

# ENR Contractor Business Quarterly

INSIGHT AND ANALYSIS FOR STRATEGIC LEADERSHIP

Fall 2015



## WINDOW TO THE FUTURE

Texas glazing firm Haley-Greer Inc. seeks to boost the profile of subcontractors

(p. CBQ4)

President Letitia Haley Barker

PHOTO BY KEVIN BROWN PHOTOS

### HIGH-RISK VENTURE

Q&A with N.J. crane company owner Jennifer Gabel (p. CBQ8)

### LIFT OFF

New lift designs ease work at two military base hangars (p. CBQ10)

### BALANCING ACT

Workplace study examines employee productivity vs. well-being (p. CBQ12)

### COMEBACK TRAIL

Sales of commercial cargo vans see big resurgence among contractors (p. CBQ16)

### NEXT-GEN MODULES

How high-end prefab is transforming markets (p. CBQ21)

**“IT IS RELIEVING NOT TO WORRY ABOUT FUEL COSTS FOR ONCE IN A LONG TIME. BUT WE ALSO RECOGNIZE THAT A SPIKE IN PRICING COULD BE JUST AROUND THE CORNER.”**

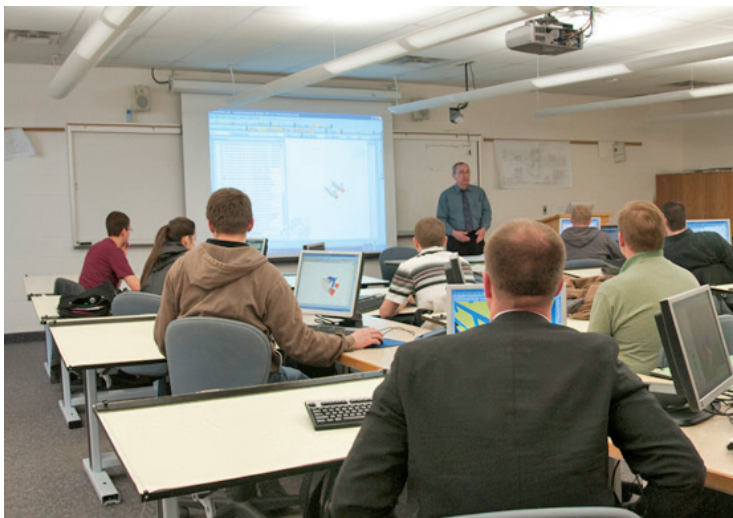
—James Reiss, CEO, Westside Mechanical Group

**\$30**  
BILLION

Estimated funding shortfall in first three years of the six-year, \$325-billion federal transportation authorization bill, unveiled on Oct. 16. U.S. Congress staffers say the funds will be found.

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#### CONSTRUCTION EDUCATION

## Making the Grade

THE FIRST TWO U.S. CONSTRUCTION MANAGEMENT programs, at Brigham Young University in Utah (above) and Pittsburg State University in Kansas, have been accredited independently from engineering programs. The Construction Management Association of America worked with accreditation board ABET to develop program-specific criteria that include project life cycle and sustainability; health and safety; labor relations; and business skills. Kevin Miller, BYU program director, says separate accreditation “acknowledges in the engineering world that CM is its own discipline,” but also will improve building process collaboration.

#### MOVERS AND SHAKERS

TRC COS., Lowell, Mass., has named **Edward J. Wiegale** as senior vice president and director of pipeline services, following its Oct. 5 deal to buy the 850-person professional services business of oil-and-gas contractor Willbros Group. Wiegale has been president of that unit. The \$130-million cash deal is set to close next year.

Terex Corp. has bypassed insiders and turned to outsider **John L. Garrison Jr.** to succeed veteran CEO **Ronald DeFeo** in leading the soon-to-be-expanding equipment company. With the change, to take effect Nov. 2, DeFeo remains executive chairman and becomes a consultant beginning on Jan. 1. Garrison is formerly CEO of the Bell Helicopter unit of Textron Inc. Terex is set to

acquire Konecranes early next year.

**Evelyn Henry Miller** has joined Dallas contractor TDIndustries as chief financial officer. She was in the same role at Agencies of Change, a marketing agency, and had been CFO of The Dallas Morning News from 2002-2009, managing a financial restructuring.

Ohio contractor Kokosing Inc. has elevated **Bryce Burgett** to CEO of its aggregates and asphalt manufacturing units. He is a grandson of firm founder William Burgett.

Penhall Co., a California demolition subcontractor, has named **Lynn Schrier-Behler** as chief financial officer. She had been North American regional CFO for WS Atkins plc and a finance senior vice president at Parsons Corp.

**Grant G. McCullagh** is executive

vice president of Pernix Group Inc. following its June purchase of KBR's building construction unit. It now is called the BE&K Building Group, reverting to its origin as contractor BE&K, bought by KBR in 2008. McCullagh also is group chairman.

#### JUDGMENT

##### FATAL DEMOLITION VERDICT

A PHILADELPHIA JURY on Oct. 19 found a demolition contractor guilty on six counts of involuntary manslaughter in a 2013 wall collapse that killed six and injured 13 at an adjacent store. Griffin Campbell was overseeing removal of the unsupported wall when it collapsed. He had given instructions to demolish it with heavy equipment rather than by hand, prosecutors said. The jury found him not guilty on more serious third-degree murder charges. Campbell has been in jail without bail since his 2013 arrest. Sean Benschop, operator of the excavator used in the demolition, pleaded guilty in July to six counts of involuntary manslaughter and other charges. Both will be sentenced on Jan. 6.

#### LOOKING AT MARKETS

##### MIXED SIGNALS AHEAD

CONSTRUCTION sector analyst Andrew Wittman of Baird Equity Research said in an Oct. 22 note that executives of privately held E&C firms report that “cost restructuring remains endemic, with still lagging end-market challenges, despite improvement in some infrastructure-based markets.” He says resources markets “remain challenged, [but have] not yet bottomed.” Baird's Oct. 13 equipment rental survey says that rental rates, revenue growth and utilization all improved in the third quarter, but that excess inventory could generate lower pricing in the second half of 2015, compared with last year.

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# Texas Glass Contractor Tackles Toughest Projects

Haley-Greer Inc. President Letitia Haley Barker leads one of the Lone Star State's most progressive glazing and curtain wall subcontracting firms **BY SCOTT DAILEY**

**W**HEN LETITIA HALEY BARKER returned to Haley-Greer Inc. in 1995 to become vice president and chief financial officer of her father's Dallas-based glass and curtain wall business, longtime employees grumbled so much that company co-founder Don Haley decided to do something about it. He persuaded Barker, who goes by the nickname "Tish," to sign up for a state glazier's licensing test. Surrounded by staffers secretly betting on how badly she would fail, she pored over the manual, took the exam—and aced it.

The naysaying stopped, and in the following two decades, Barker—who had been the company's first employee before embarking elsewhere on a 15-year career in human resources—has led Haley-Greer to become one of the most admired subcontractors in Texas for its complex glass work. With Don Haley, now semiretired at age 85—he still comes into the office a couple of days a week—Barker runs a company that boasts of its work on such projects as the glass exterior and impressive end zone doors at AT&T Stadium, home of the Dallas Cowboys; the Winspear Opera House in Dallas; the glass work at the George W. Bush Presidential Center on the campus of Southern Methodist University; and an intricate reproduction of the DNA double-helix at the Jan and Dan Duncan Neurological Research Institute at Texas Children's Hospital in Houston.

Asked what it's like to be a woman president running a company in the male-dominated construction industry, Barker essentially brushes the question aside. "You know, it's funny, and I'm just going to speak real candidly about this," she says. "I just never thought of myself as any different from anyone else. And I think that because that's the case, I don't really think it's an issue. When I worked in the HR business, I worked only with men there, too ... I just think I'm one of the guys, or one of the people who do (the job) ... and I think maybe because of that, I'm treated back accordingly."

Later, she adds, "I think that's the face of construction as it is now. I think a woman is just a person that's qualified to do the work."

That rings true with Jason Wroblewski, Haley-Greer's



vice president of project management. "She's one of the smartest women I know," Wroblewski says of Barker. "She's very thorough in her thought process, and she's a great leader."

"She knows and understands the glass business," adds Greg Stringer, senior vice president of Tellepsen Builders in Houston, which has used Haley-Greer on numerous projects. "She is very good at managing the company. She has a long-range focus. She looks way down the road, in anticipation of where the market is going to be. I've always been pretty impressed with her. You never know what you're going to get when an owner—especially a strong owner like Don Haley—decides to become semi-retired. But Tish seems to be real strong. She has good insights into the industry."

Under Barker's stewardship, Haley-Greer weathered the Great Recession, although not without some layoffs. Since then, Barker has been conservative about growth, preferring to chase projects that play to the company's

**THE BOSS**  
Colleagues respect Letitia Haley Barker's thorough understanding of the glass business.

PHOTO BY KEVIN BROWN PHOTO



strengths as a glass installer with expertise in helping to create complex buildings.

One such project is the Treehouse in Houston, an innovative, angular office space whose playful shapes are meant to encourage employees to relax and think creatively. Haley-Greer's work on the building recently won an Excellence in Construction Award from the Houston chapter of the Associated Builders and Contractors. Haley-Greer not only installed the glass, but also collaborated closely with Houston-based architect Micah Simecek of Studio RED Architects to design the building.

Simecek credits Haley-Greer with providing advice that made the Treehouse easier to build. "It was very real-time feedback and real-time involvement in some of (our design) decisions during an early stage of the project," he says. "It was a fast schedule and a very complex project, and I don't think the project would have been as big a success if we didn't have that sort of up-front collaboration with them as a team member."

Teamwork, in fact, is how Barker describes Haley-Greer's market differentiation. Unlike many other glass companies, Haley-Greer doesn't manufacture its own products. Instead, it relies on a small group of partners—chief among them Baker Metal Products of Dallas and Accura Systems of Sunnyvale, Texas—to provide curtain wall systems and other finished components.

"We choose very high-end suppliers that have big engineering departments that we work with in order to design these special buildings that are one of a kind," Barker says. "It requires a lot of work, but we only team with the very best people in order to be able to do this. Most of our competitors—they'll go and buy the components and then go back to their shop and engineer it and put it together. But we take the expertise of multiple engineering groups and these very specialized firms, and as partners we put these (projects) together."

Haley-Greer's approach means the company doesn't land every project it bids on. "We don't always get hired to do the jobs that aren't that hard," Barker says. "We're not always that competitive on those things that are simple. But I think (contractors) look to us for those difficult things because they know we'll do everything that's required to get it done."

Stringer of Tellepsen Builders gives Haley-Greer high



marks for its approach. "They're probably the best glass sub by far for preconstruction and estimating," he says, adding that Haley-Greer's installation crews are "very good as well."

Stringer also appreciates the company's skill at problem-solving. "They're one of our preferred subs because they don't go out and start arguing and fighting and pointing fingers trying to (assign) blame. They just get in there, roll up their sleeves and work with us to resolve the issues."

Although Haley-Greer has worked outside Texas and once staffed an office in Washington, D.C., Barker says the company's focus will continue to be the Lone Star State—primarily Dallas, Houston, Austin and Corpus Christi. The company maintains a branch office in Houston, where in addition to the Treehouse and the Texas Children's Hospital double-helix, Haley-Greer installed the glass for the former headquarters of Enron (Chevron purchased the building in 2011).

Barker offers guarded optimism for the work prospects in Texas. "As we look to 2016, there's a lot of work out there," she says. "We think it's going to be great, but on the other side, you read The New York Times, and they

**KNOWN FOR KNOWLEDGE**  
Haley-Greer has contributed its expertise to innovative buildings throughout Texas, including (clockwise, from left) the Treehouse in Houston, AT&T Stadium in Arlington and One Victory Park in Dallas.

**WINDOW INTO A  
PRESIDENCY**

Haley-Greer performed the glass work for the George W. Bush Presidential Center in Dallas.



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say they think 2016 is going to go back down again. We're hoping that's not the case .... The good thing about it, for us, being in Texas, a lot of people are moving into the area and there are a lot of businesses in the area. That creates the need for places to have all these people work."

One thing that will keep Barker busy through June 2016 is her new job as president of the American Subcontractors Association.

"It's an organization that I'm passionate about," she says. "I think they do such a great job of preparing subcontractors of all sizes to do better work and to have a better business and be more successful. And if they're more successful, then I always tell the general contractors, "That means that your job is going to be more profitable, it's going to be done more timely and those people are going to be able to reach your vision." ■

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# Ten Minutes With Lifting Leader Jennifer Gabel

New Jersey crane business owner talks about risk, generational changes and future directions for the industry **BY TUDOR VAN HAMPTON**

**JENNIFER GABEL** owns Kenvil, N.J.-based JK Crane.



**A**s a new generation of professionals enters the construction industry, the crane-rental business has a new face: Jennifer Gabel. In September, ENR sat down with the owner of Kenvil, N.J.-based JK Crane. Although in her early 30s, Gabel is no stranger to the crane, rigging and heavy-haul business.

Her father is James Lomma, owner of New York Crane and Equipment Corp. During the interview, Gabel discussed her thoughts on high-risk crane work and her relationship with Lomma, who is appealing a \$96-million civil judgment against him related to a 2008 crane collapse on Manhattan's Upper East Side.

Gabel talked about the incredible risks of the crane business, the challenges of being a female company owner in a field dominated by men and why she decided to start up a blog for young working women that she calls "Hauling in Heels," which you can visit at [www.haulinginheels.com](http://www.haulinginheels.com).

**ENR: How did you get hooked on cranes?**

Gabel: I sort of grew up in it. Everybody used to be excited about the new Barbie that was coming out; I used to be excited about the new Hess truck. My interests were different, and I always liked building things. I was fascinated growing up and seeing what my dad did. When I was old enough to start working, I started spending summers working at his office.

**ENR: Are you an engineer?**

No. I was working for the summers for my dad from the time I was 13 to about 19. By then, I was in college. My friends were starting to get internships, and they were getting paid. My dad would pay for my gas, and I was living at home, so he was feeding me. But I wanted more responsibility, and I was frustrated because he was giving me a lot of office work and not a lot of real, hands-on work. My dad wasn't necessarily seeing my potential. In fairness, I never really gave him that insight into me. So, I stopped working for my dad and interned at a company on Wall Street—I was a finance major—I thought maybe I would be a stockbroker. But—this sounds so flippant—all they did was make money. Buy low, sell high. I wanted something where there was a product. Money alone just doesn't drive me. I started interviewing from scratch after I graduated from college, and I found Coty, which is a beauty company. I worked my way up there for eight-and-a-half years. But my dad was bringing me into things more, maybe to gauge whether my interest was to succeed him.

**ENR: Have you ever had that conversation with your dad?**



Since then, yes. But at the time, I think he was nervous because I was having a very successful career at Coty. Finally, I said to him, “Dad, do you want me to be involved?” And he said, “I don’t want to tell you to quit your job, but if this is something that you want, I think now is the best time.” I had always had this goal of running my own company, but I didn’t want to work for my dad. So I started saving to buy out as much interest that I could afford in this smaller company that he had bought a few years earlier.

**ENR: Why didn’t you want to work for your dad?**

When I worked for him, it was hard, at times, for me to reconcile my dad as my boss. I also needed to feel like something was my own. I admire so much about him, but our styles are so different. So I think it’s a better way for our relationship, because now when I talk to him, it’s more collaborative.

**ENR: The crane business is risky. What is your appetite for risk?**

A lot of the accidents that have happened across the country have probably made some people afraid of becoming too big, because the bigger a company gets, the greater it becomes a target. For me, risk is inherent in this industry because of the type of equipment that we are working with and the type of work we are doing. I’ve always been a risk taker and comfortable with risk. That being said, I don’t have desires to be the biggest and the best. I’d rather have the best customer service or the best operators or be the best company to work for.

**ENR: As a business owner, is there any lesson to be learned from your dad’s experiences?**

This industry has learned a lot of hard lessons. The efficiencies of technology and how people use e-mails to make records of things, that is something that is highly corporate and still less done in construction. A lot of things are still done verbally. I think a lot of owners now feel as though they should get things documented more carefully to protect themselves. Naturally, technology makes most industries more efficient, but it also serves as a record. So much of construction is done on site, and many people in our industry still don’t have e-mail addresses or smartphones—things that other people take for granted. There is a learning curve right now in the industry in how to balance the everyday jobsite decisions and making sure you have created a record that protects you.

**ENR: So, in your dad’s situation, if he had a more robust paper trail, you think he would have been better protected?**

I can’t really say. Because it is still ongoing, it would be inappropriate for me to do that.

**ENR: OK, let’s talk about your blog. What prompted you to start up *Hauling in Heels*?**

I’m a member of the SC&RA—Specialized Carriers

& Rigging Association—and they had approached me to be a part of a communications advisory board. The concept behind it is: How can we get younger generations engaged in this industry? We talk a lot about social media. So I thought, here I am leaving this job I’ve had since college and starting this new adventure. And I felt like I was going to be so disconnected from my friends and everybody I had worked with.

**ENR: When was this?**

This was March 2014; my first blog was about going to CONEXPO. I wanted to engage my friends and stay in touch with them. I also thought it would be cool—because I have a daughter—to keep a diary for her so she could learn about this time in my life. And for other people, too. The feedback I have gotten has been really nice, and I’ve had so many young women reach out to me—some of their dads run construction businesses, too—and say they are inspired to pursue that dream of taking over one day. So that has been really rewarding.

**ENR: One of my favorite sections of your blog is called *That Happened*. Define “that.”**

This is going to sound like a generational exchange, but it’s when someone says, “Did that seriously just happen?” And you say, “Yeah, that just happened.” It’s when, in the moment, I can’t believe this is happening, but I can find the humor in it.

**ENR: A lot of times, it’s an offensive thing that a man said to you or did to you.**

Yeah, and it’s funny, because it is actually quite edited. I’m careful about it. After all, the blog is not just about me; it’s also about my company.

**ENR: Why do you think the blog is hitting a nerve?**

I came from an industry, the beauty industry, which was more female heavy. Coming into the construction industry, it was a splash of cold water. I went from a corporate, almost politically correct environment, full of a lot of diversity—different genders, sexual orientations and styles—to something that is a lot more homogenous. I hear all the time, “This is what’s always been done, and it’s never going to change.” But it will, and I think it happens as more diversity gets infused into the industry.

**ENR: Do you see the industry changing?**

I see parts of the industry wanting to change. I think that very visionary people are seeing that. In finance, we learn that the strongest portfolios are the most diversified. When you have too much of one thing, there is no balance. In terms of attracting women to construction, I don’t know if anybody has found the way yet in a broader sense. I’ve heard people say their maternity policy is “don’t get pregnant.” Things like that are not good ways to attract women into your company. ■

# New Heavy Lift Designs Emerge at Military Bases

An innovative approach to overhead crane design addresses engineering and construction dilemmas at two key helicopter hangars **BY JENNIFER SEWARD**

## WALL TO WALL

The crane at Fort Carson CAB ASB traverses the hangar's entire 115-ft ceiling span.



**T**wo recent projects for helicopter hangars on U.S. military bases, one in Colorado and one in Kentucky, offer examples of how out-of-the-box thinking about crane design can overcome some big construction obstacles.

It took three years to design and construct a \$750,000, 35-ton overhead bridge crane for the 88,000-sq-ft aircraft maintenance hangar at Fort Carson Army Installation in Colorado Springs.

The project's design-builder, Hensel Phelps of Greeley, Colo., drove the team's vision for the 13th CAB, ASB [Combat Aviation Brigade, Aviation Support Battalion] hangar with the ability to service as many as 14 helicopters in the hangar bay.

The project began in January 2012 and wrapped up at the end of 2014. "It was the most challenging design of my career," says Tony Strobl, CEO of Cincinnati Crane & Hoist, the project's crane contractor.

The job entailed designing a crane that could traverse the hangar's entire 115-ft ceiling span smoothly and evenly, while taking into account the allowable variances in the steel support structure and the integrity of the building—all while working around a 160-ft opening on one side of the hangar. The result is a 350-ton, 115-ft span double girder underhung on one end and top running on the other end.

"With this project being a net-zero facility, there wasn't a lot of extra head room [no wasted volume to heat/cool] in the ceiling," says Hensel Phelps's John Naccarato, area superintendent.

"Custom coping of the trolley beams was performed on the 35-ton crane to allow the MEP systems to be installed at the design elevation above it. The ASB Hangar project performed airfield apron paving concurrent with the installation of the cranes, which required large mobile support cranes to enter the hangar bay

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during installation. Overall, the design build team did a tremendous job,” he adds.

“The load requirement was 3.5 times greater than the typical 10-ton load customary on these types of projects, and the reality of a 35-ton crane was in question for quite some time,” explains design manager Blake Hoskisson, whose firm, Steel LLC of Atlanta, along with Brittingham & Associates of Norcross, Ga., the structural engineer, designed and fabricated structural steel for the crane. Hoskisson is currently the president of SunSteel, Vancouver, Wash., a company bought by Steel LLC.

“The design loads are much higher than we usually encounter on a long span structure, so that proved challenging for the designers. As a result, we had to pay special attention to the preparation of the bottom chord of the truss where the crane underhangs its bottom flange,” Hoskisson says. “We also had to coordinate the truss camber with Cincinnati Crane, as you run the risk of creating too much slope for the crane.”

“Normally, at a 35-ton capacity, you’d be able to support the crane with columns or other structures so that the span of the big opening isn’t so great,” Strobl says. “However, the runway beam the crane is hanging from had to span this whole distance. To have those two elements in combination on a crane of that capacity is something I’ve never seen; we couldn’t find any existing designs that came even close.”

Cincinnati Crane developed an anti-skew system that incorporated photo-eye sensors to ensure the 35-ton crane would travel at the same speed and track true on both sides of the runway even though the wheel-to-surface condition was dramatically different. This addressed the extreme span and the large, allowable deviations of steel sections as well as the possibility of camber changes with wind and snow loading.

“This was a one-of-a-kind solution that required innovative thinking while keeping safety in mind for the soldiers using the crane,” Strobl says. A veteran of the Army National Guard, Strobl employs a number of veterans and reservists who “strive to give the military a piece of cutting edge equipment that’s just right for them.”

### Height Restrictions

In early 2013, while the Fort Carson project was well underway, Steel LLC was pursuing a project to construct a five-ton, 165-ft span crane for an unmanned aerial support hangar at Fort Campbell, Ky.

The already-in-progress hangar featured a tight space, both horizontally and vertically, explains Joe Scappaticci, senior project manager for Walsh Construction’s regional office in Detroit, the project’s general contractor. Hoskisson referred Walsh to Cincinnati Crane and Hoist, thinking the firm’s experience



with the challenging Fort Carson design would come in handy.

“We were limited to 80 inches due to building height restrictions with the flight line at the top and minimum clearance requirements for the aircraft at the bottom,” Hoskisson says.

With a span that long, the crane is typically very deep—and so is the height of the girder. This extremely low-profile design, combined with support and stability issues at that length, presented another difficult crane design.

Cincinnati Crane and its affiliate, Diamond Construction, also of Cincinnati, worked with Walsh Engineering Services of Idaho Falls, Idaho, along with the Steel LLC and Brittingham teams to fit the crane in a too-short envelope. The result is a much-wider-than-conventional box girder design, which increased the weight of the steel girders. The additional weight was spread out along the runway with an innovative end-truck design that dispersed the weight of the crane over several columns. That kept the foundation reactions within the originally designed loading scheme, Strobl says.

Approximately 175 Lejeune torque bolts were field installed as temporary support for the heavy steel elements during construction. This amounted to approximately one bolt every 10 in. on a crane more than half the length of a football field, Strobl says.

“The Lejeune bolts did not produce the connection stiffness necessary to keep the steel support structure within allowable deflection tolerances, so we had to come back with mobile lifting equipment and lift our girder above the positive camber point and then weld the steel plates together to allow the camber to relax to its dead load status,” Strobl adds. “After the weld was applied, we were within design tolerance and good to go for final live-load and dynamic-load testing.”

Design and construction of the \$250,000 Fort Campbell crane was completed in October 2014. ■

**GREEN OPERATION**  
The 14-bay, rotary-wing CAB ASB aircraft operations and maintenance hangar at Fort Carson is targeting net-zero energy and LEED Gold.



# Firms Balance Profits And Employee Well-Being

Study finds that workers report less job-related pain when employers place equal emphasis on productivity and health **BY SCOTT DAILEY**

“Safety first.”

What construction manager doesn't utter those words loudly and clearly just about every day? Trouble is, tradespeople often don't believe them, and perhaps with good reason. Many managers sincerely emphasize the importance of safety, but, consciously or not, they stress even more the imperative of getting the job done and making money on it. The real message isn't lost on workers, who may cut corners or work unsafely to meet daily production targets.

Now comes a study by researchers at Colorado State University that finds workers report less job-related pain when they believe employers place equal emphasis on productivity and employees' safety and well-being. The 10-page article, by lead author Krista Hoffmeister and others, appears in *Applied Ergonomics* and focuses on research conducted at a large manufacturing plant.

Hoffmeister has conducted extensive research in the construction business and has a clear message for construction-company owners.

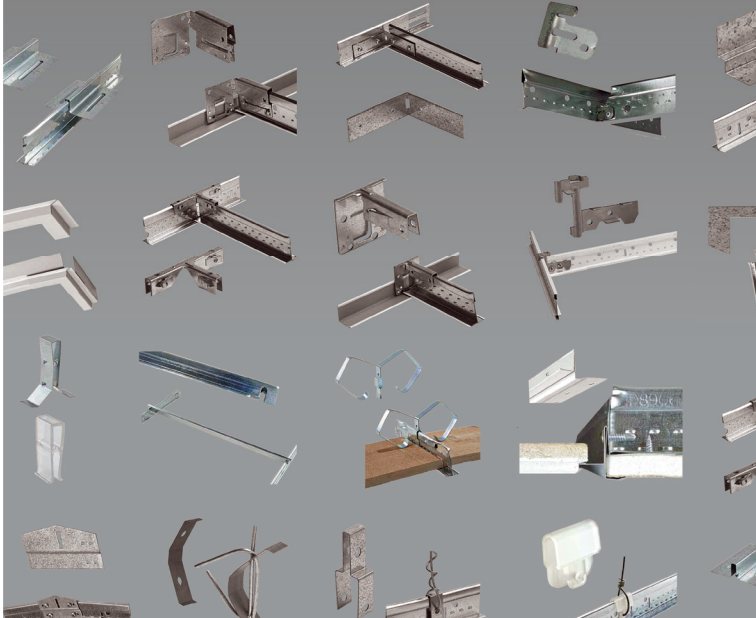
“What it comes down to is communicating an alignment between values,” she says. “When there's an alignment between your values for safety and productivity, you have better safety, better productivity and better

quality than if you were to value one over the other. It gets a little tricky, because it's easy to say that you value both (productivity and safety), but it's harder to behave like you value both.

“I think that the best way to do that is to give ownership and empowerment to your employees,” Hoffmeister says. “In order for employees to think that both safety and productivity are valued, they have to get the idea that the company wants them to behave in a way that maximizes both.

“I think it's a new way to think about things, because companies are always saying, ‘Safety first, safety first, safety first.’ And in reality, safety should be on par with things like productivity and quality. Obviously, your business can't compete if it doesn't have a good quality output and if it's not producing it quickly enough or efficiently enough. And so this idea that (safety, productivity and quality) are all valued equally is a little bit different from what companies are used to.”

Another new idea may be the concept of getting out in front of employees' job-related pain and attending to it before it grows into a workers' compensation claim. Stephen Brown, CEO of Briotix, a Centennial, Colo.-based company that helps organizations improve their ergonomics, says many musculoskeletal problems and



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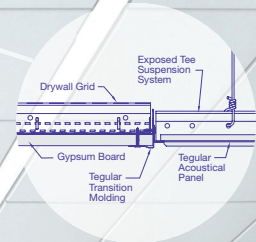
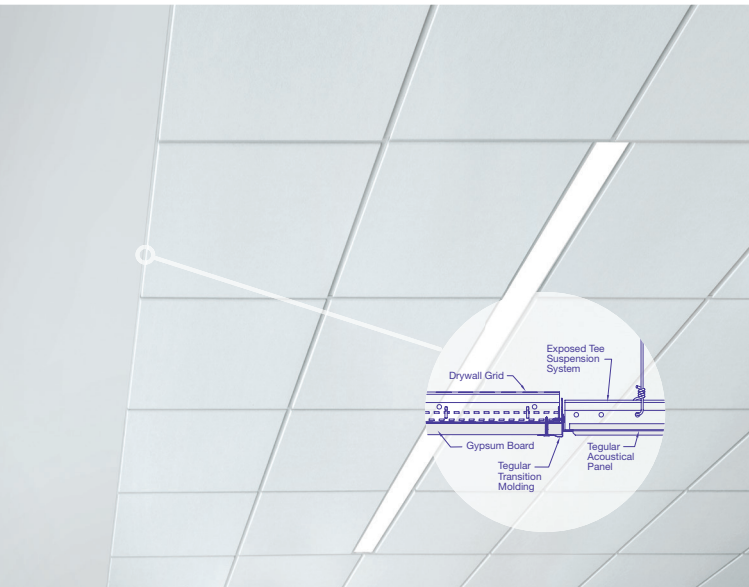
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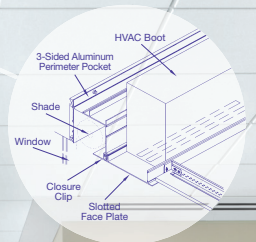
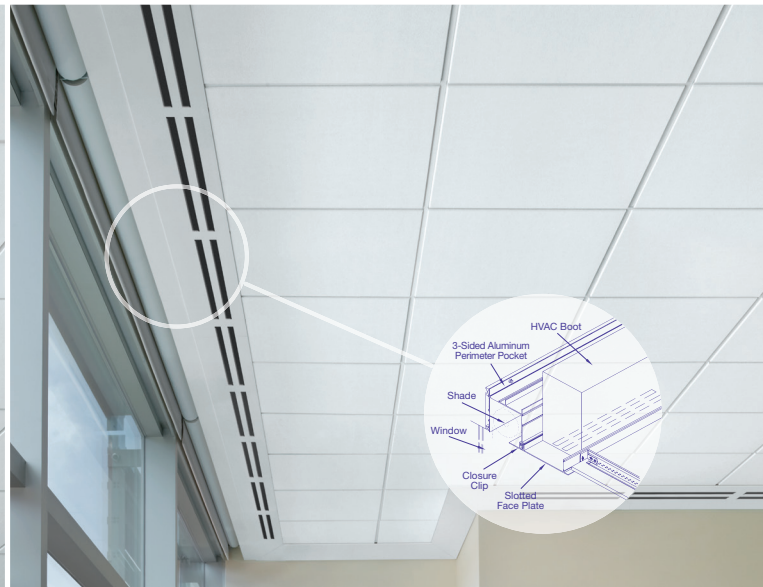


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repetitive motion injuries are preventable or can be identified early and resolved relatively quickly.

Through what Brown describes as “early symptom intervention,” employers can give workers exercises to do or other strategies to alleviate pain. Brown says that, in his company’s experience, workers’ compensation claims or hospitalization have been avoided in 92% of cases in which employees’ pain was addressed early.

Brown emphasizes the need for employers to collect data about workers’ pain and injuries and uses the terms “leading and lagging indicators” to refer to pain symptoms and workers’ compensation claims, respectively. Lagging indicators, he says, can be helpful after the fact in analyzing on-the-job injuries, but leading indicators such as employees’ complaints about pain can offer substantial dividends.

Specifically, Brown says, leading indicators can help employers create risk assessments that can identify situations where employees are feeling pain and determine what’s causing it. For example, if five people in a department of 25 have sore shoulders, “that gives us the opportunity to provide training or look at the equipment they’re using. That’s a better use of our time versus waiting for employees to report a workers’ compensation claim or go out of work for a health care claim.”

How can employers effectively address on-the-job risks? Matt Ogle, safety manager for JE Dunn Construction in Denver, describes a “hierarchy of controls” in which the first choice is to engineer out the risk, the second choice is to use administrative solutions—such as rotating workers through jobs that might create repetitive-motion injuries—and the third choice is to use personal protective equipment such as goggles, gloves, knee pads, etc.

As an example, Craig Halpern, vice president and director of risk control for insurance brokerage firm IMA in Denver, cites installing a plumbing assembly in a cramped space. Knee pads might make the installer more comfortable, but the job still can place him or her in an awkward, strained position for an hour or longer. Better, Halpern says, is prefabricating the assembly on a table while standing, which engineers out the risk. The completed assembly can then simply be plugged in, without having a worker exposed for an extended time in an uncomfortable and potentially injurious position.

Such a strategy may improve quality as well. Halpern, a certified professional ergonomist, says, “There are lot of studies that show a bleed-over effect between (safety and) productivity and quality, because often-times if you’re working in a crouched, constrained position trying to assemble some ductwork or a plumbing

fixture or run electrical, you’re exasperated and fatigued because you’re trying to work in a very awkward position. Not only can that lead to a strain injury, but it can also lead to a construction defect or poor quality, and chances are it’s going to take more time to build that building.”

Halpern also recommends that employers conduct pre-employment physical exams to check for problems that workers may already have, especially with range of motion. Data from the exams can help mitigate a claim if, for example, a worker has a 15% loss of motion following a repetitive-motion injury but had a 5% deficit even before starting the job.

### Pain at the Office

Not all construction jobs are outdoors and require strenuous physical work. Office jobs have ergonomic issues as well, and the Denver-based office of the U.S. General Services Administration (GSA) has a few answers.

As part of its mission for the federal government and the public, including private business, the GSA tests office equipment and offers advice on indoor ergonomics. Recent visitors to the Denver GSA have included the American Institute of Architects, Fentress Architects and furniture manufacturer Steelcase.

Andrew Myers, the Denver GSA’s resident expert on ergonomics, cites what he calls “a new adage”—namely, that “sitting is the new smoking.”

With that in mind, Myers encourages office workers to stay on their feet as much as possible. Meetings, for example, can be conducted in small “huddle rooms,” and height-adjustable desks can be set up for standing as well as sitting.

One new product being evaluated by the Denver GSA is called “The Level.” Created by a company called FluidStance, it looks like a skateboard with a narrow cross-beam underneath and requires people standing on it to shift their weight constantly to stay in balance. The GSA Denver office also offers 2-mph treadmills equipped with screens, so people can walk leisurely while answering emails or doing routine computer work.

With challenges both indoors and out, the construction industry finds itself positioned to address ergonomics across the board. JE Dunn’s Ogle emphasizes the importance of identifying physical work positions before construction begins, of coaching tradespeople about body mechanics and of using the hierarchy of controls to prevent on-the-job injuries.

That advice, along with recent revelations about balancing safety and productivity, may give construction-company owners new strategies to control costs for both workers’ compensation and health care plans. ■

### ENR RISK REVIEW

For information on other risk-related topics, read the **ENR Risk Review Newsletter**.

# Euro Cargo Vans Redefine Your Rolling Workshop

As body-on-frame vans go extinct, contractors are imagining new ways to use the tall roofs and spacious cargo holds of new unibody vans **BY TUDOR VAN HAMPTON**



**ON A ROLL**  
Ford has seen substantial growth in sales of full-size Transit vans since they started moving off the assembly line last year in Kansas City, Mo.

Last December, Leon LaJeunesse decided to shop for a work van for his general contracting business. He figured he'd find plenty of year-end incentives, but he didn't expect to be sorting through an explosion of several new, odd-looking models on dealers' lots.

"I've already got two Econoline vans," says LaJeunesse, referring to Ford's body-on-frame E-Series van that it discontinued last year in favor of the European-style, unibody Ford Transit. "I was looking for a small van—almost a portable gang box for getting in and out of the city."

The president of Lake Zurich, Ill.-based Custom Contracting tested out several smallish vans, including Ford's Transit Connect—a compact version of the larger Transit—before purchasing a 2014 Ram C/V, a midsize hauler based on the Dodge Caravan.

Today, the C/V is no longer available, as Ram replaced it this year with the Fiat-based ProMaster City, a small version of the full-size ProMaster. Still, "I got exactly what I wanted," says LaJeunesse. "A lot of times, there is barely any laydown space for materials, so we've got to be minimal in what we leave on site. We use this as a just-in-time delivery service."

Cargo vans are making a big comeback. Market leader Ford reported in September its busiest month for commercial vans since 1987, selling 17,994 vehicles, an annual increase of 65%—nearly four times stronger than the growth rate of pickup trucks. The uptick is partially due to replacement needs—on average, commercial owners keep their vans for 11 years or more—but the expanding options in models, configurations and capabilities also are boosting sales.

The new influx of Euro-style vans may take some buyers by surprise, with their stubby noses and tall profiles. "In



the van segment, form follows function,” says Dave Sowers, head of Ram’s commercial vehicle marketing. “Everything here starts with capability and efficiency.”

Every day, contractors are finding new ways to use cargo vans to become more productive and profitable. Full-size vans like the Ford Transit, which comes in two wheelbases, three body lengths and three roof heights—with a maximum cargo volume of 487.3 cu ft, maximum payload of 4,560 lb and a starting price of \$32,155—make haulers like bulky, fuel-thirsty box trucks seem less appealing.

“These new vans have revolutionized what businesses can do with them,” says Yaro Hetman, Ford’s van brand manager. “Instead of dragging around on the back of a truck little huts, contractors can set up a workshop and computer in a high-roof van and simply drive from site to site. That’s something you never could have imagined on the old body-on-frame, traditional E-Series.”

For users who still want flexible body options, Ford is still building E-Series cutaways as well as Transits in cutaway and chassis-cab configurations. And although Ford, Mercedes-Benz, Nissan and Ram have all joined the unibody van craze, body-on-frame traditionalists can still turn to General Motors for its Chevrolet Express and GMC Savana full-size vans, which offer best-in-class towing of 10,000 lb.

For many tradespeople, being able to stand up inside a tall work van is a productivity game-changer, not to mention a back-saver.

“Our most popular model is the medium-roof, long-wheelbase Transit,” Hetman explains. “In a medium roof,

you can stand up tall even if you are at 6 feet, which covers the majority of individuals. At the same time, you are getting fuel efficiency that is similar to the low-roof vehicles.” The high-roof Transit allows a person as tall as 6 ft 5 in. to stand up fully without craning his neck.

Manufacturers of today’s full-size vans are not required to report fuel economy estimates, but Hetman says users can expect to see up to 46% better fuel efficiency and 75% more cargo capacity than the discontinued E-Series. For full-size vans equipped with a diesel engine, buyers can expect to see unladen miles per gallon in the low to mid-20s, Sowers notes.

And while towing with a van is sometimes needed, users are finding they can carry more materials and gear in the back without hooking up a trailer.

“Some people will get a tow package just to have it in case they need to tow,” Hetman says. “With the E-Series, you have to tow more to get all your tools to your site, but with Transit’s close to 500 cubic feet of cargo capacity, you can fit most of those tools and not have the fuel economy degradation of having to tow something.” Mercedes-Benz has the most cargo room in the class with a volume of up to 586.1 cu ft.

Models in the compact class are equally impressive in their hauling capacity and efficiency. Highway fuel economy in the mid-to-high 20s is not out of the question, and many can swallow a 4x4x4-ft pallet with room to spare. A mind-numbing array of cargo bins, shelves, racks and bulkheads are available to make the most of an interior.

The increase in storage options has given contractors “an

**TAKING VANS TO TASK**

- Unibody vans are replacing those with body-on-frame construction.
- New full-size vans reach MPG in the high teens to low 20s.
- Compact or midsize vans are more economical for light hauling and towing.

**Commercial Cargo Vans**

MODEL	Max Cargo Volume (cu ft)	Max Payload (lbs.)	Max Towing (lbs.)	Est. Fuel Economy (MPG city/hwy)	Base Price (incl. delivery)
<b>Small</b>					
CHEVROLET CITY EXPRESS	122.7	1,500	—	24/26	\$22,950
FORD TRANSIT CONNECT	128.6	1,620	2,000	21/29	\$23,325
NISSAN NV200	122.7	1,480	—	24/26	\$21,605
RAM PROMASTER CITY	131.7	1,883	2,000	21/29	\$24,240
<b>Midsize</b>					
MERCEDES-BENZ METRIS	186	2,502	4,960	21/24	\$29,815
<b>Full Size</b>					
CHEVROLET EXPRESS/GMC SAVANA	284.4	4,120	10,000	—	\$31,590
FORD TRANSIT	487.3	4,560	7,500	—	\$32,155
MERCEDES-BENZ/FREIGHTLINER SPRINTER	586.1	5,508	7500	—	\$37,490
NISSAN NV	323.1	3,937	9500	—	\$27,735
RAM PROMASTER	463	4,420	5,100	—	\$30,165

SOURCE: MANUFACTURERS

**DECKED OUT**  
A dizzying array of cargo options is available for the new Euro-style vans, such as this full-size Ram ProMaster.



opportunity to really nail down what it is that they want to do,” says Jason Lehman, vice president of sales for Atlanta-based upfitter Leggett & Platt Commercial Vehicle Products. A year ago, the commercial upfitter, which manufactures racks, bins and other cargo organizers, moved into a 72,000-sq-ft ship-through facility in Kansas City, Mo., just down the road from Ford’s van factory.

With upfitting, “your imagination is where it ends,” Hetman says. “We have had 12 upfitters create facilities within 20 miles of our Kansas City plant. Some of them are multimillion-dollar facilities specifically dedicated to upfitting Transits.”

Upfitters are constantly thinking of clever options. “A lot of times, in construction, contractors would utilize a service body on a cab chassis whereas now they can go buy

a vehicle off a dealer lot and have the shelving installed in our location,” Lehman explains. “It’s probably a little less expensive for them than what they have done in the past.”

For contractors needing to haul tools and supplies, the new vans accept a wide variety of materials for cargo bins, such as steel, aluminum, wire and composites as well as ladder roof racks. Some users are even putting stepladders inside the van simply because more space is available.

“Instead of putting roof racks on the roof, a lot of contractors and tradespeople can put the rack inside, which [produces] almost a 30% decrease in fuel consumption,” Hetman says. “Some people still prefer to have the ladder on top, but we’ve definitely seen a shift.” Super-long extension ladders may still need to go topside, however.

Even more cargo van options are on the way. Within the small-van class, which includes the Ford Transit Connect, Ram ProMaster City, Nissan NV200 and its twin, the Chevrolet City Express, a new midsize model is joining the fray: the Mercedes Metris. On sale since October, the van, which can haul up to 2,500 lb in the back and is priced at just under \$30,000—making it the lowest-cost Mercedes vehicle in the U.S.—fills a void that Ram left wide open when it discontinued the C/V this year.

LaJeunesse says he wasn’t too happy about that move, but he plans to keep his C/V van busy for years to come. ■

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LOCATION: Raleigh, NC  
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ARCHITECT: Clark Nexsen Architecture (Raleigh)  
INSTALLER: Sears Contract, Inc.  
GC: Skanska (Durham)

# Component Design Moves Beyond Standard Prefab

Prefabrication is creating next-generation change in the fast, efficient delivery of complex buildings **BY STEPHEN A. JONES**

**R**ecent growth in the use of BIM and model-based processes has spawned an enormous increase in offsite and near-site prefabrication, a trend that could be transformative for the construction industry.

According to a new SmartMarket report published by Dodge Data & Analytics, general contractors are reporting extensive use of model-driven prefabrication. Research in the report shows that:

- 78% of contractors report its use for mechanical and plumbing systems.
- 60% report its use for structural steel and for hangers.
- 43% report its use for electrical, data and communications systems.

Industry leaders, such as DPR Construction, hold prefab brainstorming sessions early in projects where, instead of identifying which elements can be prefabricated, they challenge the entire project team to justify why any element can't be prefabricated for greater efficiency, lower cost and improved safety.

Driving this growth is the fact that we can now work directly with data from models that accurately and centrally describe the physical and functional characteristics of a project rather than being limited to manual interpretation of drawings and specs by multiple, disconnected parties. Other large industries that create complex capital assets—like aerospace, automotive and shipbuilding—have changed dramatically over the past 20 years because of similar evolutions, and construction is now poised for a far-reaching transformation in how projects are designed and put in place.

## A Perfect Storm

Phil Bernstein, vice president for Strategic Industry Relations at Autodesk, describes a perfect storm of factors that will drive this change, which in addition to modeling for design, constructibility and prefabrication, includes:



**GOING UP**  
A 30-story hotel in China, completed by BROAD Sustainable Buildings in only 15 days, is shown in a time-lapse video at hour 317 of the process.

- Technologies that increasingly bridge the virtual and real worlds such as laser scanning, augmented reality and 3D printing.
- Digital manufacturing, aka “mass customization,” which allows small quantities of high-quality, precision components and assemblies to be produced on demand.
- Reduction in our skilled workforce, which will accelerate robotics and other forms of mechanized assembly to put these manufactured elements efficiently in place.

Several innovative companies are currently at work on advanced approaches to design, fabrication and onsite assembly. Those include:

- **Project Frog** (for Flexible Response to Ongoing Growth). It grew out of an awareness that too many children attend school in “portables” that were originally intended to be temporary but are now becoming permanent due to the costs and time required to build new facilities.

The multidisciplinary team has created a standard set of elements that can be combined in almost unlim-



**Stephen A. Jones**  
Senior Director,  
Industry Insights  
Research, Dodge  
Data & Analytics



**ASSEMBLY LINE**

The BROAD Sustainable Buildings factory is where its components are manufactured.



**SCHOOLHOUSE**

This two-story classroom building was configured with Project Frog components.



**HEALTH CARE MODULES**

The competition-winning design for a small hospital for Kaiser Permanente was configured from the Aditazz library of components.

ited iterations to create well-designed schools that are less expensive and faster to put in place, and which can also often be green. For example, Project Frog has put in place an energy-neutral new school in Connecticut.

The company has expanded its scope in recent years to apply a component-based approach to design and construction on other building types, including health care and data centers. The images show a completed school facility and a manufactured component used in the mechanical system for data centers.

- **Aditazz** (Sanskrit for “from the beginning”). This firm represents a great mash-up of talent and expertise from the architecture and construction industry, with innovation and fast-paced development skills from Silicon Valley computer microchip manufacturing. The venture-backed company initially focused specifically on the health care industry with a full-service approach to design for manufacturing on the digital Aditazz Realization Platform.

Beginning with early operational programming to define how a facility should function and support the medical care workflows it will house, the Aditazz team virtually configures an optimized design using its library of standard components, which it can manufacture in its production facilities. This end-to-end integration on the Aditazz Realization Platform allows high-quality facilities to be completed faster and at less cost, and deeply engages future users in the process.

Aditazz is also expanding its focus to more types of facilities, including schools, high-rises and commercial office buildings. A prototype hospital that won a competition sponsored by Kaiser Permanente had a number of Aditazz components in place.

- **BROAD Sustainable Buildings** This Chinese company grew from being an air-conditioning manufacturer to become the global leader in deploying manufactured components to create large buildings at incredible speeds. The company developed a steel structural system that can withstand a Richter 9 earthquake, but it was not garnering the industry attention company leaders had hoped for until it leveraged another advantage of its system—the speed at which components can be erected.

In 2010, BROAD began a series of projects in China that highlighted this advantage. The first involved building the 15-story Ark Hotel in just 48 hours. In 2011, BR finished a six-story dormitory in five days (from slab on grade) and a 30-story hotel in just 15 days (from the foundation), complete and ready for occupancy by guests. The company claims this hotel was done for less than \$1,000 per square meter.

In addition to speed of delivery and seismic resistance, the company claims that the facility has exceptional thermal performance, featuring quadruple glazed windows, and through extensive filtration provides guests with air that is nine times purer than the typical outside air. A time-lapse video of this project (known as T30) is available on YouTube. It has been viewed more than 5 million times.

Several more large projects have been completed at lightning speed, with the most recent being a 57-story, mixed-use facility done in February 2015 in just 19 days (not including four days when work was halted for rain). The company says 95% of the building was prefabricated in its factory, and 1,200 workers completed the assembly in the field, progressing at an average speed of three floors per day.

Xiao Changgen, vice general manager of The BROAD Group, says, “With traditional construction methods, the building would have taken two years to complete. The company also contends that 90% of the building can be recycled at the end of its life because it uses much less concrete than typical buildings. Still in the works by BROAD Sustainable Buildings is the 220-floor Sky City in Changsua. The goal is to complete the project in 90 days from the completed foundation, but government approvals have snagged the process.

**Future of Component-Based Construction**

Other trends will also accelerate a shift toward the efficiency and speed of component-based buildings. One is the relentless growth of cities. According to the United Nations, the world can expect to add close to 1.5 billion urbanites in the next 15 years, and 3 billion

**\$1K**  
Per square meter: BROAD Group's cost to build a 30-story hotel in China in just 15 days.

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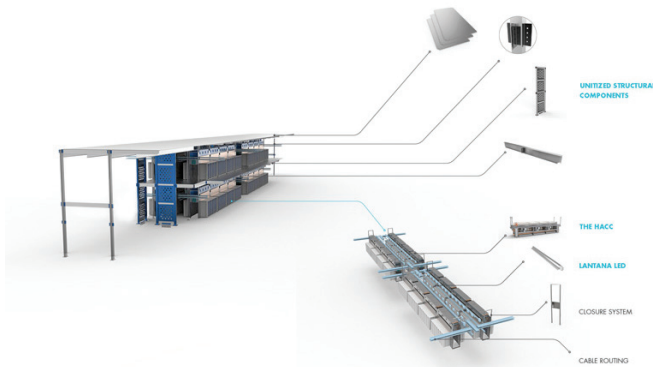
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These HVAC system pieces were created by Project Frog.

by 2050. The buildings required to support this influx will by necessity be taller. To that point, Dan McQuade, group president of AECOM Construction Services, says of the five tallest buildings undertaken by the firm's New York City-based Tishman Construction division, four are under construction right now.

And they won't be anonymous boxes. As Autodesk's Bernstein says, "Design will be as important—if not more so—in the age of mass customization and increasingly sophisticated consumer demand." So the buildings are likely to be highly detailed, with irregular shapes and facades composed of multiple materials, with stringent sustainability

and energy-performance requirements.

Since no one expects cost and schedule pressures to do anything but increase, the successful future for contractors will mean adopting emerging technology-driven processes such as a design-for-manufacture approach to putting up component-based buildings. Bernstein believes that short-run, high-quality digital manufacturing of ever-more complex parts of buildings on demand will become standard practice in this environment. "When a computer is driving the making of a building part," he says, "it doesn't care if you change that part for each customer. That means the same computer-controlled building assembler will make what you want for no additional cost."

As construction sites become assembly sites and more work shifts to factory settings, all the familiar aspects of estimating, procurement scheduling, logistics planning and productivity management will be turned on their heads. New players will enter the arena, non-traditional alliances will be formed, education and training will adapt to provide the right kinds of workers, and new types of agreements will be developed to support this next-generation way of delivering projects. It's a promising future for those companies willing to embrace transformational change. ■

IMAGE COURTESY OF PROJECT FROG

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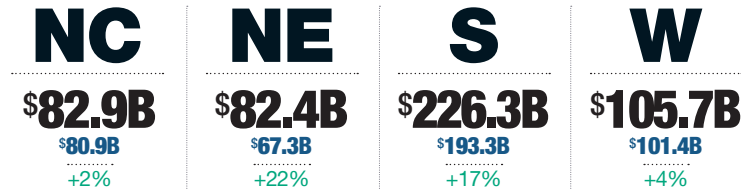
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# The Numbers

A compilation of key data from targeted segments of the industry

## REGIONAL FOCUS Where Is the Growth in Construction Starts?



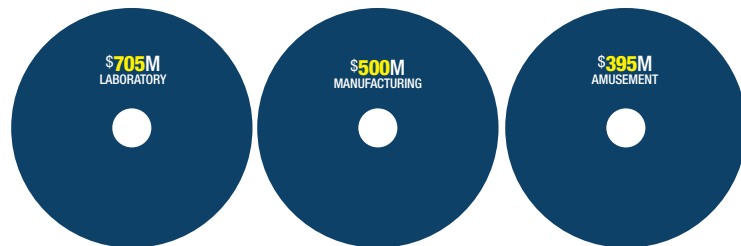
■ Q1 2015 ■ Q1 2014

## NORTH CENTRAL SPOTLIGHT Top Metro Areas for 2015 Q2 (\$ Mil.)

METROPOLITAN AREA	NON-RESIDENTIAL	RESIDENTIAL	NON-BUILDING	ANNUAL
Chicago, IL-IN-WI	\$999	\$969	\$839	\$2,807
Kansas City, MO-KS	\$192	\$898	\$414	\$1,503
Minneapolis-St. Paul, MN-WI	\$212	\$315	\$556	\$1,082
St. Louis, MO-IL	\$184	\$477	\$406	\$1,068
Detroit, MI	\$246	\$330	\$304	\$880
Columbus, OH	\$285	\$278	\$285	\$848
Indianapolis, IN	\$90	\$179	\$448	\$717
Cleveland, OH	\$328	\$144	\$184	\$656
Cincinnati, OH-KY-IN	\$61	\$270	\$173	\$504
Milwaukee, WI	\$90	\$131	\$153	\$374

SOURCE: DODGE DATA & ANALYTICS

## TOP NORTH CENTRAL OWNERS Commercial Construction in Q2 2015



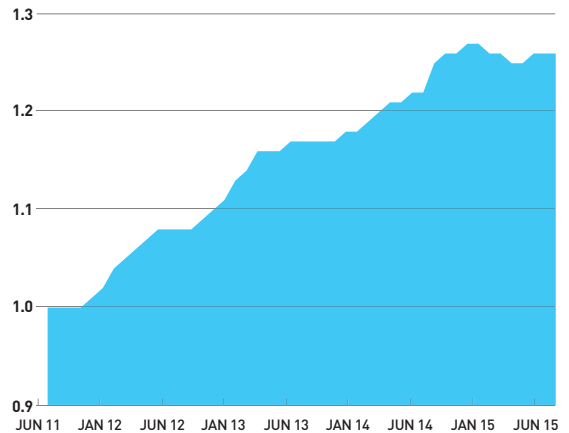
Dept. of Homeland Security

Dakota Gasification Co.

Olympia Entertainment Inc.

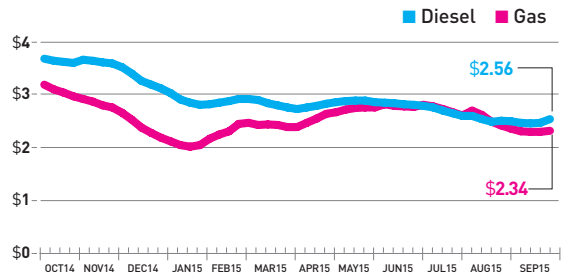
SOURCE: DODGE DATA & ANALYTICS

## EQUIPMENT RENTAL RATES: Flat in 2015 Q2 (Rental Rates Relative to January 2011)



SOURCE: ROUSE ANALYTICS; ROUSE RATE INDEX, ALL CATEGORIES

## FUEL PRICES What Am I Paying at the Pump?

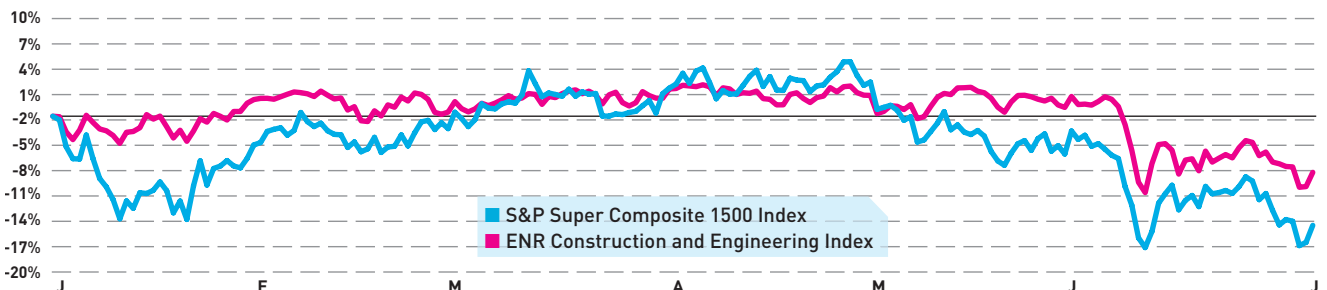


SOURCE: U.S. ENERGY INFORMATION ADMINISTRATION. WEEKLY RETAIL PRICES FOR REGULAR GASOLINE AND ON-HIGHWAY DIESEL

## DRILLING DOWN: THE NORTH

Dodge Data & Analytics reports the North Central region of the U.S. is holding steady with a 2% increase in total construction starts value through the first three quarters of 2015. Additionally, Ohio, Kansas and Missouri enjoyed double-digit increases. However, muted growth for the region was influenced by Illinois, Michigan and Minnesota—all of which saw deceleration from the growth levels they achieved in 2014.

## ENR CONSTRUCTION STOCK INDEX How Are Construction Stocks Performing?



SOURCE: S&P CAPITAL IQ

# Drones Taking Flight Despite Uncertain Regs



BY LAURA E. VLIEG

FOR DECADES NOW, the word “drones” has evoked a militaristic image of pilotless aircraft, but the technology of unmanned flight has evolved and adapted to meet civilian needs. Drone technology

is now available at prices that make it affordable and lucrative to operate, and contractors are increasingly relying on it as a resource to produce results in all phases of construction.

These small, nimble aircraft can be used to increase productivity on the jobsite. Their capacity for capturing video, photography, thermal imaging and Lidar makes drones useful for surveying potential sites, creating 2D and 3D mapping and imaging, inspecting infrastructure and building facades and monitoring progress, quality concerns and work hazards.

However, drones fit within the legal definition of aircraft, which means they are subject to Federal Aviation Administration regulations. Unfortunately, regulations specific to drones, or unmanned aircraft systems (UAS), as the FAA calls them, do not yet exist. Congress included a mandate in the FAA Modernization and Reauthorization Act for the development of a regulatory structure to integrate drones into national airspace, but the FAA has been slow to develop those regulations.

In February, the FAA took the first step by releasing the highly anticipated Notice of Proposed Rulemaking called, “Operation and Certification of Small Unmanned Aircraft Systems.” Those systems are defined as drones that weigh less than 55 lb. The public comment period ended in April. More than 4,500 comments were submitted, and now the agency is reviewing them.

In the meantime, the only way to obtain permission to operate drones commercially is through an exemption. The drone operator must submit a petition for exemption from FAA regulations that would otherwise prohibit the operation.

Seeking an exemption was initially a lengthy and unpredictable process, requiring a considerable industry and agency resources. This past spring, however, the agency streamlined the process.

Now, upon receipt of a petition for exemption, the FAA will automatically grant a blanket certificate of

waiver, or authorization, (COA) for flights at or below 200 ft if the aircraft weighs less than 55 lb and operations occur during daytime visual-flight rules conditions and stay a certain distance from airports. After receiving the blanket COA, operators who want to fly outside those parameters are then eligible to apply for a separate COA specific to their operations.

The ability to seize economic opportunities afforded by advancing drone technology will be largely determined by compliance costs related to the FAA’s eventual regulatory framework as well as potential liability under state laws. According to the National Conference of State Legislatures, in 2015 alone, state legislatures in 45 states have deliberated 164 different bills related to drones. Of those, 25 have become law across 19 states.

Plainly, there are hurdles to clear before contractors can more easily fly drones over construction sites, but so far those hurdles have not proved insurmountable to individuals and companies purchasing and operating drones.

To date, more than 1,700 FAA exemptions have been granted, with more than 150 of those specifically mentioning construction as an intended purpose of the drone operations.

Furthermore, there is anecdotal evidence that many individuals and companies are operating drones without government approval. This is a dangerous path to take, as evidenced by the FAA’s proposed \$1.9-million fine on Oct. 6 against a company that allegedly conducted 65 unauthorized commercial drone flights.

While the legal implications of commercially operating drones are still murky, the industry growth potential is undeniable. One indicator of market strength lies in investment data. CB Insights reports that \$108 million was invested in the UAS industry in 2014 alone.

Additionally, the Association for Unmanned Vehicle Systems International estimates that between 2015 and 2025, the cumulative economic impact of integrating drones into the NAS will be upward of \$82 billion—creating more than 100,000 jobs and boosting \$482 million in tax revenue to the states.

While these figures are speculative and will depend largely on the impact of federal regulations, the message is clear—the drone industry is ready to take flight. Are you? ■

**‘There is anecdotal evidence that many individuals and companies are operating drones without government approval.’**

**Laura E. Vlieg** is an associate of Obadal, Filler, MacLeod & Klein PLC. She advises clients in international aviation safety regulation and government affairs.

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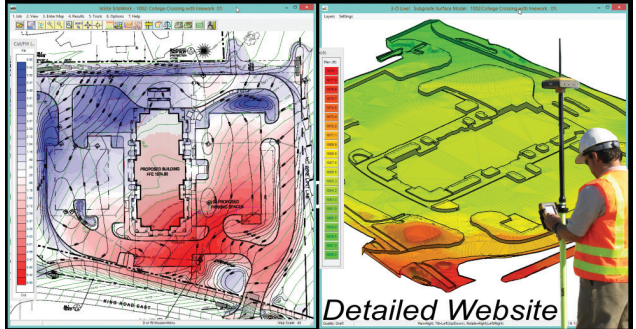
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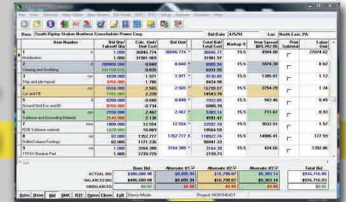
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