Discussion on the Difficulties and Countermeasures of Steel Structure Construction Technology in Building Engineering

Wei Sun

Yunnan Vocational and Technical College of Agriculture, Kunming, Yunnan, China.

Abstract

In recent years, with the rapid development of economy and the acceleration of urbanization, the steel structure of construction engineering as a new type of construction technology has attracted more and more attention. With the advantages of low density, high strength and good stability, steel structures are widely used in high-rise buildings, large-span structures, bridges, stadiums, airport terminals and other fields. However, there are many difficulties and challenges in the construction process of steel structures in construction projects, such as narrow construction sites, difficult work at height, complex and variable installation locations, and imperfect protection measures, which often lead to quality problems and accidents during construction and seriously affect the construction efficiency and cycle time. Therefore, this paper proposes a series of countermeasures to solve these difficulties and challenges, such as rational planning and layout of construction sites, strengthening safety protection measures for working at height, introducing intelligent equipment and advanced technical means, and strengthening construction site management. These countermeasures can help enterprises avoid the difficulties and challenges in steel structure construction, improve the efficiency and quality of steel structure construction, and thus promote the continuous development of the industry.

Keywords

Construction engineering, Steel structure, Construction technology

1. Introduction

Construction technology for building construction steel structures is an important development direction in today's construction industry, gradually becoming the mainstream construction method and widely used. In the process of steel structure construction, assembly and corrosion prevention are two very important steps. However, in actual construction, due to factors such as the large volume of steel structures, complex material characteristics, and tight construction time, steel structure construction technology faces many difficulties. Among them, how to effectively solve the problems of steel structure assembly and corrosion prevention has become a hot topic of discussion in the industry. The difficulty of steel structure assembly involves the splicing of large components, dimensional accuracy, alignment accuracy, stability and other issues. To address these issues, it is necessary to start from multiple aspects, such as strengthening manufacturing quality control, rationalizing design, and strengthening construction management to ensure the quality of steel structure assembly is excellent and meets design requirements [1]. At the same time, in terms of steel structure corrosion prevention, it is necessary to comprehensively consider the environment and usage conditions of the steel structure, develop a reasonable corrosion prevention plan, enhance the adhesion of anti-corrosion coatings, and improve the durability and stability of anti-corrosion coatings to ensure the safety and service life of steel structures. Therefore, in the discussion of the difficulties and countermeasures of building construction steel structure construction technology, we
need to fully recognize the challenges faced by the assembly and corrosion prevention stages in steel structure construction, and actively adopt effective measures to respond. Only by continuously optimizing construction processes, improving technical levels, and strengthening construction management can we better guarantee the quality and safety of steel structure buildings and further promote the sustainable development of the construction industry [2].

2. Difficulties of Steel Structure Construction Technology in Building Engineering

2.1 Installation problems

In the process of building construction steel structure construction, installation is a relatively difficult issue to solve. Because the structure of the steel structure is complex, and high requirements are placed on high-rise and large-span buildings, high precision and high requirements are required during construction. In addition, the limited space on the construction site requires on-site workers to perform high-altitude operations, which also pose certain risks to safety. Specifically, these issues manifest in the following aspects: (1) The weight of the steel structure components is relatively large, and assembly requires the use of modern equipment such as cranes and hoists for high-precision installation to ensure the accuracy and stability of component splicing. (2) Steel structure has a complex structure, and special installation methods such as grouting, welding, and bolt connection are often required. These methods require construction workers to have high technical proficiency and rich experience. (3) Protective measures must be taken during the installation of steel structure components to prevent scratching, collision, or pollution during transportation. At the same time, it is also necessary to prevent construction workers from being injured during the installation process. (4) The installation process of the steel structure usually needs to be carried out at high altitude, for example, when constructing high-rise buildings or bridges, construction workers need to perform high-altitude operations. For high-altitude work areas, the shift work system must be strictly implemented to ensure the safety of construction workers. Therefore, the installation process of the steel structure is difficult, and construction workers need to strengthen safety management, strictly follow norms and regulations, and use modern installation equipment and auxiliary tools to improve installation efficiency and accuracy, and ensure the safety and reliability of the construction process [3].

2.2 Assembling problems

Assembly is another challenge faced by steel structures in building construction. Among them, assembly accuracy and sequence are the most important issues. If the assembly is not in place, it will directly affect the stability and strength of the structure, and even affect the construction quality and safety. Specifically, these issues manifest in the following aspects: (1) Steel structure components are usually prefabricated and need to be assembled and combined on the construction site. Due to the complexity of the assembly process, the assembly sequence and accuracy of each node are very important. If the assembly is not in place, it will affect the stability and strength of the entire structure. (2) Steel structure components are often heavy, and special assembly equipment, such as assembly manipulators and cranes, is needed for assembly. The operation difficulty of the assembly equipment is high, and construction workers need to have certain professional knowledge and operation skills. (3) In many large-scale building construction steel structure projects, on-site assembly is required, which requires construction workers to perform fast and accurate assembly within a limited time, placing higher demands on their operating skills and teamwork abilities. Therefore, to solve the assembly problems in the construction technology of building construction steel structures, construction workers need to strictly follow regulations and adopt modern assembly auxiliary equipment.

2.3 Anti-corrosion issues

The material of steel structures is susceptible to oxidation, corrosion, and rot, which can pose significant threats to the stability and safety of the structure. Specifically, these issues manifest in the following aspects: (1) Steel structures are easily affected by the external environment during transportation and installation. The surface of steel is prone to rust and corrosion, which can seriously affect the strength and stability of the structure. (2) If effective anti-corrosion treatment is not carried out during the use of steel structures, they are also susceptible to various corrosion factors, which can shorten their service life and even lead to safety accidents. (3) The anti-corrosion treatment of steel structures requires the use of professional coatings and coating technologies. The quality and protective effect of the coatings directly affect the durability and service life of the steel structures. Therefore, in the construction technology of building construction steel structures, anti-corrosion issues are a difficult point that must be given high attention [4].

3. Countermeasures for Construction Technology of Steel Structure of Building Engineering

3.1 Installation measures

The installation of steel structures is an important aspect of the construction technology of building construction steel structures, and the quality of installation directly affects the stability and safety of the entire building. To solve the
problem of steel structure installation, construction personnel should take the following measures: (1) Prepare a detailed steel structure installation plan, including the connection method of each node, installation sequence, reinforcement measures, etc., and strictly follow the plan operation to ensure that the installation process is reasonable and smooth. (2) Optimize the installation process, use mechanized equipment to achieve automation, improve installation efficiency, reduce manual operation, reduce installation difficulty, and ensure installation quality. (3) Use specialized installation fixtures and tools such as installation support frames, lifting slings, adjustment tools, etc., to ensure firm fixation and accurate position. (4) Prevent component deformation during installation; take appropriate reinforcement measures, such as increasing support points, adjusting construction pace, ensuring that steel structure components are not easily deformed during the installation process. (5) Strictly implement installation specifications to prevent substandard products, such as checking the size, quality, and surface condition of steel structure components, and ensuring that each node is installed correctly and accurately. In conclusion, for the installation issues in the construction technology of building construction steel structures, we can solve them through detailed installation plans, optimized installation processes, the use of specialized fixtures and tools, reinforced reinforcement measures, and strict adherence to installation specifications [5]. This can ensure the correct installation of components and achieve the expected stability and safety.

3.2 Assembling measures

In the construction technology of building construction steel structures, assembly is one of the key links in the installation of steel structures, and the quality of assembly directly affects the stability and safety of the entire building. The following are solutions for the assembly issues of steel structures: (1) Prepare a detailed assembly plan, including the joint method of each component, elevation position, various reinforcement measures, etc., to ensure that the assembly process meets standards and requirements. (2) Use specialized assembly equipment and tools, such as lifting machinery equipment, assembly platforms, and adjusting equipment, to ensure accurate positioning of components and smooth assembly operations. (3) Enhance the cleaning and inspection of components. Before assembly, it is necessary to clean and accept the components, remove surface dirt and rust, and check the size, quality, and surface condition of each component before assembly to ensure that the components meet the design requirements and quality standards. (4) Supervise and control the assembly process. During assembly, it is necessary to supervise and guide construction personnel to assemble, promptly discover and correct quality problems that occur during construction. (5) Provide comprehensive technical training and guidance. Provide necessary skills training and operation guidance for construction personnel to perform relevant operations according to the assembly plan. In summary, for the assembly issues in the construction technology of building construction steel structures, considering that assembly is one of the key links in the installation of steel structures, we can solve them through preparing detailed assembly plans, using specialized equipment and tools, enhancing cleaning and inspection of components, supervising and controlling the assembly process, providing technical training and guidance, and other measures. These measures can ensure that the assembly process meets standards and requirements, effectively improve the stability and safety of the steel structure building.

3.3 Anti-corrosion problem countermeasures

In the construction technology of building construction steel structures, corrosion prevention is a critical issue that must be considered after the assembly of the steel structure. Failure to take effective corrosion prevention measures can lead to problems such as rust and corrosion during the use of the steel structure building, seriously affecting its safety and service life. The following are strategies for corrosion prevention after steel structure assembly: (1) Implement relevant national standards and choose appropriate anti-corrosion coatings and methods based on different usage environments and material characteristics. The anti-corrosion coating should have good corrosion resistance and adhesion, and be able to adapt to different climate conditions and environmental requirements. (2) Strengthen surface treatment by performing operations such as sandblasting and rust removal before construction to remove surface dirt and rust, and improve coating adhesion and anti-corrosion performance. (3) Pay attention to construction processes and strictly follow the construction specifications for anti-corrosion coatings, ensuring the thickness and uniformity of the coatings, while avoiding situations such as missed or inadequate coating. (4) Perform regular anti-corrosion maintenance, including reasonable anti-corrosion maintenance measures based on usage environments and weather conditions, such as regularly checking coating conditions and promptly repairing local damaged areas, which can effectively extend the service life of the steel structure building. In summary, corrosion prevention is a critical issue that must be considered after the assembly of steel structures in building construction technology. We can solve this through various measures such as selecting appropriate anti-corrosion coatings and methods, strengthening surface treatment, paying attention to construction processes, and performing regular maintenance. These measures can effectively improve the corrosion resistance and service life of the steel structure building, and ensure its stability and safety [5].
3.4 Ensure construction cycle and quality

Ensuring the construction cycle and quality is a very important aspect of the countermeasures for the construction technology of steel structures in building engineering. On the one hand, the control of construction cycle requires detailed planning and arrangement for specific projects, including construction process, construction nodes, staffing and material supply. Construction progress and quality inspection must be reasonably arranged, and various problems must be found and solved in time to avoid delays. On the other hand, quality management is also crucial. The steel structure construction process involves a lot of materials, equipment and construction process links, and if the quality cannot be guaranteed, there may be safety hazards, which will also directly affect the quality and service life of the whole project. Therefore, it is necessary to start from strengthening quality control, training and education of staff to ensure that the quality problems in the construction process are solved in time and improve the service life and safety of the steel structure. In conclusion, for the countermeasures of steel structure construction technology in construction projects, it is necessary to pay attention to the construction cycle and quality control, reasonably arrange the construction progress and quality inspection, timely find and solve various problems, and ensure the smooth and high-quality completion of the steel structure construction process.

3.5 Safety and security measures

In the process of steel structure construction, there are many dangerous factors, such as working at height, lifting, etc. If there are no strict safety protection measures, it will bring great risk to the life and safety of construction personnel. For this situation, the following safety protection measures need to be taken: (1) Formulate detailed safety management system and operation procedures, and clarify the responsibilities and obligations of each work type. All personnel engaged in steel structure construction should undergo strict safety training and examination. (2) Conduct strict safety inspection and hidden danger investigation on the construction site, and correct the problems found in time. Strengthen safety education and publicity to improve the safety awareness and prevention ability of construction personnel. (3) Strengthen supervision of work-at-height and special construction, and set up special safety monitoring personnel to ensure that all safety parameters are in normal condition. (4) Strictly implement safety protection measures for steel structure construction, such as installing safety nets and safety ropes, to ensure the safety of lifting and assembly. (5) Strictly record and count the safety problems during construction, summarize the experience, continuously improve the safety protection measures and enhance the construction safety level. In conclusion, ensuring safety protection measures is a crucial part of the countermeasures for the construction technology of steel structures in building engineering. Only through a series of measures such as strengthening safety management and strictly implementing safety protection measures can the safety awareness of construction personnel be improved and the lives and properties of construction personnel be safeguarded, while ensuring the smooth progress of the project.

4. Conclusion

Overall, as an important development direction in the current construction field, building construction steel structure construction technology has a wide range of application prospects and market demand. However, in actual construction, there are still a series of difficulties and challenges in steel structure assembly and anti-corrosion, which require continuous exploration and research for solutions to improve the quality and efficiency of steel structure construction. Through discussing the difficulties and countermeasures, we can see that good manufacturing quality control, reasonable design, and standardized construction management are important ways to solve construction difficulties in steel structure construction. At the same time, implementing scientific anti-corrosion measures for different usage environments and weather conditions is also critical to ensure the safety and service life of steel structures. It is believed that in the near future, with the continuous improvement of technology and the accumulation of practical experience, building construction steel structure construction technology will become more mature and perfect, playing an increasingly important role in the construction field.

References


