

What I Wish I Knew Then

What every structural engineer should know about AISC Certification.

By Brian Raff

When I was a practicing engineer, I didn't know much about AISC Certification or how it affected my projects. I would use the firm's typical standard specification for each project and omit the material sections that didn't apply. At the time, I was uneducated as to what AISC Certification meant, and I certainly didn't realize what impact it had on our Quality Assurance section of the project specification (1.6 in section 5120—Structural Steel). Looking back, there are a number of things that I wish I had known, and the most important is that structural engineers play one of the most significant roles in overall project quality.

What's in an audit?

If you have been following Quality Corner in *Modern Steel Construction* these last few months, then you probably have a fair understanding of what AISC Certification is all about. It involves a rigorous audit to evaluate a company's quality management system. But, what exactly does being audited mean, and why would that be important for a structural engineer to know?

Recently, I had the opportunity to observe audits for both steel fabricators and steel erectors. I realized afterward that I had learned more about steel fabrication and erection on those two trips than I did working for years as a practicing engineer.

What I found amazing was the simplicity in the questions pertaining to such an important audit:

- How does something get done?
- Who is responsible for checking that it gets done correctly?
- How does one go about checking it?
- How is a situation dealt with if a mistake is made?

These questions seem so trivial, but it makes sense that every company should be able to answer them for every single one of their operational activities. These four questions are the heart of what AISC Certification is all about.

As engineers, we want to make sure that what gets built in the field is exactly what we show in our details and plans. By looking at those four simple questions, one can begin to understand the types of things QMC's auditors look for in the shop or on a construction site.

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It's just a bolt, right?

As a simple example, let's look at the auditing process for bolt installation. On a fabricator audit, an auditor might ask, "What type of bolts are being used on this project, and how do you know? Is this information written down somewhere? Where are these bolts stored? How do you know which material and what size bolts are required for this particular project? Can you describe and show me an example of what your bolt tightening procedures are?"

Many times the auditor will actually require the shop employee to set up a

Skidmore test (which I didn't know anything about), and demonstrate bolt testing procedures on site that conform to RCSC (Research Council on Structural Connections) standards. In case you're wondering, too, according to the *Bolt Science* glossary, "a Skidmore-Wilhelm bolt tension calibrator is a hydraulic load cell used to determine the tension in a bolt or other threaded fastener. The tension in the bolt compresses fluid in a hydraulic cylinder; a pressure gauge connected to the cylinder is then calibrated to read in terms of force rather than pressure."

The auditor asks these and many other questions to ensure that all of the required information for a particular procedure is on site, available, and that the procedural information has been documented and conveyed appropriately to the staff.

Welding looks so easy...

Another important audit topic was welding. QMC auditors not only spoke to the individual welders about how they perform their work—and how they check their work—but also asked the management to show that they have their welding procedures documented, and that they have all the appropriate paperwork that proves their employees are qualified by the American Welding Society (AWS) to perform the work. Auditors wanted to know if their welding electrodes were kept in an oven, and at what temperature. This ensured that excess moisture was not being held in by the electrodes, since coatings on welding electrodes rapidly absorb atmospheric moisture once they are removed from factory tins.

When a moisture-contaminated electrode is used in the welding process, hydrogen is released into the metal when heat is applied. When the weld cools it can become brittle, crack, and/or develop

pinholes. Auditors also wanted to know the amperage settings on their welding machines, how the welders knew which settings to use, and if those settings conformed to the procedures written down in the company's quality manual.

The auditors asked questions that, as an engineer, I just took for granted or never even thought to ask. I would specify a specific grade of material, certain weld sizes, or perhaps even a certain bolt type. But I never thought about how I could be sure all of these requirements were met, and what documented steps were being taken to avoid mistakes.

To me, specifying certification is really one of the only ways to really know that your structural design will be realized in the field without any deviation from the drawings and specifications you have provided.

It's your responsibility!

One misconception about the certification specification requirement is that it can just be removed from the specification without any consequences. When one is asked to waive the certification requirements for a project, essentially, they

are being asked to lower the quality on their project and take a chance.

Because I wasn't aware of the intricacies of AISC Certification when I was a practicing engineer, I was unprepared to defend my projects against the pressures of waiving these certification requirements. Ultimately, it is the owner's decision to keep these requirements, and it is up to the specifier, as well as other members of the project team, to educate the owner on the potential pitfalls of waiving the certification requirement. One other thing I was not aware of was that there are people at AISC who are there to help when it comes to defending your certification requirements. Visit www.aisc.org/NoMoreWaivers for more information.

How do you know?

When you visit your physician, you expect to receive professional health care services. But how do you know when you walk into your doctor's office that the person wielding the stethoscope is a qualified professional? You probably never really gave it much thought, but that license issued by the American Medical Association on the wall in their office

is the only way to communicate to you that they have the knowledge, training, and skills to provide you the professional service that you expect.

Certification is the root of communication for almost every known profession. How does an owner know that you, as a structural engineer, are qualified? Your state issued license, right? Why would you allow a non-certified fabricator to work on your project without a "license" stating that they are qualified to do the work? As a profession, structural engineers are responsible for the safety of many lives, and this same responsibility can only be realized by the participation of every member of a project team. Without quality certification, how does one know that a fabricator or erector is capable of meeting the demands of this important responsibility? ★

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