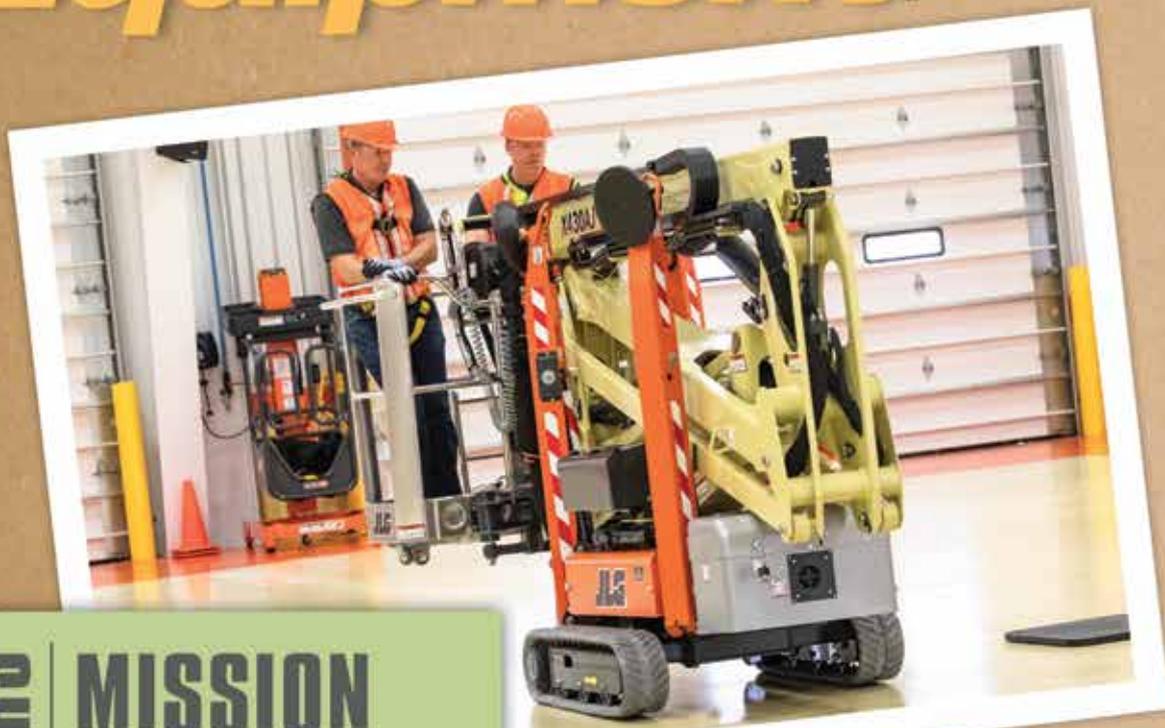


Compact Equipment

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June 2018



OPERATION EDITORS

MISSION

Bring the Operational Experience to Our Readers

TARGETS

- Volvo EW60E
- Kubota RTV-X1120
- JLG X430AJ
- Gehl V420
- John Deere G35





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Compact Equipment

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CANADIAN SUBSCRIPTIONS: Canada Post Agreement Number 40830553. Send change of address information and blocks of undeliverable copies to: KML Logistics Group Inc., 118 Herald Ave., Oakville, ON L6K 1S2 Canada

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On the Road Again

Our June Issue Encapsulates How We Educate Ourselves and Readers

Operation is the coolest part of this job. Over the last 18 years, I've gotten behind the joysticks and steering wheels of a zillion different machine models (maybe not an exact number). I've operated everything from giant mining trucks to tiny mini excavators, and those experiences (both operating and interviewing the machine experts) have provided me a great foundation to spearhead the editorial direction of one of the best machinery publications in America.

In fact, we actually like to differentiate ourselves as an equipment media brand by getting out in the field and operating machinery, and one of our big goals for 2018 was to get our staff out of the office to kick tracks, explore manufacturing facilities and operate the latest models changing the equipment industry. This June print issue is dedicated to not only running those cutting-edge machines and giving our insights about that experience but also visiting the facilities, talking to the head honchos and experiencing the culture these iconic machine brands create. I gotta say: It was pretty fun to do, and we're pleased with the results.

In this specialty issue of *CE*, we traveled around the country to operate everything from crawler booms and telehandlers to excavators and utility vehicles. We hit Volvo Construction Equipment in Shippensburg, Pa., to experience a wheeled excavator. We stopped by Kubota headquarters in Grapevine, Texas, to off-road some UTVs. We headed north to West Bend, Wis., to compare skid steers made my Gehl. We visited JLG and John Deere and operated all types of equipment, discussing technology and trends with the big brains at all these famous manufacturers.

It kind of made us realize that the office is a little boring, so in our next issue expect reports from us visiting two of the industry's top engine manufacturers — Perkins and Hatz — to better understand the evolving diesel industry and talk new tech and product. The best way to learn about the rapidly changing equipment industry is to get out and experience the machines and the brands behind them, and we'll continue to do that in every issue of *Compact Equipment*.

Keith Gribbins
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The best way to learn about the rapidly changing equipment industry is to get out and experience the brands behind it. That's why we're visiting Perkins in Kentucky for our July/August print issue.

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BACK TO A BACKHOE

Ohio Electrician John Herczog Finds the Perfect Fit with JCB's Compact 3CX Backhoe

By Pam Kleineke



In addition to working on jobsites, Herczog relies on the JCB 3CX Compact backhoe to maintain his 20-acre property, which we had the chance to visit in April.



John Herczog, owner of BMC Electrical and Mechanical Contractors in Newton Falls, Ohio, has been in business for more than 20 years, performing work for customers in the commercial, residential and military sectors (with some projects taking him as far as South Korea). To keep up with the demands of his job, Herczog needs a machine with enough power and versatility that comes with the ability to take on different attachments.

"In my business there's always something that comes up, so I need a machine that can handle the demands of different jobs," he says. "Attachments help me do work that I may otherwise have to hire out. It's nice to say 'Hey, I have a machine that can do that.'"

In December 2017, Herczog took ownership of a brand-new JCB 3CX Compact backhoe, the first one in North America to be outfitted with a skid steer attachment plate. However, his journey to the 3CX Compact came after a little trial and error with other machines.

Finding the Right Fit

Herczog first started off with a backhoe that served him well but lacked an important feature for someone who lives in an area with four seasons, a cab. Without a cab, it made it difficult to keep using the machine year-round.

"I loved that machine," he says, "but it didn't have a cab and the manufacturer didn't offer one on that particular machine at the time. It seems like every year it gets harder and harder to take the cold, and I used the machine a lot to plow snow, not only at my home but apartments I own in town,

so I would use the backhoe to drive out there. One day I just said, 'This is crazy. By the time I get there to plow snow, my fingers are numb.' So, that's when I started looking around, and I ultimately bought a track loader."

While the track loader boasted important features such as the ability to take all sorts of attachments and a cab, Herczog eventually realized it wasn't the machine for him.

"The track loader served its purpose, but I missed the backhoe," he says. "Plus, anywhere I took it, it had to be towed, because it was very slow as far as moving from job to job. Track loaders tend to ride rough. I also had trouble when I would move larger items and couldn't get out of the machine easily because the door would be blocked. On one particular job, I had large 3-ft spools of wire on a set of forks that we were unspooling as we worked. Once I was in the cab, I couldn't get out unless I took my door off."

After knowing what he wanted and needed in a machine (and everything he didn't), Herczog found the JCB 3CX Compact backhoe.

"I started seeing ads for this machine, and I said, 'This thing will do everything that I want.' Then I visited my local dealer, who happened to have one in stock, and I liked it," he says. "It had everything I was looking for: the capability to take skid steer attachments, a dedicated backhoe, a cab and plenty of power. Another benefit was that it doesn't weigh as much as a traditional full-size backhoe, nor is it as large, which allows me to pull it with a one-ton pickup as opposed to having to get something larger to move it."

Herczog has had the 3CX Compact for six months now and is more than pleased with his purchase — and happy to have a backhoe back.

“The backhoe is effortless, and the way it’s designed, you can slide it from left to right,” he says. “This allows me to get close to buildings to dig a trench, which you can’t do with a traditional backhoe. The backhoe actually tucks in behind the machine for transport, making it that much shorter not only for transport, but even maneuvering around a jobsite.”

Tools of the Trade

Thanks to the 3CX Compact’s skid steer attachment plate, Herczog has the ability to run hundreds of different implements off of his machine. He breaks down his most used tools.

“Obviously the bucket is my most used attachment, followed by pallet forks and a post hole digger, which helps when we install parking lot lighting,” he says. “I also use my four-in-one bucket, brush hog, concrete breaker and tamper a lot. In the winter I use a snow plow to clear my driveway as well as my neighbors’ who are elderly — it’s the neighborly thing to do. Sometimes I’ll rent attachments that I don’t have. Luckily, the skid steer plate allows me to do all that.”

Speaking of rental, Herczog mentions he has relied on it for his business in the past.

“I rented trenchers quite a bit when I had my track loader and just never bought one,” he says. “I would like to try a trencher one day on the 3CX Compact. If my work calls for me to dig a long trench, a trencher attachment would do the job quicker than using the backhoe.”

Customer Satisfaction

Herczog purchased his 3CX Compact from Burns Equipment in Macedonia, Ohio. In addition to the great experience he had working with the dealership, Herczog raves about the customer service he has received from JCB itself.

“The customer service from JCB is just awesome,” he says. “I’ve never had service like that before. The company’s regional backhoe manager came to visit me when he found out I bought this machine since it was the first one in the United States with a factory-attached skid steer mount. He came to my house for a couple of hours and asked a lot of questions about my experience with the machine.

“I can’t speak highly enough of JCB’s customer service — they really go above and beyond,” Herczog continues. “Typically, it’s very hard to get somebody at a large company like that to even spend a minute or two with you, let alone try to get hold of them. However, with these guys, all I have to do is call. Anything and everything I want, just call and they’re right there.”

Pam Kleineke is managing editor of *Compact Equipment*.

At just 6 ft, 6 in. wide and 9 ft high, the JCB 3CX Compact backhoe offers operators maximum maneuverability around jobsites.



TRIMBLE AND KOBELCO ANNOUNCE TRIMBLE READY OPTION FOR SELECT KOBELCO EXCAVATOR MODELS



Select excavators that ship from the Kobelco factory are now ready for the installation of the Trimble Earthworks Grade Control Platform for excavators.

Trimble and Kobelco recently announced the introduction of a Trimble Ready option for select Tier 4 Final Kobelco excavator models. Select excavators that ship from the Kobelco factory are now ready for the installation of the Trimble Earthworks Grade Control Platform for excavators, which can significantly reduce the cost and complexity of the installation for the contractor.

The announcement was made at Intermat 2018, one of Europe’s largest exhibitions for the construction industry.

“This is another significant step forward in the adoption of construction technology by Kobelco,” said Troy Rigby, OEM manager for Trimble Civil Engineering and Construction, Asia Pacific. “Allowing contractors to order a Tier 4 Final excavator from the Kobelco factory that only requires hand tools to install a full Trimble Earthworks system is an incredible advantage.”

Trimble’s Sitech global distribution network provides installation services, personalized training and local technical support for the Trimble Earthworks Grade Control Platform installed on Kobelco excavators. Sitech dealers understand how to apply Trimble Connected Site solutions across the construction site’s operations to effectively improve on- and off-machine productivity. For more info, visit kobelco-usa.com.

DITCH WITCH CUSTOMERS EXPERIENCE NEW EQUIPMENT AND TECHNOLOGY AT ANNUAL SEMINAR

Customers worldwide traveled to the Perry, Okla., headquarters of Ditch Witch, a Charles Machine Works Co., to participate in the annual Equipment Seminar on April 17 and 18. Experiencing an up-close look at customer-driven equipment enhancements and next-generation technology advancements, more than 300 global dealership employees and their customers attended this year’s event.

“Our customers play a vital role in the development of our equipment. We value their feedback, and we are committed to offering products that help them conquer jobsite challenges,” said Dennis Wierzbicki, Ditch Witch president. “The annual Equipment Seminar allows our dealerships and their customers to see and demo the latest underground construction equipment and new technologies that were designed specifically with their productivity in mind.”

The two-day event included an equipment program that introduced customers to the latest Ditch Witch equipment, featuring the new line of HX vacuum excavators, the advanced family of construction-grade mini skid steers and the Ditch Witch HDD training simulator. Attendees also received a tour of the Ditch Witch manufacturing facility and campus, spanning over 1.2 million sq ft.

Customers were able to experience product demonstrations from other Charles Machine Works companies, including Subsite Electronics, Hammerhead Trenchless and American Augers. For more info, visit ditchwitch.com.



More than 300 global dealership employees and their customers attended the equipment seminar.



BUCKET LIST

Let's Learn Our Bucket Options for Compact Wheel Loaders

By Giles Lambertson

Buckets and compact wheel loaders are made for each other. Literally. Yes, grapples and forks can be affixed to the front end of wheel loaders, but they smack of hood ornaments on a VW bug. A bucket is the money-maker for a wheel loader. So, the real question is, which bucket?

The ready answer is a general-purpose bucket that is neither too deep, nor too shallow and is equipped with a bolt-on wear-resistant steel edge that can be turned around when the leading edge becomes dull. A good general purpose bucket either can be pinned to a machine's hydraulic arms or quick-attached with a coupler. It is ideal for rental fleets and will range in capacity from .5 cu yds on up.

After the general purpose version of a bucket, however, the choices become a little trickier. Going to dig into the ground? You need a bucket with teeth to engage the turf or rocky soil. Going to be scraping along a concrete surface to collect material or pushing the front edge of the bucket into mounded material to scoop out a load? A straight edge will do ... but the shape of the bucket becomes a factor.

Wacker Neuson has shaped a bucket, for example, that specifically addresses the challenge of loading commercial fertilizer such as urea and potash. Fertilizer suppliers mound various bulk fertilizers in separate bays and wheel loaders repeatedly scoop and dump loads into a mixer to meet the chemical requirements of a particular customer. The problem comes in the slipperiness of the manufactured materials.

"Fertilizer is like picking up water," says Brent Coffey, Wacker Neuson's product manager for loaders. "It sloshes around and goes everywhere." To contain it and minimize spill, Wacker Neuson designed a custom-built bucket. "Once it rolls back, the bucket's angled edge is perfectly parallel with the ground. It is designed for our kinematics and sits flat and contains the material like the load area of a truck." To create the bucket, Wacker Neuson engineers worked with a leading attachment company to optimize the design to the specific demands of the fertilizer market. Coffey says the company tries to cater to the market by performing in-depth voice-of-customer sessions to ensure that the final product performs as the market intends.

Caterpillar actually patented its Performance Series wheel loader buckets, which feature flat floors, "open-throat" backs and rounded sides, all of which are designed to increase capacity and reduce spillage of materials. "This optimized shape is echoed across the general purpose, light material, sand and gravel and high-dump bucket families," says Amy Vincent, Cat work tools consultant. Vincent says all Cat buckets are designed in house.

It should be noted that some bucket configurations are not especially relevant to smaller compact wheel loader applications. Massive spade nose buckets, for example, have toothy, protruding lower edges and reinforcement at critical points and usually are attached to 10-ton and larger loaders to dislodge heavy rock. Other buckets are specialized and infrequently attached to compact loaders, such as tree-scoop buckets sometimes employed in nurseries and side-dump buckets that are jacked left or right to spill material from an angled bucket side plate. Compact loaders more often utilize buckets with especially flat floors and straight edges at the rear to perform light grading or leveling tasks. Caterpillar incorporates the features into some of its general purpose buckets.

So, there is no shortage of bucket variations for compact loaders. We haven't even mentioned grapple and clam-shell models for coarser material or snow removal buckets that sometimes have screened upper backs for visibility. Spilled snow is of little consequence, after all: The stuff eventually melts.

Yet another variation — multi-purpose buckets, as opposed to general purpose buckets — are gaining popularity, according to Vincent. “They enable an operator to gain additional functionality out of one tool. They offer excellent versatility. They are ideal for handling, clamping, leveling and grasping irregularly shaped objects such as stumps and debris.”

The Wacker Neuson 4-in-1 bucket functions as a scoop, grader, grapple and drag-leveler. Coffey says it is increasingly popular. “We see them growing rapidly in the skid steer and compact track loader market and expect to see the same for compact wheel loaders,” he says. “And it isn’t cheap. A general-purpose bucket is \$1,000 or \$1,200, but a 4-in-1 can cost three or four times more. People who use the value proposition in buying attachments find it way more practical to get a 4-in-1.”

SDLG released the 74-hp L918F compact wheel loader in 2017, with a rated capacity of 4,000 lbs. The new model loader can be equipped with either an ISO skid steer coupler (with a 1.0 yd³ general purpose bucket) or an ISO compact loader coupler (with a 1.3 yd³ general purpose bucket). The choice of couplers enables end-users to select from a wide assortment of extra attachments. This is impressive, given that the L918F is available for the price of a large skid steer, but it also raises an important question for customers.

“When working in the compact loader range, you have two options,” explains Nick Tullo, sales manager of SDLG North America. “You can either make your machine more versatile with skid steer attachments, or you can move up to an ISO compact wheel loader coupler for added lifting capacity, since the bigger coupler is stronger and can accommodate a larger bucket. The L918F enables end-users to go either route, but not all machines offer this versatility, so customers need to find out which couplers are available when choosing a machine.”

Another factor in selecting a compact loader bucket is dimensions. Obviously, the lighter the material to be loaded, the larger a bucket can be employed. “We size our compact loader buckets the same way we do our larger loader buckets,” says Sam Shelton, marketing manager for Hitachi Loaders America. “There is a rated or target payload that the machine is designed to handle. That determines what the bucket size should be based on the material being handled.” Shelton offers a formula for calculating appropriate bucket size according to bucket capacity: Divide a rated load by material density.

Wacker Neuson has created a guide for its buckets to help shoppers match a bucket to a compact machine. Coffey says buyers should pay attention to it. “You can take a loader and stand it on its nose because you have too much bucket. You can’t even back it up.” He adds that a lot of people don’t consider the weight of the bucket itself in calculating what a compact wheel loader can lift. That’s a mistake. Coffey has seen a compact loader designed to use a 1.5-cu-yd bucket fitted with a 3-yd bucket. “The bucket was about as big as the machine, but what it was carrying didn’t really weigh anything.”

KAWASAKI VS. HITACHI BUCKETS?



Hitachi Construction Machinery Loaders America is on the brink of introducing their four new Hitachi branded compact wheel loaders to market, including the compact ZW120-6.

If you own a Kawasaki compact wheel loader, you might ask if a new bucket from Hitachi Loaders America will fit your older machine. There are two answers to that question: “Yes” and “soon.” If the twin answers wedge some uncertainty into your mind, relax. The confusion is a consequence of an ownership change involving Hitachi Construction Machinery and Kawasaki Construction Machinery. In 2010, the two companies entered a joint venture to further develop wheel loader products. Six years later, Hitachi bought out Kawasaki. This year, Hitachi Loaders America will formally enter the North American market with its branded compact wheel loader line. Soon.

“The Hitachi brand compacts have not yet made it to the USA,” says Sam Shelton, marketing manager for Hitachi Loaders America. She adds, “As a matter of fact, the new Hitachi brand compacts haven’t been introduced anywhere else in the world.”

A quick visit to their website (hitachicm.us/USAProducts.aspx) reveals the specifications and a quick glimpse of what is to come. But back to the original question: Can that ZW50 bucket be coupled to its counterpart in the Kawasaki line, the 42ZV-2? Yes, it can, Shelton confirms. “KCM buckets are interchangeable with the Hitachi loaders.”

After properly fitting a bucket to a loader, manufacturers suggest operators follow some reasonable operating guidelines. Shelton observes that digging shot rock, loading out of a loose stockpile and dozing are different tasks calling for different techniques. “The main problem with dozing is that you cannot have the bucket fully rolled forward, or you can damage the linkage.” She also notes that a compact loader is designed for cycling operations, not constant load work such as “long dozing pushes. Care should be taken not to overheat the machine.”

The usual procedure of loading a trailer or truck from the middle out can cause problems for an operator because of sight limitations, especially when a bucket has a long floor. After dumping material, Coffey says an operator should consciously roll a long-floored bucket back up into scooping position before starting to back away. If not, the still-vertical floor of the long bucket will bang into the side of the trailer or truck. That is, at the very least, embarrassing.

Caution should be the watchword when scraping or dozing paved surfaces with a bucket, according to Coffey. This is especially true in regard to speed. Low-profile obstructions in the path of a speeding bucket can rudely awaken an operator. “The general practice,” says Coffey, “is to move along as quickly as possible to get the job done. There is no rule of thumb on appropriate speed, so people learn the hard way. You can tell something about an operator by how many grease spots are on the windshield where his forehead hit it.”

Giles Lambertson is a freelance writer for *Compact Equipment*.



Caterpillar’s Performance Series wheel loader buckets feature flat floors, “open-throat” backs and rounded sides, designed to increase capacity and reduce spillage.

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Be the First North American Journalist to Operate the EW60E Wheeled Excavator



This is my go-to, arms-folded pose.

OPERATION VOLVO

Excavators on wheels are a fairly new category of construction equipment in the American marketplace — especially small varieties. That’s what intrigued me about Volvo’s EW60E. It’s a compact size class excavator engineered on four wheels (not tracks), which allows for convenient road travel (similar to a backhoe) and excellent maneuvering (four-wheel drive) in confined spaces, digging and wielding other attachments from breakers to pipe handlers. The EW60E, which travels 18.6 mph, is an ideal machine for operators on the move — a municipality or road contractor — that would often prefer to road to a project rather than use a trailer and truck.

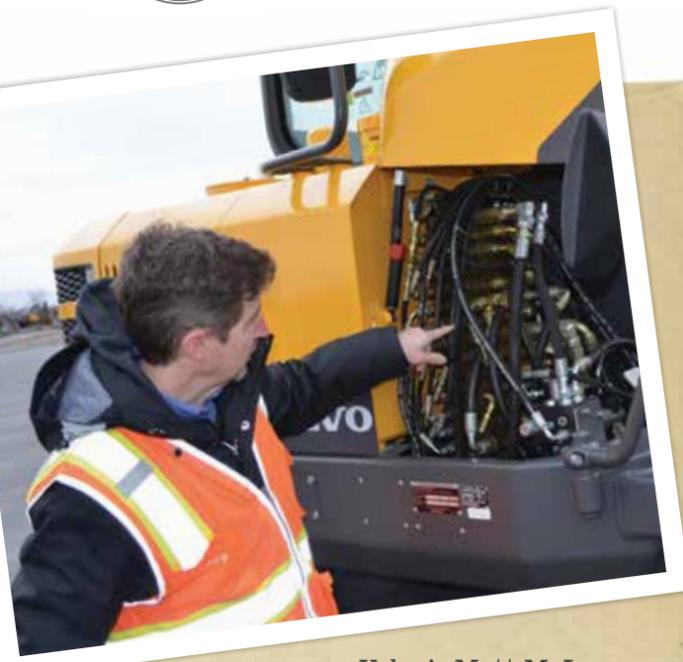
“So, you can obviously trailer this machine and go from job to job, but for an area like say Shippensburg, you can pretty much zip all around town in an EW60E,” explained Matt McLean, product manager for wheeled excavators at Volvo. “There’s probably no place in Shippensburg where you couldn’t get to within half an hour.”

Can we take it somewhere around town?

“Ha. You’d have to put on the flashers,” laughed McLean.

He quickly waved the sentiment away and politely pointed to the expansive operation area behind Volvo Construction Equipment’s Customer Center in its hometown of Shippensburg, Pa. There’s 40 acres, he explained, surrounding this state-of-the-art meeting facility (just built in 2014) designed to house sales and operator training and dealer and VIP visits with swank. Behind the actual center is a giant operator’s playground full of simulated jobsite applications. Excavators of all sizes are set up in a giant circle, ready to dig in thick Pennsylvania mud. Volvo haul trucks are navigating around an obstacle course with speed and precision, and a group of random trainees is huddled in a circle in front of it all, devising a plan, eyeing everything from skid steers to wheel loaders.

Volvo CE has also invited me to this destination to be the first journalist in North America to operate its new EW60E compact wheeled excavator, but before I’m encouraged to go play in the muck (it’s an extremely muddy day in late April), McLean gave me a walk-around.



Volvo's Matt McLean explaining the EW60E.

"The EW60E replaces the EW55B, which actually went out of production I believe around 2009," he said. "So, we were out of this market for a little while. When we came back, we had to make it better, and one of the things they did was combining the crawler and the wheeled technologies. Because you have two different engineering teams, one in Germany, one in Korea. They were forced to work together, so this is the first series where the wheeled and the crawler internally look almost the same. For example, if you go into the cab of one, and I put you in one of the crawlers, even the full-size crawlers over there [he pointed to a mud field full of diggers], you should be able to find your way around because so many of the controls and the layouts are going to be identical to what you're seeing here."

I jumped up into the cab. Besides the big steering wheel, the EW60E definitely feels and operates like other Volvo excavators, with maybe a little more comfort and control capabilities. The EW60E features the latest generation Volvo cab which claims 10 percent more space than prior compact versions, including more room behind the seat. I threw my cell in the phone tray, inspected two power sockets, plopped my bottled water in the cup holder and kicked around the three other large storage areas. I should have brought lunch.

I eyed the large 7-in. color LCD display and a series of keypad groups on my right-hand side, which create a cluster of easily accessible navigational tools. I could create hot keys on the joysticks to swap boom functions, control hydraulic flow, lock the axles (yep, there's axles), engage travel, work the dozer blade or initiate attachment usage. I could even drive the unit with the joysticks, instead of the big steering wheel in front of me.

"And what happens if you're in a panic and you use the steering wheel? The wheel will override the joysticks," said McLean, noting another cool feature: "And here's your axle lock button. There's oscillation on this unit because it's a wheeled off-road machine. So, if you want to stabilize it, you'll push that and that's when it will lock your axles, so that if you picked up a heavy load, it's not going to dip down."

The Experience

The experience of digging and/or picking and placing with a wheeled excavator is somewhat different than a tracked version. Digging, lifting or dumping while extended from the side does have a different feel. "There is going to be a little bit of a trade-off on that sensation you have while digging," McLean admitted. Also, wheeled units don't have the traction of an undercarriage and set of tracks. As I dug through the impressively dense spring sludge, the bucket and boom dragged the wheels forward. Using the dozer blade to counterbalance that lack of traction was essential. But those same wheels also allowed me to road at over 18 mph, and while the EW60E only sits about a foot higher than its tracked counterpart, it definitely felt like a higher, bigger and better view from the cab.

"For an operator who is used to tracks, there are obviously the advantages of roading," explained McLean. "It may also depend on what you are operating on. Road work is ideal. The size, despite the fact that the [EW60E] isn't a short-swing machine, it's not sticking out that far. So, if you're in tight spaces, working on asphalt or concrete, then tires are obviously a great idea."

My particular EW60E was fitted with a tiltrotator that allowed the bucket to spin for any angled excavation. It was awesome. The tiltrotator also had a grapple on the back of the bucket which allowed me to flip the bucket and easily pick up stones. "Add in an optional tiltrotator, coupler and the hundreds of attachments available for these machines and you have the ultimate in flexibility for any job," said Ray Gallant, vice president of sales support and also McLean's manager, giving additional insight into the wheeled ex market. "Although the current wheel excavator segment in North America is still small in comparison to Europe or Asia, we see a significant growth opportunity in North America for this type of machine."

The EW60E looks to capitalize on those opportunities, fueled by is a 60-net-hp Volvo Tier 4 Final engine and adjustable hydraulic flow. McLean was quick to note that the EW60E has 12 percent more horsepower than prior series models while delivering a 10 percent improvement in fuel efficiency due to a smaller displacement engine with a turbocharger. The standard auto idle feature helps to reduce fuel consumption even further, and a unique optional feature from Volvo, called auto engine shutdown, shuts off the engine automatically after a preselected idle time, lowering fuel costs and noise.

The EW60E is also equipped with features designed to ease service. "You have ground level access to almost everything," said McLean. I especially dig that service intervals can easily be moni-

OPERATIONAL ADVICE

By Matt McLean, Product Manager for Wheeled Excavators at Volvo CE

I typically recommend when you're putting spoils back from an excavator that you never sweep across because that's going to put excessive load on the pins. Usually, if you can't reach material over here, I would actually move the excavator to be perpendicular and approach the pile from straight on. So, if you're doing your cleanup work, it's never a good idea for the excavator to just sweep across. As far as the actual digging, generally just make sure you're well-anchored when you start. It just depends, especially on a slick day like today, even if I had triple-grousers, if I had a dozer blade I would definitely sink the dozer blade to make sure I don't get pulled.



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tored via the in-cab screen, which displays maintenance reminders. The EW60E also comes standard with Volvo CareTrack telematics and Volvo MATRIS (Machine Tracking Information System) software — fleet management technology to remotely monitor a wide range of machine diagnostics in real time.

“These services see the warning signs before machines break, telling you to stop, fix the problem and by doing that we maintain the uptime of the entire vehicle over its lifetime,” said McLean.

Shippensburg Manufacturing Center

Right next door to where we’re operating was Volvo CE’s Shippensburg manufacturing facility and North American headquarters — a site that houses more than 1,000 employees and currently manufactures soil and asphalt compactors, motor graders, pavers and screeds, wheel loaders and milling machines. Also, in the facility is the Volvo CE Uptime Center, featuring ActiveCare Direct, which is one of the industry’s first OEM direct-machine monitoring services. Volvo monitors thousands of machines in real time (24/7/365) and automatically filters and prioritizes actionable alarm codes.

In addition to proactive monitoring, the center delivers monthly fleet utilization reports directly to the customer and the dealer. This center could monitor the EW60E I operated to help prolong the life of the unit, improve uptime and reduce my total cost of ownership. After operation, I’m invited to tour these facilities with Ian Harvey, director of product marketing for Volvo. He explained that the Shippensburg facility has been producing quality construction equipment for more than 30 years. The

business was acquired by Volvo CE from Ingersoll Rand in 2007 for \$1.3 billion. Expansions included a new assembly hall and materials building, the addition of wheel loaders to the product line and the relocation of the sales team from Asheville to Shippensburg.

Welders, large machining, paint facilities and teams of workers assembling Volvo iron highlight an interactive VIP tour that also allows visitors like myself an opportunity to get hands-on in the manufacturing facilities, inspecting welds, operating torque guns and performing cab sound inspections.

“Volvo has not only invested heavily in its manufacturing facilities in Shippensburg but has a world class Customer Center on site,” said Harvey. “Here, the Volvo team hosts many different types of events, from one-on-one specialized customer visits to events with over 1,000 people attending. During the year over 10,000 people will visit the Volvo Customer Center. One of the main features of the Customer Center is the ability to showcase the full lineup of Volvo equipment at work and show it working in many different simulated jobsite applications. As part of an individually customized VIP or dealer visit, our guests are shown around our entire campus, including the manufacturing facility. Here, they experience many hands-on features and get to see many of the state-of-the-art manufacturing processes.”

It’s an experience CE readers can enjoy for themselves. Ask your local Volvo dealer, and while you’re there, take an opportunity to operate the new EW60E. I’d be interested in hearing your operational thoughts on these new wheeled excavator tool carriers entering the U.S. market

Keith Gibbins is associate publisher of *Compact Equipment*.



Volvo’s Ian Harvey making the tour fun.

COMPANY CULTURE

By Stephen Roy, Volvo CE President

One element of Volvo CE’s culture is that it is customer-centric. In practice, that means that everyone here knows that a customer’s uptime is key to them and is working together to maximize it. You see this in built-in quality coming out of the factory, how we proactively monitor machine performance, the responsiveness of our support technicians and engineers and the way our senior management has their eyes on any machines down every day. We view this as the way we contribute to our customer’s success and are building the future we want to live in.

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By Pam Kleineke



SPECS

Engine Horsepower:

24.8 hp

Type of Engine:

Diesel

Max. Travel Speed:

29 mph

Payload Capacity:

1,102 lbs

Towing Capacity:

1,300 lbs

MISSION

Learn What Makes the New RTV-X1120 the Perfect Utility-Focused Vehicle



Todd and I enjoyed our day test driving the RTV-X1120.

OPERATION KUBOTA

Utility vehicles, or UTVs for short, have been gaining popularity throughout the construction industry thanks to their ability to move materials and people around a jobsite efficiently and for less cost than a traditional pickup truck. Add on the fact these vehicles can take attachments and, well, that's just icing on the cake.

While UTVs pack a productive punch, they're also just plain fun to drive. So, when I was tasked (I use that term loosely) with visiting Kubota for our Operator Issue, I gladly booked my ticket to its corporate headquarters in Grapevine, Texas. There, product marketing manager Roger Gifford spoke about the company's latest model, the RTV-X1120, and then let myself and my colleague Todd Miller take the wheel. Together we learned all about the vehicle's features and experienced firsthand what makes the RTV-X1120 a true workhorse.

"The new RTV-X1120 models are Kubota's most well-equipped utility vehicles at the best price among its competition," said Gifford. "They're designed for the

commercial customers who use these machines for heavy-duty work every day."

The first two features Gifford discussed were the RTV-X1120's engine and transmission. Naturally, he gushed a little over the vehicle's Kubota-branded 24.8-hp diesel and hydrostatic transmission (a feature brought over from the company's tractors).

"We're a compact tractor manufacturer. We built our company on compact technology," said Gifford. "When it came time to build the RTV-X1120, we built it on what we knew best — a diesel engine and a hydrostatic transmission. A lot of manufacturers in this industry use a CVT transmission, so this is where we really start to vary from our competition. By going to a hydrostatic transmission, you give the vehicle better working capability and more durability so you can handle those demanding worksites.

"The real big difference in this type of transmission is it changes how the driver operates it," he continued. "If someone is driving a UTV with a conventional CVT and



My colleague Todd Miller got to experience the RTV-X1120's hydraulic bed lift firsthand.

OPERATIONAL ADVICE

By Roger Gifford, Product Marketing Manager

When operating the RTV-X1120 Series or any RTV-X Series machine, always keep in mind you are operating compact tractor technology versus power sports technology. This simply means when extra performance is needed, like when climbing hills, ease back on the speed control pedal to allow the VHT-X (hydrostatic transmission) to deliver the torque needed to the wheels. This operation is the same as operating a hydrostatic tractor.

needs more power, they just push on the accelerator. When you do that with ours, the power goes away. When you're driving a vehicle with a hydrostatic transmission on an incline or grade and you need extra power, you always ease back on the pedal and the transmission will kick in and give you that power to climb a hill. This type of transmission lowers engine RPMs, improves fuel economy and increases the machine's overall durability."

During my test drive, I had the opportunity to experience the hydrostatic transmission. Despite Gifford warning me about the need to let off the pedal ahead of time, I instinctively hit the gas going up a steep hill. Luckily, he was riding shotgun, told me to ease up and sure enough the RTV-X1120 handled that hill without a problem. I tested it out on several more hills for good measure (it's a tough job, but someone's gotta do it).

"When discussing the RTV-X1120 with someone, we really try to educate them on how to run this type of transmission," he said. "That's the biggest learning curve when operating it."

Next up was checking out the RTV-X1120's dynamic braking system. Prior to my test drive, Gifford discussed the system and how it's designed to create a more utility-focused UTV.

"We designed the machine to brake when you let off of the gas pedal. When you let off on it, the pressure actually keeps working so you're using the wheels, the axles and the whole drive system to give you the extra braking power to create a stable stop. This is a pure utility vehicle. It's a working machine that's designed to operate on those demanding sites."

Gifford pointed out that the transmission and braking system (a feature also derived from Kubota's tractor background) work in tandem to make the RTV-X1120 a more work focused vehicle. "Since the RTV-X1120 has the hydrostatic transmission, the operator doesn't have to put a lot of pressure on the brakes," he said. "If you're moving material around the jobsite, it's a huge benefit."

I gave the dynamic braking system quite a workout throughout my test drive, especially in the earlier portion of it as I got comfortable with the vehicle. Hesitation kicked in around some bumpy terrain, causing me to let off the pedal and engage the braking system, but Gifford assured me I could roll over curbs, larger rocks and whatever else came our way. Yep, he was right. I was able to maneuver over all those obstacles without a skip in my step. Easy peasy.

Gifford also discussed the RTV-X1120's hydraulic power steering — a unique feature in the RTV Series. This type of steering was selected to help minimize operator fatigue and boost productivity. Bonus points for the steering wheel being tilt-adjustable, allowing drivers to set the perfect angle for their comfort.

"With fully hydraulic power steering, you won't experience kickback when going over curbs or other bumps like you would with other machines," he said. "The wheel on the RTV-X1120 won't move. It will actually withstand the hydraulic pressure, and you won't have that steering wheel kickback. This really enhances the operation of the machine.

"If you're on a jobsite moving dirt and materials around all day, that kickback would eventually cause fatigue in your arms. That is not going to happen here. Our power steering

eliminates that fatigue which ultimately increases safety and productivity."

We took a brief break in our test drive to shoot some photos and take a closer look at the RTV-X1120's hydraulic bed lift, which allows operators to dump the heavy-duty steel cargo box with ease. The cargo box has the capability to haul 1,102 lbs of materials around a jobsite. The RTV-X1120 also features standard 2-in. receivers on the front and back for towing up to 1,300 lbs.

Taking the Tour

Our visit to Kubota wasn't all zipping around on UTVs. We also had the chance to tour the company's picturesque corporate headquarters (which earned its Gold LEED certification late last year). The building, which opened in January 2017, sits on 27 acres of land that was purchased from former Texas Ranger baseball player Rafael Palmeiro. Everything in its design incorporates Kubota's "For Earth, For Life," motto, from recycled materials used throughout the building (reconstituted ebony in the wall paneling, rocks from the original site) to the membrane system used for water filtration (the Kubota Japan-branded system filters rain water and uses that water for the building's plumbing and irrigation).

The corporate headquarters, which sits on the highest point of Grapevine, was constructed by Corgan Designs and is divided up into a 164,000-sq-ft main facility and a 64,000-sq-ft R&D department. Visitors are greeted by newer Kubota machines at the front entrance outside, while older tractor models from the 1970s welcome you on the inside.

"It's really cool to see where Kubota has come from over the last four decades," said Chris Balsly, HR administrator and tour guide. "One of the models we have on display is our L200 Series, which was the first tractor introduced in 1972."

After taking a quick peek at the R&D department, we ventured over to the main three-story facility which houses everything from human resources and payroll to product planning and parts. Immediately, we noticed the building's living wall, which fits perfectly with the "For Earth, For Life" theme. The wall extends all three floors with live plants on the first, brown dirt on the second and blue sky on the third. Balsly then showed us the cafeteria, as well as the seating areas throughout the space.

"When designing the building, the company wanted to go for an open collaborative environment to encourage employees to meet on the spot and not have to reserve a conference room," he said. "You'll see a lot of open seating, especially around our coffee bars, so people can sit down and work together."

Balsly also showed us various classrooms and conference rooms (each one is named after a geographical spot in the United States), as well as the company gym and outside deck which overlooks the property.

While our visit to Grapevine was short (less than 24 hours), we certainly learned a lot during our time at Kubota. There's nothing quite like an informative (and fun!) test drive to better appreciate the features that make the RTV-X1120 unique. Not a bad way to spend a Monday. Not bad at all.

Pam Kleineke is managing editor of *Compact Equipment*.

COMPANY CULTURE

By Roger Gifford, Product Marketing Manager

"For Earth, For Life" is much more than Kubota's brand statement. It's a mission we dedicate ourselves to as a global company. We are committed to engineering excellence so that our customers can focus on planting, feeding, building and caring for our world.



Kubota's corporate headquarters became Gold LEED certified in late 2017.



By Chris Crowell



SPECS

Operating Capacity (50%):
4,200 lbs

Overall Height to Top of ROPS:
82 in.

Height to Hinge Pin:
143.8 in.

Overall Machine Width:
81 in.

Breakout Force:
9,040 lbf

MISSION

We Contrast Two Gehl Skid Steers But Find the Biggest Value Beyond the Iron



OPERATION GEHL

I ventured to Gehl's headquarters in West Bend, Wis., to operate a barebones R105 and a fully loaded V420 — the latter being the largest skid steer in the world. It was a glimpse into life at opposite ends of the operating spectrum, but relaying the view from the cab is only a skid steer-sized portion of what Gehl and its parent company Manitou Group are doing to innovate compact equipment operation and ownership.

Gehl Snapshot

For nearly as long as there has been a West Bend, Wis., there has been Gehl. Founded 11 years after Wisconsin became a state in 1859 as a manufacturer of agricultural equipment, Gehl has a storied history in the state. Gehl acquired Mustang in 1997 and then was acquired by Manitou Group in 2008, a French company with similar family roots. Today, Laurent Bonnaure, executive vice president of Manitou Group, and Mark Hanson, regional vice president of Manitou Group and CEO of Manitou North America, are focusing their fresh eyes on the customer experience.

"We're looking at everything we do across the organization and eliminating processes that are not value added for our customers and for our team in order to deliver on our brand promise," Hanson said, adding with refreshing honesty: "We're even looking at the brand promise. It's not as well defined as it needs to be. There's a lot of work ahead, but there's a great foundation here and we will be adding resources in a number of areas as we realign our focus on

the customer experience."

This realignment continues to take shape, but customers are already seeing benefits from a more focused customer support structure.

"We recently added new leadership to our Manitou North America product management team and will be growing and aligning the team with marketing and training teams to drive a cohesive strategy from concept through execution. Our product management team will be seeking out the voice of customer to ensure the products and services we bring to our customers are a tight fit with their needs and that they provide reliable performance, a low cost of ownership and strong return on investment capital," Hanson said. "It can be a pretty simple formula — learn the competitive map, listen to customer's needs, provide good value, solid support and be easy to work with."

The team looks at everything in terms of production, lead time, cost and any additional specificities gleaned from R&D that would enhance performance and reliability across the entire Manitou Group product range, which includes (deep breath) all-terrain fixed, rotating and heavy-duty telehandlers, all-terrain, semi-industrial and industrial masted forklifts, skid or track loaders, backhoe loaders, access platforms, truck-mounted forklifts, warehousing equipment and more than 2,000 Edge attachments.

The end product of this calculation is a machine that fits a direct need while minimizing total cost of ownership. More on that later.



Test driving a barebones R105 and a fully loaded V420 was a glimpse into life at opposite ends of the operating spectrum.

OPERATIONAL ADVICE

By Nathan Ryan, Global Product Manager for Excavators, Skid Loaders and Track Loaders

Skid loader operators can follow these few simple guidelines to minimize cost of ownership. To extend the life of the tires, practice gradual turning when space allows, versus sharp counter-rotation. To lower fuel consumption, use the foot throttle to increase engine RPM only when you need it, instead of operating with a wide open hand throttle. To prolong the life of the machine, follow routine maintenance guidelines and regularly grease the components.

Let's Operate the R105 and V420

The overall market for skid steers has plateaued, but it remains a classic American compact machine for both weekend warriors and professional contractors, and I wanted to feel the experience from both sides, starting with the basic model.

The R105 is a standard skid steer, but it's integral to Gehl's lineup as it pursues a bigger piece of the rental market, a prime target of Bonnaure and Hanson, both of whom have deep ties to the rental business.

"Our way to market is important," Bonnaure said. "We are working to strengthen our dealer network as well as organizing ourselves to address the large rental companies with enhanced direct service. We are looking to align our dealer market with broader market opportunities, looking at the largest markets — California, Texas and Florida. A lot of our dealers are legacy companies in dairy and closer to factory manufacturing. We're looking into larger equipment sales markets to make sure we have a solid network to serve and support the larger markets in North America."

Key to a rental machine is its durability, ease of use and price point, and the value conscious R105 checks all of these boxes making it a good fit for smaller applications and rental customers. As someone in that weekend warrior set, I appreciated the purposely de-featured design. It was easy to hop in and intuitively figure out the T-bar controls, which — big shocker to me — I preferred over the joystick controls of the V420. Obviously, joystick controls are the trend for professionals today and are extremely responsive and low effort. If I was operating equipment every day, I could see becoming a Picasso with those. But for a novice like me, in the time-frame I had to get comfortable, the joystick seemed almost too responsive, at least after having started out on the R105.

Bottom line, whatever your control preference, Gehl has it ready.

"What's not as commonly known is our control option availability," said Nathan Ryan, global product manager for excavators, skid loaders and track loaders. "We are flexible and offer a T-bar control system, joy stick and hand foot, and we even offer a kit for H pattern. If you're accustomed to a given style, we can accommodate you."

The V420 came about after Gehl paused in producing its largest skid steer at the time, the V400, to upgrade to the current Tier 4 Final engine. Customer feedback indicated they should also extend the machine's reach. The 400 was reborn as the V420, the largest skid steer in the world, and it lives up to all parts of that claim. Looking up at the bucket at its highest point, I definitely forgot I was in a skid steer. But I quickly remembered when backing up and easily maneuvering within a compact footprint.

The Gehl team recognizes this won't be a high volume seller (the 200 Series is the most common skid steer size) but being the largest in the category is a point of pride to tout as well as an asset to specific niche customers that need hydraulic power, zero turn and low operating height. Think larger material movers, ag and tree trimming applications.

"We also see this used in land clearing, asphalt and recycling," Ryan said. "Those looking for high performance and a robust hydraulic center for attachments such as cold planers and brush cutters. Some small telehandlers and tractors can match the hydraulic performance of the V420, but you won't get the same zero turn radius and low operating height."

All Gehl loaders, from the smallest to the largest, are equipped with industry-exclusive hydraulic attachment systems (All-Tach on the R105, Power-A-Tach on the V420) and are ideal for less-than-ideal conditions — great responsiveness in cold weather (as I discovered since Wisconsin generously greeted me with a huge mid-April snow storm) and when mud is caked on the attachment plate. Changing attachments from inside the cab is a breeze.

While I had my learning stumbles with the joystick controls, all of the other bells and whistles made this a perfect work station for an owner/operator, with an easily configured digital display in sight and features like rearview camera coming standard. And god bless the standard air ride suspension seat.

"What we see from a customer standpoint is those who choose the larger skid loaders most often prefer more options," Ryan said. "So we released the V420 with select configurations which streamlines manufacturing and allows us to deliver the machine quicker and already equipped with those upgraded options our customers are requesting."

Beyond Operation

Operating equipment for a day won't reveal Gehl's big differentiator: total cost of ownership. TCO is a borderline obsession for Manitou Group, and all Gehl product development and company initiatives revolve around it.

"Our customers are buying uptime," Bonnaure stated, which means calculating how even the smallest decisions affect the lifetime performance of a piece of equipment and its impact on an operator's time. A great example is the IdealTrax tensioning system on Gehl track loaders, which uses the hydraulic cylinder to automatically tension the tracks, removing this maintenance task from the operator's to-do list while increasing reliability (operator's won't accidentally over tension the system or forget to check) and extending track life.

"From a product standpoint, we understand the features and benefit set that will position us in the market," Hanson said. "But we are also looking at how we provide additional value — extending service intervals, reducing cost of ownership and cost of operating. We want reliability baked into the DNA of all of our products."

Manitou Group launched its Service and Solutions division for Gehl, Manitou and Mustang products in 2014 with the goal of reducing service and maintenance headaches for owners, allowing them to focus more on operating. In a way, most equipment has evolved to the point of parity, which makes innovations in service real differentiators, and as a cord-cutting, ride-sharing, Blue Apron subscribing consumer, the attention to details in this area stands out to me the most during my visit.

- Gehl now provides options like a maintenance kit subscription, in which, after every 1,000 hours, you'll receive a shipment of filters to switch out.
- At the design level, a lot has been done to increase service intervals, from 500 to 1,000 hours and 1,000 to 1,500 hours in some cases.
- Maintenance contracts that are near full service leasing deals: A customer pays a flat fee per month that includes everything from financing of the machine and all attachments to service and downtime.

These options can all be sliced and diced to meet the preferences of any buyer.

"Look at any industry, the trend is people are moving away from owning a machine to using a machine. There's a trend of outsourcing more and more. So we as an OEM must be prepared to offer the best service solution to the customer, taking into account the residual value of the machine and optimizing the cost," Bonnaure said. "Labor is important and part of TCO. You save time if you select the right machines and can do something in 20 seconds instead of 30 seconds."

Chris Crowell is a contributing editor of *Compact Equipment*.

COMPANY CULTURE

By Rick Alton, President, CEP Division

We're making significant strides to be a customer-first organization. In terms of the operational side or R&D or customer support, we're becoming more customer focused. It's important to me that our employees view customers as the fulcrum point of what we do every day, and this becomes engrained in our culture. We're working hard to make sure we build on the legacy that we have.



Gehl's state-of-the-art R&D center in West Bend, Wis., is the epicenter of new innovation — where engineers make customer's ideas come to life.



By Chris Crowell



SPECS

- Engine Horsepower:
23.3 hp
- Max. Digging Depth:
10 ft
- Max. Reach:
17 ft, 1 in.
- Bucket Breakout Force:
6,085 lbf
- Operating Weight:
7,760 lbs

MISSION

We Find the Secret to the 30-Year Success of the Deere-Hitachi Line of Excavators



OPERATION DEERE-HITACHI

I ventured to the John Deere-Hitachi manufacturing facility in Kernersville, N.C., to check out the new features on its line of excavators. But before we hop in the cab and tool around in the new diggers, it's important to understand the ecosystem from which that final product emerged.

The Kernersville facility is sprawled over a 1 million-sq-ft campus, involving more than 800 employees building made-to-order 13- to 47-metric-ton excavators from "steel to real" in 8 days, and it would not happen as seamlessly as it does without the combined influence of both John Deere and Hitachi, a partnership celebrating its 30th anniversary this year. Thirty years ago, the idea was to combine Deere's branding, marketing and North American dealer presence with Hitachi's hydraulic and excavation engineering expertise. Mission accomplished, but over those decades, there's also been a very real blending of Eastern and Western values that you can see throughout the entire facility — from the layout to the workflow to the excavators in the field.

"The 30-year Deere-Hitachi partnership is unlike any other joint venture in the industry and is a testament to the longstanding mutual respect and dedication of our teams," said Jon Chase, president of Deere-Hitachi. "Combining the strength of Hitachi's world-leading hydraulic excavator technology with the resources and might of the 180-year-old John Deere brand, the alliance produces excavators for the world's best customers."

This starts with the concept of Kaizen, a Japanese word for small improvements that lead to the greater good. Kaizen is a guiding principle of Deere-Hitachi.

Chase told us a lot of these small improvements started with a new approach to manufacturing safety to prevent all accidents — the STOP program. Again, some small changes to each worker's routine, the number of safety audits done (one a week), a video screen at the entrance of the building that tabulates the number of consecutive incident-free hours of production — currently a record 6 million hours without a loss time injury. The STOP program dropped incidents by 300 percent, and the success of the program made them say "hey, why don't we take the same approach to quality assurance?"

Touring the manufacturing facility revealed a collection of Kaizen vignettes that would be easy to miss on their own amid the advanced welding robots, CNC machining centers, plasma plate-cutting and ceiling high cranes transporting 25 tons at a time. There were the color-coded jig cut-outs as quick visual reference. The welders pausing before welding shut a boom so those inside welds could be inspected (100 percent of all welds are inspected). The photos that adorn certain working spaces to show exactly how it should look at the end of the day (to minimize misplacement and clutter). The cutting machines that were sunken into the floor versus plopped on top to improve ergonomics.



OPERATIONAL ADVICE

By Jonathan Spendlove, product marketing manager, excavators, John Deere Construction & Forestry

Don't forget to take advantage of the different work modes on the 35G or your other John Deere compact excavators. For most general digging, choose Power Mode. For lighter digging, Economy Mode will get the job done and will increase fuel efficiency. Utilize the arm power in the machine. Digging a flat trench when arming in can eliminate a clean-up pass that would be required if you dig only with the bucket curl.

The manufacturing process is also purpose-driven for each employee. The basic task in each station is the same, but the built-to-order model ties every new job to an individual buyer and a specific design. Tying each project to a real end-user, and each team member being accountable for their role in building an errorless machine for that customer leads to a quality final product.

What's New?

The coolest new technology was Grade Guidance which, sorry to say, is only available in the larger excavators at the moment — the 210G LC excavator was the most recent to have this factory-installed.

The grade guidance system, developed in cooperation with Topcon, and its integration into the ever-evolving cloud-connected construction machine of the future will change the job of the operator forever. Deere-Hitachi Grade Guidance provides operators with information on the bucket's location with respect to a 2D reference or 3D design surface and is ideal for digging trenches for pipe, shaping ditches or slopes or digging structure foundations.

The integrated grade guidance displays the elevation and position of the bucket cutting edge with respect to a target plane (2D) or design surface (3D). Factory integration and calibration ensure the machine arrives on the jobsite ready to work and puts grade guidance at the customer's fingertips. JDLink integration provides information on system utilization and allows rapid diagnosis of problems. The grade guidance system will be available on the 350G LC and 470G LC excavator models in the next year.

Let's Try Stuff

Grade guidance on its own already seems foolproof, which I say confidently because I am definitely a fool and was shocked at how precise I was with help from the alert noises (which I preferred over the visual commands). This was a press event, so there was a large group of trade journalists there trying out the grade guidance system. Having been to a lot of these events, I have an expectation for how this looks from the ground. Let's just say this is not our day job. But on this trip, with the aid of grade guidance, everyone looked to be a pro out there.

But that's just guidance. Coming in 2019, Deere will be producing grade control systems that automate a lot of the movements.

On the compact side, I hopped in the 35G. Now, the cab felt spacious to me, but I'm a little guy, so that opinion might not translate for everyone. Digging and movement was so smooth. Even without a guidance system, I didn't have choppy moments or get stuck pulling the bucket back through the fairly thick mud (it rained a ton the day before) that I am used to having as a novice operator. The Hitachi hydraulics are renowned for handling any high-flow attachments, and that was apparent. On the Kaizen side, there was a handy switch under my seat to shift controls from excavator to backhoe depending on preference or the job at hand.

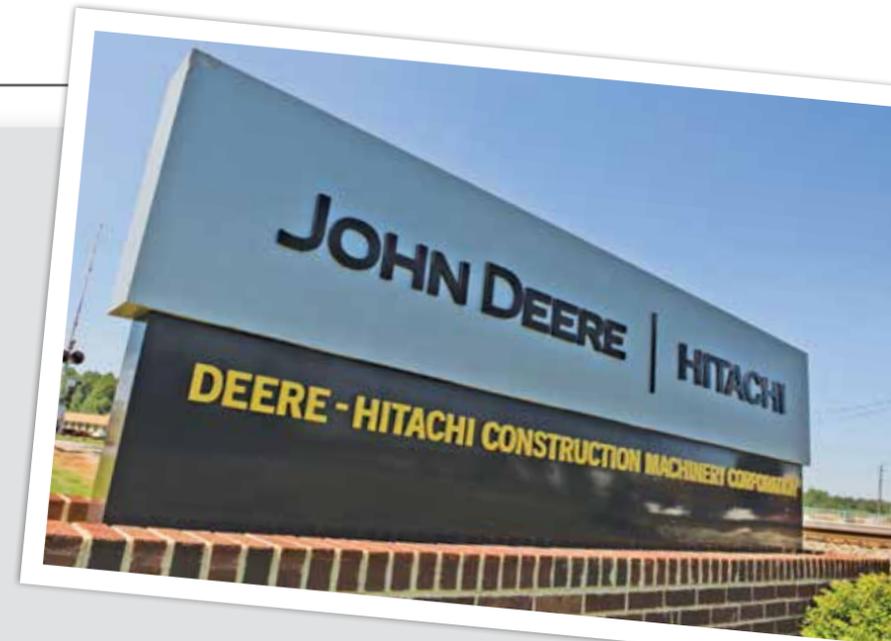
Final thought: I honestly think the company culture, design process and workflow that led to the machine I was sitting in, in some small way, helped me operate it, either because it was inherently easier to operate, or it all had a placebo effect on my skills. Either way, it worked. And with that, I say *Sayonara* to Kernersville.

Chris Crowell is a contributing editor of *Compact Equipment*.

COMPANY CULTURE

By Graham Hinch,
division manager, John Deere
Commercial Worksite Products

The culture of the CWP division is deeply rooted and aligned with our core values of integrity, quality, commitment and innovation. While our core values guide our approach to business, we also strive to be the voice of the customer and do everything we can to deliver value that will benefit their operations.



The Deere-Hitachi partnership is in its 30th year.

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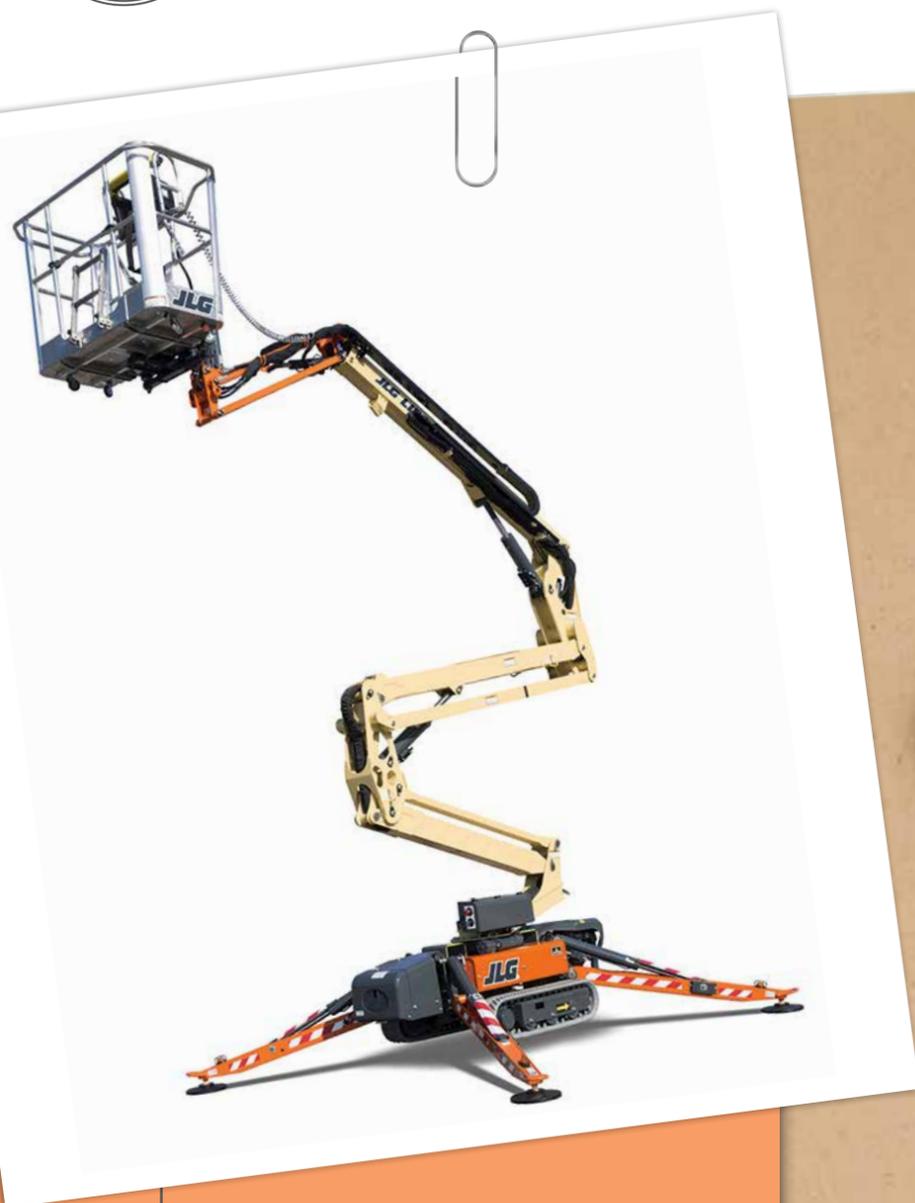
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By Keith Gribbins



SPECS

Platform Height: 43 ft, 6 in.

Platform Capacity: 500 lbs

Overall Width: 29 in.

Drive Speed: 0.87 mph

Battery Powered: 8 hours of life

MISSION

Uncover the Awesomeness Behind the Crawler Boom Category of Equipment



I dig the option of operating remotely.

OPERATION JLG

Compact crawler booms just have a cool look — like some mechanized arachnid — its knuckling boom craning like a scorpion. Despite their awesome appearance, I was impressed by how safe, slow and evasive a compact crawler boom really is. It's a category of aerial lift machinery that's only recently been showing up on American jobsites, in warehouses, on tree trimming projects and in places where pros need to lift people and tools both up and over safely without moving the unit.

The JLG compact crawler boom I had the opportunity to operate also had a ton of impressive features that went way beyond its articulating boom and jib, including low-pressure, non-marking tracks that expand in and out, a sturdy set of auto-level outriggers that can work on uneven surfaces, green operation and power options, super easy drivability and the amazing ability to fold up and fit through a frickin' doorway. I've concluded that a compact crawler boom has a high cool factor for aerial lift machinery, and I'm not alone.

"I always like to call it the sports car of machines that we make here at JLG. It's different enough that it has an appeal all its own. Very specialized, very unique and sells at a premium compared to a lot of machines," said Randy Marzicola, director of business development at JLG. "But it's also very versatile. It can be used indoors or out on sensitive flooring and is easily transportable to and from various work locations."

I can definitely see the potential after visiting JLG in McConnellsburg, Pa., this past May to test operate its smallest compact crawler boom — the X430AJ — along with a ton of other cool equipment from UTVs to telehandlers (which I won't even discuss in this feature). JLG Industries Inc., an Oshkosh Corp. company and a global manufacturer of aerial work platforms and telehandlers, expanded its line of compact crawler booms with the X430AJ at CONEXPO-CON/AGG 2017. It's one of five units that will include the X1000AJ compact crawler boom this fall, offering machines with platform heights of 43, 49, 59, 77 and soon 100 ft.



Higher education.

OPERATIONAL ADVICE

By Randy Marzicola, Director of
Business Development at JLG

On a compact crawler boom, like any piece of aerial equipment, complete a daily walk-around before operating the machine. Make sure there are no obvious leaks and that there aren't any loose or detached cords or hoses. Always remember: A lot of aerial equipment is rented, so it's with new operators on an ongoing basis. You don't typically know how it got returned to the shop, so the required daily walkaround becomes even more important to maximize safe operation of the unit. When the machine gets delivered to the jobsite, make sure the rental company conducts machine familiarization with your operator. Then the obvious stuff — make sure you're tied off, that you're wearing safety gear and that you're certified to operate the machine. Always familiarize yourself with the operator's manual on the unit you'll be operating.

"We tend to have more indoor applications in the U.S. than in Europe for compact crawler booms," said Marzicola. "Over in Europe, they tend to be used on narrow, cobblestone streets where bearing weights are very critical, but we've adapted these machines to U.S. applications. So, you go into say a college or university, they've got these beautiful atriums with high ceilings, how do you maintain and service those areas? How do you work while protecting the flooring at major airports and museums? The low bearing weight of a compact crawler boom provides you with a solution."

The Experience

First off, in order to operate a crawler boom lift, operators will require ANSI A92 compliant training. Manufacturers like JLG and even select rental houses and associations can help you to get certified. Some of the things you'll learn as part of the certification are regulations, safety hazards, proper operation, use of safety harnesses and lots more. Luckily, the X430AJ is easy and intuitive to operate. The unit can be operated from ground controls or the basket. Thanks to a handheld unit with a wire, you can step outside the basket to operate it while walking next to the machine.

"Non-marking tracks are standard on the unit," pointed out Marzicola as we inspected the X430AJ before operation. "They don't mark the floors which is important to a lot of customers. We offer an optional deep lug for outdoor use for customers who want it."

The track undercarriage is nimble. It can spin with a zero-turn radius just like a skid steer, and like a mini excavator it can expand and retract those tracks to help fit through tight situations. With a stowed width of 2 ft, 5 in., the X430AJ easily moves through doorways, gates and garages. The basket will need to be popped off the boom to do that, but with two people it easily comes off in seconds and has caster wheels for rolling separately. Additionally, new designs allow these units to be transported by forklift or crane, thanks to pockets and lifting eyes.

"This is the second generation of compact crawler machines," said Marzicola. "Along with the lift eyes, we added a 500-lb unrestricted basket capacity to this new generation, so we're market leading in that. We're the only company that offers that today. It allows two guys to go up and work in the basket or one with tools and materials."

Marzicola and I put that theory to the test. We used three points of contact to enter the basket. We hooked our safety harnesses. I gravitated toward the easy-to-read buttons and toggle paddles on the portable controls, which locked into a box on the basket. We found a nice indoor spot in JLG's Customer Training Center and Proving Grounds and deployed the auto-level outriggers with just the push of a button. I then worked the knuckling boom and jib. The articulated column design gives operators the ability to go up and over and swing in nearly any direction. There's also a final extending orange jib that can articulate 89 degrees for precise maneuverability of the basket. Both the unit's travel and boom function are extremely slow, so operators have plenty of time to observe and react while positioning the machine.

While we inspected the ceiling of the Customer Training Center, Marzicola discussed the environmental halo of these JLG units.

"This is like an electric sports car," he noted. "When we brought this to North America, competitive models offered gas and diesel, and while we do offer those options, JLG pioneered the lithium ion battery in its line of compact crawler booms. In this type of environment, with an engine, you'd have to hook up to those exhaust tubes over there. This unit is clean and quiet. The other thing we're very proud of is that we upgraded, on the second generation, to biodegradable synthetic oil."

The X430AJ uses a Lithium-ion 2.0 power system for eco-friendly operation indoors or outdoors. A Honda gas engine and a Kubota diesel power source are also available, offering customers the choice of exclusively diesel-electric or gas powered units.

The Company

Unfortunately, it rained nearly the entire day I was at JLG, so we spent most of our time indoors at the Customer Training Center and Proving Grounds in McConnellsburg. This is where the company brings together students and machines for classroom instruction, hands-on training and operation. It has big bay service areas for maintenance training with 30-ft-high ceilings and a four-acre outdoor testing area that is set up to reflect a construction jobsite with mixed terrain, simulated power lines and aerial work platform targets. The center sits in the middle of JLG's corporate headquarters which remains in the small, Pennsylvania town of McConnellsburg where JLG was founded by John Landis Grove in 1969; it was bought by Oshkosh Corp. for approximately \$3.2 billion in 2006.

McConnellsburg is located in the Ridge and Valley section of the Appalachian Mountains. I basically crossed over a cloud-covered mountain to reach the town of about 1,200 residents, noting that 1,400 people actually work at JLG's McConnellsburg facility. The company's headquarters sit in a big beautiful valley surrounded by tree-covered bluffs. Over nearly five decades, JLG has kept expanding in this valley, so its facilities today are uniquely spread across 28 buildings, which combined to total 520,000 sq ft of space. Mike Lendacki, principal engineer — manufacturing, gave me a tour.

"Off to the far left of this particular building is all your SkyTrak products [a JLG telehandler brand] — anything from a 6,000-lb machine to a 10,000-lb machine," explained Lendacki. "Next to it is 80-ft straight boom aerial work platforms, the 80-ft articulating units are assembled at our Shippensburg, Pa., facility. This line right here is JLG and Caterpillar telehandlers [JLG OEMs Cat telehandlers]. And over on the far side of the building is what we refer to as our ultra series booms. Anything from 120-ft machines up to 185-ft straight booms. We also have a 150-ft articulating boom machine, but it's not assembled in this building because it's pretty unique. Currently, we are running three shifts, six days a week and some Sundays. We're busy without a doubt. Right now, we're probably making about 70 machines a day out of this facility."

Of course, the crown jewel for a visitor like myself is the aforementioned Customer Training Center and Proving Grounds. A good example: After operation of the X430AJ, I got the opportunity to play with JLG's lift and access virtual equipment simulator, which was definitely a highlight. These VR systems employ advanced gamification learning to familiarize students with the controls and operation of lift equipment.

"It's been a really cool project — in that it's pushing the envelope," said Rick Smith, senior director, product training at JLG. "We moved the industry in this direction, but there's applications beyond training. I'm working with our engineering group, and we're asking how do we use VR and AR to help our customers in bigger ways? I think you're going to see some amazing stuff. Applications that we're on the verge of it's really exciting stuff."

That's the overall sentiment with all the JLG employees I encounter on my expedition. A general excitement for the product and the company. Some workers drive an hour or more from Maryland, West Virginia, even Northern Virginia just to work at JLG. That committed workforce manufactures, assembles, markets and sells top tier products for the global marketplace — machines like the compact crawler boom line — another progressive product I suggest you explore from the aerial lift experts at JLG.

Keith Gribbins is associate publisher of *Compact Equipment*.

COMPANY CULTURE

By Jennifer Stiansen,
Director of Marketing at JLG

Though today we are a large, international manufacturer, JLG continues to cultivate a people-first culture where every employee, every customer and every supplier matters. At JLG people enjoy coming to work each day. It's not uncommon to speak with someone who's been with the company 40 plus years. Employees constantly share ideas and are encouraged to challenge one another to identify unmet customer needs for which we can develop products and services that make a real difference on jobsites. This healthy dialogue within and across departments, even around the globe, results in continuous improvement across the business that drives tangible benefits to both employees and customers. JLG is a partner in its customers' — and their customers' — success with more than 4,000 employees across five continents working daily to enable performance, boost productivity, ensure uptime and support progress.



JLG's Customer Training Center
and Proving Grounds.

HAVE EQUIPMENT, *Will Travel*

ENSURE A SAFE AND EFFECTIVE TRAILER CHOICE TO HAUL YOUR MACHINERY

By Dawn Geske

The high season for trailering is here, and with it brings a range of common safety concerns that some contractors have forgotten over the long winter. From knowing the proper weight distribution of your load to securing it with the proper tie-downs, contractors need to keep safety in mind when trailering their compact equipment to ensure they don't run into issues on the road. Even the type of trailer invested in for equipment hauling can make the difference in total trailering capabilities and safety.

"Having the right equipment for the job is crucial," says Colin Holthaus, technical director at the National Association of Trailer Manufacturers (NATM). "If you have a specific piece of equipment that you work with frequently, you definitely want to be communicating that to your trailer manufacturer and/or dealer in order to purchase the ideal trailer for your specific application."



MATCHING THE RIGHT TRAILER TO THE JOB

Choosing the right trailer for the job is a matter of what exactly you plan to haul. How heavy your equipment is and the total length of your machinery dictate the type of trailer that is geared for your operations.

“Those are the two parameters that are going to drive a conversation with one of our dealers,” says J.D. Schmid, technical product expert at Big Tex Trailers. “We want to make sure we match the anticipated load to the trailer’s capacity and include a safety margin of error.”

Accounting for this safety margin is often what gets some contractors in trouble. They don’t take into account the GVWR (gross vehicle weight rating) of the tow truck and machine they are hauling as well as add-ons like fuel, extra equipment, attachments and utility boxes to arrive at the total capacity their trailer can haul.

“The trailer will be marked with its gross vehicle weight, so you have to look at the tow vehicle and trailer in combination to know what that rating is,” says Butch Hughes, sales representative at Car Mate Trailers Inc. “That will determine a lot of how that vehicle has to be licensed and what the driver’s requirements would be to tow that equipment.”

In addition, contractors need to consider the type of hitch used to attach the trailer to their tow vehicle. A ball hitch attaches to the frame of the vehicle while still providing access to the bed of the tow vehicle. A gooseneck hitch secures to the bed of the truck with a regular ball pull off the bumper. Both hitch options can be used in similar applications but are driven by the type of tow vehicle — gooseneck with dually trucks and ball hitches with standard capacity pickup trucks. For bigger jobs, the fifth wheel hitch is a heavy-duty hitch that mounts into the bed of a truck right over or just forward of the rear axle.

A RANGE OF TRAILER OPTIONS TO CHOOSE FROM

Trailer options are just as diverse with options for dumping, equipment hauling, landscape operations and utility flatbeds to name a few. In these configurations, the trailers are constructed with steel channels to handle the support of the machine hauled and are equipped with a variety of ramp styles for easier loading and unloading. A popular option that many contractors are gravitating towards as of recently is dump trailers. These nimble units offer the ability for a contractor to carry a material load along with the equipment needed to spread, grade or move it.

“Dump trailer sales have exploded over the last few years,” says Hughes. “It’s less expensive to register and insure a trailer being hauled by a pickup rather than insuring a small dump truck itself. With a dump trailer, you are looking at a double-duty trailer that hauls small equipment but gives you that dump trailer capacity as well.”

Also, a favorite with small contractors is the utility trailer. This trailering option provides a lower hauling capacity usually under 5,000-lb GVWR but offers just as much function and convenience with storage for tools and accessories. These trailers are ideal for small walk-behind machines and landscaping equipment.

More dedicated trailer options include landscape models and equipment trailers that are both designed to haul



For bigger jobs, the fifth wheel hitch is a heavy-duty hitch that mounts into the bed of a truck right over or just forward of the rear axle.

the exact equipment of the trade. Landscape trailers are packed with features, allowing landscape contractors to haul additional equipment such as blowers, trimmers and weed eaters. There are integrated boxes designed specifically to hold these often-lengthy outdoor power tools.

“Sometimes folks use these landscape trailers for a variety of activities that involve compact equipment because the storage features and the type of ramps associated with it,” says Schmid. “There are boxes built in to hold equipment, and those boxes may also serve for attachments and other small equipment.”

For compact equipment such as skid steer loaders, mini excavators and compact wheel loaders, an equipment trailer provides a solid solution to haul more weight without sacrificing on flexibility. These trailers include features such as wider ramps in a flatbed configuration.

KEEPING SAFE WHEN TRAILERING

While matching the right trailer to your specific application can provide contractors a safer way to haul equipment, if they don’t take the proper tips to stay safe when trailering, it is all for naught. There are several common trailering mistakes that arise with novice and experienced contractors each season.

According to Holthaus, “Safe trailering starts by conducting a walk-around safety inspection of the trailer. This should occur every time the trailer is used, even before

hitching up. Towers should always follow the trailer manufacturer’s owner’s manual regarding proper hitching procedures, loading and cargo securement.”

Attaching the trailer to your tow truck before loading can also decrease the possibility of an incident occurring. This prevents a runaway trailer and makes it easier to secure the trailer before it is weighted down. Weight distribution of your equipment is also key to maintaining proper control when driving the tow vehicle. Loads that are too far to the front can create a whipping effect as oscillation and articulation of the trailer and vehicle are restricted. Too far back and you have a recipe for a machine to tip.

“It is important that you get the load centered over the axles completely, so you don’t get too much or too little tongue weight,” says Schmid. “Tongue weight is the amount of trailer load that is being pushed down on the tow vehicle. Getting the load properly balanced on the trailer is important to not create too much tongue. However, it’s also important that you don’t have too little tongue.”

To achieve that perfect weight distribution on your vehicle, Hughes suggests backing equipment with heavy backends onto a trailer. “Those machines typically need to be backed on to the trailer because what can happen if you’re going up a ramp grade with all the weight on the back of that unit, it might have a tendency to flip back over,” he says.

Securing with the right equipment straps is also imperative to safe trailering. Chains and straps need to be used with machinery and attached at an angle to properly keep the machine secured.

Dawn Geske is a freelancer writer for *Compact Equipment*.

PIMP MY TRAILER

The trends in trailers are changing with a new emphasis placed on appearance to garner attention while also maintaining pride of ownership. Long gone are the days of a typical black trailer with no flash or appeal to sell it. Contractors are getting savvy to the use of paint, lights and custom wheels that are meshed with all the convenience and features one would want in an equipment trailer or utility model.

“The trend is for trailers to look better and be better equipped, improving the long-term durability,” says J.D. Schmid, technical product expert at Big Tex Trailers. “By having the tow vehicle and trailer looking good, there’s a pride in ownership. It gets the crew that’s working on it to take care of it better.”

There are a few factors driving the new demand for customized trailers, according to Colin Holthaus, technical director at the National Association of Trailer Manufacturers. “We’re seeing strong growth and good consumer confidence. It has evolved quite a bit,” he says. “It’s really come a long way. People are more interested in how things look than the pure functionality of it as it was in the past.” With a typical trailer having a lifespan that ranges from 10 to 15 years, it is not uncommon for contractors to invest in that splashy paint job or to chrome out their wheels. “Custom wheels are very common — chrome or black — just to make the trailers look better,” says Schmid. “Customers are demanding that.”

Big Tex Trailers even offers an upgradable option for the flooring of a trailer. Gone is the traditional wood, and instead Blackwood rubber-infused lumber is used. “It’s really durable,” says Schmid. “It’s not as slippery as wood when it gets wet. You really end up with a cool looking deck and a very durable deck.” There are even phone apps available to control the lights on a trailer which may be for function but may also be a part of that cool factor to turn heads as they roll through neighborhoods and communities to drum up business.



AIMING FOR EFFICIENCY

Outdated Welding
Technologies
Waste Hours on
the Jobsite

By Joe Ryan

Business as usual can cost thousands of dollars a year in a welding operation, and outdated technologies can unnecessarily cost hundreds of hours in productive time on construction jobsites. Consider some of the issues that impact productivity on the jobsite. How many times a day do welders walk back to the power source to make parameter adjustments? Making this trip even four times a day — with each walk taking an average of 15 minutes — wastes 250 hours per welder every year.

This lost time adds up, totaling significant labor costs that could be better spent on value-added tasks. This productivity loss is especially painful for operations that already struggle to find skilled labor.

Productivity isn't the only thing that takes a hit when welders must stop welding and walk to the power source to make adjustments. These interruptions can also impact weld quality and increase the risk of operator injuries through slips, trips and falls — especially on large jobsites where welders may need to climb up and down ladders or scaffolding to get to the power source hundreds of feet from where they are working.

To stay competitive, contractors must find ways to waste less time and complete jobs faster without sacrificing safety or weld quality. The right solutions can help operations meet important timelines, produce quality work and secure more bids.

Complete Control at the Weld

Remote control welding technology is a solution that minimizes the non-value-added time spent walking to and from the power source — and maximizes arc-on time, weld quality and jobsite safety. It's possible to save up to two hours per day per welder and reduce rework thanks to improved weld quality.

Technology that provides complete control at the weld joint — without the need for a control cable — saves significant time because welders can easily adjust parameters at the weld joint, so they can do less walking and more welding. In addition, new solutions on the market automatically adjust the voltage to compensate for the voltage drop in weld cables, and they allow parameter adjustments without stopping the arc — for more responsive and accurate performance.

When it's easier for welders to accurately adjust parameters at the weld joint using the wire feeder or remote, operators can do their best work with improved productivity, efficiency and safety.

Consider a system that provides these remote control welding capabilities without the need for a control cord, which saves time and money in cable setup, maintenance and repair. ArcReach technology from Miller Electric Mfg. LLC uses the weld cables to send information between the wire feeder or the remote and the power source so a control cable isn't needed between the remote accessory and the power source or engine-driven welder/generator.

Benefits for Weld Quality

Because the ability to make fast and easy adjustments at the weld joint with remote control technology eliminates the walk to the power source, there is no need for welders to “make do” with less-than-optimal settings. This helps welders of varying skill levels produce high-quality welds.

Some systems also ensure that adjustments can only be made at the feeder or remote once the power source and accessory are paired by locking out any changes to the weld process, voltage or amperage at the power source. This eliminates mistakes that can occur if parameters are incorrectly or accidentally changed.

Equipment that makes parameter changes easier and faster also provides benefits for productivity. As the welding workforce changes, less experienced welders may require more frequent parameter changes, so using technology that is more intuitive and easier can save contractors time and money.

Automatic Voltage Adjustment and Greater Control

As remote control welding technologies advance, they offer more capabilities that help improve productivity, efficiency and weld quality. One example is a new technology that automatically adjusts to compensate for the voltage drop in weld cables, so welders know the voltage they set at the power source is the voltage they will get at the wire feeder or remote, even hundreds of feet away.

With traditional machines, operators must manually adjust for the voltage drop that occurs with the resistance in weld cables by setting the voltage higher than necessary at the power source to ensure they get the voltage they want at the feeder. This process is often a guessing game, requiring the welder to set a certain voltage, weld for a bit, then either radio another worker on the site or return to the power source to adjust voltage again before walking back to weld more. This back and forth may happen several times before the welder dials in the right level to compensate for the voltage loss that occurs in weld cables — a loss that varies based on cable length and setup.

New technology can automatically compensate for this voltage drop in the welding circuit. The machine measures the resistance in the weld circuit, uses that measurement to calculate the voltage drop in the weld leads, then makes the necessary adjustments — all in a matter of seconds once the operator sets the voltage.

The time-saving benefits of this technology can be especially significant on large jobsites, such as infrastructure, construction and shipyard projects, because it simplifies the interaction between the welder and the quality control inspector. With traditional technology that requires the welder to manually accommodate for the voltage drop, the quality control inspector may notice that the power source is set to 35 volts when the weld procedure specifies a maximum of 30 volts, for example. The welder would then have to take the time to explain to the inspector why the voltage is set higher than allowed. A system that automatically compensates for the drop — so the voltage at the power source can be set within the allowed levels — eliminates this time and hassle.

Another new technology available in remote control welding systems allows for parameter changes even while the operator is welding. This technology allows welders or other jobsite employees to make adjustments at the feeder or remote without stopping the arc. This allows welders to compensate for heat buildup, changes in weld position or variations in part fit-up. The welder can signal to another worker to adjust voltage, amperage or wire feed speed.

Maximize Productivity with Technology

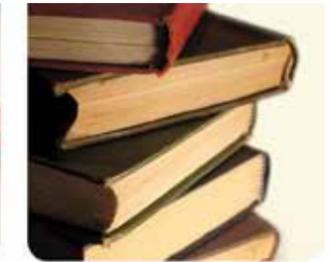
Sometimes, changing how things have always been done can yield big results. Adopting remote control technology can potentially save hours on the jobsite every day, for a substantial impact on the bottom line.

When welders have complete control at the feeder or remote — even hundreds of feet away from the power source — it minimizes downtime and maximizes productivity, while also improving operator safety and contributing to high weld quality.

Joe Ryan is the infrastructure segment manager for Miller Electric Mfg. LLC.

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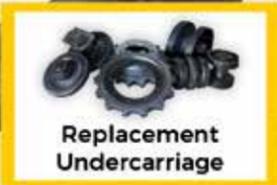
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BY THE NUMBERS



17,000

That's the number of new construction jobs created in April based on recently released data from the U.S. Bureau of Labor Statistics. According to an analysis by the Associated Builders and Contractors, the U.S. construction industry bounced back in April by adding 17,000 net new jobs. In April, initial estimates showed a 15,000 job loss, though that has since been revised upward to a loss of 10,000 jobs. During the past year, the construction industry has added 257,000 new jobs, representing a growth rate of 3.7 percent. Nonresidential construction employment increased by 9,000 net jobs for the month. Nonresidential specialty trade contractors led the growth, adding 7,300 net jobs, while heavy and civil engineering employment lost 3,400 net jobs in April. For more info, visit abc.org.



2019

That's the year of the next International Construction and Utility Equipment Exposition (also known as ICUEE-The Demo Expo). Exhibit space sales are now open for the trade show, where the utility construction industry's newest product innovations will take center stage Oct. 1-3 in Louisville, Ky. ICUEE will be held at the Kentucky Exposition Center and is known for its extensive equipment test drives and product demonstrations. The utility construction showcase earlier this year was ranked as the fifth largest U.S. show and earned fast-growth honors from the expositions industry community. ICUEE 2019 will feature exhibit pavilions for fleet management, safety and new for 2019 — emerging technologies — which will include business solutions, technology and software. For more info, visit icuee.com.

40

That's the number of *Jobsite Juniors* subscriptions Iowa Trenchless president Jason Clark purchased for the first-grade class at Panorama Elementary in Panora, Iowa. Launched in October 2017 by Benjamin Media Inc., *Jobsite Juniors* is packed with educational articles and activities intended to teach children about all aspects of the construction industry. Originally only offered through paid individual annual subscriptions, bulk orders and subscriptions now allow businesses, associations, manufacturers and potential resellers to provide this exciting publication to their members, staff and supporters. Interested parties have the opportunity to purchase one issue, multiple issues or full subscriptions (six issues per year) depending on their needs. A minimum of 25 copies per issue is required. For more info, visit jobsitejuniors.com.



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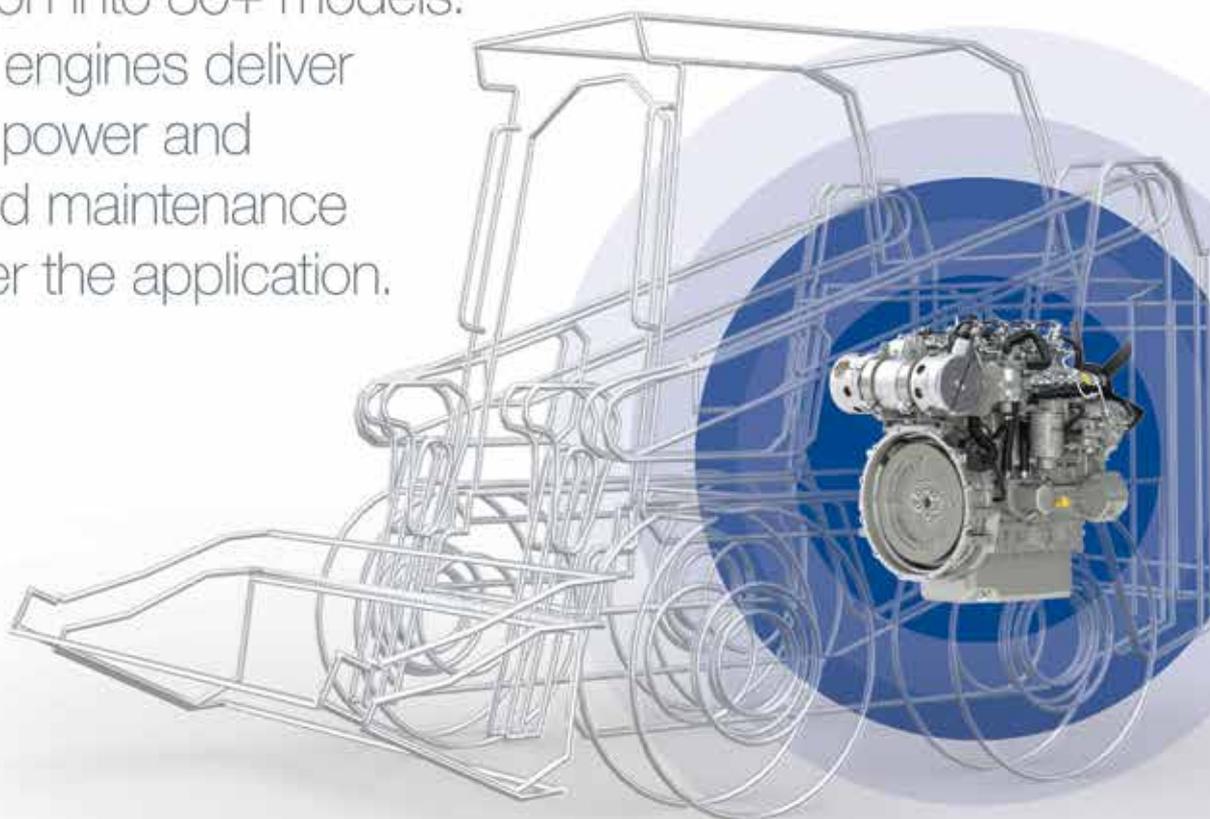
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