DECEMBER 2019 | CONSTRUCTIONBUSINESSOWNER.COM

CONSTRUCTION BUSINESS OWNER®

THE LEADING BUSINESS MAGAZINE FOR CONTRACTORS



THE CONSTRUCTION TECHNOLOGIST

What is it & why do I need one?

Correcting concrete form face defects

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IN THE OFFICE
A contractor's guide to getting paid on time

IN THE FIELD
The major dangers that plague your jobsites & how to avoid them

Image courtesy of Winter Construction

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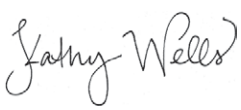
I'd like to begin this month's letter by thanking you, the reader. There's always something about the end of another year that helps us reflect on and recognize what we're grateful for, what brings us joy, and what we're prepared to change for the year ahead. I can say for certain that we are thankful for you. You are what brings us to work every day and keeps us asking questions and seeking answers. We have great respect for what you do, and we hope you find value in what we put forth in these pages and on constructionbusinessowner.com every month.

This year, we have been fortunate enough to encounter some of the best contractors in the United States, and they have been kind enough to share with us their stories, their stresses and their successes. What did you think? Did you find them helpful? Do you see yourself in our pages? Is there something we haven't covered? Our editors are eager to hear your feedback and suggestions. Email me at kwells@cahabamedia.com to tell us what you think about our content, and share your views and comments (both positive and negative). We'd love to hear from you!

In 2020, we'll be making some changes to the CBO you know. While our content will remain as strong as ever, we'll be adding to the count with even more special sections highlighting the hardworking individuals who run this industry. There are so many construction business owners who are getting it right, and it's our goal to find them and learn from them. In January, we'll launch a new website, which has been rebuilt and redesigned to optimize the visitor experience and give you more of what you've asked for. And we're finalizing the details on a digital conference later in the year that will bring CBO subscribers together in a way that will boost your business acumen and help you grow as a business owner.

I think it's safe to say we're all interested to see where the U.S. economy will be headed over the next few years. For more direction on that topic, look for our January 2020 issue, where we'll be checking in with some of the industry's top economists, technology experts and legislative authorities in our annual State of the Industry series.

Take good care,



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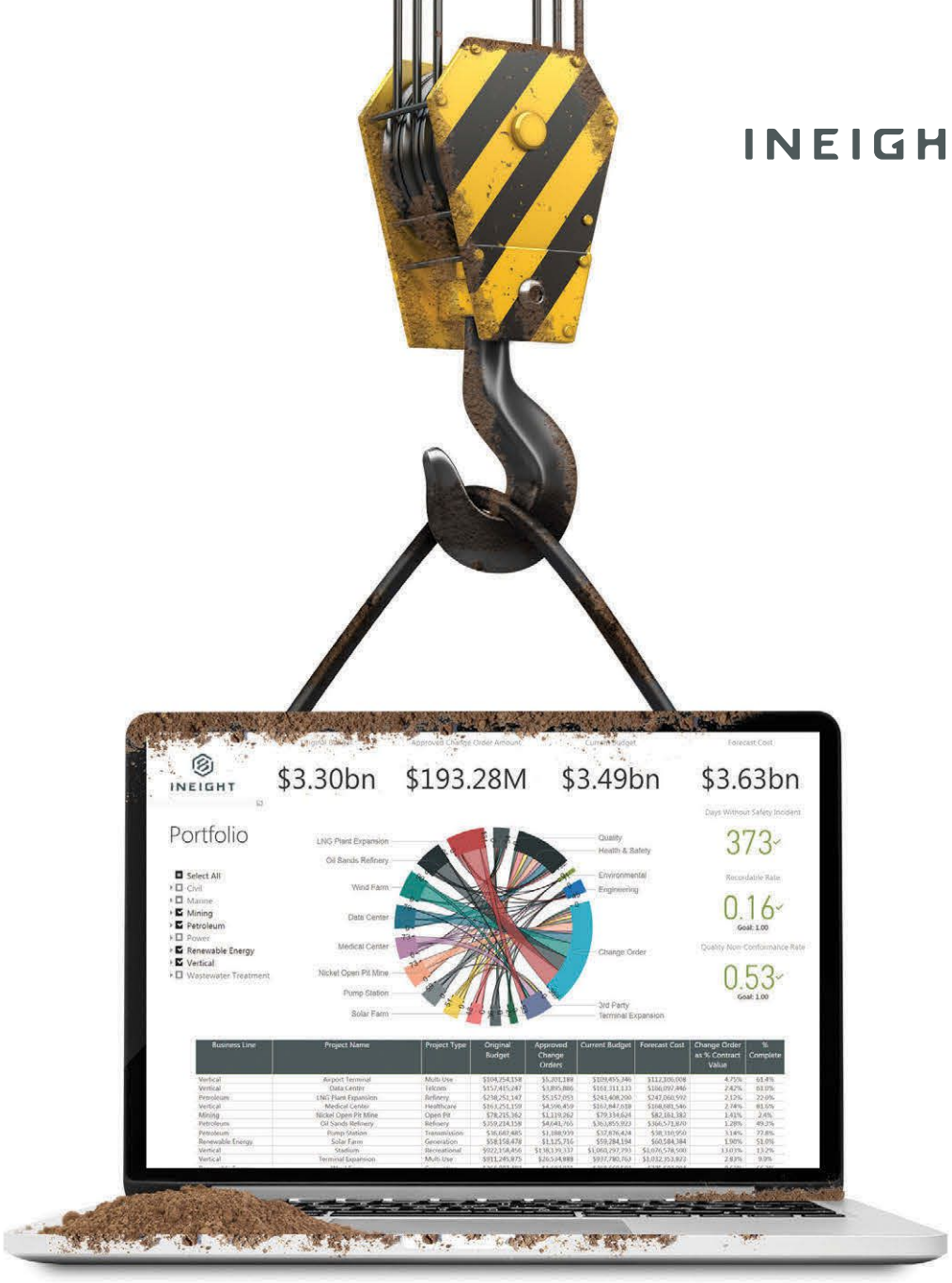

A NEW WAY TO BUILD

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Dodge Data & Analytics Releases 2020 Forecast

Dodge Data & Analytics has released its 2020 Construction Outlook, which calls for a slowing economy but no recession. The outlook references the skilled labor shortage and trade wars as two of the main drivers behind a slight downturn in construction starts. As far as industry segments go: Commercial starts will decrease 6% in 2020, with warehouses and hotels seeing the biggest drop. Retail and office construction will also decline, but data center construction will help buoy office builds. Residential single-family housing starts will fall 3% in 2020. Multifamily housing starts will drop 13%. Public works starts will increase 4% in 2020, mostly due to federal appropriations. Dodge cites continuing trade tensions as the main cause for a 2% manufacturing decline in 2020 after a sizeable decline of 29% in 2019. Institutional construction starts in this segment are not projected to change much. Dodge predicts small increases in education and medical starts, to be offset by decreased dollars in recreational and transportation builds. After a strong year of growth in 2019 (83%), electric utilities and gas starts are forecasted to drop 27%. Visit construction.com.

Rosendin Announces CIO



Matt Lamb

Rosendin, an electrical contracting firm, has announced Matt Lamb as its chief information officer (CIO). Lamb will oversee the entire information system organization, including client services and application teams. Among his priorities will be completing the migration of the corporate infrastructure to the cloud and developing mobile apps. Lamb was handpicked by Rosendin's previous CIO, Sam Lamonica. "I am thrilled to help Rosendin move into the future by developing new ways to take innovative designs, like augmented reality, and make them functional to help our men and women in the field be safer and more productive," said Lamb, who started at Rosendin in 2015 as a senior business system analyst. Prior to that, he served as a project manager in internal technologies and project engineer at Webcor Builders. Lamb holds a bachelor's degree in history from the University of Arizona. Visit rosendin.com.

Fluor Corporation Project Named Finalist for S&P Global Platts's 'Construction Project of the Year'

Fluor Corporation has announced that the Dow Poly 6 project has been named a finalist for "Construction Project of the Year" for the S&P Global Platts Global Energy Awards. The grassroots Poly 6 project is the latest addition to Dow's Freeport, Texas, site, which is the largest integrated chemical manufacturing complex in the Western Hemisphere. Fluor provided mechanical construction for the complex's new manufacturing unit, designed to produce high-melt-index polymers. With 600-plus Fluor craft and subcontractors performing the mechanical construction, the project team set industry benchmarks for safety, quality and production, including 4 straight months of 10% progress or greater. The project was completed in 2018. Visit fluor.com.

Southland Industries Executive Receives LCI Pioneer Award



Victor Sanvido

The Lean Construction Institute (LCI) recognized Victor Sanvido for his outstanding service to the construction industry and the lean community by honoring him with the Pioneer Award at LCI's 21st Annual Congress. Currently serving as senior vice president at Southland Industries, Sanvido has been a dedicated advocate of lean techniques for over 20 years. With a Ph.D. in civil engineering and extensive studies in project delivery, Sanvido has played an integral role in the development of not only lean processes and alternate delivery models, but also in the identification and refinement of behaviors within the design and construction industry. Previously, he served as professor in the Architectural Engineering Department at Pennsylvania State University, where he conducted research in the areas of alternative project delivery systems and critical project success factors. "Sanvido has made LCI a much stronger and more influential organization than we otherwise would have been, and he has impacted our industry for the better by helping project teams coast to coast to see and eliminate waste and enhance value for the owners they serve," said Dan Heinemeier, executive director, LCI. Visit leanconstruction.org.

Takeuchi Breaks Ground on New Training Center

Takeuchi-US, a compact equipment manufacturer, has broken ground on a new training facility set to open spring 2020. The center will allow dealers from North America and around the globe to gain knowledge about Takeuchi products and offer year-round service training. The expansion from its current training environment will include a new 37,500-square-foot building on 9.45 acres. It will feature two dedicated service training classrooms and workshop areas, workspace for the training department, two flex-space training rooms, two flex-space meeting rooms, a cafeteria and a kitchen area that can hold 90 people, and a 7,500-square-foot covered demo area. "This signifies the growth of Takeuchi and all that we have accomplished thus far with our training efforts," said Jeff Stewart vice president/general manager at Takeuchi-US. "By building this new training center, it allows us to invest in our community and bring more jobs and opportunities to Jackson County." Visit takeuchi-us.com.

Equipment Manufacturers Call on Governments to Negotiate on Trade

The Association of Equipment Manufacturers (AEM) and the Committee for European Construction Equipment (CECE) released a joint statement calling on American and European government leaders to negotiate towards a friendlier trade environment. After the recent World Trade Organization ruling on Airbus, the United States announced tariffs on $7.5 million of European goods, including certain types of construction equipment, and the European Union may do the same. "Equipment manufacturers in the U.S. are proud to stand with our European partners in calling on U.S. and EU policymakers to reaffirm their commitment to a strong transatlantic relationship," said Kip Eideberg, AEM senior vice president of government and industry affairs, while attending the CECE 2019 Summit in Brussels, Belgium. "Our partnership has brought considerable benefits to workers, consumers and businesses of all sizes on both sides of the Atlantic. Supply chains drive 80% of global trade, and tariffs on European manufacturing products will hurt American businesses that source parts and components from across the EU," Eideberg said. "A mutually beneficial trade partnership is vital to the American and European economies. We urge Washington and Brussels to recognize the importance of our transatlantic alliance and the

negative impact tariffs will have on equipment manufacturers." Visit aem.org.

▶ Study Finds Construction Workers Most Likely to Use Opioids & Cocaine

A study by the Center for Drug Use and HIV/HCV Research (CDUHR) at New York University (NYU) College of Global Public Health Construction, published in the Drug and Alcohol Dependence journal, has found that construction workers are more likely to use drugs than workers in other professions. Using a decade of data (2005 to 2014) from the National Survey on Drug Use and Health, a nationally representative sample of U.S. adults, Danielle Ompad, associate professor of epidemiology at NYU College of Global Public Health, deputy director of CDUHR, and the study's lead author, along with her colleagues, analyzed responses from 293,492 participants. They compared 16,610 construction, extraction and mining workers to those working in 13 other occupations. Participants were asked about their employment and workplace drug policies, as well as whether they had used drugs, including marijuana and cocaine, within the past month. They were also asked about their use of opioids for nonmedical reasons. The researchers found that, compared to all other professions, construction workers had the highest prevalence of misusing prescription opioids (3.4% versus 2%) and cocaine use (1.8% versus 0.8%). Construction workers also had the second highest prevalence of marijuana use after those in service jobs (12.3% versus 12.4%, compared with 7.5% in nonconstruction occupations). "In the high-risk settings of construction work, where safely handling hazardous equipment is critical ... drug testing and other workplace substance use policies may play a role in protecting workers. However, not all marijuana and opioid use is problematic, and drug testing cannot distinguish recreational use from medical use. Thus, strict workplace drug policies also have the potential to harm companies and reduce employment opportunities for workers. Coupled with reports of high overdose mortality among construction workers, our findings suggest that prevention- and harm-reduction programming is needed to prevent drug-related risks and mortality among this population." Visit cduhr.org.

100,000

The U.S. Green Building Council (USGBC) has surpassed 100,000 registered and certified Leadership in Energy and Environmental Design (LEED) commercial projects, which "demonstrates how the global green building community is delivering on the vision we set forth more than 20 years ago," said USGBC President and CEO Mahesh Ramanujam. Visit usgbc.org.

▶ American Concrete Institute Adds Senior Engineer



Trey Hamilton

The American Concrete Institute (ACI) has announced that Trey Hamilton joined the staff as senior engineer. Hamilton will provide technical and administrative support to ACI's technical committees and assist with the development of technical resources, educational programs and the adoption of ACI's consensus-based standards. He has 35 years of experience in structural engineering research, practice and teaching. For the past 28 years, he has been conducting applied research and teaching with a focus on structural concrete and masonry. Prior to entering the academic side of the industry, he was in private practice as a design engineer for 7 years, designing commercial and institutional buildings, as well as municipal and industrial facilities. Hamilton is past chair of ACI Technical Activities Committee and ACI Committee 423 Prestressed Concrete. Recently retired from the University of Florida, Hamilton is a registered professional engineer in Florida and Wyoming. He is also a fellow of both ACI and the Post-Tensioning Institute. Hamilton holds a bachelor's and master's degree in civil engineering from the University of Florida. He holds a doctorate in civil engineering from The University of Texas at Austin. Visit concrete.org.

▶ Oregon Metro Council Adopts Policy to Diversify Construction

The Oregon Metro Council has adopted a policy framework that lays the foundation for creating career pathways in construction for women and people of color in greater Portland. The Construction Career Pathways framework establishes consistency among the region's public agencies in their efforts to grow a diverse construction workforce. It asks public agencies to set goals for the percentage of total hours that women, apprentices and people of color should work on public projects at 14%, 20% and 25%, respectively. Metro has committed to set aside $200,000 a year for the next 5 years—funding that could support preapprenticeship and apprenticeship training programs and community-based organizations that serve culturally diverse communities. The agency plans to work with philanthropy and partner agencies to leverage the public investment as a part of a broader initiative to recruit and retain women and people of color. The framework calls on public agencies to require anti-harassment training on construction sites to shift hostile work environments, as well. To keep partners accountable, agencies that sign on to this policy would come together once a quarter to track progress, work through problems and create strategies about where to make more investments. The framework also encourages the use of workforce agreements on large projects as a vehicle for implementing diversity hiring goals. Visit oregonmetro.gov.

▶ Restoration Builders Inc. Acquires Sorenson Roofing & Exteriors G.C.

Restoration Builders Inc. has signed an asset purchase agreement to acquire Mile High Restoration Inc. DBA Sorensen Roofing and Exteriors G.C., headquartered in Greeley, Colorado. Founded in 2017, Restoration Builders is focused on building a strategic network of licensed contractors and other industry-related acquisitions disbursed in key geographical areas across the U.S. The Restoration Builders network of companies will include a global infrastructure of offices, teams, equipment, trucks and other resources. Restoration Builders estimates the consolidated companies will report more than $100 million in revenue for 2019. The company reported $7 million in revenue for 2018. Visit restorbuilders.com.

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What is your company's approach to artificial intelligence (AI) use on the jobsite?



TONY HAMILTON
Owner & Vice President,
Construction Administration
EHC Inc.

Recently, EHC's field operations have improved due to AI. Several years ago, we decided to invest significant capital in GPS machine control systems for our earthwork-grading heavy equipment. Initially, it involved retrofitting the newer and compatible equipment, and now we purchase the equipment with the machine control appurtenances already installed or integrated into the machine. The benefits of these AI solutions are reduction in construction surveying requirements, increased production and increased accuracy.

Like any other significant technology implementation, there are additional costs, resources and time required. However, our operators and supervisors have come to appreciate the new equipment as an opportunity to work smarter, not harder. **We don't see AI replacing our equipment operators; we see it making our good operators even better.** While not every project makes sense for utilizing AI, we do try to use at least some portion of the technology on every project, and by doing so, we have the tool to solve a problem that needs an immediate and accurate solution.



DAVE BURNS
Director of Innovation & Field Applications
McCarthy Building Companies Inc.,
Northern Pacific Region

McCarthy recognizes that the world of technology is changing rapidly, and it's important for us to understand what emerging technologies are available and how they will bring value to our jobsites now and in the future. AI is one such technology that stands to enhance our projects on multiple levels.

Through a combination of photos and computer vision technology, professionals can identify potential unsafe work conditions and hazards on the jobsite. When this data is combined with other data sets, such as weather patterns and schedule conditions, **AI provides the ability to build models that can predict if a safety incident may occur.**

Beyond safety, AI can support the automatic extraction of critical design data from unstructured sources, such as submittal and closeout data from project specifications, and link documents through text and image recognition and hyperlinking. Emerging technologies, such as AI, have the potential to drive significant efficiencies that weren't possible before. In order to realize the opportunities, organizations need to put significant focus towards understanding what data sets can drive future automation opportunities.



KAUSHAL DIWAN
National Innovation Leader
DPR Construction

We're excited about the possibilities for AI in the field, as well as in other areas of our business, throughout the project life cycle. **From our pilot projects, we have learned that the ultimate issue that needs to be addressed industrywide before we can fully implement AI is the quality of available data.** Construction has historically dealt with a large variety of data from systems of record that don't speak with each other, causing the industry to treat the information independently.

As it pertains to safety, for example, having an AI solution that could see patterns in industrywide data and alert crews when there are conditions that correlate with past incidents would be very useful. But the factors that inform those decisions haven't really been captured. We're great at finding root causes of incidents as a lagging indicators, but do we have enough information about things like time of day, site and weather conditions, adjacent trade work areas, and so much more, so that we can move from observing to predicting? To have AI solutions that not only work well, but can also be trusted is going to take a lot of structured data, and we should focus on gathering it now.



THAI NGUYEN
Director, Virtual Design & Construction
Hensel Phelps

At Hensel Phelps, we focus on how we collect, manage and surface our data. **Whether we are using 360-degree photos, point clouds or drone data, we are leveraging AI and machine learning.** These systems leverage our data in a way that allows us to be more efficient within our current processes, create safer working conditions, reduce schedules and cost.

We've been piloting several different AI systems at different jobsites across the country. As we continue to roll out AI and create larger and larger data sets of captured information, the machine learning helps us unlock greater insight and value for our projects.

The gathered data from these solutions has helped to strengthen communication at the individual job level, as well as the corporate level. We can then use this data to help make decisions, which in turn helps us be a better builder and safely deliver our clients' projects on time and

To submit your question, email Associate Editor Rachel Crosby at rcrosby@cahabamedia.com.

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Why Becoming a Better Leader Means Letting Go

The time trade-offs you must make now for a more prosperous future



GEORGE HEDLEY, CSP, CPBC, is a professional construction BIZCOACH and industry speaker. He helps contractors build management teams and get their businesses to work for them. He is the bestselling author of "Get Your Construction Business To Always Make A Profit!," available on amazon.com. Email George at gh@hardhatpresentations.com to sign up for his free e-newsletter, start a BIZCOACH program, attend a 2-day BIZ-BUILDER Boot Camp or get a discount at hardhatbizschool.com online university for contractors. Visit hardhatpresentations.com for more information.

Ask George

To submit a question for George Hedley, email Editor Kathy Wells at kwells@cahabamedia.com.

As the year comes to an end, it's a good time to reflect on your performance—both personal and professional. Did you accomplish what you set out to achieve? Sure, like most contractors, you were probably busy. But what results did that work produce for you or your business? How have the last 12 months delivered personal freedom, financial security or balance?

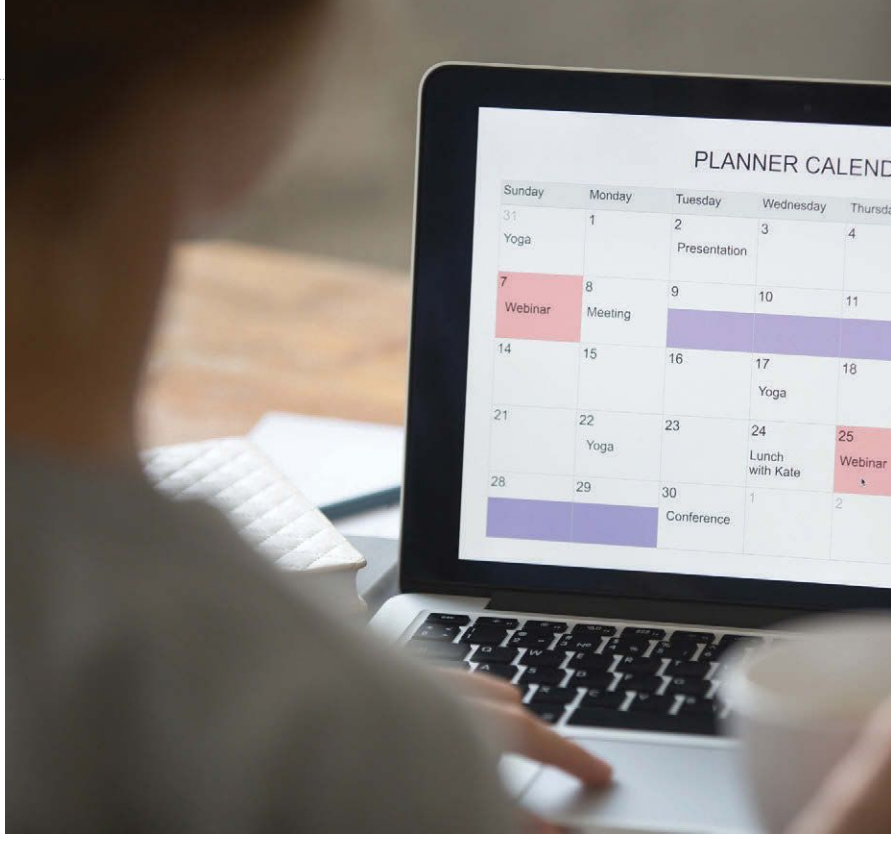
IMPROVEMENT BEGINS WITH YOU

After a point of significant growth for my construction company, I had reached my maximum threshold—I was doing too much myself and working too many hours. Something had to give. I decided to rate my personal and professional performance and results, judging specifics such as estimating, punch-list work and more, each on a scale of one to 10. From the ratings, I made a priority list of areas in need of improvement.

In the end, not only was I was dissatisfied with our company's overall performance, but also my effectiveness as its leader and the lopsided work-life balance I had created for myself. With the weight of this on my shoulders, I attended a time-management goals workshop to get control of my calendar and business priorities and try to find a better balance. The workshop helped me get organized and put my top priorities first, and I left with clear intentions.

The following Monday, I went into work early, reviewed my priorities and set out on my new, organized day. However, the day then unfolded like it always did—too many calls, emails, interruptions, urgent discussions, crew scheduling crises, customer requests and an emergency jobsite meeting. I didn't get back to my desk until 3:30 p.m., and I hadn't accomplished even one must-do item from my priority list. Then, at 4 p.m., I received a call from my best customer with an invitation to play golf the next morning and discuss signing a new construction contract for a large job. I knew I didn't have time to play golf with my best customer—I already had too many fires to put out and hadn't made any progress on my new list of business priorities.

To get the results I wanted, I once again had to make the choice to focus on my own priorities and delegate the work required to reach our production goals. I hired a senior project manager to take over the projects I was managing, and an estimator to perform the take-offs, update our cost history library, enhance our subcontractor database, and prepare our bids and estimates. I also hired an executive assistant to help keep me organized, handle some of my personal activities and optimize my meetings calendar, which allowed me the time I needed to become a better business leader—one who golfs with top clients.



TIME & MONEY: THE ULTIMATE TRADE-OFFS

The hardest part of making a commitment like this is deciding to invest money in people to help build a better company. But I know now that it's impossible to get to the next level without it. With these adjustments, I was able to commit my time to more growth opportunities—spending 2 hours per week developing new business systems and 8 hours per week building stronger customer relationships, and holding regular manager meetings to maintain employee accountability.

Most construction business owners possess a personal trait that nearly forces them to sacrifice and put themselves last. Rather than hire, they postpone the decision, save money and just work harder. Or, if they do hire, they hire inexpensive and inexperienced people, who, ultimately, end up costing even more in frustration than in payroll.

Money buys good employees. With good people on their team, a business leader is able to focus on their top priorities, like generating loyal customers, coaching key managers, enforcing systems and standards, and going home at a decent hour, knowing they have the right employees in place to handle whatever problems arise in their absence.

GENERATING A HIGH RETURN ON YOUR TIME

To free yourself from the workplace shackles of your own making, start by being specific about what role will generate the highest return on your time. Take a hard look at your company to determine what needs improvement, what systems can offer you greater profitability, and which staff positions need to be filled, trained or released. Then, make a commitment to:

- Fill two positions that allow you to focus more time on your priorities.
- Develop and implement one new system per week.
- Devote 1 hour per week to mentorship and training.
- Hold employees accountable for results.
- Stay out of the decisions your managers are authorized to make.
- Leave the office by 5 p.m. and take a 3-day weekend monthly.

COMMITTING TO IMPROVEMENT

The best time to try new ideas and invest in your future is now. Operating in new and different ways daily is sometimes difficult to accomplish, but forgetting old processes and comfortable methods is even more difficult. Each day of your life involves difficult demands and trade-offs. You must be ruthless about your commitment to three things:

1. *Accepting responsibility*—When winners take on a job, they get it done. Do not accept excuses like, "It's not my fault," "It's just not fair," or, "That's not my job."
2. *Accepting reality*—You can't change the past. However, you can determine your future, starting now. Make the best of what you have and make tomorrow even better by introducing slow, but steady, changes in how you manage your business.
3. *Accepting risk*—The definition of an entrepreneur is "one who assumes the risk for the sake of profit," according to the Entrepreneur Post. Step up professionally and personally. Take on a risk or two. What are you waiting for? What's the worst that can happen?

What areas of your business and leadership need to be improved? How will you create the extra time required to invest in those areas? Your calendar tells the story—where you spend your time is where you get results. **CBO**

Addressing Mental Health in Construction

How the industry with the worst statistics can better support those in need of help



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I am the son of William—a man who battled mental illness and substance abuse for most of his life. I share this not as an admonishment of our health-care system, nor as a plea of sympathy for my family. In full disclosure, my father lived a long life despite his challenges and was the best father he could possibly be. Still, I recall a time when I was about 15 years old and we had taken my father to the hospital where he proceeded to tell the doctor, my mother and me how he wanted to take his own life. And I wish I could say that was the only time this happened.

As I reflect on this encounter, which is still mind-boggling to me, I consider the countless lives that have been lost in situations just like this because there was no one to hear that cry for help. As you know by now, reader, this is not a piece about preconstruction planning or close-out, but a call to action for all industry professionals to mobilize against the horrible truth that there are people in our field whose cries for help go unheard.

SEE THE STIGMA

The construction industry is one of the hardest hit where mental illness and substance abuse are concerned. Consider the facts: Construction work is extremely taxing on the body and takes a physical toll. Additionally, construction is an incredibly stressful business that couples the stigma of addressing mental illness with a largely masculine presence.

Consider the last time you heard someone say, "Wow, I am really stressed out." How often is the advice, "Just man up!" and "Don't be a wimp!" offered? There are many great men and women in the industry, and this is not meant to further segment this problem as strictly a male issue. After all, mental illness and substance abuse are not discriminators. This is simply a commentary on how perceptions further complicate the need for addressing workers' mental health.

It is fascinating to realize that, if the need for help came from an individual with heart disease or high cholesterol, the reactions would be drastically different. Physical health issues are tangible and are therefore accepted as deserving of attention and empathy. The stigma of mental illness, however, makes the often-intangible issues of depression or suicidality, for example, more challenging to confront. As such, the construction industry and the public at large must address this problem head on and no longer build walls but, rather, open windows, letting in the light needed to see this epidemic more clearly.

KNOW YOUR TEAM

Knowing your team is easier if your firm is comprised of 10 or 20 individuals, but what if the teams number 100, 500 or 1,000? Then, it's far more difficult. This is not to say a president or chief executive officer should have an intimate relationship

with every associate, but do the leaders of your firm (e.g., department heads, business unit managers, field leaders) have any idea what drives or motivates their team members? It's not the job of division managers to act as therapists or psychologists, but individuals who are connected to their teammates are more likely to recognize unusual or aberrant behavior. Sometimes all it takes is a colleague asking, "How are you doing?" to provide the impetus to drive concern.

WATCH FOR INDICATORS

The construction industry is, in fact, a world of extremes—extreme risks, dangers and deadlines. This creates a pressure cooker of anxiety. Long hours and stress-filled days are commonplace. Firms manage projects with an eye fixed on cost control and labor deficiencies. As a result, managers, supervisors, craftspeople and estimators all build, while the stress around them weaves into every fiber of the project—especially now, as we allow technology to keep us on the clock 24 hours a day.

So, how do leaders discern the normal stresses of the job from saturation? If you have ever said, "In my day, I managed 10 projects at a time (uphill, in the snow, etc.)," then stop it. Times are different—they are not better; nor are they worse. The industry has experienced enhancements, as well as new challenges.

There is a fine line between "normal" and "overworked," yet so many leaders know what they are doing when they take on "just one more project" with little concern about the effects that extra work will have on the people doing it. Human capital is not disposable, and burning through those assets as if they have a shelf life of 12 to 24 months is a sure indicator that the team is not OK.

FOCUS ON THE POSITIVE

The construction industry is a "fixer" business. Contractors fix problems. As rudimentary as it sounds, that is how the business works. As a result, contractors have become very efficient at identifying the things that require fixing. If something is operating correctly, they find something else to fix. Unfortunately, the unintended consequence of this behavior is that businesses generally tend to focus on the negative (what isn't finished, what needs more work, etc.).

At many firms, positive feedback is the hardest thing to come by. Rather, there is a focus on negative or constructive reinforcement. When was the last time someone in your firm acknowledged an employee for doing something well? Once again, this is not about every person getting a trophy or providing empty platitudes, but offering credit where it is due and because it is right. Associates in firms tend to muddle around, shell shocked because the last piece of real feedback they received was on some cumbersome annual performance appraisal form, completely devoid of anything meaningful. Best-in-class firms have made it a point to celebrate their associates with greater frequency, which has a correlative effect on mental stability.

When one considers how much time is spent at their job, it is easy to see how mental stability may be negatively influenced by environmental factors. Mental illness and substance abuse were not created by our industry, nor will they be fixed overnight.

However, the stigma of this plight must be removed so that we, as an industry, can do a better job of fixing it. Let's not add to the ever-increasing statistics, but rather, be the solution. For William. CBO

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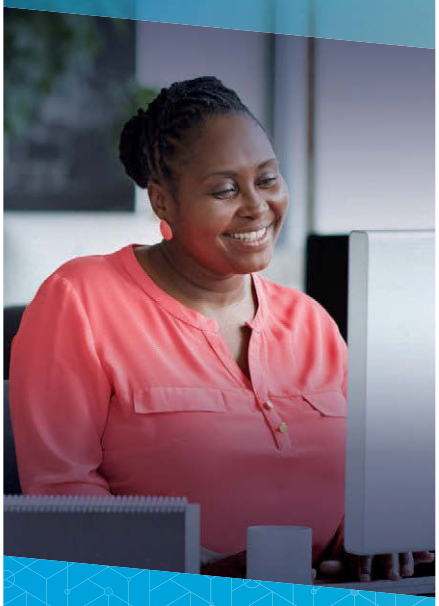

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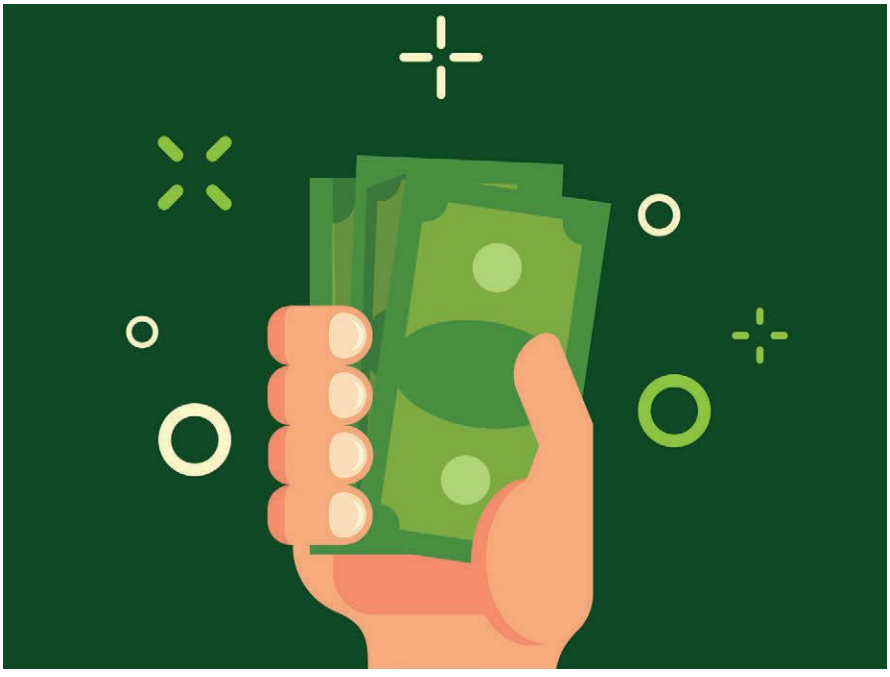
The Contractor's Guide to Getting Paid

5 steps to ensure your company is compensated on time & in full

BY PATRICK HOGAN

One of the most crucial aspects of managing a construction business is ensuring that you get paid. A steady cash flow helps you fulfill your financial obligations, purchase materials furnished by vendors and pay for the services of your subcontractors. It also allows you to take on new projects without any danger of going in the red.

Yet, securing payment is still a huge challenge for most contractors. In fact, payment issues are so prevalent in the industry that it is considered the norm rather than the exception. But that doesn't mean you can't take action to protect your business against these issues. The following steps can help contractors get the payments they are owed.



1 CREATE SOLID CONTRACTS

A solid contract is the strongest weapon in your arsenal. Not only does it contain provisions that help guide both you and your client through the agreed-upon specifics of the construction project, but it also protects your business in case of a legal dispute. But, for a contract to do its job of protecting your business, you need to be familiar with what is included in the contract and how to tailor it to your specific business situation. In general, the following items should be included in the construction contract:

- *Project purpose*—Overviews the entire project, including the property owner, the property location, and expected project start and end dates
- *Title and project description*—Describes the work required for the project and ideally includes a detailed breakdown of all the steps needed
- *Cost estimate*—Includes the agreed-upon estimates and a detailed breakdown of each
- *Payment schedule*—Details when each payment should be made, based on agreed-upon dates and/or project milestones
- *Materials and equipment list*—Specifies the materials and equipment needed to complete the job, their respective costs, and which party will be responsible for each expense
- *Add-ons and exclusions*—Lists the possible add-ons that the client may request and their cost estimates
- *Warranty*—Notes the time period that the warranty covers (The industry standard is one year after completion,

but you should consult a legal expert before creating a warranty contract to ensure its completion and enforceability.)

2 OPTIMIZE YOUR CONTRACTS

You can optimize the cost estimate and payment schedule section of your construction contracts to make sure that you get paid on time and in full. Consider using the following strategies to maximize the effectiveness of your contracts.

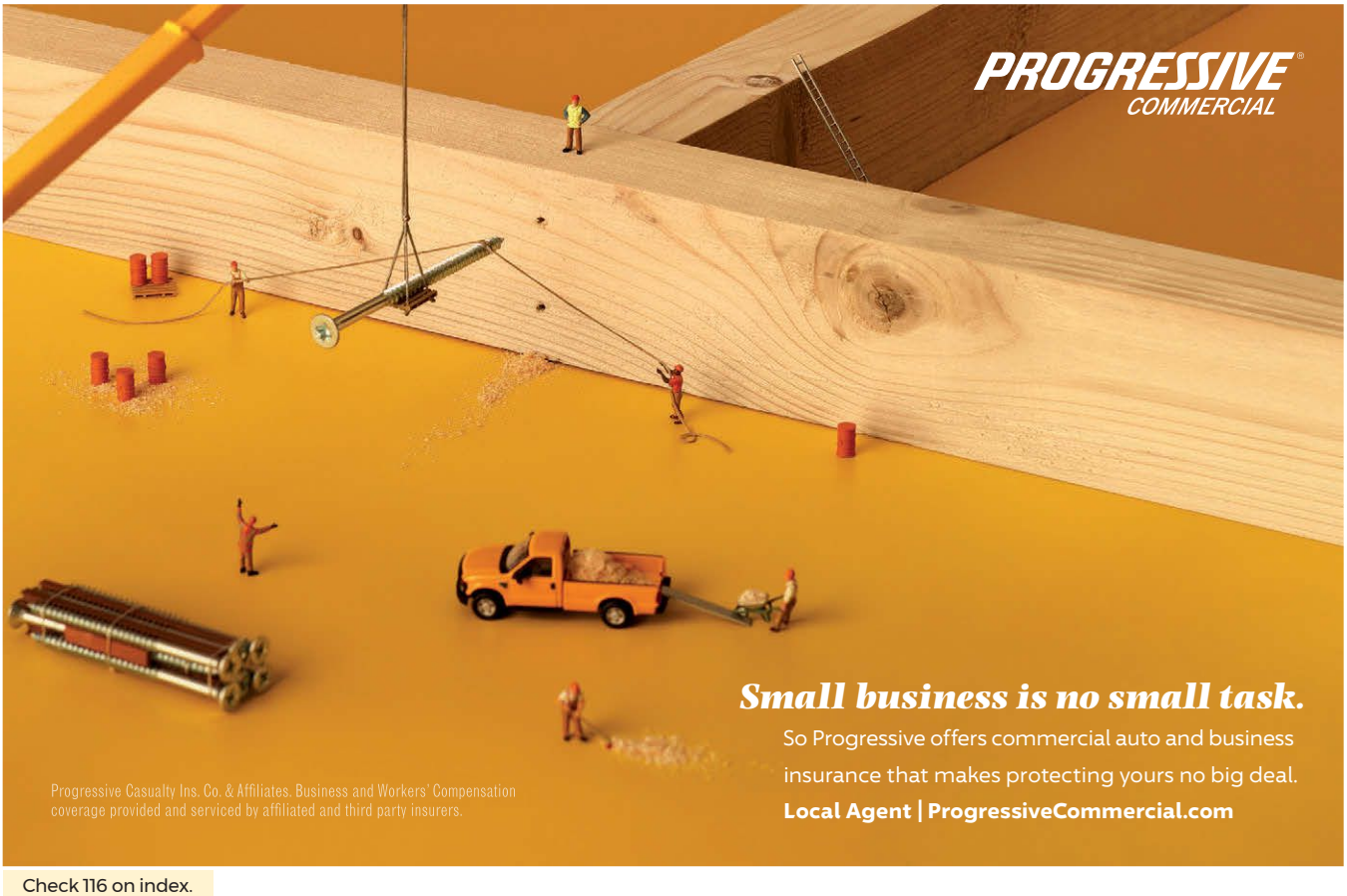
- *Make it easy for clients to pay*—You need to include in detail how and when the invoices will be sent to your client. But be flexible when it comes to the payment methods you accept. The more convenient payment options for clients, the faster they can pay you.
- *Increase the upfront payment for new clients*—While you should always assume your client's good faith, it doesn't hurt to protect your financial interests and minimize risk. If you are working with a new client, it is wise to require a higher upfront payment. You can lower the upfront payment once you gauge their payment practices.
- *Include late payment fees in your payment terms*—Another way to secure your financial interest in the project is by imposing penalties for late payment. Both you and your client should agree on the terms before the project starts. Note: This does not fully deter late payments, and you may need to seek other avenues of receiving payment in full.

3 SEND INVOICES FOR PROGRESS PAYMENTS

In general, you cannot be paid if the client does not know how much to pay you. This is why sending invoices is important. Invoices are usually sent via email, registered mail or private couriers, and you may include a self-addressed envelope along with the invoice to encourage prompt payment. Manual invoicing can be time consuming, but automating the process can save time and reduce inaccuracies. Incorrect information in invoices is one of the leading causes of payment delays.

4 USE PRELIMINARY NOTICES & CONDITIONAL LIEN WAIVERS

A mechanic's lien is a contractor's legal claim on a property because of unpaid work. But, to protect your right to file a lien, you will need to follow strict documentation and procedural requirements specified by state laws. One of the initial steps to secure your lien rights is sending a preliminary notice. The preliminary notice or pre-lien notice



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is a legal document that reminds the property owner of their obligation to pay contractors, subcontractors and suppliers. Sending a preliminary notice can be just as effective as a mechanic's lien at getting the property owner or contractor to provide payment.

Another legal document that can help ensure prompt payment is the lien waiver—a legal document stating that a contractor, subcontractor or material supplier is waiving their right to file a mechanic's lien against the property when paid to the extent of the amount given in the waiver.

There are two kinds of lien waivers: unconditional and conditional. Unconditional lien waivers are effective as soon as they are signed, while conditional lien waivers are effective only when the payment is made. Use conditional lien waivers to tell the client that you are giving up your future lien rights as long as you are paid the proper amount.

5 SEEK PAYMENT AFTER THE PROJECT IS COMPLETED

What should you do when the client doesn't pay after the work is complete? You have several options, but time is of the essence. The longer the bill goes unpaid, the more difficult it is to receive payment.

- *Send gentle reminders*—You can send a message via registered mail or email, stating that the bill is past due and reminding the client of the late payment fees you agreed upon.
- *Visit the client*—After the reminder is sent, it is a best practice to visit the client for a follow-up, which is a good opportunity to talk about the project and ask about the reasons for the payment delay. If there are issues on the client's side, such as dissatisfaction or financial problems, this is the chance to make things right or negotiate new terms.
- *File a mechanic's lien*—If the client still fails to pay, it is time to consider filing a mechanic's lien, which has the power to foreclose the property, after which, the proceeds will be used to satisfy the unpaid invoices. Different states have different procedures and requirements for filing a mechanic's lien. You need to satisfy these requirements, such as sending preliminary notices and using required statutory forms, to ensure the lien's effectiveness. CBO

Patrick Hogan is the chief executive officer of Handle.com, builders of software that helps contractors, subcontractors and material suppliers secure lien rights and get paid faster by automating the collection process for unpaid invoices. Visit handle.com.





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Shaping a Hiring Strategy That Makes Them Want to Stay

5 tips for retention that benefit the worker & the work environment

BY PARKE JACQUAY



The share of workers quitting jobs hit a post-Great-Recession high in 2019, reports the Bureau of Labor Statistics, challenging employers even further in this era of low unemployment and competition for qualified workers. Construction companies large and small are flush with projects. Yet, their ability to fulfill those projects could be jeopardized by the realities of today's labor market, in which workers are in such high demand that both candidates and current employees are being actively targeted by job recruiters.

And, according to the ADP Workforce Vitality Index, the industry suffers from an average turnover rate of 21.4%. For business owners, this has sparked an increased interest in strategies to reduce attrition, rehiring and retraining costs, and to create long-term workforce stability.

REDUCING TURNOVER

Most employers are keenly aware of the need to pay competitive wages and, therefore, include it in their projected costs. But it doesn't stop there. They're also strategizing ways to improve the employee experience and create a positive work environment.

An October 2019 report, "Workplace Satisfaction Report: What Workers Want—And What Doesn't Matter," revealed that there is often a disconnect between what employees want in their jobs and how often they experience those benefits. In short, there is no one-size-fits-all approach, and the best way to find out what motivates employees in the workplace is to start a conversation.

You need to specifically ask your employees, "What's most important to you?" For one employee, it might be more flexible hours. For another, it might be additional time off. And for a third, it might even be the opportunity to lead a new initiative or be considered for more responsibilities. Providing benefits that employees want but don't necessarily expect allows employers to deliver benefits that make a real impact on employee engagement.

WHAT WORKERS WANT

As part of the survey, skilled trades workers were asked what factors they prioritize in the workplace. The top responses were: opportunities for growth and advancement, business practices in

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You need to specifically ask your employees, "What's most important to you?" Providing benefits that employees want but don't necessarily expect allows employers to deliver benefits that make a real impact on employee engagement.

line with personal values, opportunities to gain marketable skills, recognition for their work and job security. These factors aren't just valuable for the skilled trades, but for all employees. Keep them in mind as you consider the following components for inclusion in your retention strategy.

1. PRIORITIZED ONBOARDING

One company I work with sends each new hire an onboarding package that includes a letter from the supervisor, as well as a hard hat, t-shirt, safety vest and short bios about all the people they will meet during their first day. It's a great strategy for kickstarting a feeling of belonging for new employees. Effective retention of top employees begins even before an employee's first day on the job. Successful onboarding strategies include:

- *Consistent communication*—Making contact with candidates between the time an offer is made and their scheduled start date is crucial to the onboarding process.
- *Clearly defined job expectations*—Be sure to document expected duties and set 30-, 60- and 90-day goals. New employees should have access to all the information they need and managers who can answer questions.
- *Regular check-ins*—Schedule a meeting with new hires on their first day, first week and first month to answer questions and mitigate concerns.

2. CULTURE OF COMMUNICATION

Your employee value proposition (EVP) isn't just for attracting talent; it also helps retain workers by defining what your company (and current employees) stand for. When creating an EVP, be sure to:

- Make sure your EVP is an honest statement of your culture, workplace and brand.
- Establish trust by following through on the values articulated in your EVP.
- Consistently look for new ways to demonstrate your EVP.

3. CONSISTENT FEEDBACK

Ensuring that employees feel productive, invested and appreciated will make them more likely to say no to other job offers and choose to stay on your team. You can offer your employees this security by:

- Offering frequent performance conversations and in-the-moment feedback, which create better work habits for all employees
- Normalizing regular communication about what "good work" looks like for specific tasks and how employees can get there, which makes the process of correcting mistakes more palatable
- Offering consistent feedback to reduce the opportunity for misunderstandings and clarify what is good behavior and what falls short; keep in mind that high-performing employees might interpret a lack of feedback as a lack of appreciation for their good work

4. OPPORTUNITIES FOR GROWTH

Even satisfied employees are often looking ahead to the next chapter. Take advantage of their strengths to help them succeed.

- Make sure you're challenging your workers and allowing them to develop skills that will help them contribute more and advance in the company.
- Create opportunities for employees to grow within your organization rather than making them feel they have to move out to move up.
- Make workforce development a top priority—it's an investment that pays.

5. UPSKILLING

Upskilling, or training and advancement practices that help workers learn new skills and take on new responsibilities, is being used more frequently to keep workers on top of their game. Consider these best practices:

- Identify and address your company's skills gaps.
- Pinpoint high-performing workers and ask what training or certifications will help them achieve their future goals.
- Consider the impact of mentorships and other opportunities that cultivate a leadership mindset.

Today's labor market is already challenging, and workers are setting the terms of their employment. To make a real difference, companies need to know why workers quit and understand how to create a work environment that makes them want to stay. **CBO**

Parke Jacquay is the director of business development, energy and construction at Aerotek, a provider of recruiting and staffing services. Headquartered in Hanover, Maryland, Aerotek operates a network of over 250 nonfranchised offices with more than 8,000 internal employees. Visit aerotek.com.





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WHAT IS A CONSTRUCTION TECHNOLOGIST & WHY DO I NEED ONE?

Christopher Baierl, BIM Manager, Winter Construction
Images courtesy of Winter Construction

First, it was building information modeling (BIM), then virtual design and construction (VDC), then drones, then virtual reality and augmented reality (VR/AR) and artificial intelligence—not to mention all of the software solutions along the way. Now, all of these pieces of tech are part of the larger experience broadly termed "construction technology," which can be complicated for even the techiest tech enthusiast out there. This is why identifying and implementing technology on a larger scale—say, for operating a cutting-edge construction business or increasing productivity on the jobsite—requires a certain level of commitment. That's where the construction technologist (CT) comes in. For companies with clear intentions of moving forward with technology initiatives as part of an overall business strategy, the CT plays an integral part in overseeing the implementation and success of those technologies.

Of course, different business owners have different goals, and different specialties have specific needs, creating disparate use of a conglomerate of tech pieces across many different areas of business. At a minimum, some of those differences might include company size, number of employees, number of locations, plans for expansion, technology budget and, most importantly, an understanding of the company's current technology pain points. A CT could be the problem-solver you need to streamline your tech strategy, but before you post that job opening, you should first consider an in-house review of your technology setup as it stands today.

Start by forming a technology committee, comprised of company leadership and its most innovative, tech-savvy individuals, who serve as the assessors of the company's current state of technology, future wants and needs, and plans for growth. Start by asking them:

- What are our tech priorities?
- How do we see ourselves operating in the next 3 to 5 years?
- How many apps and systems are we currently using, and how often do we use them?
- How does each app or system save us time or money (i.e., Are they worth the cost to maintain)?
- Which person or team does each piece benefit most, and how?
- Who on our staff is capable of resolving tech pain points?

- Who on our team can be accountable for the oversight and integration of tech systems?
- What better or more suitable solutions are available to us?
- Who on our team is qualified to lead the research and trial of new solutions?
- What technologies are we avoiding because they seem too daunting a task to take on?

After the meeting, you and your committee may come to the conclusion that the handful of simple technology solutions you're currently using fit the bill for now, and hiring a full-time CT may be too large a leap. In which case, you might consider bringing on a third-party technology consultant just to help step up your processes.

On the other hand, if your committee's answers to these questions point to a deeper need for technology management, you may consider the expertise of a professional who has the background and insight to ensure that your teams can experience seamless transitions to new technologies and gain a clear understanding of the data and value they deliver. That's the role of the CT.

WHAT IS A CT?

By one description, a CT is responsible for closing the gap between construction and technology, and for finding, implementing and fine-tuning the solutions with which to make that possible. By another description, CTs serve as specialized tech agents who have an interest in the trades. According to Procore writer Jeff Wing, "The CT is a construction company's technology insider; a sort of family tech guru who is intimately acquainted with an outfit's construction processes. The CT is able to clearly see, in the landscape of options, the best technology fit for the company—considering price point and plausible return on investment (ROI)."

Construction technologist David Epps serves as director of construction technology at Winter Construction, a privately owned and operated Atlanta, Georgia-based general contracting company. For most of his career, Epps has focused on BIM, while leveraging technology to enhance the art and science of construction. In addition to BIM and VDC, Epps also leverages drones, laser scanning, VR/AR, 4D scheduling, construction simulation and digital field integration. He contributes to project pursuits and marketing, project assessment and setup, project standardization and consistency, BIM execution planning, company and industry training and recruitment.

"At the end of the day, we don't build buildings—we are a support department; we support the teams who build the buildings," said Epps. "We are problem-solvers with a digital toolbox, ready to deliver the right solution for any particular problem." In collaboration with leadership, Epps is responsible for shaping Winter's long-term vision for tech and driving innovation in all aspects of the company.

In 2016, wanting to bring more emphasis to the role of technology



David Epps, Director of Construction Technology, Winter Construction

throughout the entire construction process, across all departments and functions, Winter execs knew they needed to find someone to build a technology department and make a long-term commitment for the future of their projects. Rather than conduct technology research on their own, they sought out a CT.

"You can't do your day job and build a BIM department on the side in your spare time—it just doesn't work," said Epps. Many companies experience a similar problem when engineers are tasked with project management priorities on the jobsite—their primary role as engineer precedes the need to complete any project management work, leaving incomplete projects and lots to be desired.

HOW DO I FIND A CT?

According to Wing, incoming generations of "techsperts" with experience from a range of academic and vocational disciplines are immersed in technology almost from birth, giving them opportunities that previous generations wouldn't have even considered possible. Whether tech trends give rise to generations of future technologists remains to be seen, but there's no doubt that for many contractors, as construction continues to adopt and adapt, the need for technologists will continue to arise.

According to Epps, most major firms have already established vice-president- or director-level technology roles. And while some companies focus on using one technology to be good at one thing, Winter is focusing on many technologies to be good at a lot of things. "We're out there sifting through all of the new technologies, filtering out the junk and asking, 'How can this add value to our work?'"

When it comes to construction technology, value is the name of the game. "I'm constantly pushing back, starting and continuing conversations, and presenting and selling the value [of tech]," he said. "Most owners just want the hamburger—they don't always care how it's made or who's making it. They want the baby, not the labor pains," which makes Epps's role that much more valuable to Winter's leadership and is just one pixel from the bigger picture: an industry in need of tech assistance.

"As an industry, we still have some of the same challenges we had years ago," said Epps, but he's encouraged by the direction in which construction seems to be headed. "Construction is largely a 2D

world, and we're trying to feed a 3D platform into that 2D world, so there will always be kinks to work out," he said.

For this reason, many companies choose to work with a CT who already has some level of construction experience. "If you don't understand how a building goes together," said Epps, "you can't understand the problems and challenges of building it (scheduling and site logistics, for instance)." It's this information that a CT then translates into technology tools.

For companies looking to staff the role with the right person, the road could be long. There isn't exactly an undergraduate BIM degree. And, while more BIM courses are being developed, the right candidate also has to be able to juggle different types of technology. At Winter, Epps interviewed with about six people from the team before he was hired. Each person represented different corners of the company and/or different project interests, and, Epps says, "they were all focused on their own needs, and that's the job—being able to satisfy everyone's technology needs differently. Testing them in different ways and proving that a CT can deliver."

WHAT CAN A CT DO FOR ME?

Most of the solutions Epps and his team have developed are in response to direct project needs. As many contractors continue to evolve and become more sophisticated in their technology choices, the role of CT will be more in demand, and business owners will be looking for a competitive edge that sets them apart. For every existing construction specialty and business structure out there, there are equal, if not more, combinations of desired tasks and efficiencies that could land in hands of an in-house CT. In short, the role is whatever you choose to make of it. Some CT tasks might include:

- Monitoring and understanding the company's technology budget, use and impact
- Asking the right questions of company stakeholders to properly assess business needs and technology pain points
- Interfacing with teams to identify the technology needs of different types of employees: field crews versus office teams
- Identifying opportunities for automation
- Creating a new set of technology requirements to help build and develop internal or external solutions
- Putting in place the necessary technology to drive more accurate and efficient results
- Connecting and maintaining the functions of internal and external applications, and harnessing the right data to measure effects, develop insights and continuously educate employees
- Serving as key stakeholder and conductor of research and proposals for potential technology solutions
- Experimenting with new technologies most suitable for your company's specialty, project size or client
- Studying ROI and metrics supporting the value behind new apps and processes

To hear Epps describe his office is like peeking into the cockpit of the Starship Enterprise. He operates from two different computers—one desktop with four screens (mostly used for laser scanning and crunching data), and a laptop with a dock and three other screens. That's eight screens in all, displaying construction models, pictures, drone footage and renderings to clients and passersby. "It might seem excessive, but so often we're multitasking between so many processes and software, it's necessary," said Epps, "Our work is never done. New challenges arise on jobs every day, and we touch every single job."

With that many plates spinning at one time, there are bound to be frustrations. "Our challenge is to find ways to build technology that is billable to jobs, which is hard to do when people still see BIM as a 'nice to have' on a project rather than a 'need to have,'" said Epps. "We are constantly trying to justify the cost of our jobs [as construction technologists]."

For instance, Epps and his team use BIM models to digitally study clash detection in electrical or plumbing work to predict problems ahead of installation, fixing issues proactively. "It's a frustrating scenario, though," says Epps. "These problems don't really exist yet, because we solve them before a job begins, making it incredibly difficult to show someone who holds the purse strings these nonproblems and that the work we're doing is worth it. It's part of an ROI conversation that's been happening throughout the industry for decades," said Epps. It can be difficult to assign an absolute dollar value to each clash, but if Epps and his team discover hundreds of issues ahead of time and only 10% of those issues end up being legitimate, the company avoids far more cost to the project than it costs to run the coordination in the first place. CBO

Kathy Wells is the editor of Construction Business Owner magazine.

Did Somebody Call IT?

The role of construction technologist (CT) should not be confused with the role of information technologist (IT). CTs should not serve as your company's in-house support for computer system troubleshooting or maintenance—just because a person is technologically inclined does not mean they are also experts in computer repair.

IT is a role designed to manage computer performance, communications and networking. CT is a role designed to drive efficiencies and implement and manage the launch and use of new systems. The same way a director of business development might spend their time networking with new clients to explore new contract opportunities, the director of technology operations might spend their time meeting with and assessing software and technology providers to explore new technology opportunities.

In recruiting or hiring, job titles may vary. The CT role might also be called "manager of construction technology and innovation," "director of technology integration," "technology integration specialist," "director of construction technology," or "director of technology operations."

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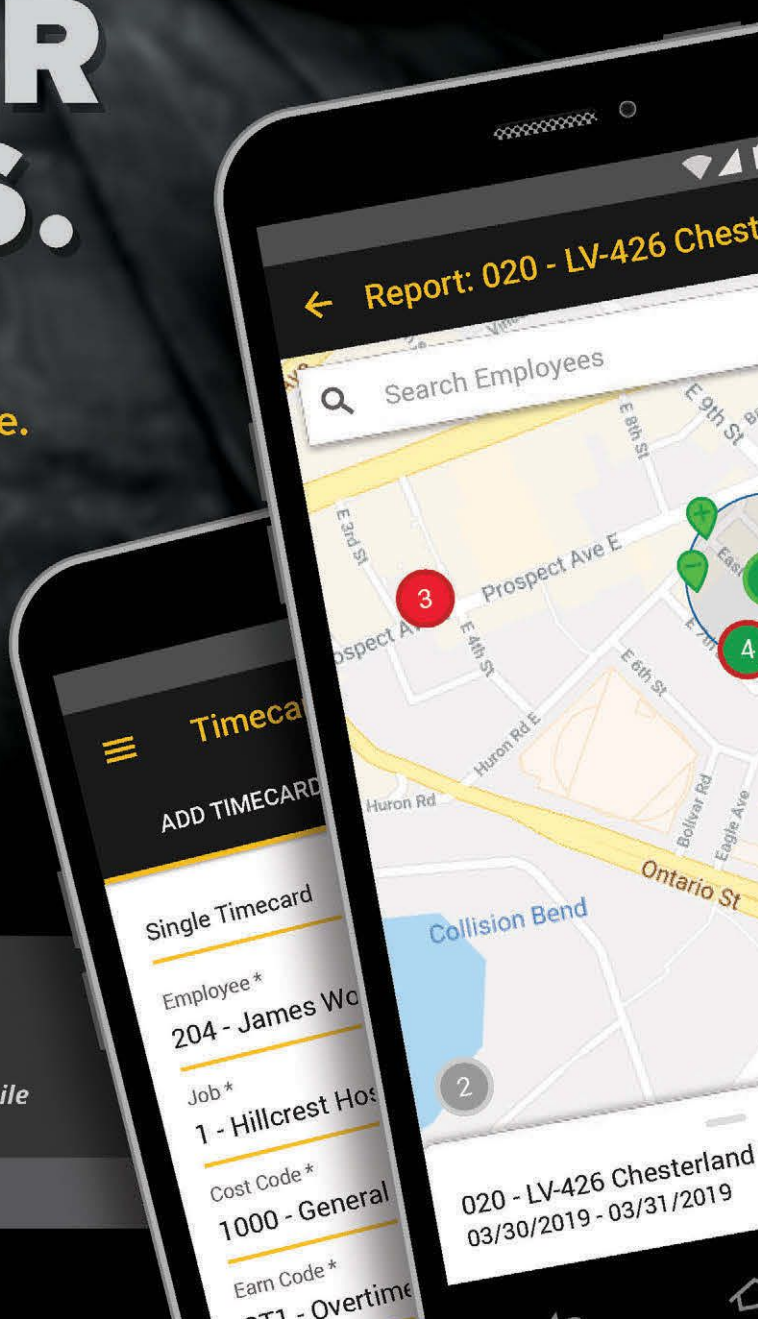

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TECHNOLOGY: Subcontractors Need Data, Too | By Ross Wagner

WHY HISTORICAL PROJECT DATA IS VALUABLE TO MORE THAN JUST THE GC ON THE JOB

Technology standardization is becoming more commonplace. With general contractors (GCs) requesting their teams use specific tools, subcontractors are often required to use the GC's system of record while also leveraging their own system. Consequently, subcontractors often lose ownership of business-critical project data once the projects end.

This comes at a cost, as maintaining ownership of the project data they contributed to the GC's system is just as important to subcontractors as it is to GCs. Lasting access to project data enables subcontractors to make data-driven decisions for future projects.

For instance, the ability to track and analyze performance over time facilitates evaluations, informing future improvements and helping protect profitability.

Additionally, data ownership mitigates risk by protecting subcontractors in the event of disputes or claims against their work on a project, as the ability to go back and trace a project's design and construction changes enables subcontractors to defend their work.

PROTECTING PROFITABILITY

Field workers on subcontracting teams are typically paid hourly, meaning every minute of the work being done impacts the company's bottom line. Spending extra time on work here and there can really add up and chip away at the profits that subcontractors are able to recognize on a project.

To ensure they are paid properly for the work they contribute, it's important that subcontractors enter into projects with accurate bids. And historical data plays a critical role in developing accurate bids for future work.

For a basic example, let's say an electrical contractor is brought in to build the electrical systems for a data center that has to be



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completed within a certain timeline. Based on the subcontractor's work on a similar data center project the previous year, the team submits a bid for approximately the same cost as the earlier project. However, as the new project evolves, the team learns new types of equipment will be installed, presenting unique challenges that require more time and money than what was budgeted for in the original bid.

The additional charges for electrical work might then be negotiated down in attempts to keep the project on schedule and closer to its original budget. In other words, the subcontractor has to do the additional work within the original timeline and potentially be paid a little less—a situation that can potentially be avoided if subcontractors have their project data to refer back to.

In the above example, if the electrical subcontractor is able to refer back to their history working on data center projects, they can recognize a trend of late-stage updates with new technologies. Consequently, the subcontractor could include a cushion, or clause, within the bid and contracts to offset the pattern of increasing scope on data center projects.

> Data ownership mitigates risk by protecting subcontractors in the event of disputes or claims against their work on a project, as the ability to go back & trace a project's design enables subcontractors to defend their work.

Of course, data ownership also provides the opportunity for subcontractors to make proactive analyses about how they can improve operations. If a they are trying to optimize their operations to grow in a particular segment, then they can study the organization's project data and determine whether it makes sense to cut down on work in other segments in which the projects produce a smaller return on investment. Additionally, they can see which GCs they work well with by tracking productivity and response times, making the business leaner.

Last, but not least, the ability to leverage data sets helps subcontractors strengthen their relationships with the owners and GCs on project teams. When subcontractors have ongoing access to the rich project data set, they are empowered to be most helpful to their partners across the project and able to develop stronger working relationships that might serve their business for years to come.

MITIGATING RISK

Disputes are often inevitable on construction projects, especially when many teams are involved. Disagreements that arise during the building process can typically be addressed immediately as the work itself gets done. However, making claims against work that has already been completed on a project is not uncommon.

If something goes awry at a building after construction is complete, owners or inspectors may need to do a full reassessment of the work to pinpoint exactly where the issues are and fix them. In scenarios like these, subcontractors will likely be required to review their work and provide explanations for when and why they did what they did.

Owning the data that details exactly what work was done and what conversations took place around it gives subcontractors the ability go back and justify their decisions, and those justifications are essential for mitigating the risk of liabilities around the issues in question. Of course, reduced risks further protect a subcontractor's profitability and, most importantly, their reputation.

DRIVING SUCCESS

The digital document and project management solutions used across the industry today can certainly help subcontractors maintain and leverage their data to protect their profit and mitigate risks. Solutions that are integrated across the various functions of the construction lifecycle—from design, planning and construction to closeout and operations—provide the richest data set for everyone on a team, including subcontractors, to refer back to.

With projects becoming increasingly complex and new challenges being introduced regularly, developing accurate bids informed by data is critical for subcontractors looking to protect their profitability. Even if subcontractors are only involved in a few phases of a project's construction life cycle, they must be diligent about maintaining access to those rich data sets.

Whether doing so means establishing personal access to the tools housing the data or locally downloading the data itself, it's an important resource that should not be overlooked. For subcontractors looking to develop or maintain a competitive advantage today, maintaining data to extract value from is key for project success. CBO

Ross Wagner is a technical solutions executive at Autodesk Construction Solutions, where he helps customers across Asia-Pacific and the western United States maximize benefits from their technology investments. Wagner previously spent 7 years in the architecture, engineering and construction (AEC) industry as an architect and project manager and is an expert on all phases of design, preconstruction and construction administration. He holds a bachelor's degree in architecture with a minor in business from The University of Texas at Austin. Visit autodesk.com.





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© Robert Benson Photography

TECH WILL BE THE DIFFERENTIATOR YOU CAN'T IGNORE IN 2020: HERE'S WHY

As we look ahead to 2020 and beyond, one thing is clear: The construction industry will continue to see high levels of growth. In fact, analysts at Global Construction Perspectives and Oxford Economics predict that by 2025, the construction industry will have grown by 70% to $15 trillion. An even more amazing statistic is that, according to the World Economic Forum, 75% of the infrastructure that will exist in 2050 doesn't exist today.

With so much potential for growth, it's an exciting time for the industry. However, two significant challenges stand in the way of this growth. First, construction projects are getting more complex. They're bigger, taller and expected to be more efficient than ever before. In addition, the industry continues to face a lack of skilled workers. The good news is that construction firms can navigate this risky environment of more complex projects and less-experienced workers, and the key to doing that is technology.

INNOVATIVE TECHNOLOGIES

Innovators are adopting new business models and proven industrial processes and technologies without a painful learning curve. Similar to the way that emerging nations skipped landline telephones and went directly to cellular, many construction companies will jump directly from outdated methods and tools to the most innovative solutions. This inflection point, known as "the industrialization of construction," is expected to lead to dramatic improvements in productivity across the industry.

Technologies like drones, lasers, artificial intelligence (AI) and machine learning may sound far off, but some firms are using them now. If technology is already a big part of your construction business, these are additions you should consider investing in soon. Drone use on construction sites continues to increase, as the data gleaned is helping firms with everything from improving communication and keeping projects on track, to increasing safety and streamlining the bidding process. Laser technology helps construction teams accurately, safely and efficiently take site measurements.

Meanwhile, AI and machine learning enable computer systems to "learn" from the mass amounts of data gathered to make the jobsite more efficient. As AI becomes more widely adopted, it will help address issues plaguing the industry, such as labor shortages, cost overruns and on-the-job accidents.

THE POWER OF CHOICE

Not all firms are ready to dive right into AI, but wherever you fall on the spectrum, technology can help. When it comes to software solutions, the "best-of-breed" label is back due to advances in the interoperability of technology and the depth of point solutions. There are now point solutions tailored to very specific activities or sections of work, and they are becoming increasingly niche as technology is getting more robust and mature in each specialized area.

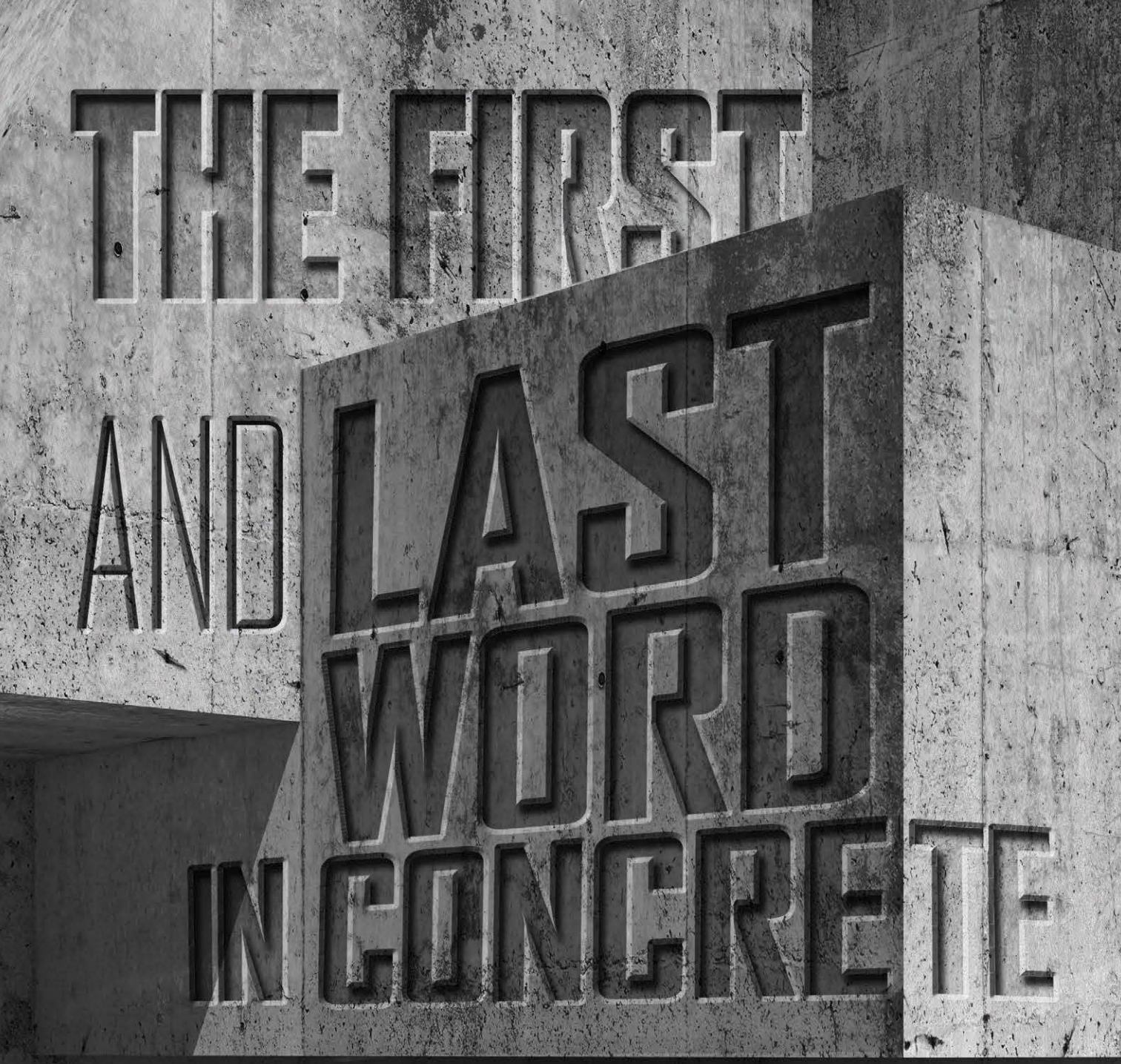
This plethora of solutions addressing a wide range of business issues gives construction firms the power of choice. You can find the right technology for the right problem, which often involves a mix of solutions since today's contractor isn't forced to settle with one solution that attempts to do everything. You can use one solution for accounting, and add another for project management and another for estimating. Many technology vendors are adapting to this shifting software landscape by making it easy for their solutions to integrate with one another.

INVESTING IN PRECONSTRUCTION

The surfeit options can seem overwhelming, especially to construction firms that have been slower to adopt to new technologies. For those who are unsure where to start, preconstruction is a great place to begin investing in technology.

The industry has seen greater adoption of building information modeling (BIM) in recent years. It's no longer being used just for large, highly complex projects—projects and companies of all sizes are recognizing the value of BIM as a sales tool. Take, for example, a smaller project like a kitchen remodel, where one contractor submits a 2D sketch while another submits a full 3D rendering of what the finished kitchen will look like.

The contractor who produces the full 3D rendering will have an advantage when it comes to winning the job and will also have the



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tools needed to better execute the project, helping them to deliver on time and within budget.

DATA IS THE NEW OIL

Data is a precious resource, playing a crucial role in helping construction companies learn from past mistakes and improve upon their performance in the future. Luckily, even the smallest firms have data, harnessed from sources such as financial statements, business reports, emails, plan revisions, conversations, documents and change orders. In addition to past indicators, monitoring the current state of projects ensures you're alerted to any potential issues before it's too late and helps you keep a handle on whether or not you have enough cash coming in, enough work planned out and a productive labor force. Best-in-class contractors use a series of key performance indicators (KPIs) to measure, monitor and manage performance. These KPIs can be used as yardsticks to help you evaluate how things are going, spot red flags and act decisively.

Data sifting is another area where you can easily begin implementing technology. Most firms have an overwhelming amount of data, but the right technology can help you find, filter and focus on the information that matters most. Three types of technology to consider investing in are interoperable software tools, an automated alert system and an effective dashboard tool. An integrated construction software solution supports and automates critical, industry-specific functions and allows you to easily mine consistent data, which in turn allows for timely measurement against KPIs and more rapid, accurate completion of key business processes.

An automated alert system actively monitors the data housed in software and filters high quantities of information to keep you updated on what's most important. It also provides immediate notification when something requires attention. An effective dashboard presents information clearly, quickly and compellingly, providing you with easier, more intuitive access to project and accounting details.

INCREMENTAL CHANGES

For those who are still unsure if investing in new technology is the right move for your business, there are additional ways you can dip your toes into the water, so to speak. Myriad free apps are available that provide simple business solutions and are a great way to introduce technology into your construction business.

You can consider starting with an app that enables file sharing and collaboration, such as Dropbox or Google Drive, to help keep project teams on the same page. Or perhaps an app that tracks mileage, such as MileIQ, or an app that keeps track of receipts, such as Expensify, would be a better fit for your business. There is an app for just about any need, and most people are already using an array of apps in their personal lives. This makes it easier for you and your crew to quickly adopt similar apps on the jobsite.

Begin embracing technology anywhere and everywhere you can. Making small changes and incorporating an app or two where it makes the most sense will help you feel more comfortable using technology as an everyday part of your business. And once you start seeing the benefits, it will be easier to begin adding additional technologies as you see fit.

The construction industry is growing, and the role technology will play in this development cannot be understated. So, whether you're all in or just getting started, now's the time to step outside of your comfort zone and incorporate new technology into your construction business. CBO

Dustin Anderson leads Sage's Construction and Real Estate practice in North America and is an active member of Sage North America's executive leadership team. Anderson is a construction software executive with more than 20 years of success serving the industry, focused on driving healthy change in construction and real estate through technology. Visit sage.com.




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Hey, Who Has the Remote?

The technology offering equipment operators a new way to perform old work

BY BRITTA KOPP

The childhood dream of having life-size, remote-controlled compact equipment is now a reality. In fact, remote-control technology has become a new market segment for most major compact equipment manufacturers.

But what exactly is a remote-controlled machine? Precisely what it sounds like: The advanced technology allows you or your compact loader operators to control your machine and the work it does from outside the cab, through the use of a transmitter strapped around the neck or a smartphone app.

BENEFITS OF REMOTE CONTROL

Most remote-control technology is completely portable, designed to work in even the harshest of working environments, and used primarily for skid steer and compact track loaders with joystick controls. One of the main advantages of remote-control operation is the ability for you and your operators to have complete visibility of the machine without having to be inside the cab.

Being able to stand outside of the machine allows you to see every angle and adjust accordingly. You can also operate more effectively by navigating confined jobsites from outside the cab and by having more control when operating various attachments.



Additional benefits of this technology are the opportunity for enhanced operator comfort and a more flexible working environment. For example, if you or your equipment operators are unable to sit in the cab of a loader for a full 8- to 10-hour shift for any reason, you can work outside of the cab without losing any productivity for the day. With remote-control operation, you can keep projects on the established timeline regardless of where you're operating. This technology also brings opportunities to individuals who are unable to climb into the cab due to injury.

LIFE-CHANGING TECHNOLOGY

Trevor Brown had run a successful cabinetry business with his wife out of a shop on their family acreage for 15 years when he underwent a routine surgical procedure to fix a neck problem. When he woke up in the intensive care unit, his world was rocked by the news that he was paralyzed. He could no longer perform the work he loved and did every single day, leaving a majority of the acreage maintenance to his wife and kids.

He and his wife were determined to stay in the woodworking industry and were

"It's been a game changer for me because, for quite a few years, I've had to sit here not able to tackle the jobs that I'm looking at on the yard. And now I have a way to do it."

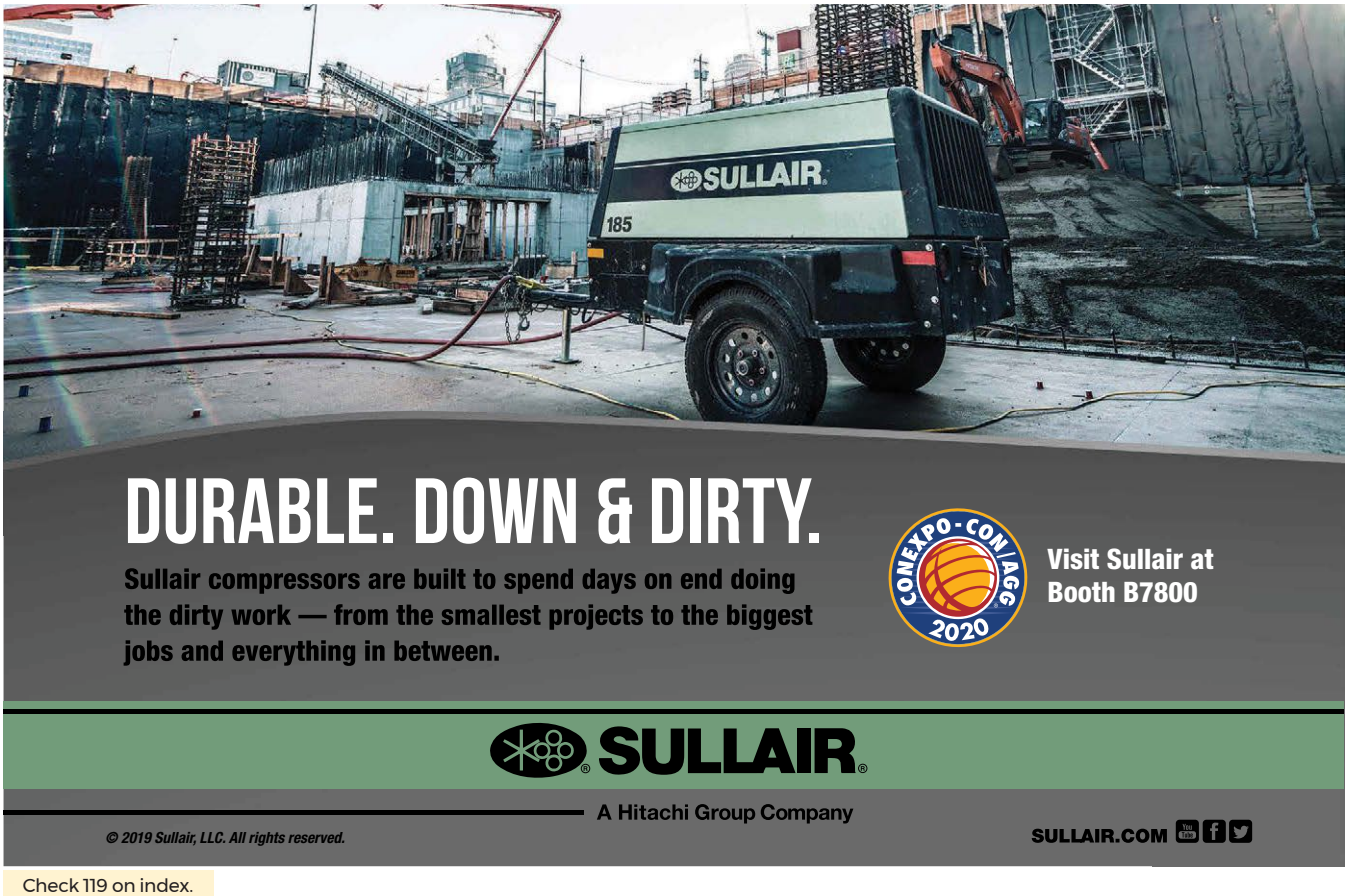
able to rebrand their cabinetry business with other forms of technology in the shop. This, however, did not address the major workload still left on their acreage. Brown questioned whether or not the life they had known for decades was sustainable. But then, his and his family's lives changed when he upgraded to a compact track loader with a radio remote-control kit.

"I can grab this thing off the countertop and put it over my shoulders, start the machine and go," said Brown. "It's been a game changer for me because, for quite a few years, I've had to sit here not able to tackle the jobs that I'm looking at on the yard. And now I have a way to do it."

NEW WAYS TO WORK

For work that often requires two people, remote-control technology can be immeasurably helpful because it changes those jobs to one-person tasks. A single operator can load trucks without making countless trips in and out of the cab, and use a pallet fork to lift, carry and place building materials.

Compact loader operators can also utilize remote-control technology when working on jobsites with a higher safety risk, when using a breaker attachment during demolition or when unloading hazardous materials on a barge, for example. By utilizing remote operation of machinery, contractors improve their time savings and efficiency. It's also advantageous for recruiting new operators and retaining current employees, as crew members want to work with the latest technologies that make their jobs easier.



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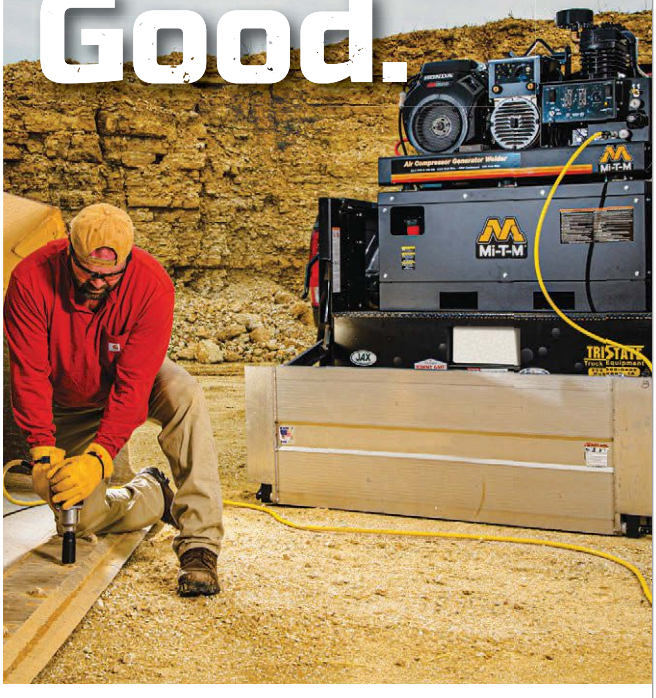
Mighty.
Damn.
Good.



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LATEST ADVANCEMENTS

Every year, technology has a way of innovating and advancing faster than other segments of the industry. Remote-control technology is no exception. Instead of using a large remote control that straps over an operator's neck, some manufacturers have developed systems that provide a convenient, easily accessible way to operate compact equipment using an app on a smartphone or tablet.

By having the system literally in your pocket at all times, you don't need to plan out when you're using remote-control technology on a jobsite—you can pull it out of your pocket at a moment's notice, enhancing your productivity and service offerings. You also don't need to purchase multiple remote controls for your crew, as each of them likely has a smartphone already sitting in their pocket.

The addition of remote-control technology could improve almost every aspect of your business—from your bottom line to the way you recruit and retain employees. And for those of you like Trevor Brown, who find yourself questioning how you'll continue operating the machinery necessary to complete the industry work you love, remote-control technology may have the power to save your business.

In today's business landscape, it may be ideal to expand your fleet, not with another piece of machinery, but with one of the latest forms of compact-equipment technology. You can never go wrong when you're moving forward—especially remotely. CBO



Britta Kopp is the compact parts marketing manager for Bobcat Company, a Doosan Company. Visit bobcat.com.

Research Into Concrete Form Face Defects Takes Shape

How controlled frequency vibration technologies can correct pavement problems

BY PAUL J. JAWORSKI

Ongoing research into limiting concrete form face surface defects with controlled frequency vibration (CFV) technology, which has been around since the mid-1990s, is showing great promise. With modern tweaks and an age-old approach, field investigations into limiting high-frequency vibration to control the amount of concrete material separation in commercial applications are successfully limiting the surface distresses in concrete pavements. Through the application of common sense and solid clinical analysis, researchers have made pavement surfaces more durable.

Because of these advancements, the development of on-site, nondestructive tests for concrete pavement mixes is being increasingly adopted by state departments of transportation (DOTs) as a viable prediction of the compatibility between vibration variability and concrete mixture variabilities. As a result, the usual confusion that takes place when attempting to quantify vibration's effects has been identified and controlled by applying paving vibrator behavior constants coupled with data collected from CFV systems to apply to vibrator frequencies in commercial concrete vibrator applications.



Concrete form face

DESTRUCTIVE NATURE OF VIBRATOR FREQUENCY

On a paving machine, vibrators are mounted on centers no greater than 16 inches to ensure enough gravitational forces (g-forces) for proper consolidation away from the vibrator head. The amplitude of the vibrator remains close to a constant value, regardless of vibrator speed, and the off-center weights produced by different vibrator manufacturers are closely comparable. Vibrator frequency is isolated as a variable, and its effects are studied both clinically and empirically.

The results of studies from state DOTs, federal highway reports and the Portland Cement Association's technical bulletins identify elevated vibrator frequencies as the culprit in reducing necessary air entrainment and causing aggregate separation. Researchers at the National Concrete Pavement Technology Center at Iowa State University and the Bert Cooper Engineering Laboratory at Oklahoma State University have developed testing methods that use CFVs in the evaluation of mix/vibrator compatibility.

LIMITED VIBRATOR FREQUENCIES FOR COMMERCIAL APPLICATIONS

For the past 10 years, specifiers and agencies have adopted reduced vibrator frequency ranges of 5,000 vibrations per minute (vpm) to 8,000 vpm for concrete pavements as a standard practice. If it makes sense to limit vibrator frequencies to control issues with 0- to 1-inch slump pavement mixes, then applying lower frequencies to 8-inch slump pavement mixes in commercial applications is an elementary approach.

The original vibrator frequency investigation that was used to write the American Concrete Institute (ACI) 309 Consolidation standards in 1970 suggested a 10,000 vpm frequency limit before the vibration separated 3.5-inch structural mixes. It is not entirely clear how the ACI guidance standards strayed from vibrator frequency control as the use of water reducers for pumpable mixes took slump values to 6 inches and beyond.

The laborer using a concrete vibrator usually may not realize that vibrator motor horsepower and head diameter vary greatly from one manufacturer to another. The same vibrator model can vary from 11,000 vpm to 17,000 vpm and will change frequencies dependent on the concrete consistency, frustrating operators who are trying to vibrate variable concrete mixes with a variable vibrating tool.

Adding insult to injury, after stripping the forms, concrete structures that were pumped may end up needing to be patched, chipped and patched, or torn out. And, most of the time, a vibrator operator is blamed for poor consolidation results, when they have no control over the tool.





(top) Minnich Control Speed Vibrator (CSV) electric flex shaft concrete vibrator
(bottom) Minnich Auto Vibe System monitors and records vibrator speed via Bluetooth technology

CONTROLLED VIBRATOR APPLICATION AT PRECONSTRUCTION TRIALS

Upon the stripping of forms, what may look to a contractor like air pockets from under-vibrated concrete are usually pockets of separated available water from over vibration of pumpable concrete mixes. Studies on the effects of water movement from high frequency vibration (above 10,000 vpm) are in the initial stages but show that available water is moved by vibrator frequency. The question is what effect frequency has on the concrete structure's surfaces, both in strength and in permeability.

There are several CFVs in the commercial space that are being used for both in-house and field trials. At preconstruction trials for constructability, vibrators that are controlled and range from 10,000 vpm down to 6,000 vpm



(top) Normal concrete surface defects caused by water movement
(bottom) Chipped and patched concrete



Concrete surface defects with water staining



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are being used to find better vibrator compatibility. CFVs that can be manually set at a controlled frequency or operated by a cellphone or tablet are setting compatible speeds for construction. Researchers can look at load curves through the Bluetooth feature of one manufacturer's CFV flex shaft models and evaluate the concrete mix.

Much like in concrete paving, because the dynamics of the CFV are controlled, there are inconsistencies in batching behaviors. In early trials, a significant distinction between batch uniformity and vibration has been observed, and the amount of water in retempered concrete, or in concrete with added water and chemical reducers, alters the vibrator/mix compatibility target.

In pavement concrete mixes, batching practices and vibration are regulated. Although perfection is not guaranteed 100% of the time, when a CFV operator knows what the vibrator delivers every time, they can begin to look elsewhere in attempts to limit the effects of vibration on concrete form surfaces.

When a CFV operator knows what the vibrator delivers every time, they can look elsewhere in attempts to limit the effects of vibration on concrete form surfaces.

One thing is certain in the research that has come from preconstruction trials: Vibrator operators can't use the same vibrator frequencies for 8-inch slump pavement mixes that they can on those that are 4 inches. More importantly, they certainly can't solve surface defect issues with a tool that behaves differently every time the concrete mix changes. With consideration of these findings, operators have the chance to gain better control and better outcomes. **CBO**

Paul J. Jaworski has 43 years of experience in the concrete vibration and concrete batching industries and is the products manager at Minnich Manufacturing Company in Mansfield, Ohio. He has been consulted for several university studies on pavement distresses caused by improper placement practices and is involved in the development of nondestructive testing methods. Jaworski holds a bachelor's degree in mathematics from the University of St. Francis. Visit minnich-mfg.com.



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Facing OSHA's Focus Four

The major dangers that plague your jobsites & how to avoid them

BY JOHN J. MEOLA

Gathering forensic safety statistics is an arcane science to most and attempts to predict which risks we should to pay attention to based on incidents from the past. In the construction trades, these lagging indicators are unmistakable, and there are four major categories of accidents that reliably compose a high percentage of jobsite fatalities.

The Occupational Safety and Health Administration (OSHA) has bundled these categories into what is called the "Focus Four," also called the "Fatal Four" for obvious reasons. These four categories follow the leading causes of death in the workplace: opioid abuse, suicide, homicide and transportation fatalities. When any of these incidents occur in an occupational setting, they are classified as work-related fatalities.

OSHA's mantra of "providing a workplace free from recognized hazards" is a good starting point, or basis, for implementing a program that works to avoid the Fatal Four. Recognizing and adopting this mantra should be followed by identifying possible hazards, a step that is typically missing or buried in the weeds of most safety program agendas.

Hazard identification should be carried out by a "competent person," which is defined by OSHA as "one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous or dangerous to employees, and who has authorization to take prompt, corrective measures to eliminate them."



Employee safety committees also have a role to play in hazard recognition, and they are particularly effective.

But even to most who are not OSHA-verified competent persons, the Focus Four are real, tangible categories of high-risk hazards. They are usually easily recognizable, provided you know where and how to look for them. In order of prominence, they are as follows.

1 FALLS

Six feet and above is the recommended height for providing some type of fall protection, of which there are multiple types. Railings and physical barriers are preferred, but a harness and lanyard, self-retracting lifelines, travel lines, etc., all qualify, as well.

Most safety programs are fairly clear on fall protection guidelines, since understanding gravitational force does not require a degree in physics. The equation becomes more complex when scenarios change, openings and holes are cut in roofs, structures are built in stages, etc.

Most of the building trades, especially roofers, receive this message. The high-risk category of deniers (those who ignore the hazard often) include estimators, inspectors and maintenance technicians, who say, "I'm only going to be there a minute, so fall protection isn't necessary." Suffice it to say you should pay close attention to this category of people visiting the jobsite.

2 ELECTROCUTION

These hazards are ubiquitous and are often in disguise, such as when handling long metal objects when power lines are obscured by vegetation, for example. In fact, OSHA has a couple of videos depicting this exact hazard and accidental contact taking place.

Another example is using a simple tape measure around electrical hardware, such as conduits, light fixtures, junction boxes, etc. The lesson? Do not discount the electrical exposure just because it's not something you're typically thought of being subject to due to your job description.

Underground utilities, overhead lines, lightning, arc flash and tree work are also among the most common electrical hazards. Because electricity is about as unforgiving as gravity, this category of hazards needs to be addressed in a definitive pre-work assessment.

The next two categories, while less readily apparent, have combined fatality numbers that are steadily increasing at an alarming rate.

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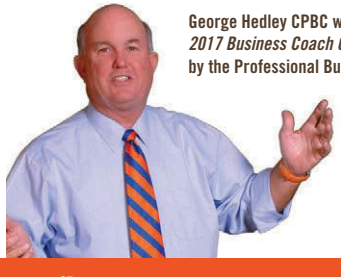

George Hedley CPBC was named *2017 Business Coach Of The Year* by the Professional Business Coaches Alliance

BIZ-BUILDER BLUEPRINT ACTION PLAN

Email George to set up a BIZCOACH program
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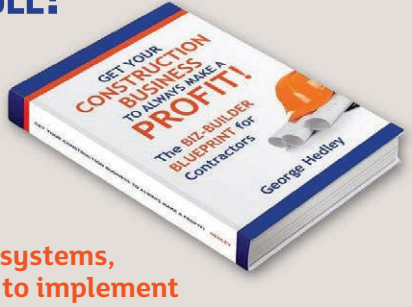

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According to Newtonian physics, two bodies cannot occupy the same space at the same time. On the jobsite, it's usually the human body that loses out when struck.

3 STRUCK-BY

This category covers a lot of territory. There are obviously a large number of things one may be struck by. According to Newtonian physics, two bodies cannot occupy the same space at the same time. On the jobsite, it's usually the human body that loses out when struck. And jobsites are only becoming more complex. For starters, they are being increasingly mechanized. Examples of struck-by hazards include vehicle or equipment movement, a tool left on a step ladder, unsecured items on a roof, a machine backing up, debris being pitched, poor rigging and hoisting practices, etc.

Growing evidence of attention to this category can be seen in tool manufacturers adding tethers to their product lines and machinery manufacturers adding proximity warning systems, back-up cameras, sensors, telematics and the like.

A good example of preventive strategy can be seen in the state of Virginia's "Unique Standards," a safety regulation enacted over 10 years ago that requires a spotter, a camera or the driver to get out and check his backing clearance. Backing fatalities in Virginia significantly decreased after this rule went into effect. Prudence dictates learning from this example and adopting this practice as your own safety commandment.

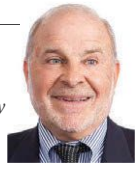
4 CAUGHT-IN OR -BETWEEN

This category is exactly as gruesome as it sounds. Examples include getting caught by things like outriggers, remote hydraulics, telescoping mechanisms, a counter-weight swing radius, moving machinery or equipment, conveyors, forklifts, backhoes, etc. This is why you see decals and warning stickers on these types of machinery.

The hazards exist in both wide-open and tight clearance areas, near obstructions, with unstable loads, irregular surface conditions, etc., and the outcomes are generally horrific since these workers are not using Lego blocks for materials. The less dense object invariably gets the squish. While this is a hard category to predict on an active jobsite with all kinds of movement, both around and overhead, you would be remiss to neglect putting it on your safety radar screens and making it part of the daily safety briefing.

A thoroughly vetted Focus Four assessment should be built into your job planning process, starting with the estimator's first look. Every activity and task should include a simple assessment for these risks. The Focus Four should also be a stand-alone chapter in your safety manual and a line item on the job hazard analysis (JHA) and activity hazard analysis (AHS) forms, discussed regularly in safety meetings, part of your safety committee agenda, etc. Probability statistics indicate that there are limitless possibilities for bad things to happen to good people. By closing off these Focus Four loopholes, you and your workers have a fighting chance of avoiding these hazards entirely, thus ensuring a safe outcome. **CBO**

John J. Meola, CSP, ARM, is the safety director at Pillar Inc., based in Richmond, Virginia. He has extensive experience in developing and implementing construction and industrial safety programs. Contact Meola at jmeola@pillaroma.com. Visit pillaroma.com.



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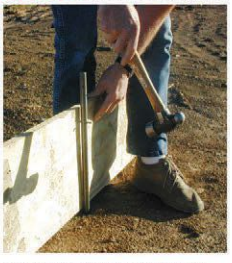

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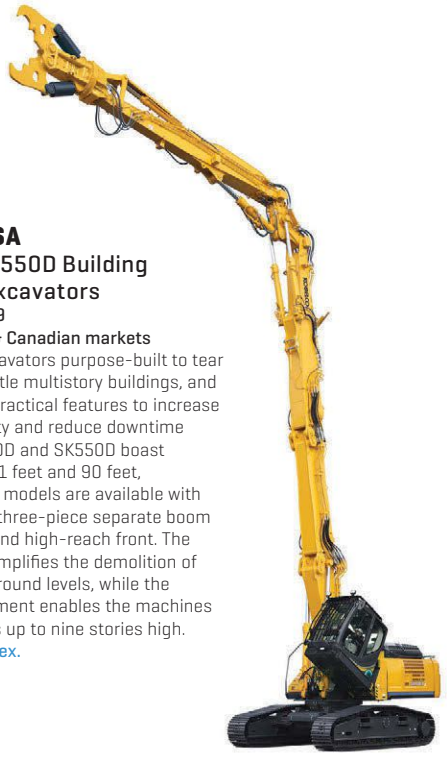
Check 103 on index.

New Products to Watch

Selected by the editors of Construction Business Owner, these new-to-the-market products are just a few of our favorites recently released to the construction community. Stay tuned in every issue to find out what you need to know about the latest gear, solutions & industry-leading innovations.



KOBELCO USA
SK400D & SK550D Building Demolition Excavators
Released: 11/4/19
Availability: U.S. & Canadian markets
What's new? Excavators purpose-built to tear down and dismantle multistory buildings, and engineered with practical features to increase jobsite productivity and reduce downtime
Specs: The SK400D and SK550D boast a reach of up to 81 feet and 90 feet, respectively. Both models are available with Kobelco's unique three-piece separate boom demolition front and high-reach front. The separate boom simplifies the demolition of lower and underground levels, while the ultra-long attachment enables the machines to demolish levels up to nine stories high.
Check 200 on index.



▲ RIGID
Cordless Wet/Dry Vacuum
Released: 8/1/19
Availability: U.S. markets
What's new? Rigid's first full-size cordless wet/dry vacuum that gives users the freedom and power to go anywhere and handle any mess
Specs: Features updated scroll technology to support an increase in suction, a QwikLock Filter that snaps on or off the vacuum for easy changing, Dual-Flex Tug-A-Long locking hose that bends 180 degrees without collapsing; accepts high-efficiency dust bags to minimize mess.
Check 201 on index.



▲ KWICTEC PTY LTD.
DrillKaddy
Released: 8/21/19
Availability: U.S., Canadian & European markets
What's new? A simple, convenient, time-saving drill and bit storage solution for any cordless power tool user
Specs: Products to choose from include: Drill Pack, Mag Bit Pack, Locking Bit Pack and a Drawer-Only Pack, all including hook-and-loop (Velcro) kits to attach up to four batteries.
Check 202 on index.



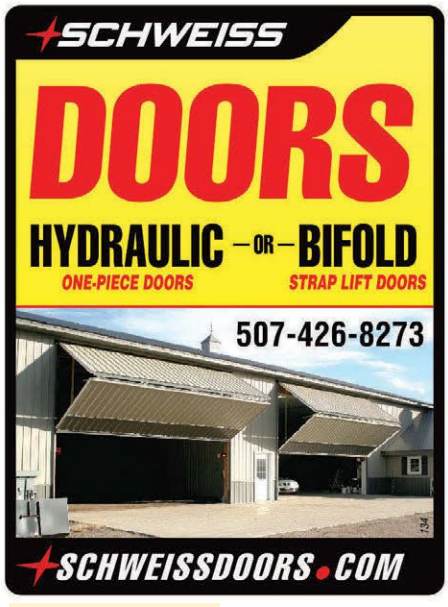
◂ TRIMBLE
SiteVision Augmented Reality System
Released: 9/16/19
Availability: All global markets
What's new? A system that integrates the Trimble Catalyst DA1 Antenna, Electronic Distance Measurement (EDM) range-finder and power management into a lightweight, handheld device that connects to a user-supplied Android mobile phone
Specs: SiteVision is available to single users on a monthly or yearly basis. The software subscription combines Trimble's high-accuracy positioning services and cloud-based processing technology to create a centimeter-accurate augmented reality system. The system leverages Trimble cloud-based processing to manage and deliver data and design models.
Check 203 on index.



▲ REDTEAM SOFTWARE
TeamPlayer App
Released: 8/20/19
Availability: U.S. markets
What's new? A free and efficient method of granting subcontractors access to important documents, which increases collaboration on projects while reducing overall risk
Specs: Through the TeamPlayer app, subcontractors have instant access to documents shared with them via RedTeam's software. Subcontractors can view the status of their contracts, change orders, credentials, lien waivers, submittals and punch-list items. They can also share day-to-day performance updates in real time and check in and out of project sites based on their location.
Check 204 on index.



▲ FECON
Roof-Mounted Hydraulic Cooler
Released: 10/1/19
Availability: U.S. & Canadian markets
What's new? Hydraulic coolers that mount on compact track loaders (CTL) and skid steer loader (SSL) rooftops, enhancing carrier performance by maintaining the hydraulic fluid at optimal temperatures and viscosity
Specs: The durable, all-steel design weighs roughly 185 pounds and includes adjustable mounting rails. Two 11-inch thermostatically controlled electric cooling fans cycle on when needed to mitigate rising hydraulic fluid temperatures. Bypass relief is included for cold oil starts. Compact units fit atop virtually all CTLs and SSLs, handle flows up to 48 gallons per minute, and provide up to 120,000 British Thermal Units per hour of cooling capacity.
Check 205 on index.



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(Check Only One)
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❑ 02 General Contractor – Residential
❑ 10 Construction – Special Trade Contractors
❑ 03 Highway and Street Construction
❑ 04 Water, Sewer and Utility Construction
❑ 05 Heavy Construction
❑ 06 Concrete Work
❑ 07 Excavation Work
❑ 08 Wrecking and Demolition Work
❑ 13 Architecture, Engineering and Construction Management Services
❑ 11 Consulting Contractor
❑ 99 Other (please specify) _____

2. Your primary job title is: *(Check Only One)*
❑ 10 Owner, Partner, President, CEO, CFO, COO, Vice President, Director
❑ 11 General Manager, Manager, Foreman, Superintendent, Purchasing Agent, Controller, Accountant
❑ 12 Engineer, Architect
❑ 06 Consultant
❑ 99 Other (please specify) _____

3. Approximate annual contract sales volume:
(Check Only One)
❑ 01 Less than $500,000
❑ 02 $500,001 – $1,000,000
❑ 03 $1,000,001 – $2,500,000
❑ 04 $2,500,001 – $5,000,000
❑ 05 $5,000,001 – $10,000,000
❑ 06 $10,000,001 – $20,000,000
❑ 07 $20,000,001 – $50,000,000
❑ 08 More than $50,000,000

4. Which of the following products/services are you planning to buy during the next 12 months?
(Check All That Apply)
❑ 01 Earthmoving Equipment
❑ 02 Trucks, Trailers and Accessories
❑ 03 Compact Equipment
❑ 04 Lifting and Hoisting Equipment
❑ 05 Safety Equipment and Apparel
❑ 06 Attachments
❑ 07 Concrete and Paving Equipment
❑ 08 Survey and Site Prep
❑ 09 Compressors, Generators and Pumps
❑ 10 Financing and Accounting Services
❑ 11 Software and Technology
❑ 12 Insurance and Bonding
❑ 13 Training and Education
❑ 14 Telecommunications
❑ 16 Greases, Lubricants and Filters
❑ 17 Jobsite Lighting
❑ 18 Building Supplies
❑ 19 Rental Equipment
❑ 21 GPS Equipment and Security

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Annual Value of Construction Put in Place

Sept 2017/2018/2019 Annual Rate Comparison

This chart compares the two previous years' total value of construction put in place to an annual forecast based on September 2019 figures. (Millions of dollars. Totals may not add up perfectly due to rounding.)

	2017*	2018**	Sept 19
Total Private Construction	**962,008**	**1,008,142**	**961,670**
Residential	561940	530,462	511,419
Nonresidential	432,604	477,680	450,251
Total Public Construction	**278,435**	**311,534**	**331,944**
Residential	6,622	6,267	6,558
Nonresidential	271,813	305,267	325,386
TOTAL Construction	**1,240,443**	**1,319,675**	**1,293,614**

**Seasonally Adjusted Annual Rates. Source: U.S. Census Bureau.*
***With the May 2018 release, unadjusted data will be revised back to January 2016 and seasonally adjusted data will be revised back to January 2011. With each May release, seasonally adjusted data will now be revised for an additional 5 years beyond the revision period for unadjusted data. Research has shown that this revision span should produce more reliable seasonally adjusted time series.*

$1,293,614

SEPTEMBER 2019 TOTAL ANNUAL VALUE OF CONSTRUCTION PUT IN PLACE

"Though still in negative territory, the moderating billings score, along with the rebound in design contracts & inquiries, serve as a continued note of caution for the industry," said AIA Chief Economist Kermit Baker, Ph.D., Hon. AIA. "Continued weakness in the larger economy still doesn't bode well for future design services, which will likely see a continued volatility in the months ahead."

AIA Architectural Billings Index (ABI)

	National		*Regional - Billings				*Sectors - Billings			
Month	Billings	Inquiries	Northeast	Midwest	South	West	Multifamily Residential	Commercial/ Industrial	Institutional	Mixed
Apr-19	50.5	60.9	45.1	49.3	51.6	49.0	47.4	46.6	49.2	53.2
May-19	50.2	56.2	47.5	51.6	51.4	50.0	46.0	53.0	48.0	55.4
Jun-19	49.1	52.8	46.1	48.9	51.0	49.3	46.3	52.3	47.0	54.3
Jul-19	50.1	54.9	48.3	48.9	48.3	51.2	50.6	49.2	49.8	48.9
Aug-19	47.2	54.5	49.1	46.4	48.2	51.2	50.5	46.9	50.6	46.3
Sep-19	49.7	59.0	46.3	45.3	52.3	51.3	53.2	45.3	48.5	53.0

For more information on the index or to subscribe to the complete historical data going back to 1995 for your internal analysis, **please contact economics@aia.org.** The ABI presents monthly construction billings data, using a base score of 50. A score of more than 50 indicates a growth from the previous month, and a score of less than 50 indicates a contraction from the previous month. A score of 50 indicates no change. Source: The American Institute of Architects (AIA), Architecture Billings Index (ABI).

*Regional and Sectoral indexes are 3-month moving averages, due to small sample size. All data is seasonally adjusted.
**Every January, the AIA research department updates the seasonal factors used to calculate the ABI, resulting in a revision of recent ABI values.



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