tectonism of the components. But is not the pursuit of economic efficiency, rather focuses on the emotional express to express a subjective ideas making use of structural form.

In addition, with the impact of post-modern thought it has appeared in succession the aesthetic values of the use of mechanical aesthetics and semiotics expressions mechanical deco style building and mechanical devices-style building.

The former we make Japanese architect Shin Takamatsu Ruo Lin Guangxing as representatives whose use more metal mechanical symbol. They use the way similar industrial design practices to create a special decorative style. While the latter is based on Wesley Jones, Neil Denali, Ken Capron as the human representative. These architects are not keen on the performance of high-tech and new technology, but back to the gloomy classical mechanical era, looking for inspiration in a large heavy mechanical devices, use technology to express their personal feelings.

In fact, building in nowadays, no matter how it is the value orientation of its external representation. They seek performance through technical means more or less to express the aesthetic imagery of the information society and use new materials and new technology to reflect the unique sense of the times. Even some building use traditional construction methods to built and looks like simple, which always embodied Local characteristics pursuing technical performance in the building's main entrance, stairs and other parts. Expression and connotation of the technical performance plays different roles in different times and different architecture schools.

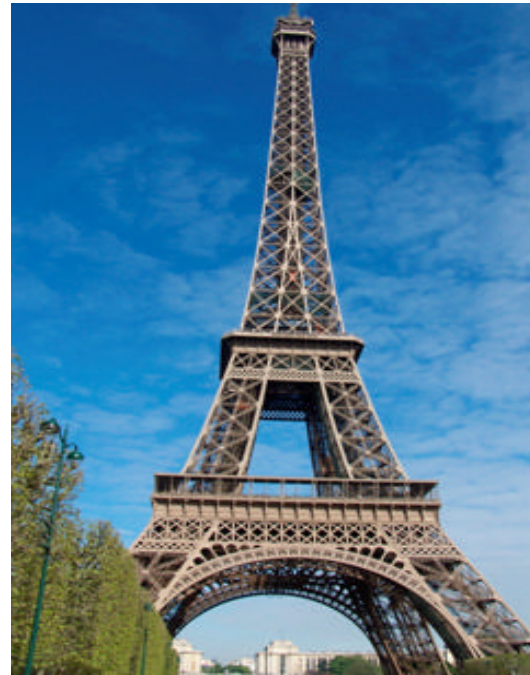


Fig. 2: Eiffel Tower in Paris

Technical performance, it come from the early times showing the charm of modern industrial civilization, with gradually develop it could express subjective concept of the creators by the way of technology. At a higher level, technology combine with emotional to affect architectural design by the means of technical aesthetic (Wang, 1997).

GREAT ROLE OF TECHNOLOGY OF THE ARCHITECTURAL DESIGN

A variety of technical is the means of the progress of human society, the construction technology is the ladder of the development of the building . The change of Technical means, beyond the genre and other cultural factors, has a huge impact on architectural modeling and transforms building creative concept and design method.

Look back at the history of Chinese and Western architecture ,we have no difficult to find that behind the evolution of any architectural form, bears very amazing architectural technology. From a macroeconomic viewpoint, since the 19th century after the industrial revolution to today about 100 years, the development of modern architecture changes experienced three major technological revolution.

The first technological revolution existed in construction materials technology and building structures technology. After the industrial revolution of the 19th century, the large number of artificial material, steel, glass



Fig. 3: Kansai International Airport of Japan

and concrete, replaced the masonry, wood and other natural materials. Flexibility of building height, span and spatial organization obtained the liberation, created architectural forms and architecture schools, which had never had.

The second technological revolution is the revolution of the device technology. With the elevators, escalators, artificial lighting, water treatment, air conditioners and other technologies continue to emerge at 20th century, they had a great impact on construction before and after the 1830s. The architectural using functional and composition patterns of architectural space, were no small evolution ensued. The proportion of the construction project investment cost of equipment were also increasing year by year. A lot of construction equipment investment accounted for more than 30% of the total cost. The pros and cons of the construction equipment had become one of the important indicators of evaluation of building.

The third technological revolution is the revolution in information technology. Computers, fiber-optic communications, electronic technology and energy-saving technology entered the field of architecture, in the 1970s. The development of automated building management systems, fire alarm systems, security monitoring system, as well as the establishment of a green architectural view of sustainable and environmental awareness, making today's building constantly moving in the direction of the intelligent and ecological development (Wang, 2007).

Overall, all of the technological revolution, fundamentally constantly changing architectural modeling and architectural view of the people. Obviously, the first revolution in materials and structures technology, had a profound impact on the art of building shape. Architectural space modeling, are no longer subject to the

limitations of the materials and structures. The new technology development of reinforced concrete structures, steel structures, inflatable structures and tension, suspension, shell, film, making buildings can be constructed higher, greater span, more free styling.

During the second device technology revolution, functional organization, instead the spatial shape morphology, had the impact on the building. The buildings are no longer subject to the constraints of the natural environment, traffic, toward, lighting, ventilation, temperature and humidity regulation, etc. are can control by manual processing. The relations of the functional organization of the construction have a great change. The mode of building space constitute is different from the traditional function space, which is divided into two parts, purpose space and equipment space.

The third IT revolution, heralded architectural transformation is from mechanical technology to the high-tech and from no organism to organism. Compared with the revolution of the material, structure, technology, high-tech in information society is gradually evolved to not visualize.

Today many buildings have IT melt into the design philosophy and aesthetic needs. They are trying to demonstrate the technology by morphology, equipment of nudity and spatial flow line and use fantastic transparent characteristics of the glass and assembly, integration and mechanical characteristics of steel structure to seek performance of modern science and technology. This design change in concept, makes technical aesthetics re-become the characteristics of the times and gradually become a pursuit of the technical performance of the aesthetic value orientation in society.

TECHNICAL PERFORMANCE OF ARCHITECTURAL CREATION

Changes in construction techniques, creat different forms of artistic expression, also change people's aesthetic values. Along with the update of the progress of technology and aesthetic ideas, the concept of architectural creation also has undergone tremendous changes. Today's building technology has evolved into a mean of artistic expression, architectural modeling creative source and architect's emotional expression medium.

Changes of the architectural creation concept, appear with the establishment of the technical aesthetic ideas. The so-called "High-Tech" is to break the confines of pursuing modeling performance purely from the aesthetic point and creating the opinion from science and technology. Through technical thinking and capturing the



Fig. 4: Bank of Frankfurt

internal relations of the structure, construction, equipment technology and architectural modeling, seek the integration of technology and art, to manifest industrial technology or highly complex soft technology in the form of plastic arts. Such as the Kansai International Airport which Italian architect Renzo Piano designed, the surface modeling of airport roof is determined based on the trend of the air distribution. So, that it not only helps the indoor air circulation, but also has a breakthrough in the aspect of space modeling. It represents the invisible technology.

Another tendency of technical performance in today's architectural creation is the concept of eco-friendly and sustainable development. Building technologies start greening. Green building will be the theme of the times demand. Many architects are trying to use eco-technologies to architectural design in various ways. The use of daylight reflective material, light control shading components and a variety of novel practices of controlling sun radiation and heat into the wall, not only have the energy-saving effect, but also add the charm of the exterior of the building, giving a strong sense of technology. UK Pavilion exterior wall designed by Nicholas Grimshaw in Seville World Expo and the natural ventilation system designed by Norman Foster of Frankfurt bank, are the most representative examples. This technology performance is not simply the use of artificial devices and a variety of new materials to build a green building, but the use of ecological principles to create a

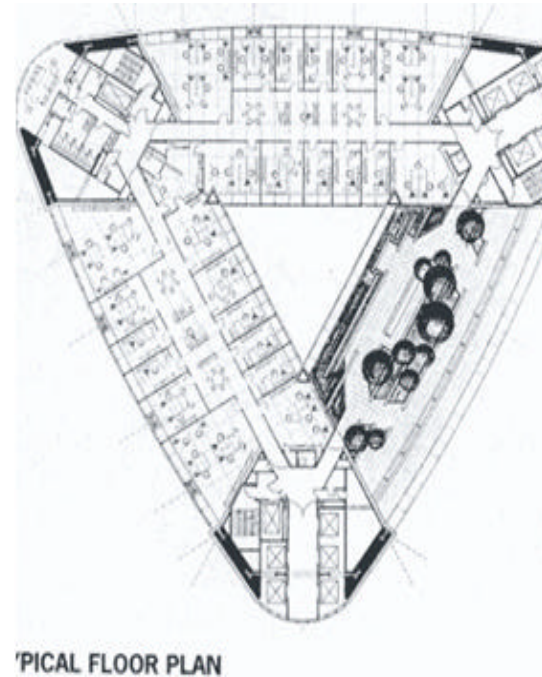


Fig. 5: Standard floor plan of Frankfurt bank

energy-saving system in the design concept of high information low energy cycle and self-regulatory, to change the traditional design concept through technical thinking.

Technology realized that in the creation of modern architecture, in addition to the aforementioned stressed the structural performance of the mechanical properties and tectonic processes, as well as pay attention to environmental protection and ecological green technology. In recent years the decoration performance which pursuits the surface effects is popular. It may be more appropriate if referred to as the Pop-Tech (Su, 2007).

Some young architects, such as Spanish Eric Miralles, Japanese Riken Yamamoto, Toyo Ito and Itsuko Hasegawa such people, often use the sense of technology and metal brought by the use of steel frame and metal materials to metaphorize some fictional imagery in the design. This results the appearance of the pseudo-technology in which the structure and mechanical properties appear insignificant. Their buildings get some ambiguous shape feeling from the structure of modern technology and materials technology, or make framework as a modeling flags, to pursuit the suspension effect exhibited by smooth and glossy metallic materials. The using of modern light quality metal plasticity, ductility and high-strength ultra-thin material characteristics as epidermal wrapped creates some building blocks of space form feature.

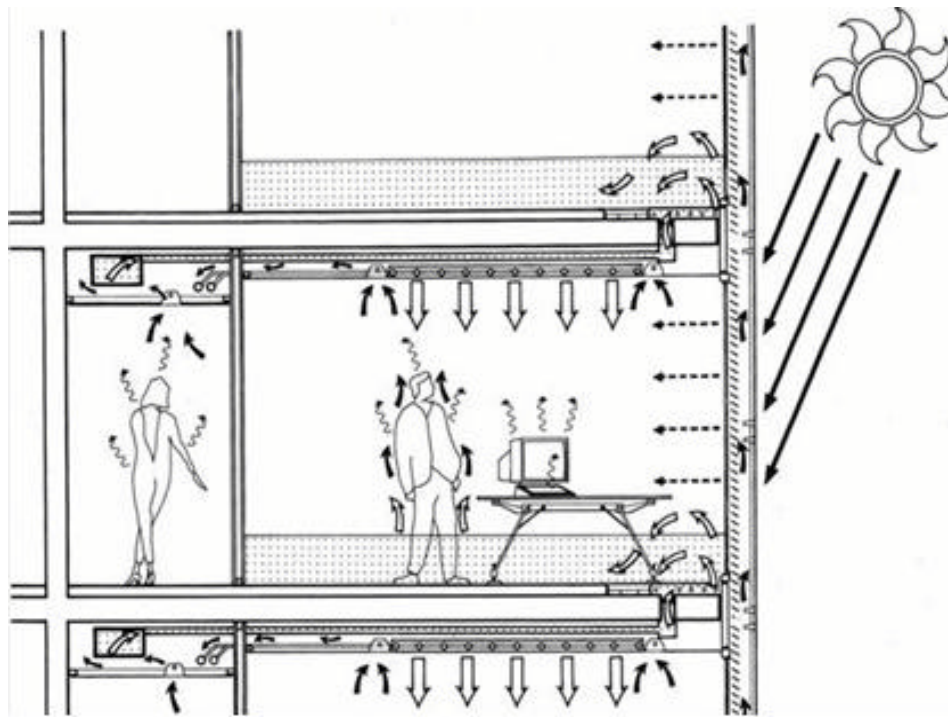


Fig. 6: Ventilation system diagram of curtain wall of Frankfurt bank

Others such as American Mike • Sorkin, Le Beisi • Wu Heights, etc., They go further. Their works combine some of the characteristics of the mechanical device, biological morphology and future age with a strong utopian and they are more close to the works of the technology artists in the field of painting and sculpture. This means technology which is exploited by artists under certain occasions has developed into a prop to show and reveal the phenomenon of modern society.

In the architecture of Pop-tech style, technology is only a tool, one either overt or covert modeling language, is not relevant with how to build architecture. This attitude change in treatment of technology, shows dynamic development in the integration of technology and emotion and the diversification trend of aesthetic ideas in the information society. And also shows that in some cases the technology has begun to degenerate into a decorative Pope art and becomes the performance means in which architects expound the respective aesthetics and express subjective emotion. At this point, we can find that the technology begins to be regarded as a form of artistic expression full of a certain metaphorical and in the development and evolution of this technology performance technology which will gradually be artistic in people's minds.

PLIGHT OF THE TECHNICAL PERFORMANCE OF CHINA ARCHITECTURE DESIGN

With reform and opening up of China, the architectural creation is prosperity and a large number excellent works was born. But we can see that there was a big gap according to the advanced level in the world particular in the field of architectural design in a relatively backward state. In China, architectural design always was influenced by cultural trends .The building materials and new construction techniques that reflect the high-tech was rarely used. Although many of the buildings have all kinds of advanced equipment, but its architectural image has no sense of technology and modern features which was regretted.

Some reasons was account on to this phenomenon, such as economic, aesthetic taste, knowledge and so on, but the most fundamental reason is that the level of overall construction technology is low. In fact, the structure construction technology and construction technology of China has been in a state of semi-stagnation in recent decades. A set of standard figure has been used for many years, which neglect tectonic processes. As well as our building rely on a single brick structure and reinforced concrete structures for a long time, which led to the creation of architectural design was out of touch with modern technology performance.

In addition to these, there was mismatch among the architectural design and structural design and equipment design, which make the structure performance is difficult to play its material characteristics. That because technical performance was keen on to make structural systems and mechanical electrical equipment exposed. Which need architectural design and other engineers to work together to complete our building. Chinese architectural design in order to catch up with the trend of the world, we need to introduce new technologies, new processes and new realization. I believe our architectural design will catch up the word lever.

CONCLUSION

Technical performance has been widely used in architectural creation and further affect people's aesthetic values. When green building concept was introduced into, the deeper technical performance will more impact building creative thinking and produce more new buildings adapt to the development of the times.

According to China for the vigorous development and technology innovation need to face more practical projects, Chinese architects need more ability to enhance technical performance in architectural creation, combining the creation of architectural design and technical performance, making effort for Chinese Architectural prosperity.

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