

structural forum

Structural Steel Shop Drawings Are We Stuck in the Stone Age?

By Jim DeStefano

Very little has changed over the past hundred years in the way we process structural steel shop drawings. Even a modest size project will often require hundreds of beam and column detail drawings that must be reviewed by the engineer. Multiple prints of each drawing (sometimes as many as 8 prints) are routed through the contractor and architect prior to arriving at our doorstep. Usually, neither the contractor nor architect actually looked at the drawings or had any understanding of what they depict. When they finally arrive, we are expected to review them in a few days so as not to delay the project.

The task of reviewing the shop drawings is often delegated to a junior engineer who dreads the arrival of the Federal Express courier burdened with rolls of drawings. After the task of date stamping the drawings has been completed, the review process begins. The most tedious and time consuming part of reviewing shop

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drawings is the Easter egg hunt of finding the corresponding piece mark on the erection plans. Once the piece location has been identified, little time is left for reviewing the connection capacities or fabrication details.

Corrections are red marked on the shop drawings and then the real fun begins – transcribing each red mark onto all of the other prints. We are sometimes tempted to allow minor deficiencies to pass rather than having to red mark multiple prints and then process a second submittal.

By the time all of the shop drawings have been processed, our fee for the construction phase services has been pretty well exhausted, leaving little fee for site visits.

Some things have changed over the past few decades. Structural steel detailers used to be very knowledgeable about steel fabrication. Many of them started their career working in large fabricating shops, such as American Bridge or Bethlehem Steel, where they were exposed to many aspects of the business. As

these old timers have retired, CAD technicians with little understanding of fabrication and erection practices have replaced them. Seasoned steel detailers are becoming a rare breed. CAD technology has also resulted in a dramatic increase in the number of shop drawings that must be reviewed. When shop drawings were hand drawn,

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one beam detail would often depict dozens of similar beams. Today, a separate drawing is generated for each beam.

For years I have lamented “there must be a better way.” We have experimented with ways to make the shop drawing process more efficient. We have tried alternative methods of routing drawings. We have taken the architect and contractor out of the loop of reviewing drawings that they don’t need to see. Architectural dimension verification and rooftop HVAC unit coordination only require the architect and contractor to mark up the erection plans. We have reduced the number of prints that need to be processed by requiring the fabricator to send record sets of the final approved drawings to the owner, contractor, architect, etc. rather than everybody getting red marked prints. We have also required the detailer to imprint our review stamp directly on the CAD drawing, eliminating the need for hours of rubber stamping. We have required detailers to document connection capacities on the piece drawings, which expedites the review of connections. All of these steps have allowed us to be more efficient.

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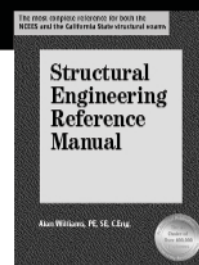
There is now a new generation of software technology that is a “dream come true”. The steel detailer can now create a 3-D model of the structural frame with intelligent elements. Once the computer model has been created, generation of

the individual piece drawings is almost automatic. We are now able to review the 3-D computer model directly on the computer screen and have the detailer make corrections prior to plotting the individual piece drawings. This new software technology has allowed us to review all of the steel shop drawings for a project in a few days rather than weeks.

I know that many engineers have resisted changing the way they do things and have not embraced these new technologies. Old habits die hard. As far as I am concerned, good riddance to the old ways!■

Jim DeStefano is the Principal of the structural engineering firm DeStefano Associates, and is a Partner in the firm of Coastal Engineering Partners. Jim currently serves as the Chair of the STRUCTURE magazine Editorial Board.

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