

# Research on Quality Control and Safety Management Strategies in Construction Engineering Construction

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**Abstract:** Construction in building projects is a complex and multi-stage process, wherein quality control and safety management are critical elements to ensure the smooth progress and completion of the project. This paper aims to explore strategies for quality control and safety management in construction engineering, with the goal of providing insights for enhancing the overall level of construction projects.

**Keywords:** Building projects; Quality control; Safety management

## Introduction

With the accelerated pace of urbanization, the number of construction projects is increasing, highlighting the crucial importance of quality control and safety management in the construction process. Quality control not only affects the final outcome of the project but also directly influences its safety and durability. On the other hand, safety management is directly related to the safety of construction personnel and the social responsibility of the enterprise. Therefore, researching strategies for quality control and safety management in construction engineering holds significant practical significance.

## 1. Quality Control Strategy in Construction Engineering Construction

### 1.1 Improvement of Quality Management System

Quality control in construction engineering construction is a crucial aspect to ensure the overall quality and safety of the project. The enhancement of the quality management system is particularly critical in this regard. A comprehensive quality management system not only covers the entire process from project planning to construction completion but also emphasizes detailed management and continuous improvement. Firstly, an improved quality management system requires clear definition of management responsibilities at all levels



to ensure that each level has designated personnel responsible for quality supervision and control. This includes establishing a dedicated quality management department with professional quality management personnel. They are responsible for formulating quality plans, supervising the construction process, inspecting project outcomes, and providing timely feedback on quality issues. Secondly, the system emphasizes the establishment of comprehensive quality standards and specifications. These standards and specifications should be based on national and industry requirements, customized according to the specific characteristics of the construction project. They provide construction personnel with clear operational guidelines, ensuring the standardization and consistency of the construction process. Additionally, an improved quality management system places emphasis on quality education and training. Regular lectures on quality knowledge, skill training, and activities to enhance quality awareness contribute to strengthening the quality consciousness and skill levels of construction personnel. This, in turn, enhances their sensitivity and execution capabilities regarding quality requirements. An improved quality management system plays a crucial role in construction engineering construction. It not only enhances the quality of the project, reduces the occurrence of quality issues and accidents, but also boosts the competitiveness and market reputation of the enterprise. Therefore, construction companies should pay high attention to the construction and improvement of the quality management system, providing a solid quality assurance for construction projects.

### **1.2 Strengthening Material Control**

In construction engineering construction, strengthening material control is the foundation and key to ensuring project quality. High-quality building materials are crucial prerequisites for ensuring structural safety and improving the durability of the project. To enhance material control, it is essential to start from the source and rigorously control the procurement of raw materials. Choose reputable suppliers and conduct a comprehensive assessment of their production capacity, quality management system, and supply history to ensure that the purchased materials meet design requirements and national standards. Secondly, strict inspection and testing should be carried out before

the materials enter the construction site. Sampling inspections should be conducted for each batch of incoming materials, checking their quality certification documents, specifications, appearance, etc., to ensure that the materials meet the project requirements. For materials that do not meet the standards, they should be promptly returned to prevent them from entering the construction site. In addition, the management of the material storage and usage processes is also crucial. Materials should be stored in a classified manner to avoid confusion and damage. For materials prone to moisture or deterioration, effective moisture-proof and deterioration prevention measures should be taken. During the usage process, material processing and installation should strictly adhere to construction process requirements to prevent a decrease in material performance due to improper handling. Strengthening material control is one of the important strategies for quality control in construction engineering construction. By strictly controlling the procurement, inspection, storage, and usage of materials, it ensures the use of high-quality materials, thereby improving project quality and guaranteeing the safety and durability of the project.

### **1.3 Strengthening Construction Process Monitoring**

Quality control in construction engineering construction necessitates the indispensable element of strengthening construction process monitoring. Construction process monitoring aims to track construction progress in real-time, ensuring that each operation conforms to established quality standards and technical requirements. To achieve effective construction process monitoring, a robust monitoring system should be established, including regular inspections, specialized examinations, and acceptance of concealed works. These monitoring activities should be carried out by professional quality management personnel with extensive construction experience and profound expertise, enabling them to accurately identify potential quality issues. Simultaneously, the use of advanced monitoring technologies and tools is crucial for enhancing monitoring effectiveness. For instance, employing drones for aerial inspections can swiftly identify safety hazards at the construction site. The utilization of smart sensors and real-time data analysis allows for the continuous monitoring of key parameters

during the construction process, ensuring construction accuracy and quality. Furthermore, strengthening construction process monitoring requires a focus on feedback and handling of monitoring results. Once quality issues or deviations are detected, immediate measures should be taken for rectification, and the results of rectification should be verified. Additionally, a summary and analysis of issues identified during the monitoring process should be conducted to identify the root causes, preventing similar problems from recurring. Strengthening construction process monitoring is a key strategy for quality control in construction engineering construction. By establishing a robust monitoring system, adopting advanced monitoring technologies and tools, and emphasizing feedback and handling of monitoring results, it ensures that the construction process remains under control, thereby guaranteeing the stability and improvement of project quality.

#### **1.4 Enhancing the Quality of Construction Personnel**

In construction engineering construction, enhancing the quality of construction personnel is a crucial means to ensure project quality. The skill level, quality awareness, and work attitude of construction personnel directly impact the construction quality of the project. To improve the quality of construction personnel, construction companies should strengthen skills training and education for construction workers. By organizing regular training courses, imparting advanced construction techniques and operating methods to construction personnel, their professional skill levels can be elevated. At the same time, emphasis should be placed on cultivating the quality awareness of construction personnel, ensuring they fully recognize the importance of quality in construction and conscientiously adhere to quality standards and specifications. Furthermore, construction companies should establish a sound incentive mechanism to stimulate the enthusiasm and sense of responsibility of construction personnel. Through the establishment of reward systems, recognizing construction personnel who excel during the construction process, they can be encouraged to continue their excellent performance and inspire other construction personnel to emulate their achievements. This positive incentive atmosphere contributes to enhancing the work attitude and overall

quality of the entire construction team<sup>[2]</sup>. Improving the quality of construction personnel is one of the key strategies for quality control in construction engineering construction. By strengthening skills training, cultivating quality awareness, and establishing incentive mechanisms, a highly skilled, quality-conscious, and positively engaged construction team can be developed, providing robust assurance for the improvement of project quality.

## **2. Construction Safety Management Strategy**

### **2.1 Establishing a Safety Management System**

In construction engineering construction, establishing a safety management system is a critical measure to ensure the safety of the construction process. This system should comprehensively cover every aspect of the construction site, from macro to micro, providing a solid institutional guarantee for preventing and controlling safety risks. Firstly, the safety management system should clearly define safety management goals, policies, and objectives, establish safety responsibilities for management personnel at all levels, and construct a well-defined and responsibility-clear safety management organizational structure. This ensures that every worker, from project decision-makers to construction site workers, is aware of their responsibilities and obligations in safety production. Secondly, the system should include comprehensive safety management regulations and operating procedures, such as safety inspection systems, safety education and training systems, accident reporting and handling systems, etc. These regulations and procedures provide construction personnel with clear behavioral guidelines, helping to standardize construction practices and reduce the occurrence of safety accidents. Finally, the safety management system should emphasize continuous improvement and dynamic adjustment. Through regular safety inspections, risk assessments, and emergency drills, potential safety hazards in the construction process can be timely identified and addressed. This continuous improvement helps optimize the safety management system to adapt to the ever-changing construction environment and safety requirements. Establishing a safety management system is a crucial strategy for safety management in construction engineering construction. A sound safety management system provides robust institutional

support for safety production at the construction site, ensuring the smooth progress of the construction process.

## **2.2 Strengthening Safety Education and Training**

Safety education and training not only enable construction personnel to understand the potential risks on the construction site but also equip them with methods and skills to deal with these risks. Safety education and training should be targeted and practical, tailored to different construction positions and job types. For new construction personnel, comprehensive safety induction training should be conducted to familiarize them with safety regulations and operational procedures on the construction site. For existing construction personnel, regular safety refresher training should be carried out to reinforce their safety awareness and emergency response capabilities. The content of safety education and training should cover three aspects: safety knowledge, safety skills, and safety attitude. Safety knowledge education aims to make construction personnel understand the hazards, safety facilities, and protective measures on the construction site. Safety skills education focuses on cultivating the safety operation skills and self-protection abilities of construction personnel. Safety attitude education emphasizes guiding construction personnel to establish the correct safety concepts and consciously adhere to safety regulations. By strengthening safety education and training, the safety competence of construction personnel can be effectively enhanced, reducing safety accidents caused by human factors.

## **2.3 Implementing a Safety Inspection System**

The safety inspection system requires regular, comprehensive, and detailed safety inspections of the construction site to promptly identify and eliminate potential safety hazards. Specifically, safety inspections should cover various aspects of the construction site, including construction equipment, temporary facilities, safety protection measures, and the operations of construction personnel. During the inspection process, special attention should be given to areas and activities prone to safety accidents, such as working at heights, temporary electrical usage, lifting and hoisting operations, etc. Immediate corrective measures should be taken for any identified safety hazards to ensure the safety of the construction site. The implementation

of the safety inspection system also requires a focus on the standardization and effectiveness of the inspections. Detailed safety inspection checklists should be developed, clearly outlining inspection items and standards to avoid overlooking or misjudging potential hazards. Additionally, maintaining safety inspection records is crucial, documenting the findings and corrective actions of each inspection, serving as a reference for subsequent safety management<sup>[3]</sup>. Through the implementation of a safety inspection system, construction site safety issues can be promptly identified and addressed, enhancing the level of safety management on the construction site. Simultaneously, it contributes to strengthening the safety awareness of construction personnel, promoting their conscientious adherence to safety regulations, and collectively maintaining the safety and stability of the construction site.

## **2.4 Strengthening Emergency Response for Accidents**

Due to the complexity and unpredictability of the construction environment, accidents are difficult to completely avoid. Therefore, establishing a robust mechanism for emergency response is crucial. First, construction companies should develop detailed emergency response plans, outlining requirements and measures for emergency organization, communication, on-site disposal, medical assistance, safety protection, and other aspects. The plans should categorize various types of potential accidents, ensuring that corresponding emergency responses can be quickly initiated when an accident occurs. Second, construction companies should regularly organize emergency drills to enhance the emergency response and collaborative capabilities of construction personnel. Simulating realistic accident scenarios allows construction personnel to understand emergency response procedures, become familiar with the use of emergency equipment and tools, and ensure swift and effective responses in urgent situations. Third, construction companies should establish accident reporting and investigation systems. In the event of an accident, the emergency response plan should be immediately activated, and the relevant supervisory authorities should be promptly notified. Simultaneously, a thorough investigation of the accident should be conducted, analyzing the causes, summarizing experiences and lessons learned, and preventing similar

accidents from recurring<sup>[4]</sup>. Strengthening emergency response for accidents is one of the key strategies for safety management in construction engineering construction. Through measures such as developing emergency response plans, organizing emergency drills, and establishing accident reporting and investigation systems, the potential losses resulting from accidents can be minimized, ensuring the safety and stability of the construction site.

### 3. Interactive Relationship between Quality Control and Safety Management

In practice, quality control and safety management mutually promote and complement each other. On one hand, high-quality materials and equipment are prerequisites for ensuring construction safety, and rigorous quality control ensures the reliability of these materials and equipment, thereby reducing safety incidents caused by quality issues. On the other hand, effective safety management creates a safe and organized construction environment, reducing psychological stress and fatigue among construction personnel. This, in turn, enhances their work efficiency and quality awareness, thereby promoting the improvement of project quality. In the construction of engineering projects, it is essential to organically integrate quality control and safety management to jointly enhance the levels of project quality and safety. This requires construction companies not only to establish comprehensive quality control and safety management systems but also to strengthen the training and education of construction personnel, elevating their overall skills and safety awareness. Only through these measures can the smooth progress of construction projects be achieved, ensuring the safety of the life and property of the public.

### 4. Conclusion

Quality control and safety management in the

construction of building projects are crucial safeguards to ensure both the quality of the project and construction safety. By implementing strategies such as refining the quality management system, strengthening material control, enhancing construction process monitoring, and improving the skills of construction personnel in quality control, along with establishing a safety management system, intensifying safety education and training, implementing safety inspection procedures, and reinforcing emergency response measures for accidents, we can effectively elevate the overall standards of construction projects. These comprehensive measures not only contribute to increased construction efficiency but also serve as a dual guarantee for both project quality and construction safety. In future building projects, we will continue our efforts to refine and enhance these strategies and systems, aiming for even higher levels of project quality and safety standards.

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