

# TALL BUILDINGS CONSTRUCTION

*Moving Apace with New Products and Services*

By Larry Kahaner

Companies involved in tall building construction are continually offering new products and services to meet their customers' demand.

"Business is great!" says Kord Wissmann, President of Geopier Foundation Company ([www.geopier.com](http://www.geopier.com)). "We continue to grow our resources to keep up with market demand and focus attention on clients. We are expanding our technologies and exploring and testing new possibilities that will continue to provide an intermediate foundation solution. We have also hired new employees ranging from additional regional engineers, engineers to assist in our design center, a director of business development and more office help." Wissmann adds: "We continue to update our marketing efforts. We are working toward a much more active presence in our regions as well as promoting ourselves through social channels and success stories that showcase our experience and expertise."

Wissmann notes that, with the long-term rapid urban and industrial growth demands, there is more need than ever for ground improvement. "Geopier can develop the worst sites and soils and transform them to buildable, solid foundations. It is truly remarkable, and more ground improvement techniques like our rigid inclusions are being introduced to the market."

One project that used the Geopier GeoConcrete system was *The Grand*, Phase 2, a 12-story condominium structure with two levels of below grade parking situated on the banks of the Grand River in Cambridge, Ontario. "The Geopier GeoConcrete Column system was selected for its cost, the speed of installation, and ability to provide high bearing capacity footing support," Wissmann said. The foundations of this structure were subject to column loads of up to 1500 kips (6,675 kN), wall loads of up to 7 kips/ft (100 kN/m), and mat pressures of up to 8ksf (380 kPa). The Geopier GeoConcrete System was designed to limit total settlements to less than 1 inch and differential settlements to less than 3/4 inches. Installation of the Geopier elements occurred as conducted from just above the bottom of footing elevation. The result of the full-scale load test completed on-site showed less than 0.18 inches (4.5 mm) of deflection at the maximum design load. (See ad on page 52.)

At S-Frame software ([www.s-frame.com](http://www.s-frame.com)), CEO Marinos Stylianou says that the recent release of the S-FRAME R11.2 product suite is very well received by the structural engineering community. "R11.2 delivers significant updates and new functionality to our analysis and design products – S-FRAME, S-STEEL, S-PAD, S-CONCRETE, S-CALC, S-VIEW, and S-FOUNDATION." He says these updates include new functionality and enhancements designed to improve clients' user experience in five key areas:

- (a) Connectivity to industry standards REVIT 2016, AutoCAD, TEKLA 21,1, MS EXCEL, MS ACCESS;
- (b) Ability to automate repetitive tasks through a modern approach to automation using macros and the Python scripting language from within new products;
- (c) Improved productivity and faster product learning times by tightening the integration between analysis and steel and concrete design tasks;
- (d) Additional advanced material models and analysis capabilities to handle demanding modeling requirements, including



partial releases and material failure which are important in performance-based design studies; and

- (e) Addition concrete design codes for Eurocode 2 in ICD (Integrated Concrete Design) in S-FRAME and S-CONCRETE, their stand-alone concrete design solution.

Stylianou concludes: "We've also partnered with ADAPT Soft and provided our clients an integrated solution between S-FRAME's S-CONCRETE and ADAPT's Builder. The results from 2015 are very encouraging. The oil and gas industry has been negatively impacted by lower oil prices, but our clients are well diversified and global. We've seen strong growth in the United States and Asia, especially from companies that chose to use our advanced structural analysis and design platform particularly for newer trend-setting tall buildings." (See ad on page 4.)

At the Vulcraft/Vercor Group, Division of Nucor ([www.vulcraft.com](http://www.vulcraft.com)), District Sales Manager John Cooper says that the Complex Composite Group (CCG) formed in 2012 is doing well and continues to grow. "In 2012, our office started with just nine employees and has since grown to 25, with plans to add five more before the end of 2016. We have received new customers and several repeat customers."

CCG's main focus is to support customers' needs for large complex projects that require composite metal decking in the non-residential structural steel construction market, says Cooper. "We now provide our customers with improved services in metal deck sales support nationwide, more accurate estimating, value engineering options, precision on-time CAD detailing, proactive project management, erector-friendly deck layout, and Tekla modeling software."

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As for recent projects, “Vulcraft/Verco CCG was an integral part of the construction of the 850,000-square foot Prudential Tower in Newark, NJ. CCG supplied and managed 1,015 tons of composite floor deck and accessories to the 20-story office tower,” Cooper says. “Tekla BIMsight was utilized for the coordination of the structural steel components to increase productivity and accuracy. This was especially important given that the goal was to complete the skeleton before the cold Northeast winter arrived. CCG provided a Pour Stop detailing service to ensure all ‘Notches’ were provided in the correct locations for coordination with the curtain wall system. Pour Stop is a gauged steel product specialized to form the concrete slabs on a structural building. The Notches are located and then cut into the Pour Stop using a plasma cutter prior to fabrication. The successful completion

of the building’s steel structure was largely due to the coordination and teamwork of Cives Steel Company, the fabricator, Cornell & Company, the erector and Vulcraft, the metal deck supplier.”

According to Steven Powell, Executive Vice President at Star Seismic-Corebrace ([www.corebrace.com](http://www.corebrace.com)), the buckling restrained brace (BRB) is still growing in popularity. “From high rise buildings to bridges to industrial facilities, new applications are occurring.”

He notes that his company highlights to SEs the application of outriggers. “It uses an established product, a buckling restrained brace, but we are using it in a unique application as a structural fuse. This concept has been around probably for eight or nine years. It started out with a few buildings here in the United States, and now it’s becoming more common around the world for high rise

buildings. One limitation of high-rises is that the lateral resisting element, the core wall in the center of the building, is narrow and slender. By using an outrigger, we distribute the load to the outer super columns. It’s akin to a skier standing on his skis. It is easy to push over. However, if you take a pair of ski poles and stick your arms out, now it’s pretty hard to fall over on skis. That describes it in its simplest form. The product itself is not new, but the application of it is new.”

Powell says a limitation of core walls is their physical size. “You don’t want to eat up all your square footage in a high rise building by adding extra elevator banks and everything else. Also, increasing the wall thickness eliminates leasable square footage. By using the outrigger, you can reduce the thickness of the core walls. You are able to reduce the size of the foundations that the core wall sits on. You can distribute the loads out to these outrigger columns, and it just becomes a more economical system.”

He notes that Star Seismic and Corebrace joined in February, and the union is working well. “The companies decided that there were good parts about both companies and, if we put them together, the new form of Corebrace would be larger than the sum of its parts. It now gives us the ability to use the best elements of both companies to service clients better and produce superior performing buckling restrained braces.”

Rich Madden, Marketing Director at New Millennium ([www.newmill.com](http://www.newmill.com)), would like SEs to know about Versa-Floor, their Long-Span Composite Systems.

The advantages, according to Madden, are:

- Clear spans up to 36 feet for open space designs
- Integrates with any beam or wall-bearing frame
- Up to 40% less dead weight than cast-in-place concrete (CIP)

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Says Madden: “Versa-Floor can be used in multi-story residential buildings, commercial applications such as creating large bays designed for high-load combinations, retrofitting, healthcare, and special platforms. It is ideal for accelerated and safety-enhanced high-rise building construction, owing to a Panelized Delivery Method (PDM) whereby the floors are assembled in squares on the ground, then lifted into place.” (See ad on page 54.)

ITT Enidine Inc. ([www.endine.com](http://www.endine.com)) is continually refining its designs of Fluid Viscous Damping (FVD) devices in response to technology and application advancement, says Ben Eder, Infrastructure Sales Manager – Americas.

“Our newest FVD technology, Series-UVD, utilizes a proprietary ultra-viscous silicone fluid, offering several advantages to traditional silicone hydraulic fluids. The use of ultra-viscous fluid allows for the design of an FVD to achieve a velocity exponent [damping alpha] as low as 0.1. Velocity exponents less than 0.4 are technically difficult, if not impossible, to achieve using traditional less viscous silicone fluids,” says Eder. “The nature of the extremely high viscosity lends itself to being leak-resistant. The primary point of failure of any hydraulic damping device, regardless of manufacturer, is the dynamic piston rod seal. When a damper is acted upon, the stroking of the

damper will wear the dynamic seal due to the friction between the piston rod OD surface and piston rod seal ID surface. Over time, the cumulative seal travel [wear] will eventually reach the point of creating potential leak paths. With a traditional less viscous silicone fluid, the leak path area required to produce a leak is significantly less than what is required to produce a leak using ultra-viscous fluid. Put simply, an FVD that utilizes an ultra-viscous fluid can accommodate much more cumulative seal travel before creating an actual leak path, which allows for longer damper life.”

Eder is beginning to see many SE firms engaging with their engineering team in early design phases of their projects to discuss application specifics and to learn about the potential solutions. He says this is a positive trend and can prove beneficial for everyone, from clients to SEs to building users. “Early engagement can help inform SEs of what an FVD is capable of achieving, as well as matching FVD designs and behavior to each specific application. Specifying the best technical and most economical FVD solution for supplementary damping in the early stages of development can translate to fewer design iterations and substantial savings for a client.” (See ad on page 55.)

At Hayward Baker ([www.haywardbaker.com](http://www.haywardbaker.com)), Jeff Hill, Director, Business Development, sees increasing computer real-time data gathering. “This, in turn, makes our foundation systems more reliable and more cost effective. That’s where we’ve seen the biggest changes in the last, say, three years and what I perceive to be over the next five years.”

Hill says Hayward Baker is a full-scale foundation solution provider, and they optimize foundations using a variety of techniques depending upon conditions. “We tailor the foundation for the structure that they’re designing, with their allowable settlements and movements taken into account for making the system as optimal as possible.”

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In the future, Hill expects to see more design-builds and larger projects. “We are getting calls for what we call mega-projects where they’ve got a billion-dollar design/build project, and we think that trend will continue and it might even get larger.”

As for business conditions in general, Hill says, “Business is good in most of our geographies and most of our market segments. Of course, we have a few soft spots like oil.” (See ad on page 57.)

Business is also good for CTS Cement ([www.ctscement.com](http://www.ctscement.com)), according to Susan Foster-Goodman, Director of Strategic Initiatives & Komponent. “We continue to see strong demand for our high-performance CSA cement-based product offerings for both the Rapid Set and Komponent product lines. The project efficiencies that can be achieved using rapid setting or shrinkage-compensating concrete materials offer value to the entire project team – owners, architects, engineers, and contractors alike. We help them meet demanding fast-track schedules without sacrificing durability, save time and money on more traditional project schedules and complex design/build projects, and minimize maintenance costs and capital expenses related to repairs. This sparks a keen interest within the industry and provides new opportunities for growth.”

Foster-Goodman says that CTS Cement, founded on innovation, remains committed to providing the most innovative, high-performance concrete solutions in the industry. “We’ve recently developed two new Rapid Set products that add to our robust portfolio of concrete and concrete repair materials. The first is a rapid-setting WaterStop product designed to stop water leaks in concrete and masonry in less than five minutes and achieve structural strength in one hour. The second is a rapid hardening, multi-purpose repair mortar, Mortar Mix Plus, engineered with an integral corrosion inhibitor

for additional protection. It is ideal for wet environments where fast strength gain and sulfate resistance are essential.”

She would like SEs to know about innovation in their Komponent line that takes shrinkage-compensating concrete to a new level with their System-K offering. “System-K is a microfiber reinforced system for slab-on-grade applications. The K-Fiber used throughout the slab minimizes traditional reinforcement requirements. Perimeter steel is only required at slab edges, penetrations, and re-entrant corners to maximize the performance of the controlled expansion distinctive of shrinkage-compensating concrete. Thinner slabs are also viable,” she says.

“System-K also offers 90-95 percent reduction in control joint requirements and effectively negates shrinkage cracking. Panel sizes of 100-foot by 100-foot up to 150 by 150-foot are common. Fewer joints and larger panel sizes significantly reduce the costs associated with tooling, cutting and treating control joints during installation as well as minimizing long-term joint maintenance and spall repair costs. Mobilizations and installation times can be reduced, saving time and money on the project,” says Foster-Goodman.

She concludes: “The move toward more integrated, collaborative design/build projects to optimize project efficiencies has prompted CTS to do the same – integrate one of our core products, Komponent, into a full line of innovative shrinkage-compensating concrete, low shrinkage concrete, and non-shrink grout solutions for slabs-on-grade, concrete containment, mass elements, specialty structures and more. System-K integrates value for the entire project team and performance for the owner by offering maximum durability and service life.” (See ad on page 59.)



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