Research on steel structure technology in civil engineering construction

Chen Xue
School of Economics & Management, Tianjin University of Science & Technology, 300222
1305436203@qq.com

Abstract. In recent years, with the improvement of science and technology level in China, construction technology in the construction industry is constantly improving. In the traditional civil engineering construction, the construction is through the concrete frame structure. Facing the rapid pace of urbanization construction, various new steel structures are applied to modern construction. Although steel structure technology has many advantages, there are still many shortcomings in the application, need improving. This paper discusses the steel structure technology in civil engineering construction.

1. Introduction
At present, China's infrastructure construction has achieved rapid development, especially in the process of urbanization. All kinds of high-rise buildings continue to rise, making a great contribution to the national economy and people's livelihood. The entire "life cycle" of the structure can be divided into three stages: construction, use and aging. As can be seen from the figure 1, the average risk rate of the construction stage and the aging stage is higher. However, on the whole, the construction technology involved in the construction process of engineering construction in China is still in the stage of development to some extent. Compared with foreign developed countries, there's still some lag, especially in the application and promotion process of steel structure technology, that is particularly significant. Steel structure technology plays an important role in high-rise buildings especially super-high-rise buildings[1].
2. Steel structure characteristics

2.1 Good performance
The steel structure is composed of manganese, iron and other elements, so it has diversified characteristics, with good bearing capacity, hardness and shock resistance\(^2\). Compared with other materials, it has good toughness and ductility. With the continuous development of science and technology, the steel structure production level has a great demand. At present, the combination of steel structure categories, the production of steel to meet the engineering categories, such as heat resistant steel, high strength steel, stainless steel layer. This not only improves the construction quality and efficiency but also reflects the advantages of steel structure\(^3\).

2.2 Be flexible
The plasticity of steel structure shows that its prestress is large and plastic deformation can occur to some extent after exceeding the yield point to prevent structural fracture. This is a characteristic that other materials do not have in the application process. In the process of using steel structure, it is necessary to analyze the elongation and section shrinkage of a steel structure under the action of stress, to determine its specific plasticity. The reason for its strong plasticity is that there are more carbon elements in the steel structure, which can effectively improve the toughness of the steel\(^4\). In the process of utilizing the steel structure, there is no need to worry about the stress exceeding the tolerable range of the material. Technicians can adjust the shape of a steel structure according to the design requirements, which can not only improve the construction quality of civil engineering but also ensure its beauty.

2.3 High environmental performance
High environmental performance is another prerequisite for utilizing steel structure technology in civil engineering construction. The environmental performance of concrete buildings is relatively low. For example, some used concrete buildings cannot be used again and can only be disposed of as construction waste. Besides, due to the lack of garbage treatment technology, concrete waste cannot be disposed of reasonably and can only be disposed of in uninhabited areas. However, the materials and materials needed for steel structure technology can be used twice, effectively avoiding the generation of construction waste and providing an effective basic guarantee for the ecological environment.

3. Application of steel structure in civil engineering

3.1 Reasonable selection of materials
In the process of selecting construction materials for steel structure, construction personnel needs to investigate the actual situation of the steel market and analyze the application of profiles, plates, tubes and metal products. For civil engineering construction, construction personnel needs to use low alloy steel and carbon steel materials as the main steel to ensure their role in construction. In the case of civil engineering construction in the past, although the hardness and strength of carbon steel are relatively large, its plasticity is relatively poor in the application of carbon steel, which cannot guarantee the improvement of construction quality. The steel structure cylinder used in civil engineering construction is mainly an i-shaped section and a box-shaped section. For some projects with special requirements, the section can be treated to make it a composite section. In the process of choosing steel, the contents of these aspects need to be taken into comprehensive consideration. Besides, the research of the welding process needs to be done to clarify the parameters of steel structure and improve the application of steel structure technology.

3.2 Hoisting technology
In civil engineering construction based on a steel structure, hoisting, as a key step, determines the construction quality of construction projects. The scientific use of hoisting technology can give full
play to the value of steel structure in civil engineering. It is also the impact of these factors, before the construction, must do a good job of engineering analysis, clear engineering structure characteristics, and then combined with the actual demand, scientific use of hoisting technology, under the condition of ensuring the construction quality, improve the construction efficiency, let the benefit achieve the best.

3.3 Apply the paint
After the application of steel structures, surface corrosion usually occurs, mainly due to the chemical reaction between the steel surface and the air, resulting in corrosion. In this case, the performance of the steel structure will change, resulting in its failure to support the overall structure and loss of stability. The construction personnel can daub paint on the surface of steel structure, which needs to pay attention to the daub technique of paint. Before daubing, it is necessary to do the basic treatment of the steel structure, clean the metal surface, and carry out the derusting work. After brushing and grinding the surface of the steel structure repeatedly, it is also necessary to polish it with sand cloth and clear the rust powder. Part of civil engineering construction needs to use a larger area of steel, construction personnel can use a grinder to carry out the work of derusting.

3.4 welding technique
When steel structure technology is used in civil engineering, the material connection seems to be made by means of welding. As the foundation of improving the application technology of civil engineering steel structure, it has significant advantages in application to ensure welding quality. Although civil engineering requires high quality and large quantity, the construction period is short, so there are high requirements for welding. At present, there are many welding applications: butt welds, butt joints, fillet welds, t-joints, spot welds and lap joints. In the application, it is necessary to integrate the practical requirements, and select the appropriate way to improve the welding quality and efficiency, to ensure construction quality and progress.

4. To improve the application strategy of steel structure construction technology in civil engineering

4.1 Design reasonably according to site construction conditions
At present, China's civil engineering construction site and environment are relatively complex, and there are many uncertain factors, which cause practical obstacles to the application of steel structure technology. Therefore, based on the above situation, the author believes that, first, it is necessary to carefully analyze the regional environment, climate factors and construction demand of the construction site according to the actual environment and situation of the construction site, and accurately grasp and understand the stress degree of the steel structure of the civil engineering. At the same time, according to the maximum force standard of civil engineering hook machine, its negative load value is calculated accurately. Secondly, the construction technicians should accurately predict the possible deformation and subsidence in the civil engineering construction in advance, and then make a careful comparison with relevant engineering data, to select a technical design scheme of steel structure suitable for the civil engineering construction.

4.2 To lay the foundation of steel structure technology for civil engineering construction
At present, compared with the developed countries, the development of steel structure technology in China is a little behind, the effective use of steel structure technology in civil engineering construction, the need to master the basic technology, and advanced knowledge of steel structure technology. Such as steel structure welding technology, tower technology, hoisting technology and other steel structure technology. Do all the preparatory work to ensure that each process can be carried out safely. Welding is affected by many factors, such as welding temperature, welding speed, etc., all affect the welding is appropriate, master the welding technology is very important. Crane tower technology is very
important in civil engineering construction, the use of crane tower technology for the steel structure construction of mechanical equipment to lift heavy objects, in the construction process of construction personnel should be strictly by following the mechanical provisions of the construction, to ensure the safety of personnel. Before construction, all projects should be checked clearly, construction personnel understand the construction process should pay attention to the problem, there are solutions to emergencies, do all the preparatory work before construction.

4.3 We will put in place a sound regulatory system
In practical work, we must establish a feasible, scientific and reasonable regulatory scheme. First of all, the relevant system should meet the national laws and regulations, combine the requirements of the complete regulations, let different departments work together, in the case of each person to perform their duties, take the initiative to assume responsibility, to ensure the smooth completion of relevant work. An effective supervision scheme can monitor the construction situation in real-time, prevent safe construction, and carry out follow-up treatment based on the accident situation, to improve economic benefits and reduce the accident rate.

5. Conclusion
At present, the development scale of the civil engineering industry in China is gradually expanding. As an important link to civil engineering construction, steel structure technology is of relative importance and influence. In the process of using steel structure construction technology to carry out civil engineering construction, construction personnel needs to improve their ability and level, to provide the foundation for the application of technology. The construction unit should choose the material reasonably, let the steel structure give play to its excellent performance, reduce the problem in the construction.

References
[1] Yu yingna. Technical analysis of steel structure in civil engineering construction [J]. Architecture design management,2015(9).
[2] Shi huashan. A brief discussion on steel structure technology in civil engineering construction [J]. Doors and Windows,2017(5):103-103.
[3] Guo fangfang. Modern industrial economy and informatization. 2016(19).
[4] Discussion on application and management of steel structure technology in civil engineering construction [J]. Wang yuping. Science and technology innovation and application. 2013(07).