

# Quality in Construction

Maintaining Quality on Construction  
Projects for Better Outcomes



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# Introduction

In a retail business, compromising on quality may affect the bottom line. In the construction industry, it can cost lives. Poor construction quality costs millions of dollars in profit loss each year and accounts for hundreds of injuries, with costs related to quality issues often estimated between 2% and 20% of each project.<sup>1</sup> Quality issues are also safety issues, putting both the construction crews and long-term users of a building at risk for injury and property loss. The development of advanced construction technology has created new opportunities for improving build quality, but construction firms must develop work practices that make the most of these tools. All the risk analysis and modeling in the world won't help if the results are ignored and quality issues are overlooked.



# The Costs of Quality Fluctuations

Financial loss varies depending on the construction project, but it is possible to estimate how much is lost every year to poor construction quality. With the global construction industry expected to reach a value of US\$12.9 trillion by 2022, even a low estimated loss of 5% of total project value would equal \$645 billion per year.<sup>2</sup> This loss can manifest in multiple ways, often overlooked when it comes to estimating the true cost of quality control problems.

## Rework

The need to replace inadequate, damaged or poorly installed work accounts for most of this financial loss. Not only is cost generated for the initial work that was inadequately done, but both labor and material costs increase exponentially during rework. Don't forget to consider the extra costs of highly controlled demolition and deconstruction to remove the low-quality parts of a structure. In the UK, rework alone averages 1% to 5% of each project's costs, with problems arising primarily from a lack of skilled and fully trained labor.<sup>3</sup>

## Accidents and Injuries

Quality issues that cause accidents can lead to serious injuries. Yet the costs of these injuries go far beyond just the medical bills of the injured employees or tenants of a finished structure. When injuries and accidents occur during the construction phase, the damage also interrupts the flow of work and results in delays that push the project over budget.<sup>4</sup> It may cost more to use higher-quality materials and perform redundant construction quality and safety checks, but these measures will save the company far more than paying for major injuries or wrongful death claims.



### Lost Customers

Repeat customers form the backbone of many commercial construction firm businesses. Even if it takes years for the secondary effects of quality control issues to materialize—like leaks, high energy bills and structural collapses—it's possible to lose current customers due to the complaints of former clients.

### Violated Contracts

Some construction contracts call for specific materials and building techniques. When these contract terms are violated, a court case can result. For example, there were dozens of cases in Australia in the 2000s and 2010s over defective Chinese drywall being sold and installed as locally made material.<sup>5</sup> The contractors installing the drywall were held responsible for the fraud because the drywall was already well known to pose a safety risk and to lose integrity when exposed to moisture.

## CASE STUDY Lotus Riverside Complex



The Lotus Riverside Complex in Shanghai, China, is a stunning example of a serious quality control issue that ruined an entire building.<sup>7</sup> The 13-story apartment tower was nearly completed when it tipped over onto its side on June 27, 2009. Only a single person was killed since it was not a standard workday. Over 500 people had purchased units in the building before it collapsed. An investigation revealed that the collapse was completely preventable and was due to the project managers' negligence. A car park was being excavated next to the building at

the time and the soil from that excavation was simply piled next to the nearly finished apartment building. Changing the lateral and vertical profiles of the soil around the building foundation undermined its stability, resulting in the building tipping over. The company overseeing the project had sent numerous warnings to the contractors explaining the risk and asking them to address the problem, but the warnings were ignored until it was too late. This was definitely a failure of the quality control system.

# What Causes a Lack of Construction Quality?

Regardless of the size of the construction firm or the sector of the industry, only a few main causes underlie most construction quality issues. These same problems tend to cause safety issues as well. Addressing the following four quadrants of quality control can result in a safer, more efficient, more profitable construction workflow within weeks.

## **Planning**

Quality control (QC) requires a comprehensive plan that lays out exactly what the customer and contract calls for and how the contractor will verify they're meeting these requirements. Clear delineation of responsibility between the various subcontractors and skilled trade providers is essential for a QC plan that can be used later to defend against claims of negligence. A lack of planning is also the major cause of scope creep, which can lead to quality issues if work becomes rushed or if shortcuts are taken to accommodate a limited budget.

## **Oversight**

Third-party auditing and independent testing is essential to high construction quality in the long run. Even the most experienced project managers and contractors can make mistakes that lead to hidden quality issues. A third-party inspector or auditor who isn't familiar with the work has a better chance of spotting or finding issues that could lead to lawsuits and contract violations. Independent reviews catch problems while rework is still possible and affordable and before serious accidents occur.



## Communication

A breakdown in communication between the various teams on a construction project quickly leads to quality loss. When out-of-date documents are combined with inaccurate RFPs and communication delays, it's easy to see how the wrong materials are ordered and measurements end up switched around. In fact, research shows that construction workers lose the equivalent of two days per week working out communication issues between team members.<sup>6</sup> Improving communication with the right construction productivity software can improve quality across the board.

## Training and Labor

The shortage of skilled labor affecting the construction industry globally isn't helping construction quality either. Even as new techniques and materials are pushed out to market, a lack of familiarity results in small mistakes during construction that add up to big losses later. If a firm can't find reliable labor with the skill to spot mistakes and correct quality issues on the go, they'll need to consider handling their own advanced training programs to bring the workforce up to speed with industry requirements.



### CASE STUDY

## Hyatt Regency Walkway

One of the more severe cases of poor quality control caused the Hyatt Regency walkway collapse in Kansas City, Kansas, on July 17, 1981. Collapsing concrete walkways killed over a hundred people and injured two hundred. Investigation found that the design flaws leading to the collapse were completely preventable.<sup>8</sup> During construction, the tie rods used to support both the second- and fourth-story walkways were changed with no consultation between the engineering and architectural departments on the project. A simple phone call switched continuous

rods to a set of two interconnecting rods, which completely changed the weight-supporting system of the suspended walkways and effectively doubled the load. With no auditing or third-party verification of the designs, the work moved forward with the flawed design. Engineers and firms involved in the construction had to pay out millions of dollars in fines and damages and many companies had their licenses revoked as a result. With more focus on quality control, the lives of over one hundred people could have been saved.

# How to Improve Construction Quality

It's never too late to establish a construction quality-control process. Even if a firm is already in the middle of a multi-year million-dollar project, double-checking the quality of the current and ongoing work is always worthwhile. Use these five actionable tips to improve a construction firm's focus on quality control at every level.

## **Establish Standards**

Before a firm can accurately measure how well they're living up to their quality standards, they have to set those standards in an understandable and applicable matrix. Each project may require a different standard of quality depending on the requirements of the contract and the type of construction. Quality standards will likely combine information from multiple sources, including but not limited to:

- Local, national and international building codes
- Third-party auditing and testing standards such as ISO 9000
- The latest recalls and lawsuits regarding the quality of various building materials
- Recommendations and requirements from the manufacturers of all products and equipment used on the project

## **Control the Workflow**

Quality control inspections and tests are required before, during and after every stage of construction. Trying to handle all of the various QC checks at once prior to the final permitting inspection will only result in overlooked problems. For example, issues with the wiring and electrical system need to be identified during and immediately after installation. This ensures the subcontractors are still available for any necessary rework while minimizing design changes and demolition required during the repairs. QC planning software makes it easier to identify the ideal points for inspecting the latest work so quality issues are caught as easily as possible.





### **Implement Independent Audits**

Audits and testing from independent third-party providers are the best tool in the fight to maintain high quality standards. Every skilled builder and project manager can develop blind spots to their own work. Hiring third-party providers with advanced testing equipment allows a firm to double-check everything they complete. Firms working on infrastructure and government projects are usually required to submit these test results regardless, so investing in this kind of quality control for other commercial and industrial projects is smart even when it's optional.

### **Embrace Construction Technology**

The latest construction productivity software tools help prevent multiple common causes of construction quality issues. Facilitating instant communication between the various teams working on the same construction project decreases the chances of miscommunication, outdated documents and similar problems. Implementing a single software platform for managing and viewing all the project documents and data eliminates arguments and disagreements over which set of designs to follow. Make sure to also use software tools that allow for planning quality control audits to make sure the team hits every milestone.

### **Seek or Create Skilled Labor**

Labor skill directly correlates to the quality of construction. Even the largest and most advanced firms can do only so much with an inexperienced workforce with limited training. When it comes to complex commercial and infrastructure techniques, on-the-job training doesn't compare with intensive educational programs. When a small detail like the amount of air mixed into concrete or the depth of a weld can make the difference between success or failure, construction firms may need to invest in extensive training courses to keep their workforce skilled enough to produce their designs.

# Conclusions

Managing construction quality levels requires dedication and a comprehensive approach to inspecting and testing work at every stage of completion. It may take a whole new team of quality control specialists to bring a construction firm up to the right standards, but the investment can result in millions of dollars in savings over time by preventing costly accidents and time-consuming rework. Maintain the highest levels of quality with third-party audits to verify the firm's claims for an edge over the competition that helps the company win more work. Furthermore, selecting the right construction productivity software will help facilitate the quality control process from the onset of a project if it is leveraged thoughtfully.

## References

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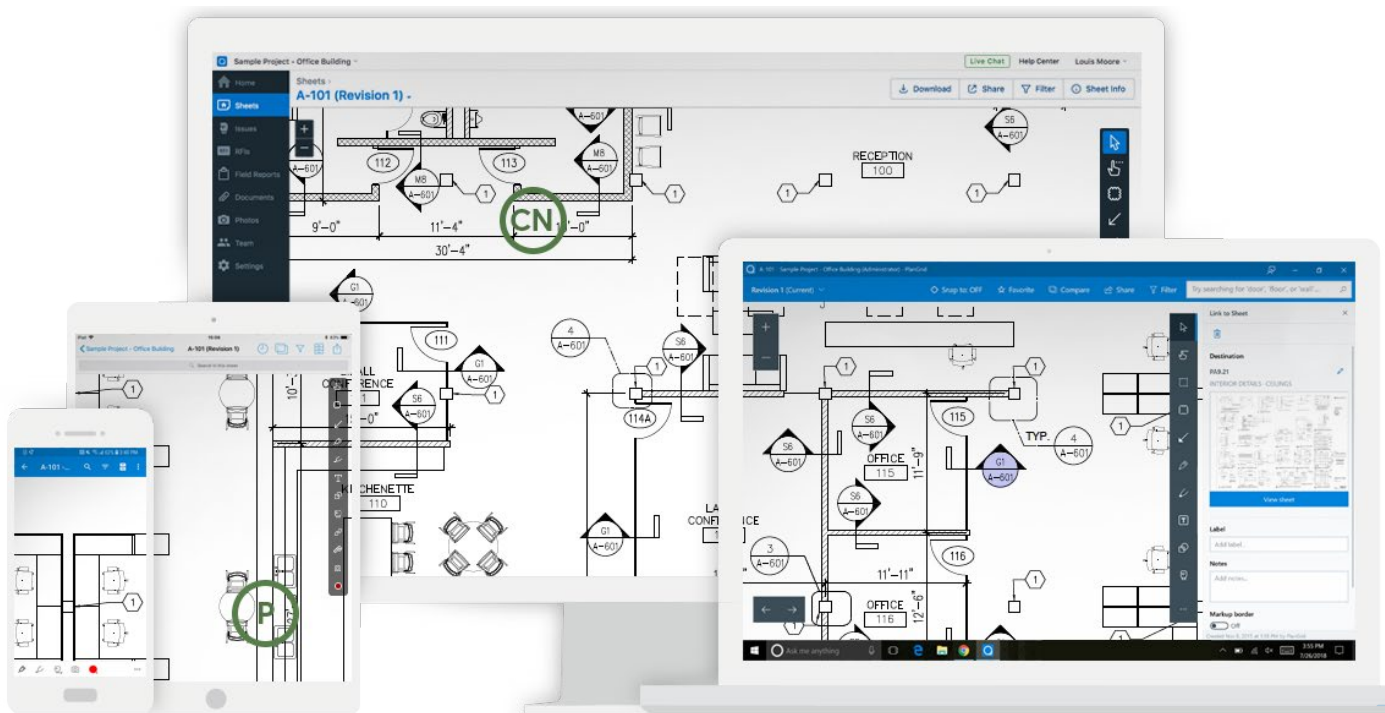
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Used on more than 1,500,000 projects around the world, PlanGrid is the first construction productivity software that allows contractors and owners in commercial, heavy civil, and other industries to collaborate, collect, and share project information from any desktop or mobile device through the entire project lifecycle.

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