

A sustainable future

Industry experts weigh in on the strengths of structural steel

By Pamela Accetta Smith

According to the Steel Recycling Institute (SRI), designers and builders have long recognized and lauded steel for its strength, durability, and functionality. However, architects are increasingly recognizing steel's important environmental attributes — especially its high recycled content and reclamation rate. And by all accounts, steel construction materials contain at least 28 percent recycled steel. This eco-friendly material is taking the weight off renewable resources.

Factors stimulating the market

The market share of structural steel has grown by eight points over the past decade to 56 percent — more than twice that of the closest competing material, says John Cross, vice president of the American Institute of Steel Construction (AISC). Cross added that this growth is a function of several factors beyond the traditional benefits of cost savings and schedule acceleration. “Designers committed to sustainable construction have recognized structural steel's high recycled content and recycling rate as key factors in conserving resources,” Cross says. “As emerging trends favor renovation, they are also embracing the flexibility that a structural steel-framed building provides for future structural modifications.”

The sustainable buildings movement has certainly spurred all industries to look at ways to improve themselves from an environmental perspective as well as explore what could already be considered sustainable about their products, says Geoff Weisenberger, AISC director of sustainability. “Even before the movement became what it is today, structural steel already fit in

well,” Geoff says. “The industry's average recycled content for all wide-flange steel members produced in the United States is more than 93 percent, and the recycling rate for all domestic structural steel is 98 percent. No other construction material comes close to this.”

The need to be green on a project comes down to more than just the material types that are chosen to go into the building, says Michelle Eret, sales representative for Design Data. “Design Data's detailing software SDS/2 can help companies go green through the approval process, cutting down on the paper wasted on RFIs and submittals by enabling engineers to approve projects electronically through the model using the SDS/2 Global Review Station,” says Eret. “Utilizing the Global Review Station for approval has also proven to speed up the approval process and cut back on the number of RFIs issued on projects. Many engineering companies have specified SDS/2 for this reason, in combination with the ‘green’ factor.”

Recent interest in recycling has also been driven in part by the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) rating system. “Steel framing systems are routinely used in LEED-certified and Green Globes projects,” Weisenberger says. “The structural steel industry has reduced its energy use by two-thirds and its greenhouse gas emissions by nearly one-half over the past three decades.”

In terms of other factors stimulating the market, structural steel is also gaining a strong advantage on projects using integrated project delivery and building information modeling (BIM). “The fact that structural steel is fabricated offsite to precise tolerances allows

the extraction of required information from 3D building information models for use in detailing and manufacturing models that drive shop floor fabricating equipment,” Weisenberger says. “This further accelerates schedules and increases cost savings.”

Building owners continually want as-built models for serviceability and future expansion, Eret says. “Steel lends itself well to this due to the advanced technology within the industry, the predictability of the material, and the ease of which you can add to the structure. Technology within the steel industry allows for owners to get an accurate model of the structure, integrating all disciplines for future needs.”

Steel support

As the market continues to trend more and more toward lifecycle information and the BIM work process, technology becomes a big part of that equation. “The steel industry is actually ahead of the curve,” Eret says. “SDS/2 was one of the first to transfer model information and has been sharing model information between engineering software and other software products for over 10 years.”

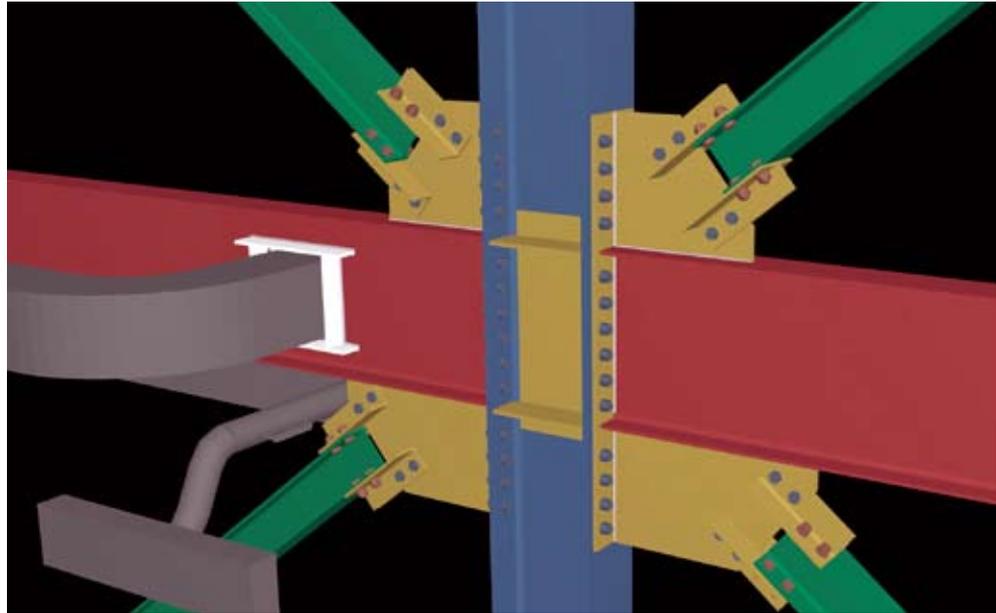
With the new work processes involved in project delivery, Design Data is responding to the market with product offerings to fit these changes, says Eret. “All project partners are required to communicate at a higher level and our new products and features make this task much easier,” Eret says. “Design Data is releasing a new project — Engineering Analysis and Design, or EAD/2 — that will automatically design connections and prepare the model for fabrication with all bolts, holes, welds, and plates. The EAD/2

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model is the same as the SDS/2 model, our detailing product, so when changes are made on the engineering model, they are instantly made in the detailing model. In addition, we have added many new features in our detailing product along with packaging our global review product to make paperless approval and model approval very easy to match new work processes."

With the level of interoperability in steel software, you have the ability to value engineer the structure, Eret says. Engineers can quickly design the structure to give the owner an idea of what it will look like and send that model to the manufacturer to generate connections and cost the structure. "Based on these results, engineers can redesign the structure to meet the needs and concerns of the owner, and take advantage of manufacturer recommendations to lower the cost and speed up the delivery," Eret says. "The unique interoperability in steel software enables you to take advantage of this process and add value to your work."

On the flipside, AISC provides financial support and technical guidance for academic research projects that improve the design and fabrication of structural steel buildings, said Keith Grubb, AISC senior engineer – research. "For example, AISC recently sponsored research investigating the influence of filler plies and oversized bolt holes in slip-critical bolted connections for structural steel members," Grubb says. "Performed at the University of Illinois at Urbana-Champaign, this project resulted in changes to the design rules for slip-critical bolted connections in AISC's upcoming 2010 Specification for Structural Steel Buildings." These changes should produce



The steel industry is ahead of the curve when it comes to information sharing and BIM. As an industry leader, Design Data's SDS/2 software has been sharing model information between engineering software and other software products for more than 10 years.

Courtesy of Design Data

more economical slip-critical bolted connections, Grubb says.

AISC and the Steel Solutions Center (SSC) offer a variety of tools for engineers looking for further information and resources beyond the AISC Manual for Steel Construction and AISC Specifications, says Tabitha Stine, AISC director of marketing. "AISC currently has 22 design guides that delve into specific design and construction topics further, to assist the structural engineer," she said. "Topics covered in these design guides include welded connections, façade attachments, steel-framed parking structures, and serviceability, just to name a few." These can be downloaded directly by logging onto the organization's website.

"Beyond this, the AISC SSC facilitates a free online community for file

sharing of structural steel tools and calculators," Stine says. "This free site, open to all construction professionals who design, specify, or build in structural steel, allows users to post, download, and exchange useful files and software utilities on topics such as base plate design, wind provisions, and gusset plate connection design." The website, www.steelTOOLS.org, has nearly 200 tools posted on a wide range of design and construction challenges that help bridge the gap between commercial software and hand calculation limitations, said Stine. ▼

Pamela Accetta Smith is a freelance writer based in Albuquerque, N.M.