# SPECIAL SECTION

## Engineering Software

# Software Becomes Easier to Use, More Transparent with Greater Interoperability

*By Larry Kahanar*

*"Interoperability is a big issue with respect to software development. In the BIM world, you can't afford time to re-enter data. The question is always how do we get data between products and how to give control to the end user? More and more collaboration is not just linear among architects and construction people but, potentially, among owners, or for archiving or facilities management. This data must be accessible to all users."*

With worldwide economies pulling out of the recession, accompanied by increasing construction projects, structural engineers and others are once again looking at software as a way to increase their efficiency and grow their businesses along with the global comeback. "We are seeing things getting better this year," says Bruce Bates, President and Founder of RISA Technologies, LLC (**www.risatech.com**) of Foothill Ranch, California. "Last year people were very conscious about their spending. Software is one of those area that you can cut corners, but we're seeing people loosening up a bit more."

RISA, which has been in business for almost 25 years, offers several software packages with *RISA 3-D* as its flagship product, according to Bates. The company will soon release a connection design program for sheer and moment connections for steel structures. "Beam-to-beam, beam-to-column, column-to-column, those type of connections," Bates says. "It will integrate with *RISA-Floor* and *RISA-3D*, or it can be independent."

Like others, Bates sees continued movement toward implementation of Building Information Modeling (BIM). "We are on the lower end of BIM adaptation. It's too good a technology not to be adopted. It's expensive and difficult to learn, but it's also too good to be ignored. It's just a matter of the time frame." (See ad on page 67.)

Dan Monaghan, North American Managing Director for Nemetschek Scia (**www.scia-online.com**), concurs. "We're seeing firms migrate from traditional engineering workflows, which are often inefficient and disconnected, to ones that are more integrated and economical."

"New processes like BIM and new project delivery methods like IPD (Integrated Project Delivery) allow firms to reduce waste and improve efficiencies throughout all phases of design, analysis, fabrication and construction." Monaghan suggests that migrating to these processes can be made easier with software such as his company's *Scia Engineer 2010*. "One way we help engineers is by linking modeling, analysis, design, and documentation in one program, so a change anywhere is reflected everywhere." (See ad on page 35.)

Another benefit of software is that it allows engineers to expand their businesses into new areas. "Engineers are looking for opportunities to work in non-traditional ways, new relationships to win projects," says Carl Taylor, Tekla, Inc.'s (**www.tekla.com**) Business Manager for the

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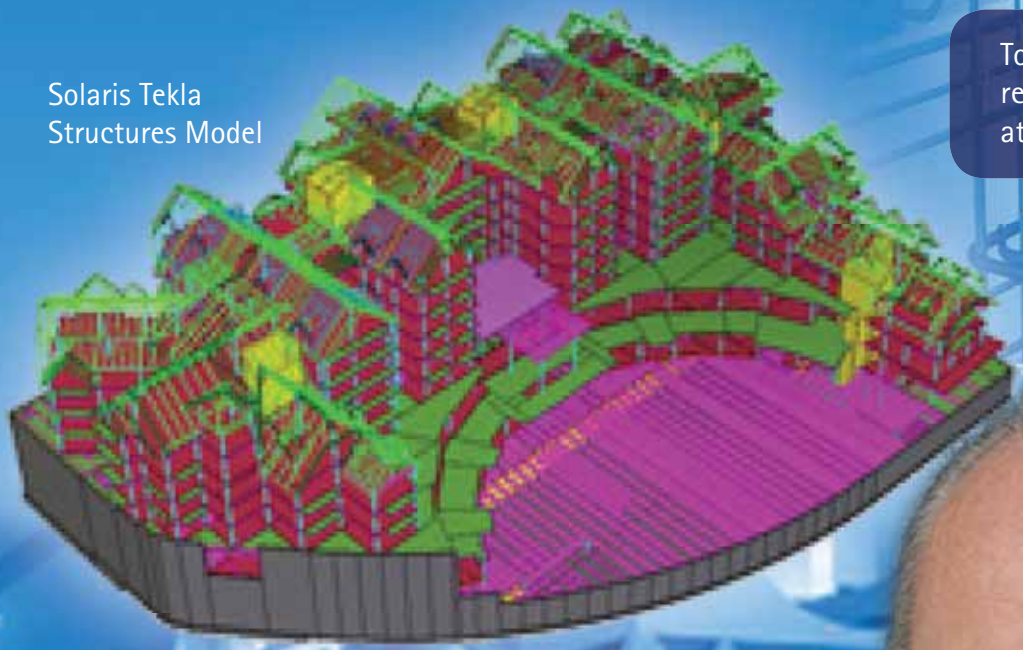

Solaris Tekla
Structures Model

To learn more about the Solaris project, read the *"Two Birds, One Stone"* case study at: www.tekla.us/solaris-architect

# COLLABORATE TO REDUCE RISK

Wayne Muir, P.E.,
Managing Principal & President,
Structural Consultants, Inc.
Denver, CO

*All images courtesy of Structural Consultants, Inc.

*Wayne Muir and his team have done it again! Using the Tekla Structures BIM Model, Structural Consultants, Inc. (SCI) delivered more information to the estimators earlier in the project, lowering the financial risk to the owner and his contractors. The steel package gave the fabricator, detailer and erector a better understanding of the engineer's design intent and put greater certainty into the cost model for a major subcontract early in the project. At the same time, the architect and SCI successfully exchanged BIM models to collaborate their designs. "Being able to collaborate and coordinate our design efforts in the Tekla Structural environment was a tremendous asset to this project, that really paid off during the construction phase," says Wayne Muir.*

Tekla Structures BIM (Building Information Modeling) software provides a data-rich 3D environment that can be shared by contractors, structural engineers, steel detailers and fabricators, and concrete detailers and manufacturers. Choose Tekla for the highest level of constructability and integration in project management and delivery.

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Engineering Segment. "For example, structural engineers are teaming up with steel detailing companies to offer packaged services. This can bring in steel deliverables in a shorter time frame with reduced risk to the owner."

Released several months ago, *Tekla Structures* version 16 has a greater emphasis on usability and is more intuitive to use with a shortened learning curve, says Taylor. "We're very conscious that users don't just want powerful software, but they want to bring it into production in a shorter time."

One of the ongoing goals of software makers is interoperability. "Interoperability is a big issue with respect to software development," notes Raoul Karp, Director, Product Management in the Structure Group of Bentley Systems, Incorporated (**www.bentley.com**), in Exton, Pennsylvania. "In the BIM world, you can't afford time to re-enter data. The question is always how do we get data between products and how to give control to the end user? More and more collaboration is not just linear among architects and construction people but, potentially, among owners, or for archiving or facilities management. This data must be accessible to all users."

Bentley's Integrated Structural Modeling (ISM) is a platform for interoperability, says Karp, and it offers a new and improved way to manage multiple software applications that are required for structural projects. He notes that the company's website offers free webinars about ISM.

Software developer AceCad Software Ltd. (**www.acecadsoftware.com**), also based in Exton, Pennsylvania, touts its interop entry Fabrication

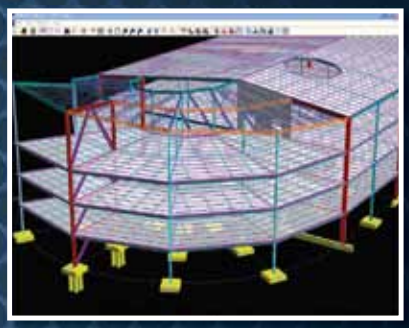
*"Structural engineering is a safety-critical profession. The safety of the public relies on the computational aspects of the software, and the quality and experience of the engineers that use the software."*

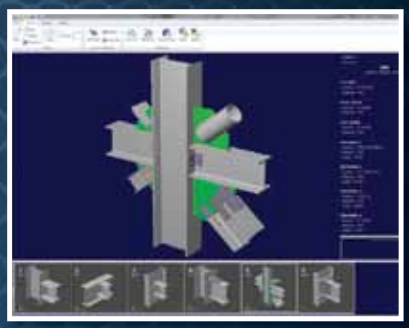
Information Modeling, or FIM, which it describes as *a business strategy methodology that harnesses the structural supply chain and workflows between engineering, fabricators and construction companies through open, best practice solutions and standards based integration, including CIS-2 and IFC's*. "BIM covers everything, but we cover it for the structural fabrication side," says Munny Panesar, Regional Manager. The company is offering its product suite, called *Evolution*, using the BIM/FIM interop theory. "We decided to just develop products under one umbrella. It's a huge project, but we've accomplished it for the detailing and fabrication side; now we are working on the engineering side," he says. (See ad on page 47.)

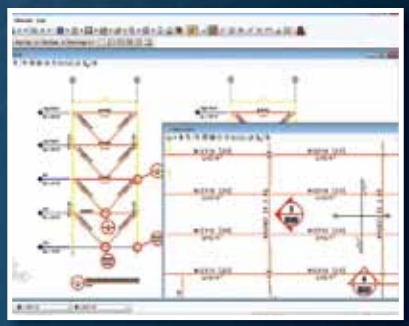
Another goal of structural engineering software is its ease of use. "We try to make our software speak the language of structural engineers," says Terry Kubat, Engineer and Developer, IES, Inc. (**www.iesweb.com**) in Bozeman, Montana. "You used to have to speak the language of computers. Our philosophy is that software is invisible. It's a tool to solve your problems. You can tell just by looking at the main menu of *VisualAnalysis* that's it's for structural engineers: You design, model, load, analyze and document. We focus on the engineer's job." The

*continued on page 40*

# Intelligent Structural Design







## Model, Analyze, Design, Document and Deliver… *in an Integrated Workflow*

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Bentley's new Passport Subscriptions for structural engineers provide access to the full range of structural software (including upgrades) and training documents and information that most projects require. These options are available as an affordable alternative to traditional licensing.

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company, which has been around for about 17 years, introduced its newest product, *VisualFoundation*, about a year ago and has just released version 2. VisualFoundation does mat footing analysis with basic design checks and information. It handles complex footing geometry, with multiple columns, walls, grade beams and pile supports.

For Leroy Emkin, Founder and Co-Director of the CASE Center in Atlanta (**www.gtstrudl.gatech.edu**), the strength of GT STRUDL – its Structural Design & Analysis software programs for Architectural, Engineering/Construction (AEC), CAE/CAD, utilities, offshore, industrial, nuclear and civil works – has always been the power and high quality of its computations. "Structural engineering is a safety-critical profession. The safety of the public relies on the computational aspects of the software, and the quality and experience of the engineers that use the software. GT STRUDL is focused on the high quality of its computations."

Emkin notes that GT STRUDL customers are looking for even more computational power, some of which is being driven by new codes. The one giving the most problems, he says, is the 13th edition/AISC. "One chapter is the 2005 specification which is now moving into the requirement for non-linear static analysis of steel structures… Our customers want computational power for non-linear static, as well as dynamic, analysis. Demands for non-linear are growing, and we've been focusing on rigorous non-linear computational power." Emkin says that his group is looking at improving graphical modeling facilities that provide front end to GT STRUDL. "We're hoping to have a product by the end of the year."

Many organizations and companies give their software away for free, or at low cost, to complement their structural products or to promote use of a building product such as wood or cement. These programs generally are available for download from the firm's website. One such group is the Canadian Wood Council (**www.cwc.ca**), a national, non-profit association representing manufacturers of Canadian wood products used in construction. The group offers their MWF Design package that provides designers using *Revit Structure* with seamless, bi-directional integration with *WoodWorks Sizer*, a design software.

"We're sticking to a premise of low-cost software that's easy to use," says Robert Jonkman, Manager, Structural Engineering and Sustainable Design. "People designing with wood generally don't need to model the entire building. Usually, there are only a few types of members to check with for wood construction. Typically, steel is more complex…If you model with Revit, you can use our software to check your wood members."

StructurePoint, LLC (**www.structurepoint.org**) in Chicago, Illinois was formerly the Engineering Software Group of the Portland Cement Association and, as a spinoff from the Association, one of its goals is to promote the use of cement. "We provide civil and structural engineers with the software and technical resources they need for designing concrete buildings and structures," says Marketing Director, Heather Johnson. For engineers, *StructurePoint* offers a single point of access for educational tools, R&D reports, library services and technical information. "Our motto is *work simply, quickly and accurately.*" She adds: "We think of ourselves as a gateway to resources for the cement and concrete industry, even

*continued on page 42*

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SOFTWARE FOR WOOD DESIGN

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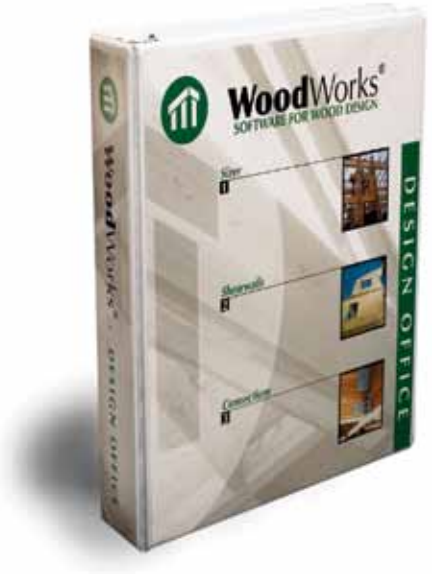
*Now IBC 2009 and SDPWS 2008 compliant*

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*Robert Jonkman, P.Eng, Manager, Structural Engineering and WoodWorks Software, Canadian Wood Council*

***www.woodworks-software.com/structure*** ***800-844-1275***

# SPECIAL SECTION

from someone who is not a user of our software… What do people want? They're asking for more training tools, more simplicity. Engineers have less time, less training time and less schedule and budget. They want something that gets them from A to Z very fast. They must be able to trust the software; they must be confident in it." (See ad on page 51.)

For Richard Morgan, Technical Services Engineer at Hilti Corporation in Tulsa, Oklahoma (**www.us.hilti.com**), the company's free software, *PROFIS Anchor*, not only keeps engineers in sync with the latest building codes but it acts as a design aid. Users benefit from Hilti's technical experience in the field of anchor fastening, as *PROFIS Anchor* provides access to the complete range of Hilti products and solutions. This makes selection of the appropriate anchor not only extremely quick and easy, it also ensures greater reliability of the final result, says Morgan.

"Version 2.1 is set to launch in October, 2010, and will have AC 318.08 [seismic], IBC 2009 and Canadian code CSA A23.3-04," Morgan says. "The design report will show all equations and calculations. We did it to take away the 'black box' for the plan checkers… We're also developing a user's manual to explain the design assumptions. Sometimes design assumptions in software are transparent, but sometimes it's not so apparent. It will explain what the program is doing with the variables." (See ad on page 49.)

Another free software offering comes from Powers Fasteners, Inc., based in Brewster, New York (**www.powers.com**). "We co-market the software with our products," says Mark Ziegler, Director of Engineering. Like other software, *Powers Design Assistant* or *PDA* will be current with recent code changes, as well as help engineers design, select and spec concrete anchors in accordance with the code.

"We will continue to add products into the software," Ziegler adds. "Next will be adhesive anchors into Version 2. It will also be compliant with Windows 7, the latest code and provisions for adhesive anchors. The software is free because it's a product complement." He notes that the new software will help design cast-in-place anchors, even though the company does not sell these products. (See ad on page 2.)

Simpson Strong-Tie Anchor Systems, in Pleasanton, California (**www.simpsonanchors.com**) offers *Anchor Designer Software* which analyzes and suggests anchor solutions using the ACI 318, Appendix D strength design methodology (or CAN/CSA A23.3 Annex D). It provides cracked and uncracked-concrete anchor solutions for numerous Simpson Strong-Tie Anchor Systems' mechanical and adhesive anchors.

Free for download, an update will come out shortly and will include new anchors for which the company has obtained code approval, says Engineer Ken Cho. "We're intending to take it global by adding ETAG (European Technical Approval Guideline) for Europe and Asia… The software provides detailed calculations which tend to make the output pages lengthy, but we wanted to make it so it's not like a black box and allows engineers to perform the review of the output calculation." (See ads on pages 11 and 15.)

At New Millennium Building Systems, LLC in Salem, Virginia (**www.newmill.com**), which is a steel joist and deck manufacturer, offering their *Dynamic Joist* component software is a way to help customers reduce their risk, as well as that of the company, by mitigating or eliminating errors. "It's a plug-in for *Tekla Structures*, and it's our introduction to BIM," says Information Technology Director Ricky Gillenwater. "The component is free and downloadable." He adds: "When we decided that we needed to participate in BIM, we went with a Tekla plug-in because that's what the majority of our customers use… We're also developing a deck component."

Nisha Mehta, Director of Engineering at Dimensional Solutions, Inc. (**www.dimsoln.com**) in Houston, Texas says that her company decided to focus on concrete design because there was a lack of automation in that area. "We serve the petrochemical, communications, mining and other industries," she says. "Customers are looking for easy-to-learn software. Civil engineers often are the last ones to receive information and the first to generate output for foundations, so their work schedule is very compressed and they need to automate as much as possible – and they don't want to use multiple software products." The company offers five foundation products: *FoundationD*, *Mat3D*, *DSAnchor*, *Shaft3D* and *Combined3D*. "We are constantly incorporating international codes as requested by our customers. Our customers also want more types of software for foundations, for equipment such as vibrating machines, pumps and tank products, so they can do dynamic analysis on their foundations." (See ad on page 46.)

*continued on page 44*

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Design Data (**www.sds2.com**) develops 3D modeling software for the structural steel industry. Their flagship product, *SDS/2*, started as a steel detailing program, but has grown beyond detailing, allowing fabricators, engineers and erectors to take advantage of it, according to Michelle McCarthy, Sales Representative. "For example, engineers can use the connection design capability of *SDS/2*, while fabricators are using the CNC information *SDS/2* generates to drive their shops." Design Data has also provided solutions for project partners who only need to view the models and drawings via the Global Review Station. "Erectors have used these stations to facilitate layouts and scheduling, while engineers use it to speed up approvals," she says.

The company is releasing a new engineering product, called *Engineering Analysis and Design* (*EAD/2*). *EAD/2* is an analysis product that also provides the engineer with the same connection design found in *SDS/2*. With the AISC code written into the software, engineers can analyze, develop connections in the structure, and pass that model to the detailer. Because *EAD/2* is directly linked to the *SDS/2* detailing model, there is no loss of information and the model maintains its integrity throughout the construction process, McCarthy says.

Software writers at Devco Software, Inc. (**www.devcosoftware.com**), based in Corvalis, Oregon, pride themselves on being software engineers and not computer engineers, says Rob Madsen, President. "We write software for the steel framing industry. The main thing about our software is that we're design engineers, so we design it from an engineer's point of view. The software works how we want it to work. It's easy to use with a short learning curve."

They are currently working on an update to their *LGBEAMER* program, which will include 2007 NASPEC adopted in the 2009 IBC. "There's lots of complexity in the new code," Madsen says. (See ad on page 42.)

Software from Retain Pro Software of Newport Beach, California, (**www.retainpro.com**) designs and analyzes nearly any cantilevered or restrained retaining wall, concrete or masonry, with just about any configuration and loading condition. This includes segmental retaining walls, says President Hugh Brooks. "We have just announced the release of *Retain Pro 9*, an upgrade that has over 20 new features and enhancements including code updates, soldier pile design, added seismic design options, pier foundations, expanded segmental retaining wall selections, and a new 210-page user's manual with 14 design examples," Brooks says. He is also the author of the new 8th edition of *Basics of Retaining Wall Design*, available from their website.

Working niche markets is the bailiwick of Montreal-based StrucSoft Solutions (**www.strucsoftsolutions.com**). Currently, the firm has two product lines – *MWF*, a light gauge steel and wood framing solution for Autodesk's Revit, and *CMS*, a CAD/CAM application dedicated to creating, editing and managing DSTV-NC files. "Our [MWF] product detects all clashes and does something about them with a rule set for changes. That's a huge step, because we're talking about thousands of openings. Even if there is not a rule to fix it, it gets flagged," says Spencer Murray, Vice President of Operations.

"There's a greater acceptance of BIM principles, and Revit in particular, as a platform," Murray says. "Revit is moving from the architect into engineering and further down into trades like contractors. This is a great opportunity for companies like ours to fill niche markets." He adds: "When the housing market picks up in the US, that will be our next boom business." (See ad on page 3.) ▪

SDS/2 DESIGN DATA

BUILDING INTELLIGENT CONNECTIONS.

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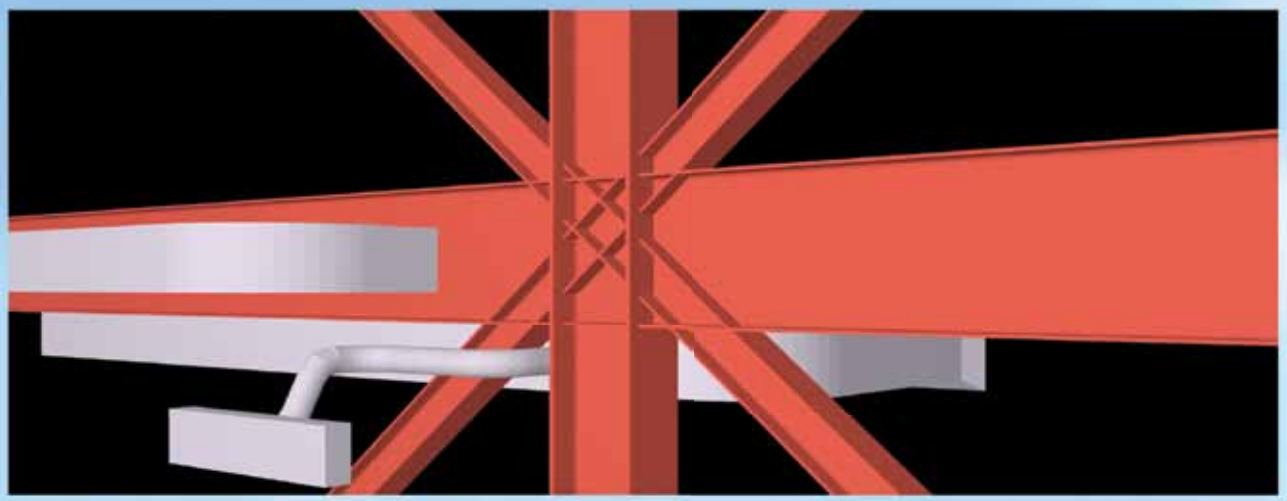
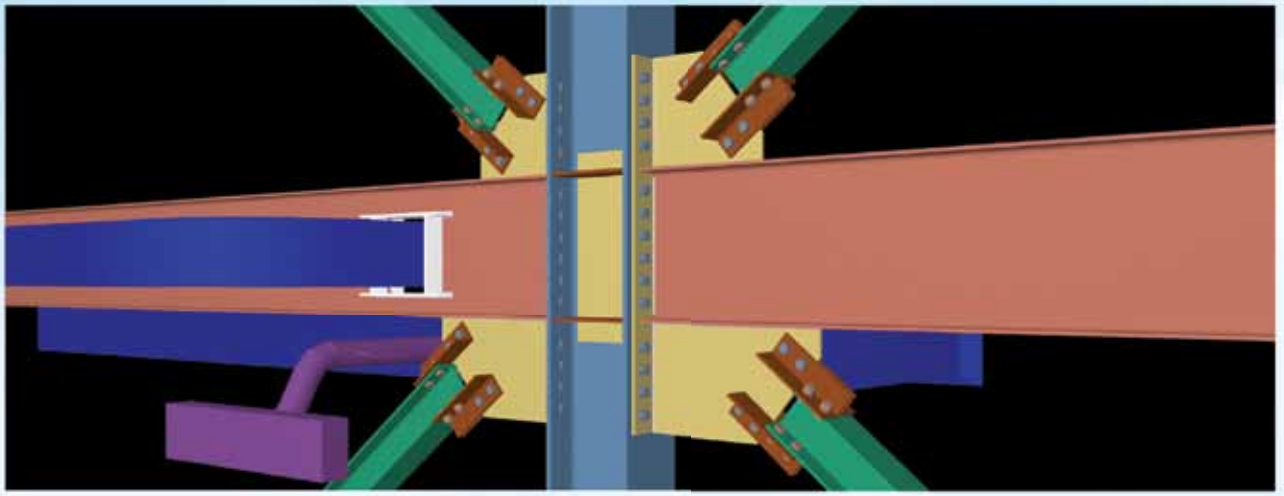


## When your software can do this?



SDS/2 is the only BIM software that designs connections intelligently. This means it recognizes — and resolves — erectability issues and framing conditions while automatically designing connections.

SDS/2 takes the work out of completing your BIM model. With SDS/2's power to engineer joints and superior connections to project partners, viewing the as-built model enables you to get the job done better, faster and smarter.

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