



Working from the Cloud

New Software, Interoperability and Mobile Apps Pushing Construction Technology

By Larry Kabaner

Structural engineers are starting to see wisps of the cloud. What has become common in many industries – working from the cloud – is beginning to see daylight among those engaged in construction.

“There are a lot of questions about the ‘cloud’ and what it means to the structural engineer,” says Raoul Karp, Vice President – Structural & BrIM, Bentley Systems (www.bentley.com/structural) in Exton, Pennsylvania. “On the information consumption side, the advantages are clear; being able to access project data authored anywhere, at any time, from any location. For example, Bentley’s Field Supervisor is the perfect companion for the structural engineer to help access all project data in the field. In addition, Bentley Navigator provides full 3D model navigation, visualization tools, and data interrogation capabilities. Soon we will have the ability to access and manage site administration tasks, markups, RFIs, and much more from the field. The cloud will also offer opportunities to consider more alternatives and more complex and complete solutions than ever before. Optimization across multiple disciplines is something that has existed in other industries for years, and we expect to see more of that with greater cloud analytical capacity and better optimization tools in the future.” (See ad on page 75.)

At Enercalc, Inc. (www.enercalc.com) in Corona del Mar, California, President Michael Brooks says that cloud-based software is on the way. “Our products are continually enhanced according to user requests and advances in software development technology. Currently, we’ve upgraded our software to support all new building codes and we will be premiering a cloud-based software system before year’s end.” (See ad on page 3.)

Other new products and services are coming along, too, says Karp. “Last year, all RAM products were updated to 64 bit, which gave our users the ability to create larger models and conduct faster analyses. Information mobility was improved with RAM Connection and RAM Concept, which are now managed directly through the RAM Structural System to provide a more unified and seamless workflow. Other enhancements include modeling, reporting, and analysis, including the addition of the SJI Joist Girder tables to allow consideration of joists in lateral analysis, and the addition of new ASTM A1085 and Jumbo HSS Shapes. The new release of RAM Connection included the latest design standard and seismic requirements from

AISC 360-10, AISC 341-10, and AISC 358-10 for moment, brace, and HSS connection design.”

He adds that Bentley’s SELECT Open Access is an industry first that provides any subscriber with unrestricted portfolio-wide access to the company’s products. “This allows subscribers to employ the best and most comprehensive mix of Bentley applications for all disciplines for every project. Subscribers also benefit from convenient and cost-effective Quarterly Term Licensing at the end of each calendar quarter, as well as on-demand and live training in the virtual classroom through Bentley LEARN. With SELECT Open Access, the purchasing barriers to the most effective software utilization are eliminated so that all Bentley applications are at your service.”

As for his company’s new offerings, Brooks says that Enercalc releases updates when available and not on a regular timetable. “Instead, we are continually improving the software and releasing it through our web update system. New enhancements come in a continual flow to our Maintenance & Support Plan subscribers.”

He notes: “Software trends in engineering design still follow the basic trends of all software. These are cloud-based solutions for global deployment, incremental pricing structures to provide more cost effectiveness to customers, and software solutions made available on multiple platforms (desktop, laptop, tablet) and multiple operating systems (Windows, Mac, Android, IOS). ENERCALC is one of the three senior structural engineering software companies, now in business for 31 years. This type of staying power reflects the necessity of the market we serve and the dedication of our long-term staff to the products and our loyal customers.”

Amber Freund, Director of Marketing at RISA Technologies (www.risatech.com) in Foothill Ranch, California, says that her company has been developing world-class structural design software for over 25 years. “Our products are used to design towers, skyscrapers, airports, stadiums, petrochemical facilities, bridges, roller coasters and everything in between. The seamless integration of our product suite creates a powerful, versatile and intuitive structural design environment, ready to tackle almost any design challenge.”

Freund says: “We recently released RISAFloor ES which will design one and two-way elevated concrete slabs. This addition to RISAFloor gives engineers the ability to design any commercial building within one familiar, easy to use interface. After releasing RISAFoundation,

which designs mat slabs, engineers started requesting that same interface and design features in an elevated slab design program. The most requested feature, beyond the easy-to-use interface, was to be able to customize design strips. Although RISAFloor ES can automatically generate your design strips, the engineer also has the ability to modify them to fit his/her design needs.”

As for trends, Freund continues to see integration and interoperability being key to design projects. “We are working closely with Autodesk and Tekla to enhance our direct links so that data can be transferred seamlessly between 3D modeling, analysis-design and detailing software. Our developers, technical support group, and even our sales team are all structural engineers. Given our background, we are uniquely able to predict and meet the needs of our clients and continually produce the most user-friendly software on the market.” (See ad on page 76.)

Another long-time software solutions company is Design Data (www.sds2.com) of Lincoln, Nebraska, which has been in business for over 30 years, says Doug Evans, Vice President of Sales. “SDS/2 software solutions are a suite of products developed for the manufacturing and engineering components of the construction industry. The flagship product, SDS/2 Detailing, automatically designs code-compliant connections and creates shop drawings and CNC data for machines on the shop floor.”

When it comes to new offerings, Evans says that SDS/2 Approval is a proven product that has been utilized in the new model approval process and is becoming increasingly popular on BIM projects. “With the added ability to transfer job status, and new tools to approve and review members, this product has seen significant market penetration. Engineers and detailers are moving away from drawing-based methods to approve project and design intent, and embracing model-based methods to accomplish the same goal. SDS/2 Approval product provides them the right tools to work in this environment,” he says.

Evans wants SEs to know about two other new products. “SDS/2 Erector combines the ability to build your own intelligent cranes with the crane building functionality and the fabricated BIM model from the manufacturer. This combination gives erectors and general contractors the needed tools to plan and organize the site to make for a smooth project.” He adds: “The SDS/2 Detailing flagship product is bringing dramatic improvement to market this year. The automatic connection design functionality now creates the ability to lock any design element, and design a connection around that variable. This gives engineers full control over every aspect of a connection. In addition, the ability to create components will increase the productivity when modeling miscellaneous elements like outriggers, conveyors and platework.” (See ad on page 44.)

Evans concludes: “All of the new offerings are a direct result of the BIM work process, and utilizing the model and model data in new and innovative ways to reduce cost and improve quality in the construction cycle. A majority of the new products and features have come out of the collaborative effort of development with our current installed base and our experienced development staff.”

There are four key trends that improve user experience: interoperability, ease of use, integration and the ability to easily automate repetitive tasks, according to Marinos Stylianou, CEO of S-FRAME

Software (www.s-frame.com) in Guilford, Connecticut. “Ideally, clients want a single model for their software and tools. They can’t afford to move back and forth between dissimilar products and technologies. Integration is key not only at the designer or engineering level, but at the entire business level of the company and its partners. With each new release of our product suite, we continue to offer our clients tangible improvements in all four key areas.”

S-FRAME recently released S-FOUNDATION, a foundation analysis and design product with automation and customization capabilities. “S-FOUNDATION has been very well received by the structural engineering community since its release in 2013, and is helping to expand our presence in the concrete analysis and design arena,” says Stylianou. “In addition, all our core products saw significant updates and new feature functionality with release R11. Our interoperability with BIM and CAD systems was expanded through new bi-directional links with Tekla and Revit. The DXF translator was also completely rewritten and modified to handle increased customer needs.”

He adds: “Industry trends and demands motivate our team to provide the best state-of-the-art technology, while providing an enjoyable and simple user experience. The ability to communicate among our products, and with 3rd party and in-house products, is another driver requested by our clients. Clients are seeing a refresh in their business that requires faster concepts and better designs at a reasonable cost. Our solutions aim to address all three of these points.” (See ad on page 4.)

Celebrating its 40th anniversary, Scia Engineer is part of a new breed of integrated 3D structural analysis software that makes it easy for engineers to plug analyses and designs into today’s BIM workflows, says Dan Monaghan U.S. managing director of Nemetschek Scia (www.nemetschek-scia.com). He is based in Columbia, Maryland. “Flexibility is a big benefit of Scia Engineer. It is used by engineering companies across a number of industries including plant/process, buildings and transportation. It’s a great design tool for day-to-day engineering work, but has the advanced analysis capabilities and multi-material code support firms need to tackle larger, more complex projects.”

The company has recently released Scia Engineer v14. “With Scia Engineer v14 we are introducing a new Open Check technology that allows firms to easily script their own custom structural calculations inside Scia Engineer’s 3D FEA environment. Giving engineers the ability to write and run their own custom checks and calculations in their structural design software is a real game changer for some firms,” says Monaghan. “It removes the dependency that firms have on any one software vendor. Engineers can now easily extend their analysis software by adding their own design checks whenever they need them. It also removes the biggest criticism that engineers have with structural engineering software: the software is too black box. With Open Checks, engineers can see the formulas and methods that are being used to derive a check. And, best of all, they can edit them to suit their own preferences or design criteria.”

Simpson Strong-Tie (www.strong-tie.com) of Pleasanton, California, has worked with structural engineers for nearly 60 years providing engineered structural connectors, lateral-force resisting systems and other building solutions, says Paul McEntee,

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Engineering R&D Manager. “Today, we offer a full line of structural products that help customers design and build safer and strong homes and buildings to resist high winds, hurricanes and seismic forces. We also continue to focus on technology by providing free software, web and mobile apps, online calculators and other resources to help structural engineers design and model projects using our products.”

The company has announced a new software program for cold-formed steel design that automates product selection and helps navigate the complicated design provisions of AISI, while offering more robust design tools for users, according to McEntee. “The new program has an upgraded user interface that makes input faster and more intuitive. CFS Designer software is the new version of LGBEAMER, a software program that has been one of the most widely-used CFS member design tools in the industry. The new streamlined software gives structural engineers the ability to design CFS beam-column members according to AISI specifications, and to analyze complex beam loading and span conditions.”

McEntee adds: “With our new Literature Library mobile app, it’s easier than ever for engineers to take Simpson Strong-Tie product information on the go. With the Literature Library app on iPhone, iPad and Android devices, SEs can now access and download all catalogs, fliers and technical bulletins to a mobile device, bookmark the pages they use most, create a customized library on their device, and view downloaded documents without Wi-Fi.”

In addition, the Simpson Strong-Tie Strong Frame moment frame selector software is designed to help engineers select an ordinary or special moment frame for their project’s given geometry and loading. McEntee says that only minimum input geometries are required for the software to select an appropriate frame for the available space. “Based on input geometry, the Strong Frame selector software will narrow down the available stock frames to a handful of possible solutions. If opening dimensions are outside stock frame sizes, designers can enter the specific opening dimensions and the Strong Frame selector will provide possible customized solutions.

“We also have updated the Holdown Selector web app so it is available in U.S. and Canadian versions. The Holdown Selector web app is a quick and easy tool that selects the most cost-effective holdown connector based on the type of installation, demand load and the wood species of the post,” McEntee says.

Although not a software company, Ram Jack (www.ramjack.com) offers many products and tools for engineers, including software. Ram Jack is a helical and hydraulically-driven steel manufacturer and distributor, says Darin Willis, Director of Engineering for the Ada, Oklahoma-based company. “Ram Jack has an international network of franchises throughout the U.S., Canada, Puerto Rico and South America. We offer a wide arsenal of brackets and pilings that are available for almost every situation.”

In addition to its free, web-based helical design software, Foundation Solution, Ram Jet also offers:

- An engineering department staffed with structural and geotechnical engineers who are available to assist with pile designs, provide calculations, shop drawings or answer any technical questions.

- An engineering portal on Ram Jack’s website that provides product shop drawings of their most common brackets and piles, standard specifications and general notes for helical and hydraulically-driven piles. It also has procedures for designing helical piles in accordance with the International Building Code, ICC ESR report. Engineers can contact the engineering department directly for any additional assistance.
- Free Lunch and Learn presentations in most locations. The presentations cover the theory and application of helical piles. Most state engineering boards accept continuing education credits based on the technical presentations.
- To further guarantee quality control and assurance to its clients, Ram Jack’s manufacturing and distribution arms have both received certification for ISO 9000 compliance.

“Even though helical piles have been used for more than 175 years, most engineers were not educated on how to design them during their college curriculum,” Willis says. “The last 25 years has seen exponential growth in the use of helical piles and tieback anchors. The ICC adopted the acceptance criteria for helical piles in June 2007, and included helical piles in the 2009 and 2012 IBC. The Lunch and Learn’s technical information provided on the engineering portal, the design software and the engineering support, are in place to help engineers understand the design theory, capacities and applications of this valuable tool.” (See ad on page 50.)

StructurePoint, LLC (www.structurepoint.org) in Chicago, Illinois, was formerly the Engineering Software Group of the Portland Cement Association, and is a dedicated team of engineering professionals committed to excellence, continuous improvement, and service, according to Marketing Director Heather Johnson. “We provide civil and structural engineers with the software and technical resources they need for designing concrete buildings and structures. StructurePoint is a convenient single point of access to the vast resources and knowledge base of the entire cement and concrete industry including library services, training, R&D, publications, building codes, specialty engineering services, concrete material and testing, concrete repair, codes and standards consulting.”

StructurePoint’s primary focus is concrete structures. “We are watching closely every code change and amendment relevant to concrete design. We are also behind the scenes looking for important upcoming changes to make concrete design simpler, faster, and more accurate. We do it once and well, so that every engineer knows that at least his concrete design is optimal, economical, safe and code compliant,” Johnson says. “In spColumn v4.8.1, StructurePoint has further refined slender column design provisions to meet stringent new requirements of ACI-318.”

Business has been improving, says Johnson. “Companies of all sizes and geographies have been increasingly more upbeat about business opportunities, and cement shipments have been growing steadily indicating more construction spending. Among our users, geotechnical engineers have been exceptionally active responding to exploding opportunities in oil, gas and petrochemical projects. These opportunities continue to drive additional demand of our spMats and spBeam program for foundations in industrial facilities and infrastructure construction.” (See ad on page 51.)

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SPECIAL SECTION

Engineering Software

The Canadian Wood Council (CWC) (www.woodworks-software.com) is the national association representing Canadian manufacturers of wood products used in construction. CWC's main priority is to ensure that building professionals such as engineers, architects, and other design professionals have the needed information to specify and use wood products in a safe, secure, and code-compliant manner, according to Josée Lalonde, Marketing & Sales Coordinator. "One way we do this is through our wood engineering software, WoodWorks. Separate Canadian and U.S. versions of WoodWorks software are available. For the U.S. version – compatible with the IBC, NDS, SDPWS, and ASCE7 – CWC works closely with the American Wood Council (AWC) to ensure consistency in technical interpretations," says Lalonde.

In the United States, the latest version of the software is US Design Office 10 (SR2a), released in February, 2014. This version conforms to the 2012 IBC, the 2012 NDS, and the 2010 ASCE-7.

Also, new features added to the February release of the Shearwalls program are:

- Worst-case design of shear walls considering wind and seismic loads. Envelopes the worst case distribution (rigid and flexible diaphragm), providing the designer with an immediate assessment of whether the walls meet all the desired design criteria.

- Reduced processing time. The software was capable of doing increasingly complex calculations. For very complex buildings the run time was as long as 10 minutes. It has been reduced to 20 seconds.

In Canada, a new release (Cdn Design Office 9) is scheduled for August. Says Lalonde: "This version will include improvements made in the US DO 10, including allowing pdf and bitmaps to be used as templates for modeling the building in the Shearwalls program, highlighting walls that are over capacity, and grouping user-defined walls together to ensure a consistent design. Additionally, an expanded list of Canadian cities will allow designers to select any of the over 600 cities listed in the NBC 2010 Design Data, which automatically populates most of the wind and seismic data needed, and, at the push of a button, determine the lateral loads on the structure." (See ad on page 53.)

According to Stuart Broome, Business Manager, Engineering at Tekla (www.tekla.com), the Kennesaw, Georgia company is focused on building and construction. Its customers are in the architectural, engineering and construction (AEC) markets and include structural engineers, contractors, fabricators and steel detailers. "The company was established in 1966, and today it has customers in 100 countries, offices in 15 countries, and a global partner network. In 2011, Tekla

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became part of Trimble Buildings Group and then, in 2013, Trimble acquired CSC which is now incorporated into Tekla," he says.

"Launched in 2004, Tekla Structures is the preferred tool of construction professionals around the world to model, detail, fabricate and build many of the world's buildings, bridges, and sports complexes. The software is designed to work seamlessly with Tekla BIMsight, a free online tool and portal for construction project collaboration," Broome says. "The most recent version, released in March, brings even more detailed information and flexibility to modeling while reducing the need for manual data transfer. Information now flows more efficiently from design, purchasing and production to the shop floor. Tekla also provides more links to architectural and design solutions to remove the technical and compatibility barriers that compromise workflow between project teams and subcontractors using different types of applications." For more information and to download Tekla Structures 20 go to www.tekla.com/tekla-structures-20.

In June 2014, Tekla released Tedds 2014, a new version of its calculation production suite which automates the design and documentation of structural components. "A major new development to Tedds 2014 is the inclusion of the Tedds Project Manager," Broome notes. "Project Manager allows users to create a project of related Tedds documents that can easily be managed directly within Tedds. Teams using Tedds are able to work even more

efficiently by using Project Manager to streamline their workflows and administration, and create dynamic reports directly from the Project Manager."

Fastrak, another offering, is a steel building design tool. It is a physical object-based modeling solution which automates the requirements of AISC360 and ASCE7, according to Broome. He says that the main reasons why clients use Fastrak are:

- The ability to model and automate the design of composite floors and complex roof structures/trusses in one model and in one interface
- The ability to model and automatically design gravity and lateral systems in one model and in one interface
- The ability to synchronize a design model with a Revit model and pass information in both directions, as many times as required, in a manageable way.

Broome concludes: "Our solutions contribute to the essential processes of today's information-intensive construction industry. Ultimately, it comes down to collaboration and sharing of information. We continually add new features to help our clients work efficiently. BIM is increasingly becoming common practice and it's vital that we offer our clients a cutting-edge BIM solution so that they can increase their productivity, win more work and be more profitable." (See ad on page 56.) ■



SOFTWARE GUIDE

BIM, Bridges, Building Components, Business/Productivity, CAD, Concrete, Found./Retain. Walls, Gen./Packages/Suites, Light Gauge Steel, Masonry, Steel, Wood

ADAPT Corporation

Phone: 650-306-2400

Email: info@adaptsoft.com

Web: www.adaptsoft.com

Product: ADAPT-PT RC Strip Design

Description: The most popular software for design of post-tensioned slabs and beams now includes a Reinforced Concrete design option. This new capability lets engineers use the strip design software they are already used to on all their concrete projects, saving time and the hassle of switching between software.

Product: ADAPT-Builder with Column Design

Description: An integrated analysis and design software for concrete buildings that now includes code check and design capabilities for columns. Use it to efficiently analyze and design your complete concrete building from foundation to roof slab all in one model – post-tensioned or mild reinforced. Seamlessly integrates with Revit Structure.

Product: ADAPT-ABI 4D Construction Phase Analysis

Description: 4D construction phase analysis of concrete bridge or building structures. Models construction phases including temporary structures, closure strips, pre- and post-tensioning. Reports forces, creep, shrinkage and deflections using non-linear material behavior. Great tool for calculating long-term effects, camber, super-positioning, and investigation of construction methods.



Applied Science International, LLC

Phone: 919-645-4090

Email: tdigirolamo@appliedscienceint.com

Web: www.appliedscienceint.com

Product: Extreme Loading for Structures

Description: An advanced non-linear structural analysis software tool designed specifically for structural engineers. Easily study static and dynamic loads such as those generated by blast, seismic events, impact, progressive collapse, and wind.

Product: SteelSmart System (SSS)

Description: Available as a complete suite, SSS will streamline production through the design and detailing of members, connections, and fasteners. Available design modules include: Curtain Wall, Load Bearing Wall, X-Brace Shear Wall, Floor Framing, Roof Framing, Roof Truss, and Moment-Resisting Short Wall.

Bentley Systems

Phone: 610-458-5000

Email: katherine.flesh@bentley.com

Web: www.bentley.com

Product: ProConcrete

Description: Advanced 3D CAD program for modeling, detailing, scheduling of reinforced insitu/ precast and post-tensioned concrete structures. Offers simple and easy-to-use tools for advanced 3D modeling of reinforced concrete structures, producing automated design and detail drawings and rebar schedules. Enables engineers to reduce documentation production time.



Product: LEAP Bridge Steel

Description: An integrated, 3D Steel bridge design and rating program. It provides comprehensive layout, geometric modeling, design, analysis, and load-rating for small to medium steel bridges. This intuitive software complements Bentley's LEAP Bridge Enterprise for concrete design with Bridge Information Modeling (BrIM) for steel bridge design.

Product: STAAD Foundation Advanced

Description: Comprehensive foundation design program which offers the ability to model complex or simple footings, including those specific to Plant facilities: octagonal footings supporting vertical vessels, strap beam foundations supporting horizontal vessels, ring foundations supporting tank structures, and drilled or driven pier foundations.

CADRE Analytic

Phone: 425-392-4309

Email: cadresales@cadreanalytic.com

Web: www.cadreanalytic.com

Product: CADRE Pro 6

Description: Finite element structural analysis application for Windows. Solves beam and/or plate type structures for loads, stress, displacement, and vibration modes. Advanced features for stability, buckling, dynamic analysis and shock. Complete seismic analyses to comply with current codes. Special provisions for unusual structural types such as geodesic domes.

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