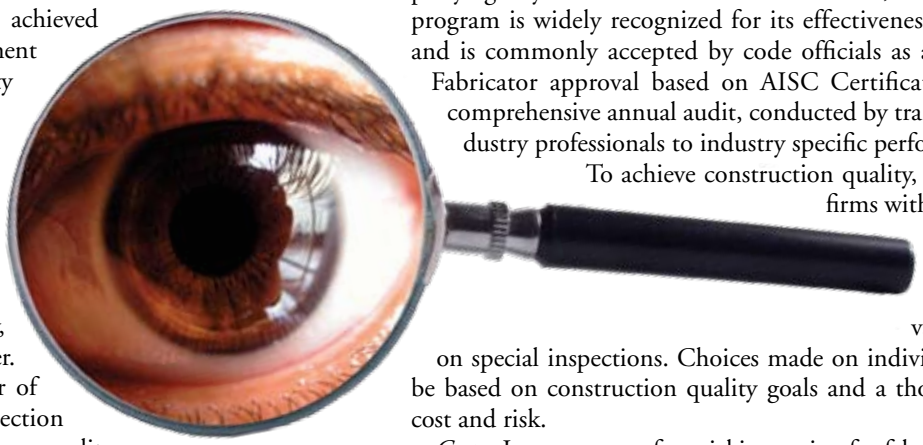
Special Inspection

Is it your best choice for achieving construction quality?

By Brian Miller

Special Inspections, is a hot topic fueled by increasing appreciation of the value of quality in building construction and by expanding adoption and enforcement of model building codes. However, a little investigation may lead to the realization that special inspection isn't the only way, and may not be the best way, to achieve construction quality on your project.

In his fall 1999 article in STRUCTURE® magazine, Steven Schaefer argued the value of built in quality over inspected quality. Mr. Schaefer cited the wisdom of the famed quality guru W. Edward Deming, who in his third of fourteen points recommended that companies cease dependence on mass inspection to achieve quality by building quality into the product in the first place. Mr. Schafer's argument and Dr. Deming's point were valid back in 1999, and are valid and even more relevant today.



Built in construction quality is achieved through effective quality management systems that provide both quality assurance and quality control. Inspection is quality control and, by itself, is insufficient for achieving construction quality. Without a quality assurance function to act upon and correct the processes that produce defects discovered by inspection, construction quality, as well as cost and schedule, suffer. Quality suffers because the repair of a defect discovered during inspection seldom matches what the first time quality would have provided. Outside the normal process, limitations on resources and skilled workers often necessitate a less than ideal "fix" to correct a defect. Schedule is consumed in the development, approval and execution of this "fix." Usually, there is an increase in overall construction cost due to wasted materials and production hours, and due to the management effort, or transactional costs, required to address a defect.

In model building codes, the value of built in quality is acknowledged in the language used to communicate special inspection requirements. As an example, refer to the underlined portion of this definition provided in Section 1702.1 of the 2006 IBC.

"SPECIAL INSPECTION. Inspection as herein required of the materials, installation, fabrication, erection or placement of components and connections requiring special expertise to ensure compliance with approved construction documents and referenced standards (see Section 1704)."

The definition implies that special inspection is appropriate where providers of construction materials and services are working beyond their ordinary scope of work for which they control and assure consistent quality. Recognition of the value of assured built-in quality provided by effective quality management without special inspection is reflected in IBC Section 1704.2.1, where an exception from the special inspection requirement is provided for fabricators of structural load bearing members and assemblies. In IBC Section 1704.2.2, the exception provides that:

"Special inspections required by this code are not required where the work is done on the premises of a fabricator registered and approved to perform such work without special inspection. Approval shall be based on review of the fabricator's written procedural and quality control manuals and periodic auditing of fabrication practice by an approved special inspection agency."

How is the basis for approval established? The IBC identifies the building code official or authority having jurisdiction as the approval authority for exemption from special inspections. The basis for fabricator approval, which includes verification of an effective quality management system, can be established by the local building department if resources to set criteria and conduct audits are available. An alternative is to accept the verification provided by a qualified third party agency. For structural steel fabrication, the AISC Certification program is widely recognized for its effectiveness in assuring quality and is commonly accepted by code officials as a basis for approval. Fabricator approval based on AISC Certification is backed by a comprehensive annual audit, conducted by trained auditors and industry professionals to industry specific performance criteria.

To achieve construction quality, engaging fabrication firms with demonstrated quality management systems offers significant advantage over reliance on special inspections. Choices made on individual projects should be based on construction quality goals and a thorough evaluation of cost and risk.

Cost – In a program of special inspection for fabricated items, the IBC requires that the special inspection agency be employed by and paid by the owner. An approved fabricator, operating under the IBC exception from special inspections, conducts inspections required by the approved construction documents within the scope and price agreement for the work. Another cost consideration: a rule of thumb is that the nearer the failure is to the end user, the more expensive it is to correct. Special inspections typically focus on completed products where the material and production effort is fully invested. Defects discovered at this stage generally result in the largest amount of scrap and lost man hours. Corrections made after product completion are usually more complex and conformance with approved construction documents is more difficult, consuming resources and schedule for the fabricator, special inspector, designer, and others on the construction team.

Risk – The special inspection agency is only responsible for indicating that work inspected was done in conformance to approved construction documents (IBC Sec-

tion 1704.1.2). If the special inspection scope is less than 100 percent, what about the work that wasn't inspected? As the author of the special inspection program, is the Structural Engineer of Record responsible for conformance of work not included in the special inspection scope? In contrast, an approved fabricator, as a condition of IBC Section 1704.2.2, submits to the building official at the completion of fabrication a certificate of compliance stating that the work was performed in accordance with the approved construction documents. That assures the quality of all the work, not just what was inspected. Suppose that a fabrication defect is discovered in a building after completion of fabrication or special inspection but within the warranty period. Also suppose that the discovered defect negatively affects the building serviceability and needs to be corrected to assure the comfort or safety of building occupants. Is the best source of financial and other resources needed to make the correction likely to be the owner employed special inspection agency or the highly capitalized approved fabricator?

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No matter how well crafted or conducted, a program of special inspections cannot be expected to replace fabricator provided quality assurance and quality control — particularly that provided by the quality management system of an approved fabricator. Whether intermittent or continuous inspection is deemed appropriate, the fabricator has the best opportunity to be in the right place at the right time to conduct checks and assure quality. When working with a fabricator with weak process control or an ineffective quality management system, the special inspector can either try to be everywhere at once or concentrate effort on final inspection to prevent defective product from being shipped to the customer. As a matter of practicality, the focus often shifts to final inspection and in-process inspection is given less attention. Unfortunately, many important fabrication aspects that contribute to quality may not be visible when the work is completed. Consider as examples: welding where joint preparation and fit-up are important, or coating application where surface preparation can be critical to the quality of the finished product.

Quality in building construction is increasingly valued. Accelerated project schedules and higher construction costs are two important factors that contribute to this value, and make a careful evaluation of the best ways to achieve construction quality. So when is a program of special inspections appropriate? What is the best way to achieve construction quality for your project? Here are some recommendations to consider:

- Work with fabricators qualified and approved by the building official. For structural steel fabrication, look to AISC Certification as an excellent basis for approval.
- Rely on the approved fabricator's effective quality management system to provide quality assurance and quality control. Clearly communicate in construction documents to the fabricator requirements for specific inspections and inspection reports. The individuals doing the work are in the best position and may be the best qualified to inspect it.
- Do not accept that a program of special inspections can compensate or substitute for a low bidder's inability to demonstrate an effective quality management system.
- Use a program of special inspections and engage a special inspection agency as required by the building code or justified by the nature of the work and the capability of suppliers.
  - Use special inspection for fabrication where the work is particularly complex or critical and is beyond the usual scope of products and services provided by the fabricator.
  - Base the need for and scope of special inspections on a careful evaluation of construction quality goals, cost and risk.
  - Use a program of special inspections to supplement the fabricator's quality management system rather than duplicate or replace it.
  - Use a program of special inspections when approved fabricators able to demonstrate an effective quality management system are not available.▪

Brian Miller is Manager of Certification Standard Development for the American Institute of Steel Construction (AISC).

References

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