Exciting advances in technology are changing the way engineers and structural steel fabricators approach shop drawings.

It is a fact that shop drawing review is typically not the most exciting phase of a project; however, new tools are changing the way engineers think about shop drawings while improving review quality and decreasing review time.

Advances in technology have improved the means by which shop drawings can be reviewed and increased collaboration between engineers and fabricators/detailers. It is important for designers to understand how new technology is changing the ways in which shop drawing review can be accomplished and how to leverage these technological advancements.

Traditional methods of shop drawing review can be quite inefficient and frustrating. Do you find yourself searching for the biggest available workspace in the office so you can lay out all the shop drawings along with your design drawings? Then do you page through numerous 2D piece details and erection plans, all the while going back and forth between the shop drawings and your contract documents? How laborious is it to write your comments on the drawings and transfer those comments to multiple sets? It's no wonder shop drawing review is typically viewed as a "necessary evil."

The review of structural steel shop drawings is an essential part of a project. As an opportunity to ensure that the shop drawings show what was called for on the design drawings, it safeguards the public. Also, it may be your last opportunity to catch problem areas of a project before they are approved for fabrication and erection. Typically, past this point, changes are expensive.

With the increasing complexity of projects, it can be challenging to visualize the structure in 3D based upon 2D drawings. Yet this is important to fully understand what the fabricator and erector are going to build.

Many steel detailers create 3D models of steel structures, which are then used to produce shop drawings and eventually to fabricate the steel. These same 3D models also can be used during the review process to various extents, depending on the method that works best for the design team. In his article "Structural Steel Shop Drawing Review: The Present—The Future," in the August 2008 issue of *Structural Engineer* magazine, Michael Gustafson of Tekla outlined three workflows:

1. 2D (traditional method)
The 2D workflow is the traditional method by which most shop drawings are reviewed. Typically, 2D structural steel shop drawings are mailed to the engineer of record, who reviews them in conjunction with their 2D construction drawings and then returns them to the fabricator via mail. In order to decrease shipping/printing costs, some fabricators and engineers may transmit the shop drawings via e-mail as portable document format (PDF) files. This would still be considered the 2D workflow because there is no 3D model being used to aid in the review. Time and shipping costs can be saved,

There are multiple ways to achieve *enhanced visualization*, which include but are not limited to the following:

1. The structural engineer physically goes to the steel detailer's office where the detailer provides a "walk through" of the