



CONSTRUCTION EQUIPMENT

April 2009
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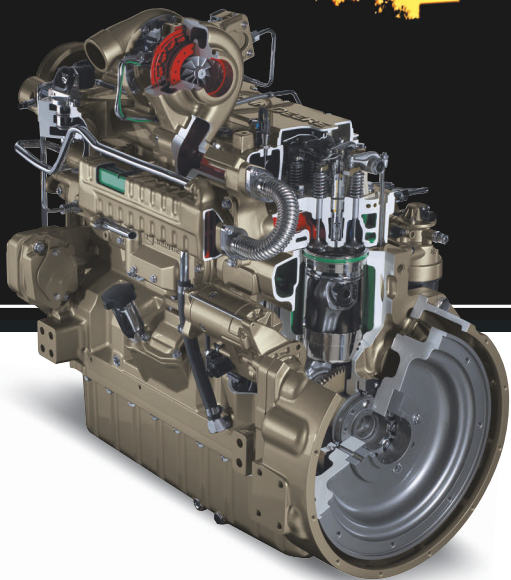
Ideas and Insight for the Equipment Pro

Fire in the Hole

GPS and SmartRig
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to rock drilling **p. 20**



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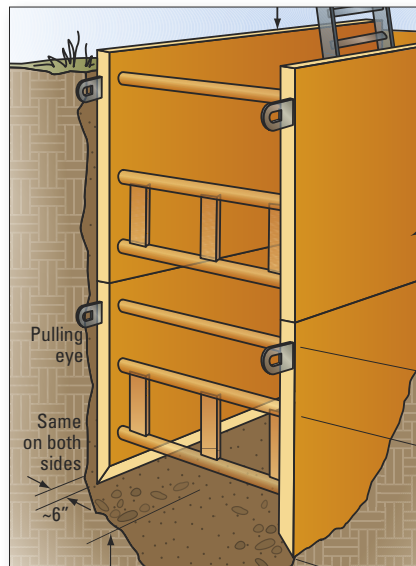
20 Computerized Drill Rig to Cut Blasting Costs \$40K

Atlas Copco put a unique and potent weapon in the hands of quarries and other rock drillers interested in cutting drilling and blasting costs when the company combined its Rig Control System (RCS) with its Global-Positioning-System-driven Hole Navigation on surface drills. The SmartRig configuration for surface drills debuted in Europe in 2007 and finally made it to North America last year, onto Conco quarries in Springfield, Mo., aboard a ROC F9C, where they're saving enough to recoup the high-tech surface drill's \$100,000 price premium in less than three years. Executive Editor Larry Stewart explains how it was done.



SAFETY ILLUSTRATED

24 How to Profit with Excavation Protection



The key to safe excavations between 5 and 20 feet deep is that the work be supervised closely by a trained, competent person. (Trenches 20 feet or deeper require a safety system devised by a registered professional engineer.) Competent-person training is available from NUCA, unions and commercial safety-training firms. It should not be intimidating. Anyone who can read equipment manufacturers' tables cross referencing shield and shore models with their soil-type, excavation-depth and width capabilities can pick the right trench box or shores to use in the job at hand. Executive Editor Larry Stewart tells you everything you need to know to prevent an accident from happening.



APPLICATION

30 Rollers That Read Road Conditions

For the operator of the Bomag BW190AD-4 Asphalt Manager, guesswork has been replaced by the confidence that the roller is achieving with Intelligent Compaction precisely what quality-control personnel will be looking for when they come along with their pavement quality indicators. "We just call it, 'The Smart Roller,'" says Eddie Breeden, superintendent with Milestone Contractors in Indiana.

HANDS-ON TRUCKING

34 Volvo I-Shift Has Indiana Fans

Who's the "I" in Volvo's I-Shift automated mechanical transmission? In this case it's Perry Allen, a driver for Klink Trucking at Ashley in northeastern Indiana, who's assigned to Number 299, an '09 Volvo VHD dump truck with the self-shifting gearbox. Allen likes the nicely outfitted truck and the work-saving transmission, and pointed out its smooth operation during the October morning Truck Editor Tom Berg spent with him as he hauled dirt and aggregate around nearby Fort Wayne, Ind.



BUYING FILE

36 Crane Makers Extend a Big Reach

If you're ready right now to slap down a cool million bucks, or two, or more, it's overwhelmingly likely those who make and sell all-terrain cranes know who and where you are. You don't need to find them; just open your door in the morning and they'll be there. Senior Editor Mike Anderson reports on the select group of OEMs and their latest product offerings.



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Face the Realities of Green

Lorne Fleming, CEM, doesn't mince words when discussing emissions regulations. The "barbarians are at the gate," Fleming told attendees at AEMP's Annual Conference last month in Orlando. "It's a reality that we're going to have to deal with."

Fleming manages the equipment fleet for Grace Pacific, and he presented several sessions on emissions and green fleet management over the course of the conference. Unlike the vast majority of equipment managers, Fleming has successfully built an emissions plan for his Hawaii-based fleet.

Last year we asked managers if their fleet had a formal emissions plan or strategy, and 82 percent said no. No doubt, as the California initiatives have become more publicized, that number has dropped. We certainly hope so.

If not, any manager running a fleet that operates in California, or any of the 16 other states anticipated to adopt California regulations, must put an emissions plan at the top of the priority list.

Fleming offered attendees a plethora of tips, but we'll only pass along a few. We provide more resources at ConstructionEquipment.com/green.

- Upper management must buy in, especially the corporate financial managers, in order to budget for the capital expenditures necessary. Emissions-related costs will be the biggest capital expense for the near future. Fleet managers must be able to fund or purchase aftertreatment hardware, GPS monitoring devices, engine retrofits or replacements, and even, yes, new machines.

- The window is closing on grant money. Once emissions regulations become law, most of these dollars go away. Act now.

- Involve the Equipment Triangle (include OEMs and distributor partners). Products must be verified, compliant and effective.

- Partner with an environmental expert. There are "too many bomb craters" to go it alone, Fleming says.

Emissions control is not going away. Management of same must start today.



Rod Sutton, Editor in Chief

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Rod



Access our online reader response form at ConstructionEquipment.com/info. Just key in the issue date and make your selections. Subscribe to our monthly eNewsletter at ConstructionEquipment.com/subscribe.asp.

A summary of the month's primary machine introductions and model changes

By KATIE WEILER, Managing Editor

► Caterpillar

Caterpillar stretched its 740 articulated dump truck to 43.5 tons, the biggest payload among 40-ton-class ADTs. The body accommodates 31.4 cubic yards. A Cat C15 ACERT engine delivers 453 net horsepower and meets Tier 3 emissions limits without exhaust gas recirculation. The Cat-designed oil-over-nitrogen front suspension oscillates plus and minus 6 degrees, allowing the operator to travel at speed over rough terrain. Cat says its latest rear suspension blocks and mounts last as much as five times longer than previous designs.



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► New Holland

New Holland extended the versatility of its crawler dozers by fitting them for pipe-laying with an optional 15-foot hydraulic sideboom. Initially available on the 19,000-pound D85B and 20,000-pound D95B dozers, the attachment offers a lift capacity of 20,000 pounds. The sideboom folds and two 1,120-pound extendable counterweight segments can be easily removed for transportation. Three control levers give the operator simultaneous control of load and boom functions.



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► K-Tec Earthmovers

For contractors who prefer to pull a scraper with the power unit of an articulated dump truck (ADT) over an agricultural tractor, K-Tec offers the ADT Series of scrapers. As well as being capable of higher speeds compared to ag-tractor-pulled models, ADT scrapers match the width of the power unit, are capable of tighter turning radii, and boast improved flotation over motor scrapers, says the company. Designed for self-loading with a six-wheel-drive articulated truck, the scrapers can exceed speeds of 30 mph.



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◀ Hyundai

The R210LC-9 and R290LC-9 excavators have joined Hyundai's 9 Series. The R210LC-9 has an operating weight of 49,930 pounds, 9-foot-7-inch arm, and 1.2-cubic-yard bucket; the RC290LC-9 has a 67,150-pound operating weight, 10-foot arm, and 1.66-cubic-yard bucket. The RC210LC-9 is equipped with Hyundai's Posi-Nega hydraulic control system to improve controllability and hydraulic power. Standard in the cab are 7-inch color cluster display, transparent skylight and heated air-ride suspension seat.

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Caterpillar

At the small end of Caterpillar's line of pipe layers, the PL61 offers 40,000 pounds of lift capacity and features the Cat C6.6 ACERT engine. Also included are an electronically controlled hydrostatic drive system that allows for smoother turns and the oval-track SystemOne undercarriage, designed to balance component wear and extend service life, thus reducing undercarriage costs by 35 to 70 percent. Engine components are easily accessible via a large hinged door.

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The Sidewinder dump-truck body incorporates a patented sidewall shaped into a continuous top rail, side and running board configuration designed to prevent moisture and freeze problems that potentially burden bulk-material truckers. A front-mounted inverted telescopic hoist with hard chrome-plated sleeves both eliminates the need for cylinder housing inside the body and minimizes cylinder contamination. Featuring a heavy-duty braced tailgate, it allows operators to spread up to 25-foot widths of sand or salt with continuous feed from the dump body.

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Steco

The Hauf features a popular dump-trailer design that has formed side posts extending down one side of the trailer under the bed and up the opposite side. It is built with continuous weld of the U-formed side posts, smooth bed, and top-hinged tailgate with remote air-controlled latch. Steco updated it with 16.5-x7-inch running gear; System 2S/M air brakes with auto slacks and ABS; 5-inch-round axles with 5/8-inch wall providing 25,000-pound capacity on a 71½-inch track; a 60,000-pound-capacity, single-point straddle-mount suspension; and sealed lighting system.

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Hitachi

Hitachi created its ZX60USB-3 to bridge the gap between the ZX50U-2 mini excavator and the mid-sized ZX75US-3. With operating weights from 13,700 pounds, the new ultra-short excavator with a swing boom would not be considered a mini excavator. Maximum dig depth is 12 feet 4 inches. The swing boom moves 80 degrees to the left and 60 degrees to the right. The 54-horsepower Yanmar 4TNV98 engine uses exhaust gas recirculation to satisfy EPA interim Tier-4 emission regulations. The ZX60USB-3 is available with either rubber or steel tracks.

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John Deere

Two wheeled excavators — the 44,974-pound 190D W and the 51,368-pound 220D W (weights with two-piece booms and front and rear outriggers) — offer significant increases in horsepower, weight and digging forces over their predecessors. Deere's 5.2-liter Powerwise III diesel engine is rated at 159 horsepower and is Tier-3-certified. The 220D W digs deeper, at 20 feet 8 inches, and has greater digging forces. Maximum transport speed for the wheeled machines is 23 mph.

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DuraClass

The Sidewinder dump-truck body incorporates a patented sidewall shaped into a continuous top rail, side and running board configuration designed to prevent moisture and freeze problems that potentially burden bulk-material truckers. A front-mounted inverted telescopic hoist with hard chrome-plated sleeves both eliminates the need for cylinder housing inside the body and minimizes cylinder contamination. Featuring a heavy-duty braced tailgate, it allows operators to spread up to 25-foot widths of sand or salt with continuous feed from the dump body.

Market Watch

▶ Fecon

A steel track undercarriage is now available for Fecon's FTX148-L track carrier. The undercarriage offers an aggressive design for durability on the roughest terrains. Single- or triple-grouser steel tracks allow operators to maneuver easily on slopes and slippery terrains, and the closely spaced rollers provide even weight distribution and smooth ride. Equipped with the Bull Hog brush cutter, the FTX148-L with the steel track undercarriage weighs 19,400 pounds.

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▶ Link-Belt

Designed for specialty applications such as scrap/material handling, demolition, waste transfer and site prep, Link-Belt's 240 X2 material handler can connect to a variety of tools like dangling magnets and orange-peel grapples for scrap yards, and trash grapples for construction and demolition debris. The cab can elevate hydraulically to a height of 18 feet 2 inches to increase operator visibility. At 70,000 pounds, the 240 X2 can be easily transported.

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▼ VT LeeBoy

Challenger V self-propelled broom features a 7-foot brush by Sweepster, new joystick controls that put all brush functions at the operator's fingertips, and improved operator visibility. LeeBoy says the Sweepster brush core is easy to change, and claims its own variable-down-pressure system reduces brush wear. The brush can be angled +/- 40 degrees, and rear steering allows the unit to pivot around its own center, for an inside turning radius of 3 feet.

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two-speed hydrostatic loader's operating weight is 9,900 pounds. A universal coupler compatible with skid-steer-loader work tools and Z-bar loader linkage handle a rated operating load of 2,756 pounds and reach maximum dump height of nearly 9 feet. The standard auxiliary hydraulic system delivers 22 gallons per minute of flow at up to 3,000 psi.

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▶ Volvo

Volvo's 34.8-ton ECR305CL short-swing radius excavator has a body that swings only fractionally outside its track width. Its compact design allows it to work next to objects without risk of damage, and near highways without disrupting traffic flow. Also included is a new rounded cab equipped with a sliding door for easy operator access. It is powered by a Tier-3 Volvo engine rated at 107 horsepower.

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▼ Yanmar

Equipped with a tailor-made hydraulic quick coupler as standard, the Yanmar ViO55-5B mini excavator facilitates single-person attachment changes for a carrier sized at 5.5 metric tons. With a digging depth of 13 feet 8 inches, it features ViO crawler technology by Advanced Stability, delivering an expanded track gauge for increased stability without increasing undercarriage width. The true-zero-tail-swing design allows for 360-degree turning of the counterweight within the machine's tracks.

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Market Watch



◀ Komatsu

A new size for Komatsu's mining-truck line, the 860E-1K electric drive, rigid-frame dump truck features a nominal payload of 254 metric tons. It is powered by a 2,700-horsepower Komatsu 16-cylinder, two-stage turbocharged diesel. The truck can be equipped with a factory-installed trolley-capable option to be used on either 1,600 or 1,800 volt lines. According to the company, this allows the 860E to propel uphill faster while the engine rpm decreases, thereby saving fuel and extending engine life compared to non-trolley. In both applications, the drive system provides a maximum speed of 40 mph with a 35.52:1 final gear ratio powered by a new Siemens control package.

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▲ Lankota

Lankota's heavy-duty crane body, designed to support a tower crane of up to 72,000 foot-pounds, features compartments 60 inches high and 24 inches deep. The compartments are built from 10-gauge galvalume steel for strength and durability. Included are full-length rain gutter, full substructure and pressurized compartments.

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▶ Caterpillar

Engine power of the new K-Series crawler dozers from Caterpillar — the D3K, D4K and D5K — has been increased 5 to 7 percent. All three hydrostatic-drive track type tractors are powered by the Tier 3 Cat C4.4 ACERT engine, rated at 74, 84 and 96 horsepower, respectively. The new models feature a larger, quieter cab and seat-mounted electro-hydraulic controls with lever efforts decreased as much as 90 percent compared to conventional mechanical control levers. The machines can be shipped from the factory with SystemOne undercarriage.

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▶ MEC

MEC unveiled its highest working-height scissor lift — the Ultra-Deck 5492RT — and its first Speed Level sigma lift — the 3084RT. Models include a scissor lift and a Speed Level sigma lift. The 5492RT reaches a platform height of 54 feet with 1,500 pounds of lift capacity. The four-wheel-drive unit has an oscillating axle and automatic-leveling outriggers. The 3084RT Speed Level sigma lift reaches a platform height of 30 feet, with 1,500 pounds of lift capacity. Speed Level levels the platform without outriggers.

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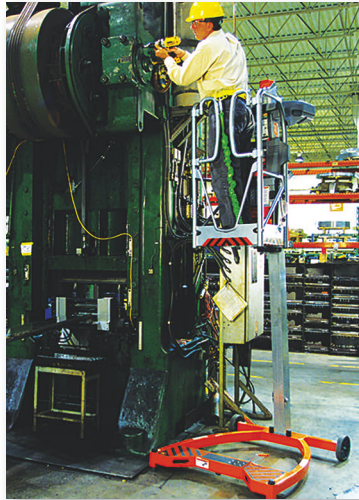
MANUFACTURER NEWS

Accolades Stack up for JLG Product

Equipment manufacturer JLG may very well require the use of one of its new personal and portable lifts to access the various hardware that its LiftPod is racking up.

Already recognized by assorted industry publications and one of *Construction Equipment's* Top 100 Products of 2008, the JLG LiftPod was named the winner of the Show Stopper Award among the close to 300 exhibitors at the National Electrical Contractors Association's convention and trade show. The LiftPod's ability to improve contractor and maintenance worker performance was cited by show judges.

"These awards have reaffirmed our confidence that industry professionals are looking for a more stable alternative to the ladder, while retaining the portability and convenience they're accustomed to," says Jeff Ford, JLG senior manager of marketing



The lightweight and portable JLG LiftPod easily moves around the jobsite.

communications.

At approximately one-quarter of the cost and weight of traditional work platforms, the LiftPod and its 14-foot working height can be used for inside maintenance and repair jobs, operated only by a common 18-volt drill or optional power pack.

MANUFACTURER NEWS

Terex Offers Equipment Refurbishment

A California equipment refurbishment facility newly acquired by Terex Aerial Work Platforms will eventually cater to Terex customers beyond the users of Genie aerial equipment.

"Our customers are increasingly expressing a need to refurbish assets. This refurbishment center in Modesto will establish us in close proximity to significant installed bases for units in California, Nevada, Oregon and Arizona," says Tim Ford, president of the Terex Aerial Work Platforms business segment of Terex Corp. "We are pleased to be able to provide additional value to our customers by offering them solutions that enhance value through their entire product lifecycle."

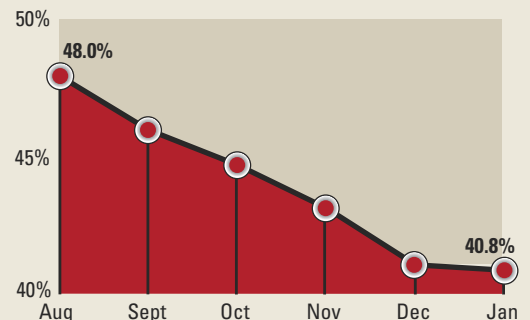
Terex acquired assets of the 10-year-old refurbishment facility from United Rentals, for which the facility had primarily refurbished the rental company's aerial fleet.

USED EQUIPMENT

January Values Level

The Rouse Value Index

(Avg. orderly liquidation value as % of cost)



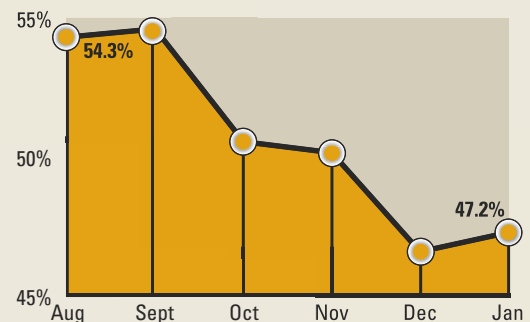
Note: Orderly liquidation value is expressed as a percentage of replacement cost (average cost paid for a new unit by large rental companies and dealers) for the average age of equipment within that category.

Includes 10 categories of equipment common to rental fleets.
Source: Rouse Asset Services

Orderly liquidation values fell only 0.5 percent in January compared to December. Values are down 16.4 percent over the past six months, and 9.9 percent compared with December 2008. Upticks in values were recorded with telescopic boom AWP's, wheel loaders and crawler dozers.

Wheel Loaders

(Avg. orderly liquidation value as % of cost)



Wheel-loader values have dropped 12.3 percent in the six months ending January, but they moved back up 1.5 percent compared with December 2008. Average selling age is now 61 months.

INDUSTRY NEWS

Apply for Stimulus Emissions-Reduction Grants by April 28

Applications for diesel emissions reduction funding under the American Recovery and Reinvestment Act will be accepted until April 28, 2009, the EPA has announced.

Included in the Recovery Act is \$300 million in grants to retrofit diesel engines around the country. A six-fold increase compared with 2008, the EPA-administered funding would help construction companies "reduce emissions from their fleets, as well as promote economic recovery and preserve/create jobs," according to the Associated General Contractors of America.

Funding will cover up to 100 percent for EPA-verified retrofit technologies, such as emission filters and catalysts, 75 percent for engine re-powers, and 25 percent for vehicle or equipment replacements. However, funding provided by the Recovery Act is not available to emissions reductions mandated under federal, state or local law.

"Applicants for these funds should move quickly to develop an application since time is of the essence," says Allen Schaeffer, executive director of the Diesel Technology Forum.

Applicants must submit applications to the EPA Region in which their project will take place. For more information and updates, visit www.epa.gov/otaq/eparecovery.

CONTRACTOR NEWS

Cell-Phone Ban Helps Earn Safety Award

A policy that prohibits cell-phone use while employees are on construction equipment is part of a Tennessee contractor's award-winning approach to safety.

"Keeping our workers safe on the job is the number-one priority for us," says Chad Baker, president of Baker's Construction Services, "and in doing so, we also are more likely to complete the job on time and on budget."

In 2008, Baker's had no lost work-day cases due to injuries or illness, and only one recordable injury or illness. The Associated General Contractors of America has named the company the winner of the Construction Safety and Excellence Award for Tennessee in the Heavy Division, for companies with between 100,000 and 300,000 hours worked.

Implemented in April 2006, Baker's current safety program also includes incentives for attending safety meetings and a zero-tolerance rule for infractions of the Tennessee Drug Free Workplace Policy.

MANUFACTURER NEWS

Gehl Commemorates 150 Years

To coin a phrase from a popular TV show, Gehl has "pimped its ride" with the chromed-out 7810E skid steer loader. The machine was decked out to commemorate the company's 150th anniversary. The design features a reflective gold and black finish, laser cut Gehl logos in the ROPS side screens, decals on the lift arm highlighting his-torical milestones, a custom seat with embroidered 150th anniversary logo, and interior chrome-plated components. Gehl has also published a hard-cover book illustrating its 150-year evolution.



MANUFACTURER NEWS

Cat Delivers Online Safety Training

Caterpillar announced in March an expansion to its online safety training service, Safety.Cat.Com, thanks to a new partnership with Tennessee-based training provider Pure-Safety. The deal enables Safety.Cat.Com to offer online classes that cover a variety of common jobsite safety issues, including aerial lifts, fall protection, OSHA rules, trenching and more.

According to Caterpillar, the training service helps to "enhance safety awareness, develop a competent and engaged workforce, reduce the risk of accidents, and create a positive culture where risk avoidance and safety become second nature."

Because training is Web-based, students can access their courses, reports and diplomas at any time from any Internet-connected computer. Prices start at \$19.95 per assignment.

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Managers Digest

ATTACHMENT NEWS

PicBucket Arrives Just in Time

Canadian-based demolition and recycling contractor The Cannington Group was champing at the bit to get the first kick at the can with PicBucket 5000 Series.

Three years after PowerTech Canada announced the PicBucket, Cannington Group president David McCrossan was eagerly waiting to be the first user to get the newest model of the demolition bucket installed on his company's Caterpillar 330D excavator.

The extensive evaluation and demonstration recently wrapped up at a jobsite in Hamilton, Ontario made the wait worthwhile, says McCrossan's crushing services supervisor, Don Maynard. With its set of three demolition pins and internal 1,000-foot-

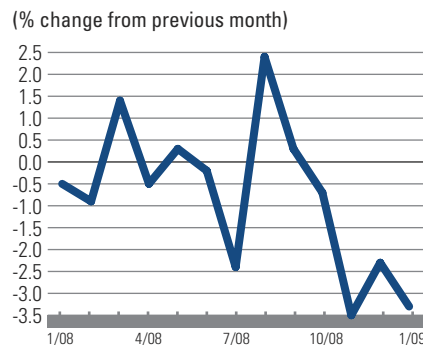
pound Atlas Copco hydraulic cell, the 36-inch PicBucket was used to prepare large piles of road debris and rubble for processing and direct-feed into a mobile crushing plant.

"The crusher and the related work crew, which is capable of manufacturing up to 400 tons per hour, is, in effect, not working at its full potential if oversized pieces such as medians, light standards or sewer-pipe sections encountered in this project need to be removed from the process for further preliminary breaking," says Maynard.

STATUS & FORECAST TOTAL CONSTRUCTION SPENDING

Total construction spending dropped almost 9 percent in the last three months after holding approximately steady for nearly a year. Spending is expected to fall 6-7 percent more through late 2009. Most of this decline will be in the winter and early spring before significant spending of the new federal fiscal stimulus construction funds occur. Heavy-construction project spending holds up best while non-residential-building project spending — especially commercial buildings — declines rapidly. The three-year housing recession continues at least into the summer. For more analysis, visit our Economic Outlook at ConstructionEquipment.com.

— JIM HAUGHEY



Source: U.S. Department of Commerce

MANUFACTURER NEWS

Bobcat to Replace Club Car with Polaris

Bobcat and Polaris announced a long-term strategic alliance that will result in a "highly differentiated," jointly produced product(s) coming to market by the second half of 2010.

These new products will be branded Bobcat and will replace Bobcat 2100, 2200 and 2300 utility vehicles made by Club Car. "Bobcat will continue to support and take orders for the next 12 months," a Bobcat spokesperson says.

The product will be marketed as a "work vehicle," rather than a utility vehicle, through Bobcat's distribution channels. Polaris will continue to market its Ranger line, and the agreement does not affect Bobcat's Toolcat.

According to Bobcat, Polaris has 1,800 dealers, only 20 of which also distribute Bobcat products. A Polaris spokesperson said Polaris products will not be marketed through Bobcat dealerships, at least not initially.



BUCKET CAPACITY

1.22 CUBIC YD

OPERATING WEIGHT

47,400 LBS

IT DID WHAT? SURVIVED **20 FEET** OF SALT WATER FOR **TWO WEEKS**

Carroll Pons is the director of heavy equipment operations for Plaquemines Parish, LA. After Hurricane Katrina hit, he knew he'd have a tough time getting his equipment working again to help in the clean-up. But he never expected anything like this. The parish's Doosan excavator had been submerged in 20 feet of saltwater for two weeks. Part of a roof was stuck in the boom. Though he thought it was a goner, it was worth a try. So Pons called M&L Industries, his Doosan dealer for 10 years. They drained 60 gallons of seawater from the engine compartment and did some minor repairs. Four hours later, our excavator roared to life and headed off to help clean up. Talk about durability! Want to see for yourself what a Doosan can do? Tell us you want a free demo. Visit www.demoadoosan.com to find out how.



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Computerized Drill Rig to Cut Blasting Costs \$40K

First combination of GPS bore-hole guidance and CAN bus control systems places holes precisely and drills them perfectly

By LARRY STEWART,
Executive Editor

Atlas Copco put a unique and potent weapon in the hands of quarries and other rock drillers interested in cutting drilling and blasting costs when the company combined its Rig Control System (RCS) with its Global-Positioning-System-driven Hole Navigation on surface drills. The SmartRig configuration for surface drills debuted in Europe in 2007 and finally made it to North America last year, onto Conco quarries in Springfield, Mo., aboard a ROC F9C, where they're saving enough to recoup the high-tech surface drill's \$100,000 price premium in less than three years.

"We were drilling an 8-

x12-foot pattern before and we've gone to 10x14 feet," says Chris Upp, Conco's director of quarry operations. "We may be at 12x16 before it's over with — that may work for us."

Agreeing with the adage: "The blast is the most cost-effective primary crusher in the pit," doesn't require overloading with explosives. The industry is finding that drilling precision is one of the keys to making optimum use of the charges loaded into a bench. Electronics used to guide blast holes in tunneling, where navigation accuracy directly influences dollars made or lost on a contract, are being adapted to surface drills.

Like other rock-drill makers, Atlas Copco started using CAN bus hydraulic controllers on underground drill jumbos because the so-

phisticated electronic systems move the machine's computing power out to the individual hydraulic pumps, motors and cylinders, where the work is being done. Decentralized systems not only simplify the machine's parts manual, but they speed systems' reactions to changing operating conditions.

The bore piloting system monitors down pressure, drill-string torque, and hammer performance, adjusting them to maintain a straight bore, for example, when the bit



Within feet of a planned hole, the GPS-identified location shows on the monitor in a bull's-eye (top). SmartRig can automatically center the bit and set the bore angle. Another screen (right) displays Rig Control System priorities: rotational pressure, impact pressure, and dampening pressure on three dials.



REPORT FIELD REP

thrusts into a void or is deflected by a shelf of harder rock. Centralized control systems, with a single computer responding to inputs from sensors mounted on the hydraulic actuators, can't respond as quickly or as accurately as a CAN bus system, which puts computer controllers directly on the pumps, motors and cylinders. Atlas Copco is the first nameplate to bring CAN bus control to a surface drill rig.

"Underground tunneling is a very sophisticated process," says Maurice Hunter, business line manager for Atlas Copco's surface drills. "The profile and direction of the tunnel has to be very precise, so you need very precise control over the drill-and-shoot process."

"The critical thing with surface drilling is typically rock fragmentation — the driller wants to get the shot rock at the right size to reduce the amount of crushing required. The industry is focused on hole diameter and hole straightness. If holes are deviating from the plan, you don't know where the bottom may be. You could get two holes and a lot of explosives close to each other and end up with a fly rock situation, or back blast."

The SmartRig adapts to changes in drilling conditions that deflect the drill bit.

"It can make minor adjustments as it drills," says Upp. "If you hit a void, it adjusts the down pressure and then it can adjust the torque and hammer speed to drill a perfectly vertical hole."

Conco blast holes are all vertical. With a machine suited to drilling consistent holes, the remaining criterion necessary to manage drilling and blasting costs was placing the holes accurately.

One of my main goals in looking at the GPS was to get maximum shot optimization," says Upp. "I want to find how wide of a pattern we can drill and still have an optimum shot."

Conco's F9C SmartRig is equipped with GPS transceivers, and with a reference station



Photos: George Ploetner

Test Set: Atlas Copco ROC F9C SmartRig

Hole Range	3½" to 5"
Drilling Method	33.5 hp COP 2550
Engine Power	300 hp Cat C9

The Rig Control System consistently adjusts down pressure, drill-string torque, and hammer performance to keep the rig drilling very straight through voids or changes in rock density. Precisely placed, straight blast holes have allowed Conco to stretch its blast pattern from 8x12 feet to 10x14.

set up in the quarry, the system can locate the drill bit to within fractions of an inch. Conco's blaster has mapped the quarry sites using a GPS rover — taking coordinates from all around the benches. To lay out a drill pattern, he gets coordinates from each end of the shot and brings them up on a personal computer using Atlas Copco's ROC Manager software. The system will automatically mark hole locations at whatever pattern is specified.

The blaster checks the layout and adjusts it if necessary, then saves it to a memory card. The memory card is plugged into the slot aboard the F9C and the pattern is downloaded into the RCS display.



Conco's SmartRig, the first at work in North America, is a ROC F9C with a COP 2560 rock drill and fully automatic rod-handling system.



Conco consistently plans 4-inch, vertical blast holes. Double drill-steel support in Atlas Copco's drifter guides the bit accurately for consistent collaring and straight holes.

The drill operator's monitor displays the pattern, and when he trams the machine to within a few feet of an intended hole, the location pops up on the screen like a bull's-eye. The SmartRig can be switched over to automatic, and it will center the bit on the target to within a tenth of an inch. Or the operator can center the machine over the target manually with the aid of the on-screen target.

"The blaster used to lay out every hole we drilled by painting a rock orange and placing it on the ground to say, 'Drill a hole here,'" says Upp. "If that rock got kicked or the driller drills to one side of it or the other, you don't have a perfect shot layout.

"With GPS being right on the money, you're true to your shot layout," he adds. "That's when you can go in and really optimize and start expanding your pattern because you

know that your plan is being followed."

In ten months of gradual expansion, Conco's standard shot layout has grown from 8x12 to 10x14.

"We're looking for a maximum of 48- to 52-inch rock in the shot-rock pile. Our comfort zone has been with a 4-inch hole on a 10x14 pattern, but with GPS and the digital layout system, we can make incremental modifications."

"We're not completely there (to the optimum shot layout) yet, but we're definitely on our way," says Upp, "and we're seeing good results.

"One of the key elements in buying the SmartRig was, 'Can I justify the extra cost for this computerized (machine) by showing that over the life of the drill we will reduce our overall drilling and blasting costs?'"

With five fewer blast holes to drill for each 30,000-ton shot, Upp says his

drilling and blasting costs are down 6 to 8 percent (precise costs are elusive, with fluctuations in explosives and labor costs). Estimating conservatively, using the 6-percent savings, Upp expects to cut drilling-and-blasting costs by nearly \$40,000 in the first year of owning the F9C SmartRig.

"(Blast optimization) is one of the justifications I used when buying the drill," says Upp. "But it's not a cheap drill."

He is also watching for savings in the drill-string consumables.

In automatic mode, the SmartRig will not only center the drill over the target, but it will automatically collar the hole and commence drilling and adding steel until the bit reaches the desired depth. It will stop automatically, and remove drill steel without operator intervention. All the while, the RCS is monitoring rotation pressure, drill-dampening pressure and penetration rate, and adjusting automatically to changing conditions.

The CAN bus control system's quick, accurate reactions to rock conditions not only reduce the risk of drill strings getting stuck in blast holes, but also result in less wear on bits, steel, and hammer components.

"We're getting in the 30-percent range more life on consumables with the drill automation because you're

not adding extra pressure that you don't need to drill the hole," says Upp. "Using a lot of hydraulic sensors, the drill is getting feedback from the steel all the time, and it has the ability to control those things that affect drill life the most — speed, down-the-hole pressure, hammer performance — whereas an operator that didn't have the computerized system is just going to go full bore down the hole until they get done."

Chris Dickinson, field maintenance mechanic at Conco, says the COP 2560 drilling hammer that their F9C carries allows significantly longer shank life.

"Striking bar life, compared to the 1858 (the drill hammer on Conco's previous ROC F9 rig) is better," Dickinson says. "On this one, we replaced one striking bar in the first six months we had it as opposed to, probably, changing three or four striking bars on the 1858. It's because the leader system senses rotation speed and down pressure, and doesn't apply any more pressure or hammering than necessary."

The CAN bus control system also extends rig durability if you ascribe to the adage that the reliability of any machine is inversely related to the number of parts that make up the machine. Atlas Copco reduces the number of hydraulic hoses and parts in its SmartRigs by nearly 30 percent, largely because the CAN bus system eliminates hydraulic control lines leading to the controls in the cab. The number of electronic control components and amount of wiring is also sharply curtailed.

The ultimate influence of machine simplification — and newly centralized filter-change station accessible from ground level and other labor-saving maintenance improvements — on SmartRig reliability and operating costs won't be apparent at Conco for



Mechanic Dickinson says the rig control has more than tripled striking-bar life, and he praises improved maintenance access.

some time. Significant benefits related to its drilling accuracy — such as reduced scaling and secondary breaking resulting from more uniform shots, and better haul-truck component life from flatter loading floors and benches — will also have to wait for deeper experience before they can be valued.

Despite impressive estimates of drilling and blasting savings, the computerized drill rig is capable of production improvements that Conco may never see because of the quarry's flat benches and strictly vertical holes. Blast planners should be able to work with a detailed digital terrain map in the ROC Manager software, and adapt blast patterns to deliver consistent shot rock and smooth walls and benches when stripping overburden or even prepping construction sites. Conco has yet to use the Hole Navigation System on virgin rock surfaces.

"I'm not convinced that the Smart Rig is the best drill for every application," Upp says. "It's working well for us in a quarry application, but I think if you're not going to have the drill running every day, you're going to have a hard time overcoming that extra cost."

"I also think eventually we'll all have somebody who's educated enough to be able to plug a (complex) topography into the computer and de-




Collecting oil, fuel and hydraulic filters behind the ROC F9C's right-side access panel eliminates the need to climb up on a track for regular maintenance.



Backup batteries were added to the latest version of the F9C and are accessible from the ground on the left side, along with air filters.

sign a productive shot layout on it. But I haven't yet seen operations, at least in this area, that have been able to do that out on a highway job, or where they're doing a lot of stripping. I think that's why (digital bore planning and guidance) has been fairly slow coming to the U.S."

Nevertheless, even with some specific values missing from the cost/benefit analysis, it appears Conco is convinced the SmartRig is a winner in its relatively simple application.

"Ultimately we're drilling fewer holes for the tonnage and we're using less explosives, so we're driving down our drilling and blasting costs," says Upp, "which is the name of the game." 

How to Profit with Excavation Protection

Lighter-weight shields and shores, used properly, safeguard workers in the trench while they save fuel for digging and compacting

The key to safe excavations between 5 and 20 feet deep is that the work be supervised closely by a trained, competent person. (Trenches 20 feet or deeper require a safety system devised by a registered professional engineer.) Competent-person training is available from NUCA,

unions and commercial safety-training firms. It should not be intimidating. Anyone who can read equipment manufacturers' tables cross referencing shield and shore models with their soil-type, excavation-depth and width capabilities can pick the right trench box or shores to use in the job at hand. The rest of the federal excavation safety standard (CFR 1926 Subpart P) is a fairly straightforward prescription for inspecting excavations for safety, evaluating soil conditions, and using trench protection safely.

Soil conditions can change in minutes on a dig — faster than the weather — and it's the competent person's job to evaluate soils with every change and deter-

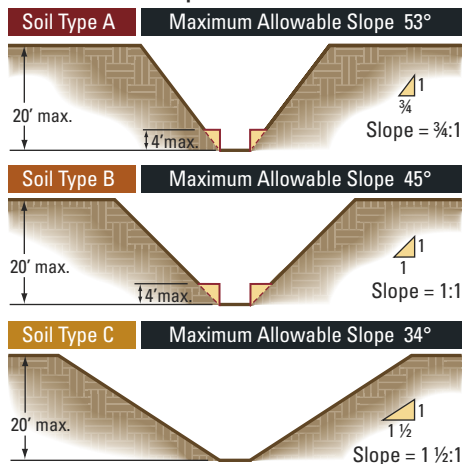
mine if the protection system or slopes being used should change.

The federal excavation safety standard squeezes all soils into four types for the purposes of cave-in protection based on their cohesiveness and unconfined compressive strength — the load per surface area at which a soil will collapse into an excavation under its own weight — measured in tons per square foot (tsf). Typically, cohesiveness is determined by a soil sample's resistance to penetration, either by the tip of the competent person's thumb or a pocket penetrometer (a less-than-\$60 tool that all competent persons should carry with them). The federal standard calls the first type "stable rock," and defines it as "natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed." Type A soils are cohesive, with unconfined compressive strengths of 1.5 tsf or greater. Everything from silty clay loam to clay and caliche can be included as Type A soil, but the actual classification depends on their condition.

The standard specifies that no soil can be Type A if it is "fissured." The Occupational Safety & Health Administration (OSHA) applies this criterion to stable rock, too.

"There is no such thing as solid rock," says Greg Strudwick, principal of safety consultancy Greg Strudwick & Assoc. and longtime leader of various safety committees for the National Utility Contractors Association. "Rock can never be an A because you can find cracks or fissures in all of it, although it holds itself up better than a clay.

Allowable Slopes

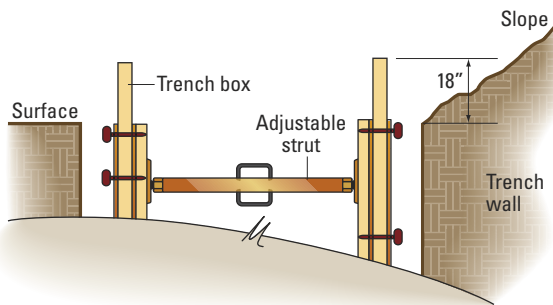


Source: CFR 1926 Subpart P Appendix B

*Slope angles expressed as H:V (Horizontal / Vertical), and as degrees (in parenthesis) from horizontal.

You're allowed to trench unprotected to 20 feet deep if you slope the sides according to the soil type. A bench with 4-foot vertical sides is allowed at the bottom of sloped excavations in Type A and B soils. Slopes must comply with the 3/4:1 maximum angle for Type A and 1:1 for Type B soils. Sloping, benching, and protection systems for excavations more than 20 feet deep must be designed by a registered professional engineer.

Top of the Box



Trench boxes should extend 18 inches above the top of the vertical trench wall. If the box is not tall enough for the full excavation depth, the walls can slope down to a vertical wall that is 18 inches lower than the top of the trench box. But the box must be rated for the full depth of the excavation.

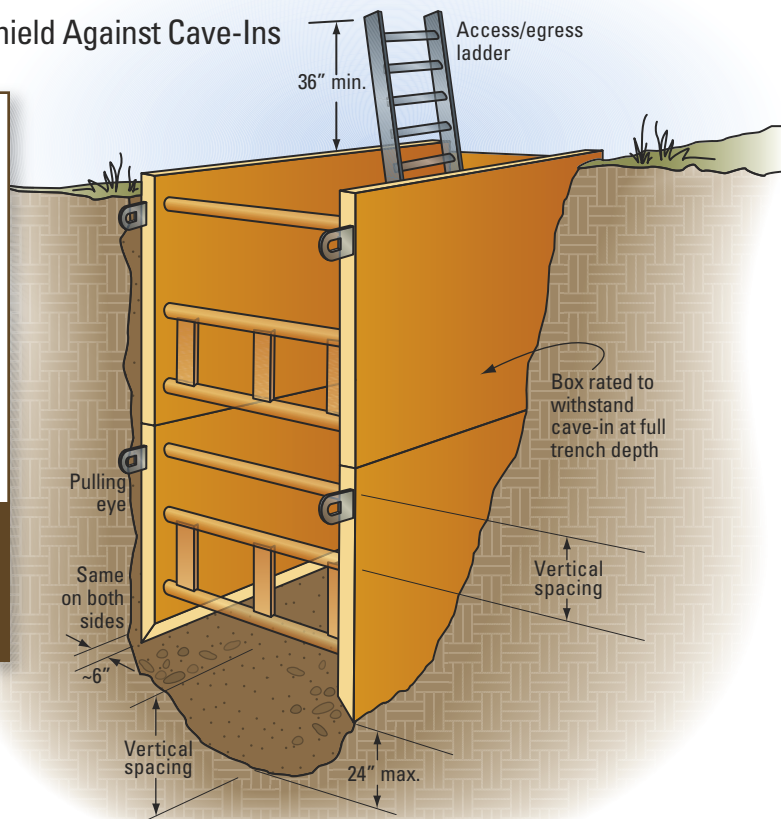
“You might have Type A soil in some clays for a while,” Strudwick adds. “But the minute it dries and cracks, it automatically becomes a B. We recognize Type A, but we don’t recommend that anybody operate with that classification because it is going to change.”

Soil classification and selecting appropriate cave-in protection — not a difficult task to begin with — are made even easier when you understand that two of the four potential classifications are seldom in play. Most excavations are going to be classified as Type B or C soil. Type B soil is cohesive, with unconfined compressive strength between 1.5 and 0.5 tsf.

“That range goes from 3,000-pound soil to 1,000-pound soil, which is a very wide range of unconfined compressive strength,” Strudwick points out.

Type C soils are granular, with an unconfined compressive strength of 0.5 tsf or less, meaning a trench cut through them will collapse under less than a 1,000-pound load. Soil that under better circumstances would be Type B is classified as C if it is submerged or there is water seeping from it, or if soil layers slope into the excavation at 4:1 (horizontal:vertical)

Shield Against Cave-Ins



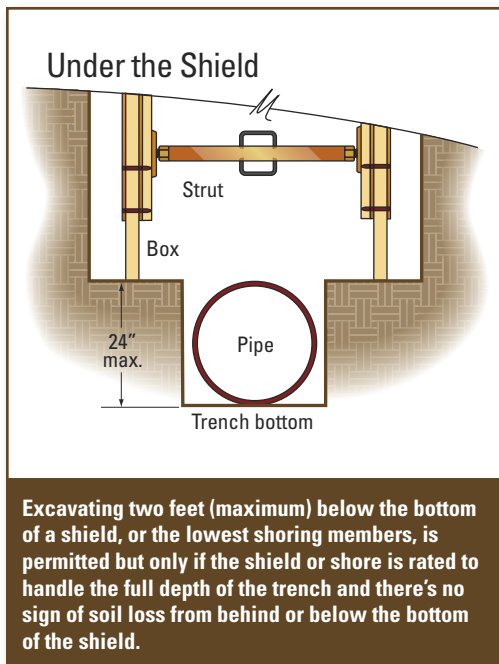
Trench boxes must withstand tons of dirt collapsing into them without being shoved across the floor of the trench. They should be centered in trenches not much more than a foot wider than the box, leaving six inches of clearance on both sides. Safety standards require a means of safe access and egress — entering and leaving — the protected work zone in excavations four feet or more deep.

or steeper.

There are protection-system choices that will secure a broad array of excavations in Type B and Type C soils. Hydraulic aluminum shores with 2-inch-diameter cylinders can protect trenches in Type B soil 5 to 15 feet deep and up to 12 feet wide. Many steel trench boxes will protect a vast array of trench sizes in Type B and practically sized trenches in Type C soils. And even among lightweight, modular trench boxes, there are 8- by 10-foot models that will protect Type B excavations 25 feet deep and Type C excavations down to 16 feet.

Soil conditions must be analyzed at least daily, and the trench protection system ad-

Safety Illustrated



justed to accommodate significant changes. The competent person's inspection should start first thing in the morning, before anybody is exposed to a cave-in risk, with a visual inspection. Is it fine-grained cohesive soil or loose, granular stuff? Is there water pooling in yesterday's excavation or on the surface or seeping from the walls? Is there soil spalling from the excavation walls?

"As the excavator operator's making his initial cut in the morning, you should look at the soil he's bringing up," says Strudwick. "Obviously you can see if it's sand, or if it's clumping and sticking to the bucket.

"We really recommend that every excavator operator be trained (as a competent person)," says Strudwick. "You need a second (competent person) out on the jobsite in case the foreman's got to run an errand. And that excavator operator knows better than anyone else on the site what type of soil you're working in. If he moves into an area that's got water in it or that goes soft or whatever, he's the one that will know if the shoring system that you're using is not going to be adequate."

A manual test is necessary to confirm a soil classification. The thumb penetration test or testing with a pocket penetrometer is probably the most objective measure of soil strength. Competent-person training details how thumb penetration works, but the basic idea is that when you press the tip of your thumb into a chunk of freshly excavated soil, if you can indent it with moderate effort about half way up your thumbnail or less you're holding a soil of about 1 tsf — in the middle of the Type B range. Your thumb easily penetrates Type C soils several inches, and the soil can be molded with light finger pressure.

"OSHA considers it an acceptable test,

but if you don't practice the thumb penetration test — keep up with it and do the necessary due diligence daily — you'll forget how it feels," says Strudwick. "The thing is, it is necessary every day. I think we're getting that across, it just takes a long time to create the culture."

Soil type determines the angle of the slope, or the configuration of shoring, or the type of trench box capable of protecting the work. Type A soils are safe when sloped at 3/4:1 (53 degrees), and Type B soils should be sloped at 1:1 (45 degrees). You can finish sloped trenches in Type A and B soils with a 4-foot vertical-walled trench at the bottom. In Type C material, the maximum slope is 1 1/2:1.

Sloping excavation walls probably should be a last resort because it requires moving more dirt than necessary. For example, you move 840 cubic feet of material opening a 7-foot trench 4 feet wide and 30 feet long. Deciding to slope those trench walls in a Type B soil, rather than use a trench box or shoring, increases the amount of dirt you have to move 32 percent to 1,110 cubic feet.

The federal excavation standard specifies that spoil should be placed no closer than 2 feet from the edge of the trench. That dimension is intended to prevent a tripping hazard beside the trench and to reduce the likelihood of spoil being accidentally pushed back into the excavation on to workers below.

"You really want to cast the spoil as far away from the trench as practical to keep from surcharging trench walls or banks," says Strudwick.

Vehicles carrying fill material should approach excavations carefully at right angles, with a spotter or other warning system to alert operators when they are close enough to deliver a load. Equipment should never come closer than necessary.

"You don't want equipment to come in at an angle because the near tire creates a load closer to the trench," says Strudwick. "And you don't want them to shake the bucket to pour just a little stone or sand."

OSHA specifies methods of safe egress, or exit, from trenches. Ladders, stairs or ramps

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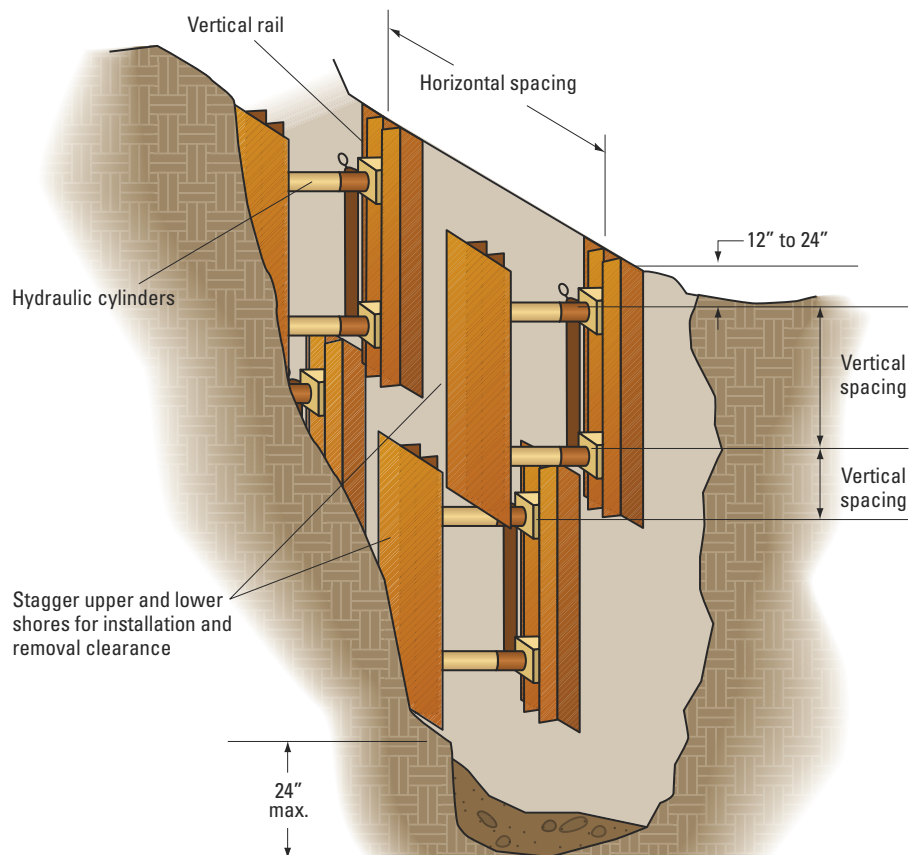
must be used in any trench 4 feet deep or deeper, and workers should reach the surface no more than 25 horizontal feet from where they are working. A ladder, if used with a trench box or shoring, must be protected by the system and extend 3 feet above the top of the protection system. There should be a ramp with guardrails to allow laborers to step safely from the top of a trench box onto the bank if the box wall is more than a foot or two from the surface (the safe distance is to be deter-

mined by the competent person on site).

The excavation safety standards (both the federal standard and the state-plan standards) are pretty straightforward on the subject of trench protection. There is more to know than what you see here, though. Any excavating firm that doesn't have a competent person on all sites should get employees trained immediately, and make sure they have authority to stop jobs and/or correct unsafe excavating practices. 

"Any excavating firm that doesn't have a competent person on all sites should get employees trained immediately."

Shores Stop Cave-Ins



Shoring is designed to prevent cave-ins by applying 750 to 1,500 psi of force to the excavation walls. Maximum horizontal space between struts is prescribed for the trench depth and soil type. Wider trenches require larger-diameter struts or structural oversleeves. Walers systems are a bit more complex, but only applicable in some Type C soils. When stacking in deep trenches, bottom shores should be set first. Top shores should be staggered forward, so bottom shores can be pulled out first and moved ahead as work progresses.

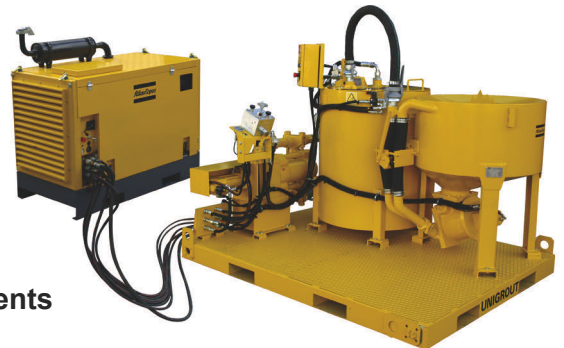
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Application: Intelligent Compaction

By MIKE ANDERSON, Senior Editor

Rollers That Read **Road Conditions**

Contractors give thumbs-up to Intelligent Compaction, welcome further development of product lines available to them

Officially the Bomag BW190AD-4 AM, the 78-inch-wide tandem vibratory compactor has earned a more affectionate handle among the asphalt-paving crews employed by Indiana's Milestone Contractors.

"We just call it, 'The Smart Roller,'" says company superintendent Eddie Breeden. Smart, indeed. The AM on the model's designation represents Asphalt Manager, a Bomag product offering as part of the Intelligent Compaction (IC) movement into North America, based on technology established in Europe more than a decade earlier.

With a basic compactor, passing over a test strip will define for the operator the number of passes needed for proper compaction, based on an assumption there will be no deviation in the material, rolling pattern or roller speed. With the new Bomag system, the control test determines an energy measurement

that correlates with the specified density to be achieved over the complete work area. As the BW190AD-4 AM moves along, it automatically adjusts the output energy the front drum is exerting into the work surface, via a process of "vectoring" or changing the angle of energy delivered from the drum: a straight vertical angle for softer areas; a more horizontal angle as the material stiffens.

The Bomag BW190AD-4 AM was introduced to users in the United States in 2005, the year Breeden's paving crew with Milestone Contractors was working on Interstate 70 at Richmond, Ind., near the Ohio border. Bomag dealer Southeastern Equipment brought out a demonstrator model for the crew to try. "The Smart Roller" not only remained for the entire job, says Breeden, but Milestone bought that very piece and it remains part of the company's fleet today.

"The thing about it is, density comes and goes as you're going down the road or the runway or whatever," says Breeden, who's been with Milestone for 39 years, "and this machine can sense when you need a little more or a little less. The front wheel will go from beating vertical, up and down, and it'll start going where it's more like oscillating, front to back, and that keeps it from over-compacting the mix. The machine will actually tell you when it's as hard as you're going to get it."

For the roller operator, guesswork has been replaced by the confidence that the ma-

Featuring Asphalt Manager, the Bomag BW190AD-4 AM vibratory roller leverages Intelligent Compaction to not only ensure required density is required, but prevent material from being over-compacted. Contractors who jumped at the opportunity to test the technology have been impressed.



chine is achieving with IC on auto what company quality-control personnel will be looking for when they come along with their TransTech pavement quality indicators. “The roller operator knows before he even checks it that he’s getting what he wants to get,” says Breeden.

In Colorado, United Contractors has likewise found the double-drum BW190AD-4 AM to be of great benefit to the quality-control process, says Ken Dobey, formerly highway superintendent and now Southern Area construction manager for the company. United Contractors likewise put one of the AM machines to work right away in 2005, and “I liked it so much, we added another one to my crew,” the next year, says Dobey. “They give us a lot of options on our jobs; we have used them with several different mix designs. If we’re trying to compact really tender mix, we can adjust those machines to fit the mix. We’ve had mixes where we have only run the front drum, because the front drum is the only one that does direct-vibe, the Intelligent Compaction part.”

Dobey had gotten to know and trust Bomag Americas national accounts manager Chuck Deahl through various training classes, and thus jumped at the opportunity to test the BW190AD-4 AM in 2005 with the support of local dealer Power Equipment Co., “and we were sold instantly,” Dobey recalls. “After testing like we did at first, we now run them in auto all the time.”

Other approaches

Smart technology was right at home amidst the iron when the compaction and paving industries gathered March 10-12 in Orlando, Fla., for the World of Asphalt 2009 trade show.

Sakai demonstrated for the first time at the show its Compaction Information System, applicable for asphalt and soil projects. With “a simple touch-screen control pattern for quick and easy access,” the new Sakai system links to a GPS system to provide the operator with real-time compaction information. This,



says Sakai, enables the operator to develop a consistent roller pattern, which is viewed immediately at the operator’s station via a color-coded monitor. It also provides a visual display of where additional passes may be required.

With the Sakai compaction information system, site-plan files can be uploaded into the on-board computer via a laptop, thumb drive or external hard drive, from which a compaction plan is developed for the project. At the end of the process, operators can print out a project report or download the information back to the laptop or other external drive for later transfer to an office computer for further analysis. Site plan or not, the system can be easily operated in real time by the operator, says Sakai.

Sakai’s mainline hot-mix rollers feature the on-board ExactCompact system, which enables roller operators to maintain impact spacing. The operator simply sets the push-button control for the desired target figure — anywhere between 8 and 20 impacts per foot. When the machine runs, the target appears on a display, allowing the operator to reset as needed.

Other roller OEMs have introduced smart solutions to their product offerings:

- Caterpillar’s AccuGrade Compaction for Soil Compactors product leverages GPS technology for measurement and mapping. Compaction values are displayed on the data display as a graduated color scale, calibrated to match characteristics of the soil being com-

Sakai’s Compaction Information System enables the roller operator to develop and maintain a consistent compaction pattern for optimum results. That pattern is viewed right at the operator’s station on an easy-to-view, color-coded monitor.

Application: Intelligent Compaction



According to Caterpillar, the AccuGrade Compaction for Soil Compactors system provides contractors with increased production, because their roller operators are able to determine when required work has been completed and thus move on to areas that need compaction.

pacted. Once the value color of the work completed matches the target color, the operator can confidently move on to the next work area. Other data that can be displayed include the number of passes completed, allowing verification of the work done.

■ Now part of the Volvo Construction Equipment product line, the former Ingersoll Rand tandem asphalt compactor line established automatic vibration control, which ensures drum vibration only occurs at appropriate times. Volvo's HFA models will, by altering oil flow through the hydraulic pumps, automatically adjust vibration frequency to the optimum level in each of the eight amplitude settings available, as compared to operating with a fixed vibration frequency. The HFA's built-in control system extends to automatically lag vibration on the trailing drum, so that both drums begin to vibrate at or near the same point on the surface.

■ While not an IC product, the Hamm HD O130V introduced at Conexpo-Con/Agg 2008 extended the Hamm Oscillation technology to the 84-inch roller market. The HD O130V is the largest model in North America to incorporate "non-aggressive" Oscillation technology, which uses horizontal rather than vertical force to compact. The drum never leaves the mat, and both the surface and operator avoid pounding. The movement changes its direction of effect during one turn, generating an oscillating or rocking movement of the drum.

In Colorado, hands-on use of the Bomag BW190AD-4 AM quickly sold United Contractors on IC.

"We did a little testing with them on roller passes on different mixes," says Dobey. "We ran them in manual and we ran them in automatic with the computer running, and we found that running manual, same number of passes, we wouldn't get the quality of compaction that we would running them in auto. We were actually over-compacting in manual;

we were pounding too hard. The machine would back off in automatic and it would bring our densities up. We also found in some mixes we could cut a roller pass running them in automatic."


Once a company and its crew foremen buy in to a technology, says Dobey, it doesn't take long for the operators, even the most cynical veterans, to jump onboard. "It's a simple process; the training's not hard on them," he says of Asphalt Manager. "Just getting people to understand what the rollers are doing, what their potential is, that's a huge part of it. After you can get that across with your roller people, do a few tests with them, they understand.

"I had a guy who had 20 years on a roller when we started using these. He was pretty stubborn, he always could 'roll better than any computer.' But after we did some testing, he bought-in hook, line and sinker. Right away, he was, 'We're only going to run them in auto,' because he saw what they did. Those machines are just a huge tool for our operators.

"We have one full-time highway crew that runs the two 190s all the time," says Dobey. A second United crew is dispatched to highway jobs if needed, but can't always get a BW190AD-4 AM on rental at that point, "but if we had two full-time highway crews, that's what they'd be running."

In Indiana, "I don't know if a company our size needs any more than one of them; maybe two at the most," says Milestone's Breeden. "But I really think that a company ought to have one if they're going to do all the kinds of work we do. If you getting into a pickle on a job, get that roller there, and it's something to help you get away from penalties and so forth."

Breeden had his fingers crossed that a couple of Interstate jobs will come to fruition for his crew in 2009, meaning it should retain use of the company's "Smart Roller" for the year. "I think it's needed in the industry," he says, "and I'm glad we got one."

Dobey is intrigued by Bomag's plans to add a 66-inch Asphalt Manager model, "and I'd like to see them in a parking-lot version, too," he says. "It's just such a good tool." 



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I-Shift Has Indiana Fans

Volvo's self-shifting electro-mechanical transmission works quickly and smoothly for this loyal fleet

Who's the "I" in Volvo's I-Shift automated mechanical transmission? In this case it's Perry Allen, a driver for Klink Trucking at Ashley in northeastern Indiana, who's assigned to Number 299, an '09 Volvo VHD dump truck with the self-shifting gearbox. Allen likes the nicely outfitted truck and the work-saving tranny, and pointed out its smooth operation during the October morning I spent with him as he hauled dirt and aggregate around nearby Fort Wayne, Ind.

The "I" could be Wayne Klink, founder and president of the fleet, which hauls aggregates, asphalt and other building materials with 89 trucks and tractors — 84 of them Volvos. He, too, likes the transmission and has

one in his personal "distribution" truck, a tanker that sprays liquid asphalt on roads undergoing chip-and-tar treatment. He's trying out automated transmissions to see how they can benefit his operation, and said he previously tested four Eaton Fuller UltraShifts, which are back at Eaton being reprogrammed for faster shifting.

Allen had one of the UltraShifts and said he prefers the I-Shift. As we drove south toward Fort Wayne using Interstate 69 and

county and state roads, he pointed out many examples where the Volvo product shifted more quickly and smoothly than its competitor would have. Stop signs, traffic lights and varying speeds kept the tranny busy, and usually it was efficient and unobtrusive. If it hadn't been an object of curiosity — it's still a rare component and is made rarer because it's available only in Volvos — we probably wouldn't have talked about it.

The electro-mechanical device is very popular in Europe, Volvo says, but far less so in North America, where owners are more frugal and drivers simply expect to shift for themselves. Like the UltraShift, I-Shift is primarily an on-highway transmission but Volvo engineers approved its use in Klink's on/off-road fleet.

The "I" could also mean intelligent, because I-Shift usually chose the correct gear for the situation and shifted up or down as needed, just like the auto tranny in your car or pickup truck but with brief pauses between each ratio as the device shifts up or downward among its 12 ratios. But it wasn't brilliant. Allen pointed out the times when it started out in 1st even when the truck was empty, a quirk that can be overridden by selecting Manual and thumbing an Up button; the brain allows the start-out gear to be as high as 3rd, and clutch engagement was always very smooth, with absolutely no chatter and no front-end hopping. From 1st it would go quickly to 2nd or 3rd and then skip-shift upward from there.

Later, when I drove, the transmission did the 1st-gear thing often, but once or twice took off in 4th, skip-shifted to 7th, then 9th and finally 11th, where it stayed for most street cruising above 35 or 40 mph. Sometimes it chose other gears, but they all worked fine in propelling the truck; the only reason I noted them is that I watched the brightly lit read-out in the info panel below the speedo-



Driver Perry Allen likes the Volvo I-Shift, whose selector is alongside his seat. He usually leaves it alone to change gears to suit the driving situation. Its only glitch: a habit of starting out in 1st gear when it's not needed.



VHDs don't offer a choice of engines; the 12.8-liter Volvo D13 is the only one available.

meter and tachometer. Given a light foot, the engine tended to stay between 1,200 and 1,500 rpm at street speeds; a heavier foot sent revs a few hundred rpm higher, but the tranny almost never hung in a gear too long.

And the I-Shift shifted quickly between Drive and Reverse, which is important while maneuvering at jobsites and while trying to rock out of mud, Allen said. If the truck was pointed downhill, as it was at one construction site we delivered to, the clutch quickly engaged and we moved backward without unintentionally rolling forward — a good thing, because a van and a pickup were parked just ahead. I wise-cracked that the van was rusty and a good whack from the Volvo wouldn't really matter. But I feathered the brake pedal with my left foot while spinning the steering wheel, and released the brakes only as we began moving rearward. A wider pedal face would make this a little easier for a driver's left foot to reach the brake, but I could also have used the trolley handle on the dash.


The Volvo's wide cab gave me the impression that it was almost too wide for street lanes, but of course it wasn't, and I soon got accustomed to it. The big right-side window compensated for its distance from my eyes and, thanks also to good mirrors, I never had trouble seeing what was alongside. The truck steered precisely, turned rather sharply and stopped promptly, all with minimal work from Allen or me. It rode smoothly, too, and the nicely appointed interior gave a deluxe feel.



As equipped with its two pusher axles, Number 299 can legally gross up to 73,280 pounds in Indiana. An East smooth-sided aluminum dump body helps maximize payload.

Noise from the D13 diesel was minimal and the I-Shift made the most of its 425 horsepower, so the truck accelerated briskly.

The VHD is a wonderful truck to operate and Klink testifies that his drivers really like all his Volvos, including earlier models. Overall they give few problems; have good trade-in value (or did when the truck market was better); and his dealer, VoMac Truck Sales & Service in New Haven (a Fort Wayne suburb), is tops.

VHDs might appeal to more customers if they had a choice of engines, but the 12.8-liter D13 is the only one available. This one's a clean-burning '07-legal model, so there's virtually no soot or odor in its exhaust. Volvo Powertrain makes the diesel in Maryland, but the I-Shift comes from Sweden. That its electronics and those of the engine are related (so to speak) is probably why they work so well together. A slow trend toward automatics in general among heavy truck buyers might boost the I-Shift. Klink said he plans to buy more of them, partly because they help inexperienced drivers — which Allen is not — perform better. And they'll work less while doing it. 

SPECIFICATIONS

Truck: 2009 Volvo VHD104B, axle-back, BBC 113.6 in., GVWR 73,280 lbs. (in Indiana)

Engine: Volvo D13, 425 hp @2,100 rpm, 1550 lbs.-ft. @ 1,100 rpm, w/engine and turbo brake

Transmission: Volvo I-Shift AT02512C, automated mechanical, 12-speed overdrive

Front Axle: 20,000-pound Arvin Meritor FL941, on multileafs

Rear Axles: 46,000-pound Meritor RT46-160, w/full locking wheel differentials, 3.42 ratio, on 46,000-lb. Volvo T-Ride mechanical suspension

Wheelbase: 238 inches

Front Tires and Wheels: 445/65R22.5 Michelin XFE on aluminum discs

Rear Tires and Wheels: 275/80R22.5 Michelin XDN2 on aluminum discs

Auxiliary Axles: Two 13,200-lb. Hendrickson steerable

Brakes: Meritor S-Cam Q-Plus, w/Bendix ABS

Fuel Tank: 100 gal. aluminum

Body: 18.5-ft. East severe-service aluminum dump

Buying File: All-Terrain Cranes

By MIKE ANDERSON, Senior Editor

Crane Makers Extend A Big Reach

The select group of OEMs who make all-terrain cranes apparently has the focused marketplace well covered

If you're ready right now to slap down a cool million bucks, or two, or more, it's overwhelmingly likely those who make and sell all-terrain cranes know who and where you are. You don't need to find them; just open your door in the morning, and they'll be there.

This may explain why some of these specialized OEMs are not inclined to shout out their stories at this time. There are members of this select group, such as Manitowoc and Terex, keen to explain their product offering when asked, but others either politely declined or flat-out did not respond to repeated requests.

With anywhere from three to eight axles, all-terrain cranes combine the ability to run the roads at highway speeds with the brute

lifting strength of shorter rough-terrain cranes or even crawler cranes. All-terrain cranes are suited to quicker projects, such as in building construction or general erection jobs, with the ability to be moved on to the next site on their own, immediately and without haulage assistance. All-terrain cranes often have two engines: the chassis engine that drives the transmission and multiple axles must meet on-highway emissions requirements; the crane engine in the upper housing that drives hydraulic pumps used for powering hoists must meet off-highway emissions standards.

Most makes in the market originate from German-based technology.

Manitowoc

Manitowoc used the backdrop of Conexpo-Con/Agg 2008 to roll out to a North American audience two new five-axle all-terrain cranes under the Grove brand. Specifically designated in North America to reflect their maximum rated lift capacities in U.S. tons, at 115 and 225, respectively, the GMK5115 and GMK5225 can achieve tip heights of 278 and 331 feet. They, along with the five-axle GMK5135 rolled out later in 2008, feature both Manitowoc's patented

With a distance of about 8 feet between the second and third axles, the Terex AC 100/4 all-terrain crane can be roaded throughout much of North America. Road homologation is also possible with 16-inch tires. A product of Terex's German-based Demag operations, the AC 100/4 was introduced to the U.S. at Conexpo-Con/Agg 2008.





With its 197-foot, seven-section main boom, Manitowoc's 115-ton-capacity Grove GMK5115 crane made its North American appearance last year. Tip heights of up to 272 feet are available with the hydraulic luffing bi-fold swingaway that includes an 11-foot heavy-duty jib.

Megaform boom and Megatrak suspension system with all-wheel steer, ensuring each wheel remains on the ground at all times. All crane operations including superstructure and carrier functions are managed by the ECOS electronic control system.

The GMK5225 unveiled at Conexpo featured the standard Mercedes engine, but a Cummins engine option is available. This choice, says Manitowoc, "will appeal to crane owners in the U.S., as will the optimum on-road/off-road performance that comes from the engine combined with the Allison transmission and two-speed transfer case."

The GMK5135, with its maximum tip height of 301 feet, combines ECOS with the EKS 5 Light load monitoring system. This particular model is designated the GMK5110-1 outside of North America.

The 11-model Grove family of all-terrain cranes ranges from the 60-ton-capacity GMK3055 to the 550-ton-capacity GMK7550.

Terex

Leveraging the technology of its German-based Demag operation, Terex offers a range of 19 all-terrain crane models, ranging from the short-length AC 30 City with a maxi-

The Cost of Ownership

Size	List Price	*Hourly Rate
17.0 - 29.9 metric tons	\$281,115	\$82.26
30.0 - 34.9 metric tons	\$474,477	\$122.75
35.0 - 39.9 metric tons	\$538,043	\$140.89
40.0 - 49.9 metric tons	\$601,609	\$155.42
50.0 - 65.9 metric tons	\$678,029	\$171.86
66.0 - 80.9 metric tons	\$984,053	\$213.80
81.0 - 110.9 metric tons	\$1,001,140	\$220.55
111.0 - 139.9 metric tons	\$1,124,387	\$241.55
140.0 - 199.9 metric tons	\$1,736,135	\$343.73
200.0 - 299.9 metric tons	\$2,030,686	\$407.41
300 metric tons and up	\$2,532,494	\$498.86

* Hourly rate represents the monthly ownership costs divided by 176, plus operating cost. Adjusted operating unit prices used in the calculation are diesel fuel at \$2.25 per gallon, mechanic's wage at \$45.39 per hour, and money costs at 5.625 percent.

Source: EquipmentWatch.com, phone 800/669-3282

mum lifting capacity of 30 metric tons to the AC 700 described as the world's most powerful telescopic crane "roadable" with the entire main boom.

After being specifically adapted to meet the requirements of North American users, the U.S. debut of the German-built AC 100/4 occurred at Conexpo-Con/Agg 2008. With the distance between the second and third axles being 8 feet, the 100-metric-ton-capacity, four-axle crane is possible, with a dolly, to road in most of the United States. The ma-

Buying File: All-Terrain Cranes

chine's width is about 8 feet 5 inches.

The Terex AC 100/4 has a new five-section telescopic boom that, at a medium length of about 110 feet (33.3 meters) with maximum counterweight, is able to hoist 24.6 metric tons within a radius of 33 feet (10 meters). When heavier loads are required, such as during the assembly of tower cranes, the 100-metric-ton-capacity all-terrain crane equipped with additional counterweight can — at full extension — lift 5.3 metric tons at a radius of more than 90 feet (30 meters). To allow crane set-up in the most uneven environments, a variable stabilizer system allows each of the beam legs to be set in any of four positions.

A recent worldwide product-line addition, the AC 300/6 is capable of 400-metric-ton lifting jobs. According to Terex, that size machine is in “a territory that, for all intents and purposes, belongs to much larger machines.” The AC 300/6 fills a gap between the AC 250-1 and AC 350. Advantages to it over a larger model, says Terex, include its quick-setup Superlift for increased lifting capacity with large-system lengths, as well as a setup-optimized luffing jib and fully automatic counterweight pick-up system.



Little Giant Corp. offers the 30-ton-capacity Little Giant 6430, a carrier-mounted, lattice-boom crane that it claims can be optioned to an “all-terrain” model.


Other players

■ At this year's Intermat show in France, scheduled for April 20-25, it is anticipated Liebherr will roll out the 350-metric-ton LTM 1350-6.1 with a 918-foot (70-meter) telescopic boom, extended by 10 meters over that of the predecessor LTM 1300-6.1 model. The six-axle LTM 1350-6.1 would be the fourth largest in what is currently a 19-model Liebherr mobile crane product line, topped off by the nine-axle LTM 11200-9.1 boasting a lift capacity in excess of 2.6 million pounds or 112 metric tons.

■ With six models ranging from the three-axle ATF50G-3 with a lift capacity of 55 U.S. tons up to the five-axle ATF220G-5 with a 250-ton capacity, Houston-based Tadano America offers a line of all-terrain cranes for the North American market. Each of the Tadano all-terrain cranes features purpose-built frames with two-man, full-width carrier cabs of composite steel-fiberglass structure, as provided by the German-based Faun organization, which was acquired by Japan's Tadano in 1990.

■ As part of its extensive line of mobile, crawler and truck cranes, Link-Belt offers the ATC-3200 and ATC-3250 all-terrain cranes rated at 200 and 250 U.S. tons, respectively. As displayed last year at Conexpo, the seven sections of the ATC-3250's boom extend independently via a solo double-acting, single-stage hydraulic cylinder. Four pinned positions on each section provide 38 extending combinations to the boom, which reaches out to 223 feet (68 meters).

■ Little Giant Corp., sister company to Badger Equipment, offers the 30-U.S.-ton-capacity 6430 carrier-mounted crane model, “with an optional 6x6 carrier drive that makes it an all-terrain crane,” reports Paul Marxen, sales manager. A new mobile crane model within the last 18 months, the 6430 incorporates a lattice boom design, uses Cummins Tier-3 engines for both the upper structure and carrier, and is manufactured in the United States by a company dating back 50 years.

If you've got it to spend on an all-terrain crane, your money will be well spent, indeed. 

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Pedestrian Trenchers

DITCH WITCH

Sporting a reversible digging chain, the Ditch Witch 1330 pedestrian trencher can dislodge rocks or spoils caught in the chain. The digging chain also has a hydraulic cooler that requires less hydraulic fluid and a direct-drive cooling fan. The 81-inch-long by 34-inch-wide machine trenches depths up to 36 inches with trench widths of up to 6 inches, and runs on Honda's 13-horsepower GX390 engine.

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ASTEC

With its automatic differential lock, Astec's RT130 walk-behind trencher offers improved traction and performance and makes operation easier, especially for novice operators. The reversible digging boom and grease fitting allow for quick service and easy adjustment. The trencher, which boasts a digging depth of up to 36 inches and width up to 6 inches, also uses Honda's GX390 engine.

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VERMEER

The RTX100 trencher from Vermeer features the company's VZ steering system, which increases maneuverability in tight jobsites and enables counter rotating the trench when stationary. Powered by a 13-horsepower Honda GX390 engine, the RTX100 trencher can dig between 24 and 36 inches deep with a 4- to 6-inch-wide cutter. The trencher also accepts both rubber tracks and tires.

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PARSONS

Equipped with a 13-horsepower Honda GX390 engine, Parsons' T130 pedestrian trencher delivers power even in tough soil conditions. The trencher has a digging depth of up to 36 inches and width of up to 6 inches. Parsons also has included its Operators Presence System, which stops the machine if the operator releases the handlebars. For maintenance, internal components can be accessed simply by opening the panel cover.

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Let the Data Speak

Use Excel spreadsheets to crunch numbers and find results that provide understanding for astute equipment decisions

Equipment managers tend to be data rich but information poor. They have lots of facts and figures carefully lined up in a multitude of reports, but seldom have the concise, clear information needed to make a decision and move forward. Many may even have reached the point of diminishing returns: too much data, too much analysis, and too little understanding of the underlying message behind the data. They need a way to understand what the facts and figures are trying to tell them.

There is a well-established technique that relies on some complex algebra, but normal spreadsheet tools can crunch the numbers and present results in a format that is easy to understand and easy to use. The technique has numerous names, but we will simply call it “the trend-line process.” The following four steps illustrate how it works.

1. Define the study

In most cases, managers are concerned about the relationship between two factors and about how things grow or change over time. They worry about undercarriage wear or fuel consumption as a function of hours worked, or about residual market value as a function of the age of the machine in years. The first step, therefore, is to determine what relationship to study and what data to support the analysis. For our example, let’s study equipment utilization and understand the relationship between machine age in years and the total number of hours worked. Age in years is the independent variable — it marches on regardless — and age in hours is the dependant variable — it depends on the age in years.

2. Define the population and collect the data

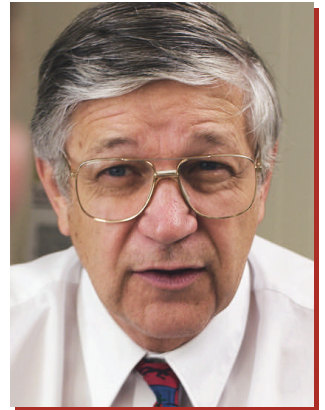
Utilization varies by machine type, geographical location, and many other factors, which means that the relationship between age in years and age in hours cannot be accurately defined for all types of machines in all applications. There will be too much scatter in the results, and it will be impossible to come up with anything other than meaningless averages.

This step in the process gives the study a meaningful, specific focus by defining a population or group of machines with similar characteristics. It is not a simple thing to do. Too much breadth in the population produces data that are too scattered to be of value, and an extremely select population is too narrow. Dividing the fleet into suitable categories and classes helps, so we will use for our example all excavators in the 80,000- to 110,000-pound class.

Defining the study and the population of machines to use makes it possible to achieve uniformity and consistency in the data. The accompanying table gives the age in years and the total hours worked for 10 excavators in the stipulated class.

3. Plot the data and insert a trend line

The data in the table are the facts. Substantial experience indicates an average utilization of 1,719 hours per year, which is a valid number. The average does not, however, give additional insights regarding variability in the data or underlying trends that may be hidden. It uses the data but does not look below the surface.

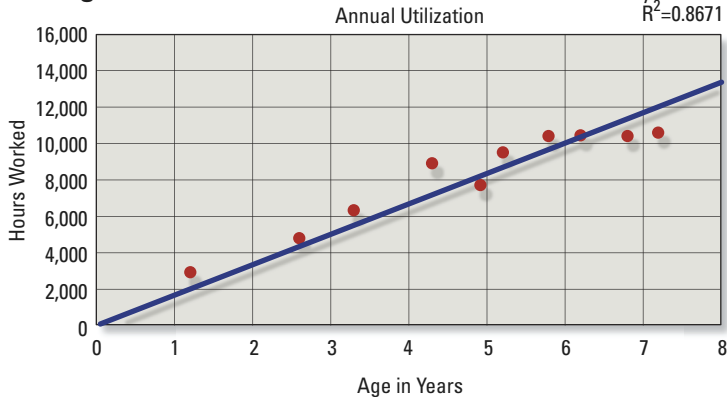


Mike Vorster

David H. Burrows Professor of Construction Engineering and Management at Virginia Tech. See ConstructionEquipment.com for full archives of “Equipment Executive.”

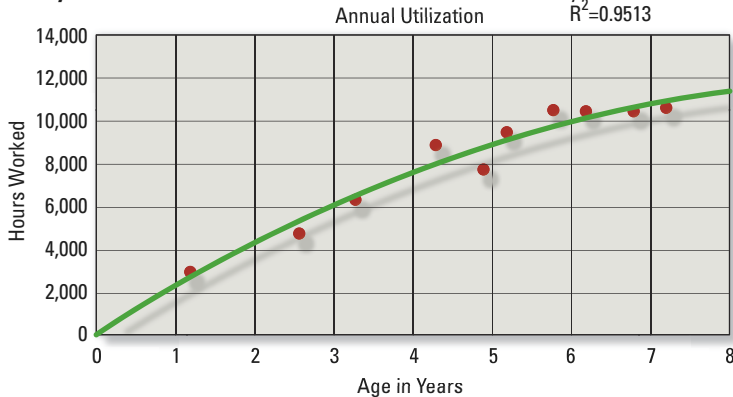
The only way to quantify the change in utilization is to add a best-fit trend line that is free to curve downward so that it can better represent the data.

Straight Trend Line



The linear trend line has been added to the chart using the “add trend line” routines. It is calculated and plotted by Excel using standard but complex routines to produce a “best-fit” representation of the data.

Polynomial Trend Line



A best-fit trend line is free to curve downward so that it can better represent the data. The green line shows the result of adding a polynomial trend line.

Chart 1 shows a plot of the data using an Excel scatter plot with hours worked plotted on the vertical, or Y axis, and the age in years plotted on the horizontal, or X axis. A blue linear trend line passing through the origin has been added to the chart using the “add trend line” routines built into Excel. This line is calculated and plotted by Excel using standard but complex routines to produce a straight line that is a “best-fit” representation of the plotted values.

The numbers in the top right hand corner of the chart give two important insights. First, the equation of the best-fit linear trend line is $y = 1672.8x$. This means the number of hours worked (Y) increases by 1,672.8 hours for each year (x). This is the annual utilization which, according to the trend line, is 1,672.8 hours per year and not 1,719 as given by the average. Second the “R” value for the best-fit line is

0.8671. This is a standard statistical measure which indicates that the best-fit linear trend line represents 86 percent of the variability in the data.

Both the average and the best-fit linear trend lines miss an important piece of information that only becomes apparent when you look carefully at the plotted data and notice that utilization clearly declines as the machine ages.

The only way to quantify the change in utilization is to add a best-fit trend line that is free to curve downward so that it can better represent the data. The green line in Chart 2 shows the result of adding a polynomial (or “free to curve”) trend line. It is clearly a better fit to the data. The “R” value has improved from 0.8671 to .9513, and the line now represents more than 95 percent of the variability in the data. The curved trend line has been influenced by the lower utilization of the older machines and provides an important piece of additional information.

4. Use the trend line

The trend-line process enables managers to understand the data and use it to its fullest extent. In this example, there is a small but not critical difference of 46 hours per year (1,719 – 1,672.8) between the average utilization and the slope of the best-fit linear trend line. There is, however, a real difference between these methods of converting data into information and the curved trend line shown in Chart 2. Utilization is not constant at 1,700 hours per year. As can be seen from the green line, the data clearly tell us that annual utilization is 2,000 hours for the first three years; 1,330 hours for the next three; and about 750 hours for the next two years.

These values, taken directly from the graph or calculated by substituting in the slightly more complex polynomial equation given in Chart 2, will dramatically change costs, budgets and expectations for the excavators in question. They clearly show how the trend-line process enables managers to permit the data to tell its full story.

The example has focused on the relationship between age in years and hours worked. Similar nonlinear relationships exist in many areas of equipment management and similar mistakes are easily made by assuming that the future is a linear extrapolation of the past. The growth in repair parts and labor or the decline in residual market value with age are excellent examples where nonlinear trend lines can be used to let the data tell its full story.

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Great Managers

By LARRY STEWART, Executive Editor

55% More Plants Doubles Asphalt Capacity

Buying APAC-Georgia and Bankhead supplies pieces to create a cutting-edge network of 28 plants with no downtime

PROFILE



Frank Crumbley,
VP, Asphalt Plants

C.W. Matthews
Construction Co.

Headquarters: Marietta, Ga.

Specialty: Integrated highway and heavy constructor and asphalt producer

Fleet Value: \$180 million

Operations: 28 asphalt plants, 17 asphalt paving crews and 7 milling crews

Market Range: Georgia

C.W. Matthews' Kennesaw, Ga., plant is equipped with the Astec Double Barrel Green System for making warm-mix asphalt — a system that injects water into the mixing chamber to improve the coat of asphalt on aggregate and allow today's mixes to be produced and laid at temperatures 30 degrees Fahrenheit to 100 F cooler than traditional hot mix.

With corporate agility that might be called “heroic,” C.W. Matthews Contracting scrapped plans to replace two of its 18 asphalt plants in favor of purchasing Bankhead Asphalt Paving and APAC-Georgia, all in the span of less than 20 days. Absorbing operations that were larger than its own, the 60-year-old family-owned asphalt contractor added 20 plants, sold its only operations outside Georgia (Chattanooga and Cleveland, Tenn.), and brought its entire network of asphalt plants up to state-of-the-art in about 20 months.

“We’ve all heard of purchases like this not going well and ruining a good company,” says Frank Crumbley, vice president of asphalt plants for C.W. Matthews. “We felt like the only way to make this one work was to convince the people who worked for the acquired companies to trust us, involve them in our plans and show them that their ideas don’t just go in one ear and out the other.”

C.W. Matthews retained field managers and other employees from the acquired companies, and relied heavily on their input to plan the massive reshuffling of plant assets that

launched the company into cost-effective production.

“During the due diligence (an intense 18 days in August 2006) we rode around to plants with the APAC general superintendents and talked about what was good and what was bad about each plant, and what was on their wish lists,” says Crumbley. “We came back after the acquisitions and sat down with both teams — traditional Matthews personnel and our new people — and said: ‘Here is where we have duplicate plants. Here are the locations we want to keep. How do we use these plants and components to make sure we have all state-of-the-art plants when we’re done? Which components can we salvage, and where are they needed?’”

A spreadsheet — a large one — was created that listed plant components and indicated which were keepers and how each fit the master list of desired plant locations.

“We had two plants that were already scheduled for major upgrades when this opportunity to purchase came into play and changed the whole game plan,” says Crumbley. “At our Douglasville, Ga., location, we were going to scrap the whole plant and put up a new one.



Photos: Frank Mullen/Getty Images

The acquisitions put the brakes on that because in Forest Park, we (APAC and C.W. Matthews) owned a plant each within a quarter mile of each other — both in great shape. One of the Bankhead plants was right next door (to Matthews' Douglasville facility)."

Instead of buying a brand new plant, Crumbley's crew shut down the original Bankhead plant at Douglasville and sold most of it, continuing to produce from the Matthews plant. They dismantled the Matthews plant in Forest Park and moved it to the original Bankhead location in Douglasville. When it came online, the original Matthews Douglasville plant was shut down and parted out to the rest of the network.

"We ended up with two great plants (Douglasville and Forest Park)," says Crumbley. And this was just the start. "We had pretty much the same situation in Forsyth, Ga., Cummins, Ga., and we had three plants in Kennesaw, and a similar situation in Lawrenceville, Ga."

Crumbley estimates C.W. Matthews saved about \$18 million on equipment upgrading plants in 28 locations with a combination of new and used components. But hardware savings were just the beginning. With redundant plants in several locations, the firm was able to renovate operations more thoroughly, seizing every opportunity for improved efficiency without having to rush back into production.

"We did 11 major renovations, but we were able to stage them so there was no downtime in any location," says Crumbley. "We were able to plan it out better, and we did things like grading and paving the lots for the maximum drainage, which helps you on your drying costs. We took nothing from one location to another location without checking it out thoroughly and repairing it so that when it arrived in its new location, it was like new."

Production numbers bear out Matthews' careful planning. In 2005, before the acquisitions, the company's original 18 plants produced 3.2 million tons of hot mix. In 2006, which included about 3½ months of ownership of the APAC-Georgia and Bankhead plants, the company made 4.7 million tons of mix. By the end of 2007, they were down to 28 plants and most of the renovations were complete. The company produced 6.1 million tons of asphalt. Crumbley suggests that if the bottom hadn't dropped out of the market in 2008, the company would have produced 7 million tons.

The company made huge strides in energy efficiency. Installing insulated tanks and moving some tank farms made a



Manfried Lemus, plant operator, monitors production at Kennesaw. Three of the renovated Matthews plants, including Kennesaw, were upgraded to completely digital control.

big difference. In the rural mountain community of Ballground, Ga., for example, C.W. Matthews and APAC had neighboring plants, offering a tremendous upgrade opportunity.

"The Matthews plant was the better plant, but one of the things we didn't like was that the tank farm was so far from drum and burner that in particularly cold weather we would have to go out with a torch and heat the lines prior to cranking up the plant," Crumbley says. "We took portions of the APAC tank farm and constructed a new tank farm right next to the drum while the plant was still in operation. We completed the piping over a weekend and had a plant with a much better tank farm."

"Prior to relocating the tank farm, our drying cost was 2.2 gallons of RFO (recycled fuel oil) per ton, and afterward it went down to 1.65 gallons per ton."

Only five of the 18 original Matthews plants had access to natural gas. Of the firm's 28 plants today, 14 have access to natural gas. Crumbley acknowledges that advantage, remembering when RFO prices increased 50 percent in 2008 while natural gas costs were dropping.

"If we didn't have ability to swap over to natural gas, we would have spent 60 more cents per mix ton," he says. "And the plants that have access to natural gas are some of our higher-production plants. They made 4 million mix tons in 2007 — 2/3 of our total capacity."

"Our plant restructuring put us in a great position relative to being the low-cost asphalt provider, despite the profound economic slowdown that we're all experiencing," Crumbley adds. "We've had to make some adjustments in manpower and mode of operation, but we don't have to concern ourselves for the time being with making additional capital expenditures on our plants."

Earthmoving Report

By LARRY STEWART, Executive Editor

Deere Brings Joysticks to Grader Control

G Series electronic option mounts fingertip joysticks that mimic traditional hydraulic levers in the armrests

John Deere distinguishes its new electronically controlled Grade-Pro motor graders from the only competitive joystick controls — on Caterpillar's M-Series graders — by mimicking traditional control-lever layout, replacing hydraulic levers with armrest-mounted electronic joysticks. Another unique feature: Deere's G Series offers buyers a choice of either hydraulic or electronic levers.

Deere's Customer Advocate Groups (groups of customers consulted extensively on machine designs) wanted clearer sight lines to the moldboard and less demand for the operator to move around in the seat. The electro-hydraulic control scheme on the new G-Series Grade-Pro machines minimizes the center console and allows operators to adjust themselves into the optimum ergo-



Levers (right to left) on the right-armrest console control blade lift (button: blade control on/off), wheel lean, draft-frame side shift, and the front lever controls articulation (button: return to straight).

nomie position. They not only see more of what's going on at the blade but they stay fresh and alert longer. Arraying the electronic joysticks like conventional hydraulic levers means today's blade hands can quickly adapt to the new controls.

Lever steering is added to the moldboard sideshift joystick in the middle of the left console. Moving the stick fore and aft shifts the moldboard. Moving it left to right steers the front wheels. The steering wheel remains in all G graders and is always live. Opera-

G-Series Quick Specs

	Tandem Drive			Six-Wheel Drive		
	670G	770G	870G	672G	772G	872G
Max Net HP	185	230	255	195	245	275
Op. Weight (lb.)*	40,986	41,405	43,119	42,682	43,220	45,068
Moldboard Length	12'	12'	14'	12'	12'	14'

*SAE; with push block and rear ripper



The G Series offers a lot of choices: electronic or hydraulic controls; wheel or wheel-and-lever steering; Topcon or Trimble grade control; tandem or all-wheel drive; front, mid-mount or rear ripper/scarifier.

tors can always steer with the wheel.

Buttons on the blade-lift joysticks activate the cross-slope feature and interact with automatic grade controls, if they're added to the machine. A button on the articulation stick activates automatic return-to-straight, that centers the rear frame. (See video explanation of G-Series electronic controls at www.youtube.com/watch?v=VMJdPQYnLg)

Cross slope comes with the G-Series electronic, Grade Pro package. Position sensors in the frame interface with the controller and allow you to key in the desired slope and maintain it with just one blade-lift lever. The cross-slope system also facilitates plug and play of Topcon and Trimble automatic grade control systems. Deere says the system will also be Leica-ready very soon. All of the control buttons for these systems are built into the blade control levers.

The graders are powered by Deere PowerTech Plus 9-liter, Tier-3 engines with variable horsepower. They're coupled to Deere transmission managed by Event-Based Shifting software. Rear axles feature automatic differential lock that engages on the roll. Three of the six new G-Series models — the 672G, 772G and 872G — have six-wheel drive



Transmission, hydraulic and axle oil filters are grouped for ground-level access.

with a precision mode for ultra-low-speed operations.

Deere engineered the G-Series graders with transmission, hydraulic and differential filters in a right-side bank for fast access. Sight gauges, dip sticks, fill ports, other daily maintenance and test ports items can be accessed from the ground behind left-side access doors. There's also ground-level fueling and a swing-out cool-on-demand automatic reversing fan standard on every model. NeverGrease pin joints mean a 56-percent reduction in greasing.

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Market Watch Lite

By KATIE WEILER, Managing Editor

Chicago Pneumatic

Rivet busters from Chicago Pneumatic are designed for concrete breaking and metal cutting. CP 4608 and CP 4611 have 8- and 11-inch tool strokes, respectively, and require 45 cfm of air to operate. Controlled Power System (CPS) prevents blank firing when a unit's rubber bumper is 75 percent worn, which extends equipment life and avoids unexpected downtime, the company says. An indicator groove on the lower sleeve shows when its bumpers should be replaced.

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Esco

Esco upgraded its Posilok system, available to fit mining-class hydraulic face shovels, excavators, draglines and cable shovels, with the safety of a hammerless locking device. Torque Wedge pin screws turn in clockwise to lock, with what Esco says is "minimal manual effort." A plug keeps fines from building up in the pin recess. Tooth changes are performed with a standard-sized hex tool. Optional wear caps provide additional protection for the adapter.

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Goodall Manufacturing

CapStart — a one-person, stand-alone jump-starting cart — is both portable and easy to connect to a dead vehicle with its full-power jaw clamps. Powered by capacitor technology, CapStart can be fully recharged from an internal battery, which means that the unit can be used in remote applications where there is no available alternate power source. CapStart can be recharged in less than a minute for repeated jumps, and it comes in 12- and 24-volt models.

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TT Technologies

For the installation of casing in a wide range of soil without surface slump, a new pipe rammer and bentonite system package is suited to oil and gas pipeline placement under railways and roads. The package includes an 18-inch-diameter Grundoram Goliath pneumatic pipe ramming system and a Grundomudd 500 bentonite mixing/delivery system. During the ramming process, the rammer is attached to the rear of the casing, and the tool drives the pipe through the ground with repeated percussive blows. The rammer installs steel pipes and casings from 24 to 56 inches in diameter.

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▶ Atlas Copco

Two new skid-mounted generators have been added to the line: QAS 45 and QAS 20. QAS 45 replaces QAS 38 and has a Tier 4 Kubota engine. Features of the gen sets include high-capacity fuel tank, large doors and service plates for serviceability, service intervals of 500 hours, and a 110-percent containment area for fluid spills.

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▶ Xplore

Work-site data collection is made easier thanks to Xplore's iX104C4 rugged tablet PC, which boasts Dual Mode AllVue Xtreme display technology. The display is 50 percent brighter compared with previous models, increasing visibility in outdoor settings. Also included are a 1.2-gigahertz Intel Core Duo Processor and a 2.4-gigahertz 802.11n Wi-Fi card for longer-range network connectivity.

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▶ Mobile Awareness

TireStat not only detects under-inflated, over-inflated and rapidly leaking tires on construction equipment and trucks, but can also monitor tire temperature. The lightweight TireStat sensors are mounted externally on the valve stem, allowing air input without sensor removal. The rechargeable handheld monitor functions as a portable tire gauge, allowing the user to monitor the actual tire pressure while adjusting each tire's inflation level. All TireStat systems include a transceiver for the continuous transmission of the wireless signals,

as well as an integrated anti-theft locking mechanism for the sensors.

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▶ Leon

Designed for New Holland tractors, Leon's Model Q440T dozer blade has a lifting clearance of 49 inches and digging depth of 8 to 10 inches, available with blade widths from 12 to 20 feet. Installation is simple with Leon's quick-on, quick-off mounting system, and the blade maintains full access to the tractor for servicing. Like other Leon products, the Q440T is ripple formed for clean roll-off and roll-break action to facilitate pushing.

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Indeco North America

Indeco expanded its HP Series breaker attachments with the largest hydraulic breaker in the world, the 24,370-pound HP 25000. The 25,000-foot-pound-rated hydraulic hammer is 10 feet 10 inches tall and handles tool diameters more than 10 inches. It fits excavators weighing from 135,000 to 330,000 pounds. Energized by hydraulic flows of 110 to 137 gallons per minute at up to 3,360 psi, it will strike 240 to 460 blows per minute.

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Stone Construction Equipment

New to Stone's Right Built Concrete Vibrator line is a 2.5-horsepower backpack featuring a Honda engine and weighing in at 24 pounds. The backpack vibrator is made of a lightweight steel frame and extra-thick padding for increased operator comfort, and it can handle all Stone shafts and heads up to 2.5 inches. Controlled via a rotary throttle, the backpack consistently delivers the proper vibrations per minute for optimum concrete consolidation.

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Topcon Positioning Systems

Now included on all new Topcon 9 Series robotic total station systems, Topcon's X-Trac 7 enhances robotic tracking by using a tracking beam sequence that keeps the instrument crosshairs focused on the moving prism pole. The X-Trac 7's internal firmware also performs advanced calculations to determine and track the prism. Topcon redesigned its RC-3 remote control by increasing sensor speed and accuracy to take advantage of X-Trac 7.

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Bobcat

Bobcat launched two new replacement rubber tracks for compact track loaders — Multi-Bar Lug (MBL) and EarthForce Bar Lug — with uniformly wound cables and the elimination of connection points to improve durability. The new tracks are constructed with layered rubber compound densities. The outside layer is comprised of hard rubber to resist cuts, and the inside rubber layers are softer to help maintain track flexibility. Compared to traditional tread patterns, MBL track has a greater number of tread lugs per foot for a smoother ride.

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DeWalt

New line of heavy-duty commercial truck rack and storage products from DeWalt includes more than 60 aluminum boxes and an assortment of fully adjustable steel and aluminum racks. Industrial-grade truck boxes use a one-piece base to help prevent structural collapse of the box over time. Dual lift struts automatically open the lid to a full 90 degrees. Truck racks use the company's SteelTruss load supports that connect the rail, cross and leg bars, so they can carry up to 1,800 pounds.

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Market Watch Lite

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Vail Products

The X-Ripper is designed for the construction, excavation and site-preparation industries. The ripper sports a contoured adapter design, a lifting eye positioned to facilitate handling, and it works with or without pin-style quick couplers. It is built with high-strength steel and boasts streamlined gusseting for minimal material build-up.

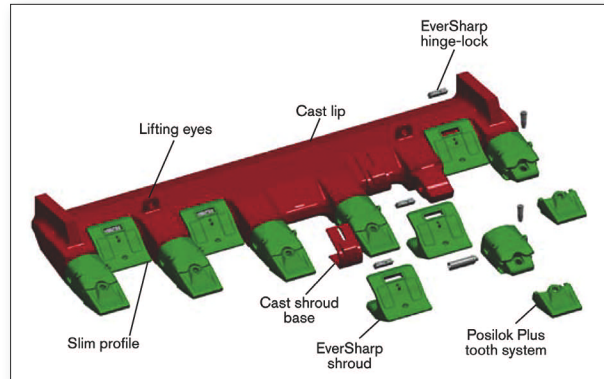
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ESCO

EverSharp lip system is cast in premium alloys for strength and designed with features intended to improve safety and performance. The Posilok Plus tooth system, with its hammerless locking device, is standard equipment, and shrouds are lighter for easier handling. ESCO claims the EverSharp lip profile reduces wear and improves bucket loading. The lip bottom and shroud are moved up and out of the wear path to reduce drag and wear and allow a more efficient bucket curl. Increased nose angle reduces wear on the rear of the adapter.

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Nye Manufacturing

Independently adjustable shanks offering three positions each allow dozer operators to, as needed, shorten or lengthen the shanks on the DR3 "triple" ripper from Nye. The 3-inch-thick steel shanks can be angled past the vertical in either direction, providing for the optimum ripping angle. Built entirely from extra-thick 44W steel, the DR3 ripper features a fully enclosed box design engineered for strength. The eyes penetrate

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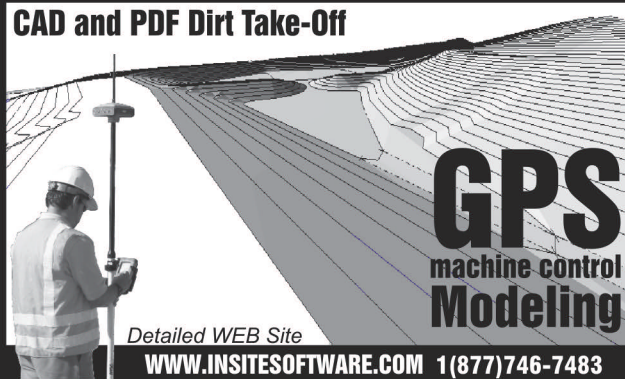
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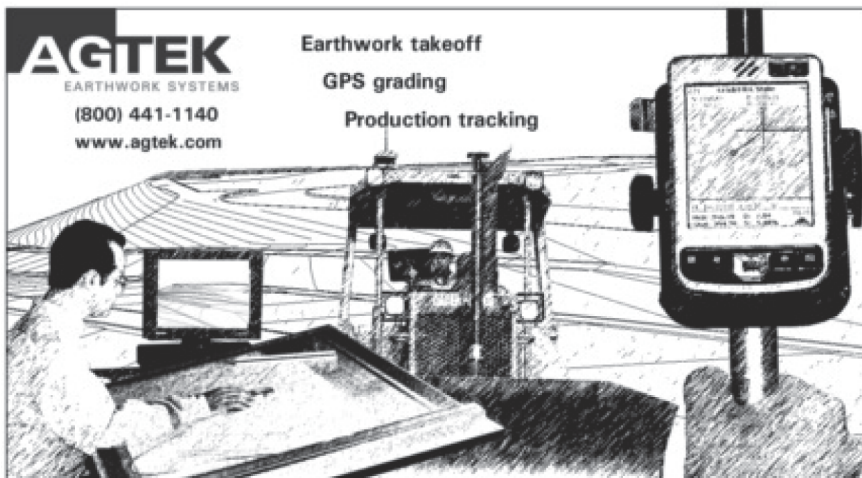
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Engine model	0.0	31.5	76.0	67.0
Net engine power - hp				
DRIVE				
Transmission type	Hydrostatic	Hydrostatic	Synchromesh/Power Shift	Synchromesh/Power Shift
No. of speeds (fwd/rev)	1/1	1/1	4/4	4/4
Max. travel speed - mph	5.5	4.7	24.5	26.8
Max. travel speed - mph	2WD	2WD	2WD/4WD	2WD/4WD
No. of drive wheels	2WS	2WS	2WS	2WS
STEERING CONFIGURATION				
Hydraulic pump flow - gpm	8	11.7	28.5	43
Relief valve pressure - psi	2400	--	3050	3611
BACKHOE				
Backhoe bucket width range - in	12" - 36"	--	12" - 36"	12" - 36"
Max. dig depth, optional extended stick - ft/in	--	--	18' 3"	18' 6"
Loading height, standard stick - ft/in	7' 8"	--	11' 2"	13'

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Deere Brings Joysticks To Grader Controls

John Deere distinguishes its new electronically controlled G-Series Grade-Pro motor graders from the only competitive joystick controls — on Caterpillar's M-Series graders — by mimicking traditional control-lever layout, replacing hydraulic levers with electronic joysticks. All models have a steering wheel, and sensors to facilitate automatic grade control are all standard. See a walk-through of how the controls work and a discussion of design features.

Read Larry Stewart's overview of all the model's key features at ConstructionEquipment.com/article/CA6642886.html.

Also, Deere K Series Loaders get a lock-up torque converter and differentials that lock on the go. Search our new-equipment database for more information.

Telehandlers Up Close

The lure of an informative and fun networking event and Arizona sunshine enticed eight North American telehandler manufacturers to participate in the third annual Lift and Access Equipment Showcase. Of the 18 products listed in the Lift and Access Equipment Guide in the 6,000- to 7,000-pound capacity, 41- to 44-foot boom length class, 13 machines made it to the Equipment Showcase.

Visit ConstructionEquipment.com/Digest to check out the innovative features of these telehandlers up close.

Innovations from The Rental Show

Although the construction trade-show season is winding down and attendee numbers have been lower than expected, The Rental Show offered some exciting product introductions. The show featured about 650 exhibitors in heavy construction, light construction/general tool, and events/parties. Of those, there were more than 75 first-time exhibitors in the construction areas. Our audio slide show brings you some booth highlights from the show floor.



Navistar Knocks SCR, Competitors Defend It

Navistar International executives used the Mid-America Trucking Show last month to scorn competitors for using expensive SCR to meet upcoming exhaust limits, and at the same time to promote their "Advanced EGR" approach that includes higher amounts of cooled exhaust gas. Competitors soon shot back from an unusual "summit" where executives defended SCR as entirely workable and beneficial to customers and the public, and refuted Navistar's charges.

Read the rest of the story at ConstructionEquipment.com/Digest.

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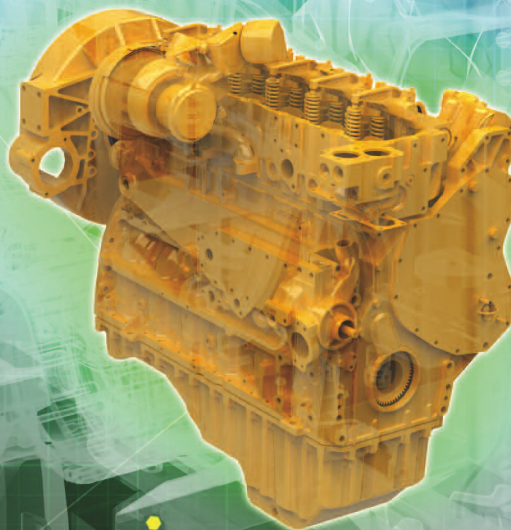
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