Research on Construction and Restoration Technology of Modern Historical Buildings

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Abstract: As an ancient civilization, China still has a lot of historical remains, but many historical buildings have been damaged to a certain extent during long-term use, and the safety of the buildings is difficult to guarantee. In response to this problem, it is necessary for relevant cultural departments to do a good job in the construction and restoration of historical buildings, and to highlight the cultural connotation of these buildings.

1. Introduction
In recent years, the speed of urban development in China has further accelerated, and a large number of historical buildings have also been damaged. However, some cultural buildings also have very important historical and artistic values, and are also an important part of China's art and culture system. Only when the protection and restoration of these historical buildings are completed, can the value of historical buildings be maximized, which is also very important for the development of China's cultural industry.

2. Wall Treatment of Historical Buildings

2.1 Wall Cleaning
(1) Cleaning Principles and Methods
In the process of cleaning the walls of historical buildings, the structure and composition of the wall materials must first be clarified, and the composition and structure of the dirt must be clarified. On this basis, a reasonable choice of cleaning methods should be made. In addition, in the selection process of the cleaning method, it is necessary to comprehensively consider various factors such as the cost of cleaning, the seasonal climate, the length of the construction period, and the surrounding environment of the building. After completing the installation and commissioning of the machine, the cleaning operation is carried out in the order from top to bottom according to the actual situation [1].

(2) Cleaning Program
In the process of selecting and investigating the cleaning plan of historical buildings, it is necessary to make a reasonable designation of the plan based on professional guidance and recommendations. If the cleaning program is improper, problems such as wall damage will also occur, and it will be difficult to obtain good wall cleaning effects. Therefore, in the selection process of the cleaning scheme, it is necessary to select the safest and least destructive method for test cleaning. The general
The test area needs to be controlled within 20cm², and then the test intensity and test area are gradually increased, and the application range is gradually expanded after the optimal cleaning agent is determined. In the actual cleaning process, because the same building is composed of many different materials, and the surface of the same material also has certain differences, this time you need to use different cleaning methods to clean the wall. After cleaning, it needs to be exposed for 1 to 2 months in natural weather to discuss the application effect of the cleaning method.

At present, the commonly used methods in the cleaning process of ancient buildings in China include water washing method, grinding method, dressing method and laser method, and the adaptive conditions are also different. Among them, the grinding method, the chemical agent method and the water washing method are used more, and their application conditions also have relatively large differences. The grinding and cleaning method can effectively restore the appearance of the original premise, but it is easy to cause damage to the external surface of the wall construction, and it can not meet the requirements of the cleanliness as it is. Although the chemical cleaning method has a good cleaning effect, the cost is relatively high and it takes a long time, and it is easy to cause environmental pollution. The water washing method is currently the most widely used clear method. The damage to the walls of ancient buildings is relatively small. It is suitable for the effective removal of the stolen materials in stone buildings, and it can avoid the problems of harmful chemical residues. As a new type of building cleaning method, the laser method also has certain application advantages in the field of historical buildings and cultural cleaning. The laser method can irradiate the surface of the wall with a high-energy laser beam, so that dirt and rust can be effectively removed, so as to achieve the effect of rapid cleaning. [2].

2.2 Wall Repair

(1) Brick Wall Repair
Clear water brick walls used in some modern historical buildings have also suffered a certain degree of damage due to weathering and rainwater intrusion. At this time, it is necessary to use related technologies to repair the brick wall to ensure the overall construction quality of the brick wall. At present, the main repair technologies used in China include a variety of repair measures such as brick wall repair, stucco jointing, and brick repair. Among them, brick powder repair is a kind of repair technology that is widely used in China. At present, it has also obtained good application results in Shanghai Hongwan Stadium and some external wall brick doors. Brick powder is a basic material that is ground into powder by clay, and has technical advantages such as good material adhesion and breathability, so it is suitable for the repair work of aging masonry. By means of brick powder repair, the repaired wall can be made stronger, and the historical appearance of historical buildings can be preserved. For example, the Hongwan Stadium in Shanghai has a clear water brick wall with a long history and large area. After many repairs, it can still maintain a rich color and a good texture. It also has very high requirements for color matching. The brick repair model can achieve the expected repair effect, and it also has economical application advantages [3].

(2) Brick Wall Reinforcement
At present, many historical buildings in China are reinforced with steel plates and steel bars or reinforced by epoxy resin injection. For some ways with severe cracks or misplaced walls, first use resin mortar to repair, then fix the steel plate or steel bar on the wall with bolts, and then fill the epoxy resin between the steel plate and the wall interface. For some walls with relatively minor damage, epoxy resin can be directly poured into the cracks. In recent years, with the continuous development of China's construction technology, fiber-reinforced composite (FRP) has also been widely used in the repair and reinforcement of concrete buildings, so it can also become a new option for strengthening and repairing historical buildings. In the process of using this method to reinforce buildings, comprehensive consideration should be given to the strength, weathering, damage and elastic modulus of masonry materials. If there is a large range of weathering or powdering on the blocks or mortar after chemical modification, the fiber reinforced composite material mode shall not be used for reinforcement treatment. In addition, in the process of brick wall reinforcement, first of all, the
concrete wall cracks must be fully considered, and then through the wall reinforcement and external reinforcement, various reinforcement materials are attached to the brick wall and painted. In the layer, the tensile strength of the wall is further improved [4].

(3) Moisture-proof Treatment

At present, the more moisture-proof treatment methods used in historical buildings are injection moisture-proof methods. In this moisture-proof treatment method, mechanical equipment is mainly used to punch holes along the brick joints, and then the waterproof paste is injected into the brick holes by means of injection pressure in. The water repellent enters the wall by capillary action, and will spread along the cracks in the wall, so that the capillary coefficient of the brick around the drill hole can be reduced. In the process of anti-moisture operation of historical buildings, comprehensive consideration should be given to the causes of moisture generation. At present, the factors that cause the occurrence of moisture in China are mainly caused by climate and geographic reasons. In addition, some buildings may also cause problems such as the generation of moisture due to their own use or design. This will also cause a relatively large impact on the normal use of buildings. Inadequate drainage considerations, blocked pipelines, and water leakage are all important factors that cause the building to get wet. Therefore, we also need to clarify the building ventilation system and rainwater drainage system. After the repair is completed, we must pay attention to the maintenance work in daily use.

3. Handling of Historical Building Components

3.1 Partial Replacement of Structural Members

If the structural members of the historical building itself have suffered serious damage, in the case of low protection requirements, it is necessary to immediately replace the local component, that is, to replace the original damaged structure with reinforced concrete, so that the overall performance of historical buildings has been further improved. However, the structure after this replacement is best placed in a hidden part of the building, which must not affect the original appearance of the original overall building. For example, in the restoration process of the East Hall of Wangfujing and the parapet wall in Beijing, because the parapet wall was originally a continuous arch form, the west gate needs to be demolished. However, due to the relatively thin wall at this location, a certain degree of collapse occurred after the closure was removed. Therefore, in the restoration process of the transparent vault, it is necessary to embed the reinforced concrete on the upper part of the continuous arch, so that the carrying capacity of the parapet can be further improved, so as to obtain a good historical building restoration effect.

In the process of strengthening and reinforcing some historical buildings with relatively high protection requirements, it is also required that the new structure must not interfere with the overall characteristics of the old structure, and the replacement of structural members must not be carried out under last resort. Even if it needs to be replaced, it is necessary to maintain the original appearance or close to the original appearance as much as possible, so as to avoid damage to the sense of history of historical buildings.

3.2 Partial Restoration of Building Components

If the structural components of a historical building are missing or severely damaged due to social, historical and other reasons, it is necessary to use modern photos to restore the historical photos in order to achieve the appearance of the building. Partial restoration of building components is suitable for the restoration of building components that have been missing or damaged seriously. If the damage is not very serious, it is difficult to obtain good building restoration effects if old photos are used as the basis for restoration.

For example, during the repair and reconstruction process of the Shanghai Steamship Investment Administration Building, the earliest green tile slope roof and stone carving mountain flowers were demolished during the restoration and reinforcement process in 1961, and were replaced with
cast-in-place concrete roof. The reconstruction of ancient buildings can be carried out through historical photos. After strict calculation, the gypsum carving can be processed according to a 1:1 ratio, and then the gypsum carving sample can be used for carving. After a special construction process, the stone joints can be concealed, and the overall effect of the stone carving can be further strengthened, so that the style of the building can be reproduced in the world.

3.3 Local Reinforcement of Building Elements
Some historical buildings are affected by factors such as inadequate design, or the problem of insufficient bearing capacity after passing through historical factors. At this time, certain parts need to be reinforced to ensure the overall use of the building performance. At present, the local reinforcement methods commonly used include a variety of application methods such as the enlarged cross-section method, the rebar method, the prestress method, and the carbon fiber reinforcement method. These methods can play a good role in improving and strengthening the beam-column structure of the building structure, so that the building's own bearing capacity and seismic resistance can be further improved.

For example, in 1916, the Red Building of Peking University was also the first institution of Peking University. Because the whole building was made of red bricks, it was called the Red Building. However, due to the impact of seismic waves during the Tangshan earthquake in 1976, a certain degree of damage was also caused to the north of the Red Building, and certain longitudinal cracks appeared in the wall. Although the appearance of the building looks complete, it needs to be dealt with by seismic strengthening measures. After research, the building adopted the method of adding wall steel support to reinforce the building, so that on the one hand, it can meet the force requirements of the red building during use, and it will not cause a relatively large influence on appearance to the red building[5].

3.4 Repair Work of Wooden Components
As an ancient country in China, there are many wooden components used in historical buildings, but due to the characteristics of the wooden components themselves, a certain degree of damage will also occur during long-term use. At this time, it is necessary to use repair methods and technical means to repair the wooden components. In this process, the number of replacement and disassembly should be minimized to allow the original to be preserved to the maximum extent. The chemical strengthening method is a kind of wood component repairing method commonly used in our country at present. In this repairing mode, it is mainly to select suitable materials to strengthen and bond some wood components with little damage. In the process of repairing the wooden components of historical buildings, epoxy resin can be used as much as possible. It also has the application advantages of high strength, strong adhesion and low shrinkage. It is good for surface cracks and holes in wooden components. And the effect of processing. If the wood component itself is slightly split, it needs to be filled with epoxy resin first, and then treated with stainless steel rings. For some wooden structures with relatively wide cracks, we first need to dig out the decaying and damaged positions of the wooden components, use sandpaper to repair the wooden components to ensure the smoothness of the surface, and then use the same materials for replacement treatment. For some logs that have severely split, they need to be replaced immediately.

4. Conclusion
As an ancient cultural country, China still has a lot of ancient buildings. However, during the long-term use of many historical and ancient buildings, a series of damages have inevitably occurred because of the traditional design concept being too backward and the influence of the external natural environment. At this time, we need to adopt corresponding repair measures to ensure the performance of historical buildings and improve the use of buildings. This article mainly explores and analyzes the creation and restoration of modern history, hoping to provide some theoretical help for relevant staff.
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