Study on the Key Points of Prefabricated Building Design  
Based on Computer CAD Technology

Yixin Cai *
Fujian University of Technology, China, 361111

*Corresponding author e-mail: caiyixin15980@163.com

Abstract. Prefabricated building is a new type of building. It has considerable advantages over previous forms of architecture. With the gradual improvement of people's quality of life, the requirements for the appearance, characteristics and quality of architectural engineering are getting higher and higher. With the development of computer CAD three-dimensional technology, the design effect of assembled houses can be better presented in the design process. This is easy to modify according to requirements. This paper first briefly summarizes the design features and process of prefabricated buildings, then analyzes the design points of architectural forms in detail, and finally explores the improvement of the application of computer CAD 3D technology. In order to provide a reasonable way of thinking for the future stable development of the construction industry.

Keywords: Prefabricated; Architectural Design; Construction Industry; Architecture; Key Points, Computer CAD

1. Introduction

Compared with the past architectural forms, prefabricated buildings have strong advantages both in the early design process and in the later application process. The main advantages of the new building form are that it consumes less manpower and material resources, is less affected by external factors and has relatively high construction efficiency. In the actual construction, prefabricated buildings can save the occupation of space to the greatest extent, and the methods of space division are also rich and varied. The following is a detailed discussion on the characteristics, process and design points of prefabricated buildings.

2. Design Features of Prefabricated Buildings

The emergence and development of prefabricated building form to a large extent stimulates the
change of traditional building mode and housing building mode. In the process of prefabrication and assembly building construction, it is often affected by a variety of factors, such as the production process, transportation conditions, climate, management level and technical level of construction, construction cycle, etc\cite{1}. At the same time, as a relatively complex systematic project, the new building form usually needs the effective cooperation of construction unit, design unit, production department and construction management department in the process of practical application. Generally speaking, the design advantages of prefabricated buildings can be described from the following aspects (As Figure 1):

![Figure 1. Construction Diagram of Prefabricated Building](image)

2.1. More refined processes

The improvement of the refinement degree of prefabricated building process is closely related to the improvement of the refinement degree of architectural design process. Different from the previous architectural design process, two new contents have been added to the design process of the new architectural form, namely, the preliminary technical planning and the design of the prefabricated component processing drawing.

2.2. improve the modular degree of design

In the process of designing prefabricated buildings, it is necessary for designers to improve the coordination among construction, components and buildings\cite{2}. Through the control and Realization of building module, it can ensure that the module gradually develops into a combination of modules, so as to promote the development of design towards the direction of standardization.

2.3. Improvement of cooperation and integration

In the process of optimizing the design results of prefabricated buildings, we should effectively cooperate with various component manufacturers and specialties, so that the construction organization and management work can develop into one with equipment pipelines, decoration parts, prefabricated components and main components.
2.4. Increased cost accuracy

In the process of production and processing, components and parts are often based on the design results of prefabricated buildings. In addition, the splitting scheme of prefabricated components is different, even based on the unified assembly rate, the difference rate of input cost will be great. Therefore, the more reasonable the architectural design, the lower the total cost of prefabricated buildings.

2.5. Improvement of technology informatization

The application of information technology is of great significance to the innovation, accuracy and practicability of prefabricated building design. Through the application of building information model construction technology to architectural design, the completion of architectural design will be improved rapidly. The abbreviation of building information model is BIM. The main principle of this technology is to use digital information technology to completely present the physical, geometric and functional information of different building projects, so as to provide effective support for the whole process of construction, operation and decision-making management in building construction[3].

3. Design process and key points of prefabricated buildings

3.1. Technical planning stage

Technical planning is an important content to support the good progress of architectural design. In the actual technical planning work, the design unit should fully investigate and understand the geographical location, input cost, construction target, construction scale and other external construction environment of the construction project, so as to provide necessary support for the rational formulation of technical route and the improvement of the standardization degree of prefabricated components. In addition, the specific implementation of the technical scheme must be based on the consensus reached by the design unit and the construction unit, and the subsequent design work shall be carried out in strict accordance with the approved technical scheme.

3.2. Scheme design stage

The good implementation of technical planning is related to the formulation of plane and facade design schemes. Therefore, it is necessary to pay more attention to the preliminary technical planning[4]. For the plan and elevation design, there are great differences between them. First of all, the facade design scheme focuses on the possibility of component processing, and the realization of facade scheme diversification and personalized design needs is mainly based on the characteristics of prefabricated building; the formulation of the graphic design scheme should first ensure the application function of the building, take "more combinations, less rules" as the design principle, and make standardized and systematic Housing sets Type B is designed as efficiently as possible.

3.3. Preliminary design stage

Collaborative design is a significant feature of the preliminary design stage. In the process of design, it is necessary to comprehensively design the relevant contents on the basis of fully combining the technical characteristics of different specialties. In particular, it should be ensured that the number of
floors in the reinforcement area at the bottom of the building can meet the regulations. In the process of optimizing the types of embedded components, the reservation and embedment of professional pipelines should be fully considered. Finally, we should make a special evaluation of the project's effectiveness, analyze the factors that affect the increase of investment cost, so as to formulate scientific and reasonable technical measures.

3.4. Construction drawing design stage

In the process of designing construction drawings, the technical measures formulated in the upper design stage must be used. Each discipline shall carry out the design of construction drawings on the basis of the parameters of prefabricated components, interior parts, facilities and equipment provided by the manufacturer, and on the basis of fully considering the reserved and embedded scheme provided by relevant disciplines\cite{3}. In addition, the construction specialty shall consider the fire prevention, sound insulation and water-proof design of the building connection.

3.5. Component processing drawing design stage

The design unit can cooperate with the production and processing enterprises of prefabricated components to implement the design of component processing drawings. Where necessary, the building unit shall provide the dimension control drawing of prefabricated components. In addition to fully considering the hook transportation equipment installation on the construction site and the embedded reservation of the installation holes of the fixed facilities, the design workers should also reasonably design the prefabricated components such as door and window openings, mechanical and electrical pipelines into the component processing drawings.

4. Summary

In the process of planning and design of residential units, the user's requirements for the separation distance between residential units, unit setback, room lighting, ventilation and other requirements should be well reflected in the design, and then priority should be given to the selection of residential unit suite module combination. The main principle of prefabricated building construction is safety, economy and rationality. On the premise of fully considering and analyzing the construction process, it is required to effectively link the characteristics of each construction process, so as to ensure the overall efficiency of construction. In the actual construction process, the prefabricated components need to be transported to the reasonable range of the hoisting tower when hoisting. Therefore, this aspect should be taken into account in the design\cite{9}. In the temporary storage yard, there are often a variety of prefabricated components. In order to ensure the performance of each component is good and can be quickly found out in the construction, the designer should make a reasonable choice of the location and occupied area of the components. In addition, the best location of the crane tower should be selected according to the construction scheme. In this way, the accurate control of the component transportation link will be realized, and the use efficiency of the construction site will be improved rapidly, which is conducive to the safety of the construction work.

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