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52 Compact, but not to be underestimated



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2008 Fleet Masters

Kokosing Construction & Virginia DOT named best fleets of the year

p. 33

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Cover photo: Ken Frick Photography ©

FEATURES

FLEET MASTERS

33 The Nation's Top Fleets: VDOT and Kokosing

The Association of Equipment Management Professionals (AEMP) and *Construction Equipment* created the annual Fleet Masters Award to recognize top-notch fleet professionals for managing just the right elements to maximize their organizations. That the discussion such recognition generates may also help others manage more productive fleets is at the very core of all AEMP efforts to support the equipment industry's best and brightest managers. The following pages profile the organizations and their strategies that piloted the 2008 public- and private-fleet winners to the top of the Fleet Masters competition, including the first-ever, two-time Fleet Masters winner.





RUNNING GREEN

40 Construction Races Toward Using Biofuels

The U.S. Energy Independence Act and escalating oil prices are accelerating use of ethanol and biodiesel. Find out how combinations of biofuels and exhaust after-treatment may be able to save some Tier 0 and Tier 1 heavy-duty diesels that otherwise would have to be replaced to comply with California's new off-road in-use diesel rules.



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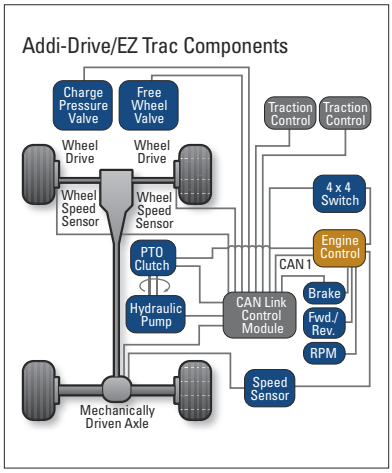

HANDS-ON TRUCKING

46 Addi-Drive Delivers Enhanced Traction On- or Off-Road

Going off road to make a delivery or pick up a load? Most of the time you can do it in a truck with a conventional axle configuration. But you might get stuck if the ground is soft or muddy. That's why some operators specify front-driving axles. An alternative is a central tire inflation system. Now there's another option: hydrostatic front-wheel drive, which sends power and torque to the truck's front end to enhance traction and give it a more secure stance on slopes and hills. It's called Addi-Drive by Poclain Hydraulics and EZ Trac by Tuthill Drive Systems.



BUYING FILE

52 Compact Wheel Loaders: Underutilized Resource

Heavy Equipment Forums (www.heavyequipmentforums.com) is an online site where owners and operators ask questions and trade ideas about construction equipment. Recently, a contributor to the site commented about compact wheel loaders, saying these machines are underutilized and under-rated. The reason, he says, is that many equipment users simply don't recognize the compact wheel loader as a logical step between larger skid steer loaders and, say, wheel loaders that have minimum bucket capacities of 2.5 cubic yards or so. This means, he says, that these users are missing the compact-wheel-loader's efficiencies. Senior editor Walt Moore reports on additional benefits.

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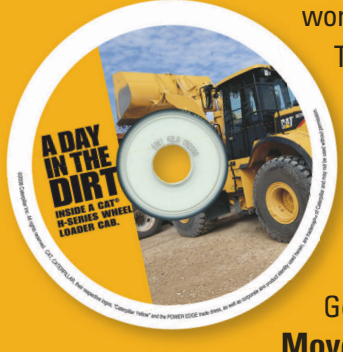

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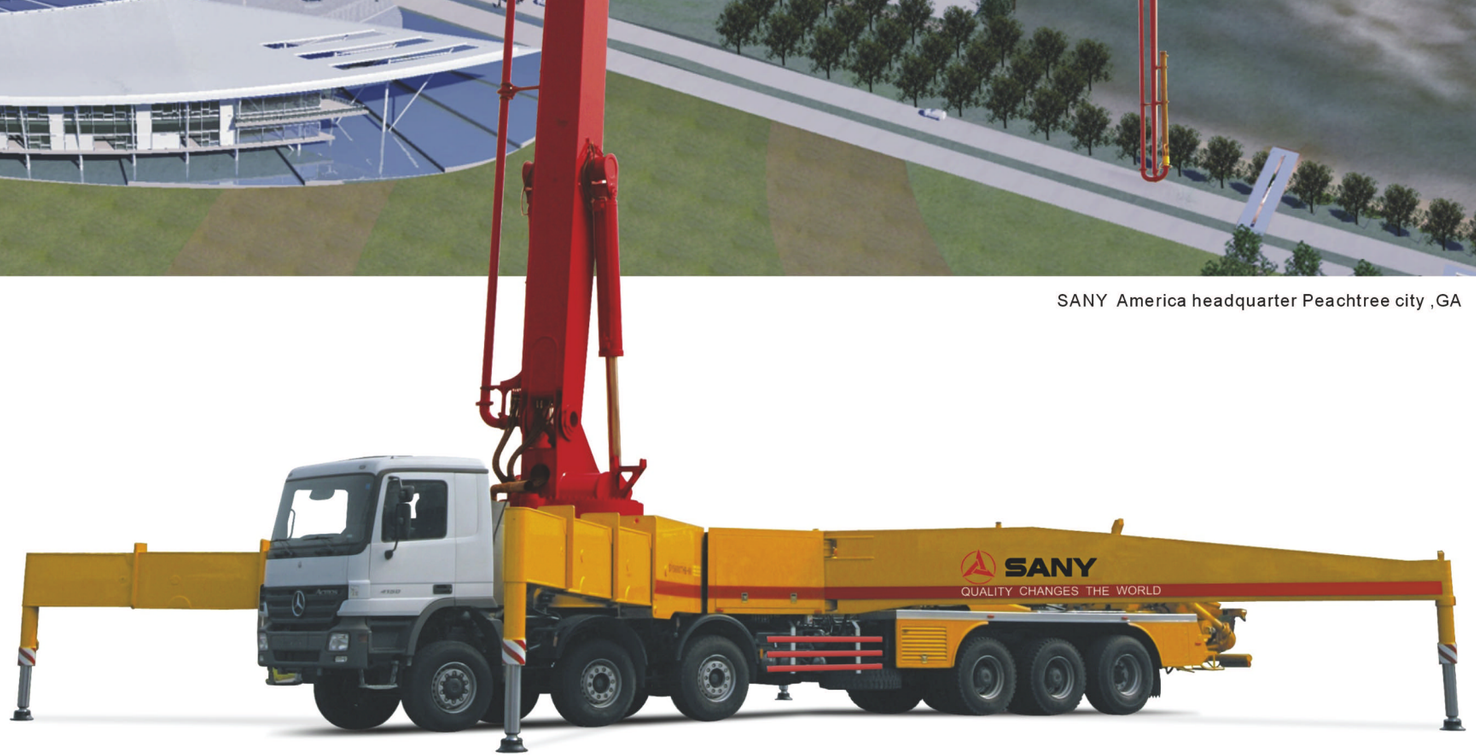

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Fleet Masters

Companies in all industries have used the Malcolm Baldrige Award as a standard for measuring performance improvement and best practices within their organizations. Baldrige recognition validates their efforts.

Such was the thinking when *Construction Equipment* and the Association of Equipment Management Professionals agreed to honor the nation's top fleet-management teams. We wanted to hold up as examples the best teams in the country in terms of fleet-management performance and best practices. This was the genesis of Fleet Masters, with the goal to evaluate human relations, vendor relations, asset management, maintenance management, and technology.



Rod Sutton, **Editor in Chief**

We welcome your comments.
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Mail: **2000 Clearwater Drive, Oak Brook, IL 60523**

In March, we recognized Kokosing Construction and the Virginia Department of Transportation in the private and public fleet categories, respectively. We tell their stories in this month's issue, beginning on page 33.

AEMP, although an association of equipment managers, also includes equipment manufacturers and distributors. In fact, one of the group's guiding principles is the Equipment Triangle: Each of the three sides supports the others, and each must succeed in order for all to succeed. That's why Fleet Masters must score high on vendor relations.

Kokosing's success in this area relates to a best practice in the way the company partners with its suppliers to ensure Kokosing technicians have all they need to maintain the fleet. Everything from the machine's documentation to the number of bolts on a cutting edge is in Kokosing's hands, and much of that is incorporated into the contractor's technological support systems.

VDOT epitomizes best practices in performance standards and measurement. By determining which metrics mean excellence, VDOT was able to set standards of performance across the fleet. More important, those metrics are measured and the results published. The resulting competition among divisions raised performance across the entire department.

Our congratulations to both of these management teams. To the rest of the industry, we offer these winners as examples of excellence. Smart managers learn from the best. Just as the Baldrige award incites others to work toward higher standards, we hope Fleet Masters does the same for equipment-management professionals.

Rod

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Tough conditions require powerful equipment. **The new Case 1221E wheel loader** has a fully electronic, six-cylinder, Tier III-certified engine capable of 335 gross horsepower, giving you the muscle you need. Limited-slip axles deliver stability and traction on any terrain. This workhorse also features responsive hydraulics and a 7.6 cubic yard bucket to improve cycle times and boost productivity. See for yourself. The Case 1221E gives you the power to get the job done. **Visit ConstructionEquipment.com/info and enter 8**

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MARKET WATCH

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By KATIE WEILER, Managing Editor

Caterpillar

Cat's wheeled AP600D 8-foot paver can tow Cat's AS2252C or AS3251C screeds, which feature CAN bus electrical systems that interface with the Advisor display on the tractor to simplify diagnostics. Cat's Advisor Monitoring System provides the operator with project planning calculators, start-up checklists, engine operating parameters and other key information including fault codes. The AP600D is a 40,000-pound paver with standard paving widths up to 15 feet 6 inches.

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Hitachi

Two new compact excavators from Hitachi — the ZX75US-3 and ZX85USB-3 — offer a standard boom and a swing boom, respectively. Operating weights are 17,743 and 18,821 pounds, with bucket capacities of 0.40 to 0.66 cubic yards. They are powered with Tier 3, turbocharged Isuzu engines and Hitachi's HIOS III hydraulic system. Maximum digging reach, respectively, is 22 feet 8 inches and 25 feet 3 inches; maximum digging depth is 15 feet 1 inch and 14 feet 8 inches.

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Gehl

DL Series Dynalift telehandlers have increased load capacities and have been repowered with Tier III engines. Lift capacities range from 7,000 to 12,000 pounds with lift heights from 40 to 55 feet. High-profile boom allows for maximum visibility, the company says. A 12 foot-2 inch turning radius and overall height of 7 feet 8 inches allows for operation in tight confines. Two attachment-mounting systems are available: Dynattach for standard lifting; Dynacarrier for heavy-duty applications.

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Rogers

Rogers 40-ton-capacity oil field float trailer is designed for hauling oil and gas exploration equipment to drilling sites. Front of the trailer is designed to be winched up. Air line "glad hands" are retractable for mud removal, the company says. The rear features heavy-duty, 8-inch-diameter "tail roller" with bushings and severe-duty dozer push areas. Single-point, two-spring suspension offers a 50,000-pound capacity.

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Bobcat

The Bobcat S70 skid steer loader, replacing model 463, is now the smallest model in the company's line. The S70, with an operating weight of 4,110 pounds, is 73.92 inches high, 45.94 inches wide and 89.07 inches long without an attachment. The new machine has a rated operating capacity of 700 pounds and is powered by a 33.5-horsepower diesel engine that drives a fully hydrostatic, four-wheel-drive system that provides a travel speed of 6.2 miles per hour.

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Kobelco Blade Runner Excavator

Kobelco ED195 Blade Runner crawler excavator combines the features of both an excavator and a dozer. It has a turbocharged FPT diesel that meets Tier III emissions standards and also features Intelligent Total Control System (ITCS), which provides progressive power for fine leveling and grading applications.

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VT LeeBoy

VT LeeBoy's 9000 wheeled paver is a 33,000-pound, 8-foot machine that shows off the maker's electrically heated Legend screed, which stretches to a maximum standard paving width of 15 feet 6 inches. The 9000 is controlled via CAN bus system, reducing most electrical circuits to a single wire and facilitating digital gauges and more sophisticated electronic diagnostics. The CAN bus also allows what LeeBoy calls responsive Plus 1 steering with dual joysticks control.



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Bridgestone Firestone

Bridgestone M775 on/off-highway drive radial is capable of highway speeds to 65 mph. The block-tread and open-shoulder design is configured to dig into soft surfaces, and angled block sipes are designed to enhance wet traction. The tire uses four steel belts and an all-steel casing, allowing it to be retreaded for any axle position. The M775 is available in three sizes: 11R22.5, 12R22.5 and 11R24.5 in "H" load ranges.



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Liebherr Concrete Technology

Easymix 1.0 Batching Plant is designed for "minimum transport and assembly," and the company describes the new plant by saying, "the 40-foot ISO shipping container features a 1.3-cubic-yard ring pan mixer, four individual end-loader-charged aggregate bins, water pump, reservoir and batcher, control room and microprocessor control — all fully integrated and ready installed into the container." Easymix 1.0 has a production capacity of 45 to 50 cubic yards per hour.



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Case

Case's 400 Series 3 skid-steer loaders offer power and torque increases throughout the Tier-3-certified engines. Net horsepower ranges from 57 to 83, with an ISM diesel in the 410 and Case diesels in models 420, 430, 435, 440, 445, 450 and 465. A 7-percent increase in headroom is accompanied by standard suspension seat. Exclusive side lighting improves the turning view after dark.

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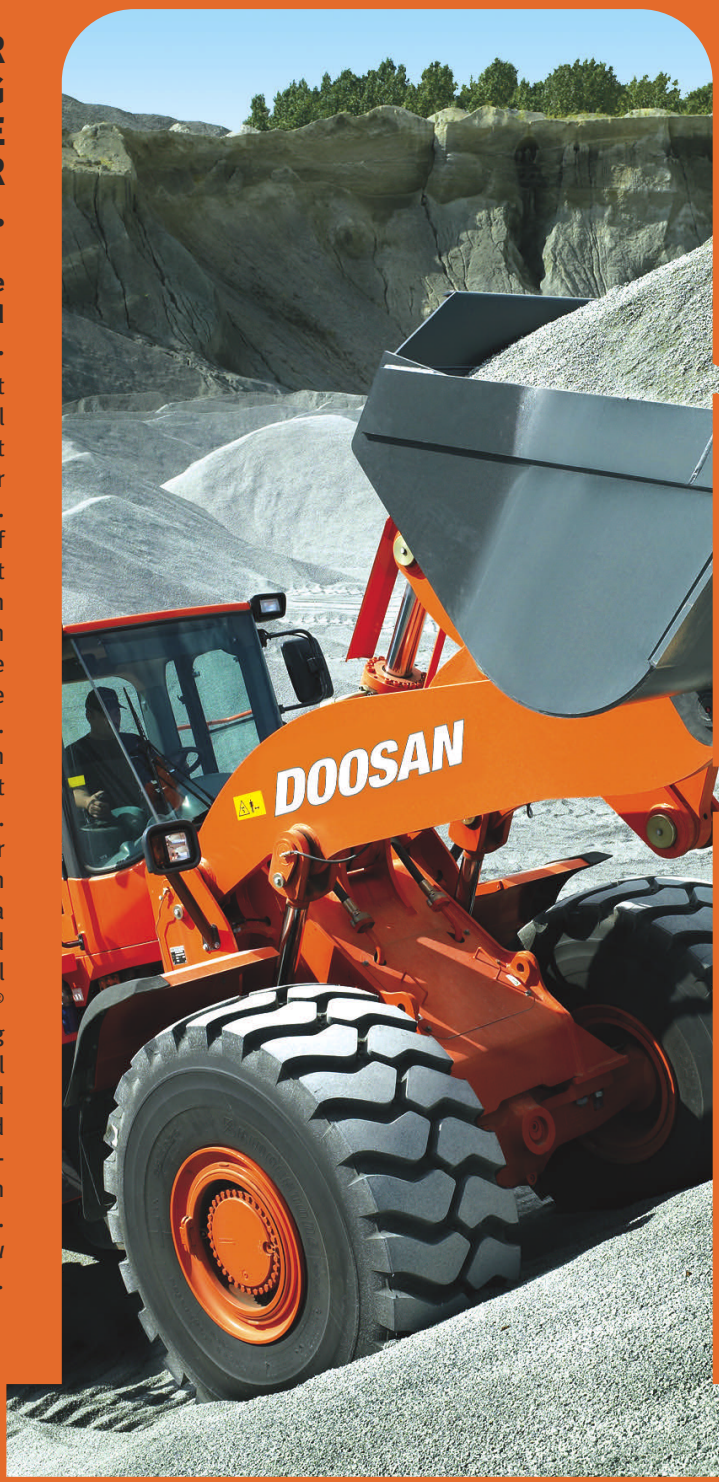

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Market Watch

IMT

Iowa Mold Tooling EDSC10 service truck is mounted on a Dodge Sprinter chassis. Available in Europe, and now in North America, the truck offers fuel economy and maneuverability for urban markets. Body measures 11 feet and can be fitted with a 10,000-foot-pound telescopic crane. Weighing 2,660 pounds, the truck has 77.3 cubic feet of storage and a sidepack depth of 16.5 inches. The cargo deck is 49 inches wide.

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Wacker



Five compact excavators have been introduced in the U.S. market — models 1404, 3503, 38Z3, 50Z3 and 8003. These new excavators range in transport weight from 3,100 to 16,800 pounds and in maximum digging depth (with standard dipperstick) from 10.6 to 14.1 feet. Optional long dippersticks for the four larger models yield maximum digging depths of 11.6 to 15 feet. Horsepower ratings range from 24.3 to 69.5, and the machines use Yanmar diesel engines.

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Genie

Genie S-60 and S-65 Trax telescopic boom aerial lifts feature a four-point track system that is permanently attached onto the machine. A profile of 8 feet 6 inches allows them to be transported without oversize load permits. Inside turning radius is 11 feet, and outside radius is 21 feet. Travel speed is 2.7 mph. Each steel-reinforced rubber track measures 17 inches wide and 40 inches long with ground contact pressure of 9.2 psi for the S-60 and 9.7 psi for the S-65.



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Bobcat

Bobcat has introduced five of its intended nine-model range of compact tractors: the CT120, CT122, CT225, CT230 and CT235. The remaining four models are scheduled to arrive later this year. These new machines feature hydrostatic drive and front-wheel assist to provide four-wheel drive in rough going. Horsepower ratings in these diesel-powered tractors are, respectively, 20, 22, 27, 30 and 34; operating weights are 2,055, 2,055, 3,021, 3,055 and 3,055 pounds.

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Huber

The M-850-D Maintainer has been improved with planetary wheel drives that are quieter than conventional drive axles, the company says. The cab floor, as a result, is flat to provide space and comfort for the operator. An 80-horsepower Cummins 4B3.9 diesel powers the unit.



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Bomag Americas

At 20,500 pounds, the Bomag BF 6615 has a heavier material-handling system, yet remains light enough for many contractors to load in front of a roller on a trailer without requiring transport permits. Hopper capacity is 9 tons. The 6615 has Bomag's first electrically heated screed, the UNIMAT 2 that paves 8- to 15-foot widths with bolt-on, 400 Brinell hardened steel screed plates. Mega-Feed dual-auger system mounts remote augers on the front of the extensions to extend and retract with the screed. Augers are reversible.

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THEFT PREVENTION

Wireless Networks Track Stolen Skid Steer

KORE Telematics and asset-management-service DPL America recently played a fundamental role in exposing an organized ring of equipment thieves. In late 2007, perpetrators rented equipment simultaneously from several branches of an equipment rental company in North Carolina with the intent of moving the machines out of the country. The rental company had outfitted its vehicles with DPL's monitoring and tracking system.

Managers became suspicious of one of the transactions and tracked the equipment to a location nearly 100 miles from where it was supposed to be. The company ran locations for every rental from the previous day and tracked another piece of equipment in Texas, where it had been transported through the night to a wrecking yard near the Mexican border.

The company was able to map the exact location for authorities, right down to the trees under which the equipment was parked. The rental firm locked down the engine remotely from North Carolina and when authorities arrived, they found nearly a dozen additional pieces of equipment being staged for transport over the border. The wrecking yard's proprietor was immediately arrested, and subsequently pointed authorities to another yard where they recovered more stolen equipment.



Finding skid steers under trees requires a combination of GPS and cell signals.

"Two years ago this outcome would not have been possible because of two factors," said Alex Brisbourne, KORE's president. "First, machine-to-machine, dedicated networks simply didn't cover the amount of terrain necessary to track equipment so closely across such great distances. Second, because of where the vehicle was, it required both GPS and cell-signal transmission to locate it. This was not a realistic option before we brought these technologies together under one network offering."

INDUSTRY NEWS

Dawes Earns 60-Year Longevity Award



In 1973, Dawes Transfer of Milwaukee purchased the Shea-Matson Co. to found Shea-Matson-Dawes. In 2008, Dawes Rigging & Crane Rental earned a 60-year Longevity Award.

Dawes Rigging & Crane Rental was awarded the 60-Year Longevity Award by the Specialized Carriers & Rigging Association (SC&RA). Dawes, based in Wisconsin since 1947, is one of the seven founding members of SC&RA. Dawes' forerunner company ranked among the top specialized carriers and rigging companies for trade shows and was also a leading heavy-machinery mover for foundries, tanneries, breweries, and the tool and die industry. Today, Dawes is a member of the ALL Erection & Crane Rental family of companies.

INDUSTRY NEWS

Bridgestone, Bandag Extend Warranty

Bridgestone Firestone North American Tire extended the warranty-coverage period for its premium truck tires and casings to seven years and three retreads. The exclusive new limited warranty covers the company's best-selling Bridgestone-brand premium commercial tires and casing when retreaded with the Bandag process.

If a premium Bridgestone-brand medium commercial truck tire becomes unusable before wearing to 2/32-inch remaining tread depth within seven years from the date of manufacture, Bridgestone will credit the owner $130 ($160.00 in Canada). If a premium Bridgestone-brand casing becomes unusable before three Bandag retreads, the owner will be credited $100 ($125.00 in Canada). To download the new premium tire limited warranty, visit www.Bridgestonetrucktires.com, click on the "View Truck Tires" button and choose any premium tire product (R287, R280, M726 EL or M720). The warranty information can be viewed and printed from all product pages.

INDUSTRY NEWS

EPA Offers $50 Million to Clean Up Diesels

The U.S. EPA is offering nearly $50 million in grant funding aimed at reducing emissions from the nation's existing fleet of diesel engines. Grants will be administered by National Clean Diesel Campaign (NCDC) and its network of seven collaboratives.

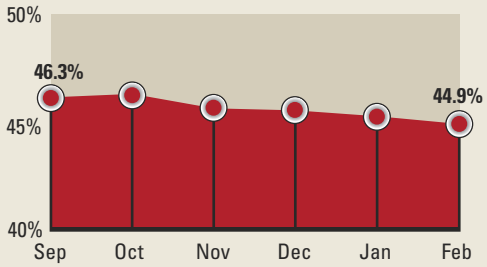
State, local, regional and tribal governments can apply for the grants, as well as non-profits and institutions with transportation, educational services and air quality responsibilities. Grants target school or transit buses, medium and heavy-duty trucks, marine engines, locomotives and nonroad engines. Grant recipients can use various emissions-reducing strategies such as EPA-verified retrofit and idle-reduction technologies, EPA-certified engine upgrades, vehicle or equipment replacements, cleaner fuels and creation of innovative clean diesel financing programs.

Some EPA Regional offices have already started issuing requests for grant applications, called RFPs. For more information, visit www.epa.gov/cleandiesel.

USED EQUIPMENT

February Values Off 0.9%

The Rouse Value Index
(Avg. orderly liquidation value as % of cost)

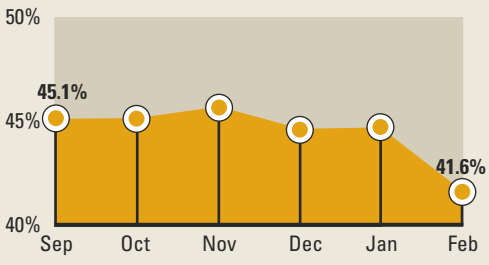


Note: Orderly liquidation value is expressed as a percentage of replacement cost (average cost paid for a new unit by large rental companies and dealers) for the average age of equipment within that category.

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

Orderly liquidation values decreased across the major categories in February, dropping 0.9 percent from January. For the six months ending February, values were down 5.6 percent. Categories recording the greatest declines were excavators, dozers and wheel loaders.

Excavators
(Avg. orderly liquidation value as % of cost)



Excavator values have dropped 11 percent in the six months ending February, and average selling age is 73 months.

MANUFACTURER NEWS

Product Link Becomes Standard

Caterpillar will equip most of its new core, mining and industrial machines with EquipmentManager and Product Link — its remote-asset-management solution — as standard equipment in U.S. and Canadian markets. Cat has provided remote-asset management as an option since 1998 and now will phase in the EquipmentManager/Product Link pairing beginning with wheeled excavators and articulated trucks. Remaining machines will be phased in through 2008, arriving to dealers with Product Link as standard equipment, along with a three-year subscription to Asset Watch, the remote-asset-management portion of EquipmentManager. Product Link will continue to be available as an option for the remaining Cat machines.



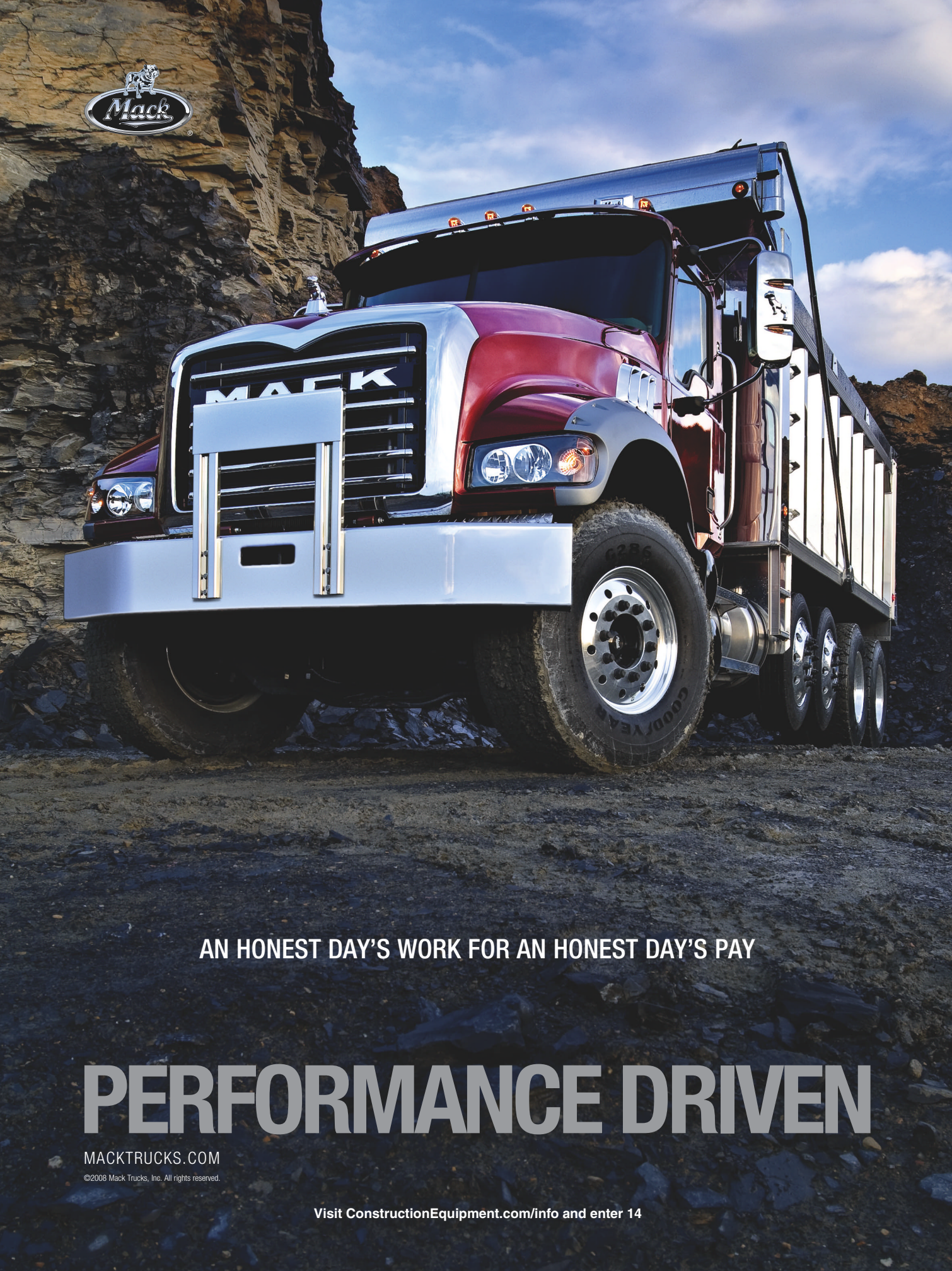
Product Link delivers working hours, location and fault codes from machines' on-board systems to the web-based EquipmentManager, which combines it with mapping, maintenance and troubleshooting functions to deliver service information in an actionable manner.

LETTER TO THE EDITOR

Adequate Aftertreatment

Excellent article on a complicated topic (Breathing Easier with Aftertreatment, January). There is a lot of controversy about the lack of adequate retrofit devices approved by the California Air Resources Board so far, but there is no doubt that these systems will be part of the solution for fleet owners far into the future.

— William E. Davis, Executive VP, Southern California Contractors Assn., TalkBack/ConstructionEquipment.com



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JOB SOLUTIONS

Strong Superdumps Help Win Hawaiian Paving Project

The two-lane Saddle Road climbs 6,600 feet as it stretches from Hilo to the west end of Honolulu. Weather, steep grades, and bad pavement have given the road one of the highest accident rates in the state, but Grace Pacific recently won the contract to repave the notorious route.

With off-island competition bidding, Grace Pacific knew a highly productive truck could help it structure a more aggressive bid. The vehicle had to be capable of moving 25 tons of asphalt quickly from a plant to the jobsite 16 miles away, and nearly half of the haul is on a military access road where speed is restricted to 15 miles per hour.

"We needed straight-truck speed and efficiency at the paving site," says Lorne Fleming, director of Grace Pacific's equipment division, "but the capacity of a truck and transfer trailer."

The solution is a Super 18, a seven-axle straight dump truck rated at 80,000 pounds gross weight. Called a Superdump because of its high legal payload, the truck has a 20,000-pound set-forward steer axle, three 8,000-pound steerable pushers, and 46,000-pound tandem drives. The key to the truck's capacity is a lift axle trailing the tandems.



Trailing axle allows 25-ton payloads on a nimble straight truck in Hawaii. The bed's elliptical floor and wider sidewalls at the tailgate make for an easy, clean-dumping truck.

Built by Strong Industries of Houston, Texas, the Strong Arm is a liftable axle rated as high as 13,000 pounds. Trailing 11 to 13 feet behind the rear tandem, the Strong Arm stretches the outer bridge measurement — the distance between the truck's first and last axles — to allow 80,000 pounds of gross vehicle weight. With a tare weight of 29,000 pounds, the truck meets Grace Pacific's 25-ton payload target.

Fleming bought 10 Kenworth T800s with the Strong trailing axles specifically for the Saddle Road project.

"Superdumps changed the way we go about paving," says Fleming. "We know we're carrying the maximum legal load of asphalt in the most efficient type of vehicle possible, and we're more competitive for it."

MANUFACTURER NEWS

Reman Business Takes on Deere Name

John Deere has leveraged its historic company brand in its commitment to the growing remanufacturing business.

Phoenix Reman Group, acquired by Deere & Co. in stages from 1996 to 2001, was officially renamed John Deere Reman - Edmonton just prior to the new year. The company produces components for John Deere Construction & Forestry, John Deere Agriculture, Hitachi Construction and Hitachi Mining customers in North America, Europe, South America and South Africa. Axle and transmission revenue now rivals the historic hydraulic component business, and recently electronics remanufacturing has been added to the product offering — all carrying the John Deere brand.

OPERATOR TRAINING

CCO Exams Available Via Computer

The National Commission for the Certification of Crane Operators (NCCCO - www.nccco.org) has begun offering its crane-operator certification exams via computer. Paper-and-pencil exams will continue to be offered. Initial roll-out of computer-based testing (CBT) will focus on mobile-crane certification, first in California and then expanded to other states and other programs as demand dictates. Both the full initial mobile-crane core and specialty exams will be offered, along with corresponding recertification exams.

Candidates will apply for CBT testing through a new online application process at http://www.iaiexam.info/CBTApp.html. NCCCO contracted with LaserGrade to develop the web tests, which are administered by the International Assessment Institute.

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THEFT PREVENTION

LoJack's Study Probes Equipment Theft

LoJack's seventh annual Construction Equipment Theft Study in 26 states suggests that theft rings continue to drive construction-equipment theft. Law enforcement discovered eight theft rings and chop shops by tracking and recovering stolen machines equipped with LoJack. Through these discoveries, police also recovered more than $2.5 million in stolen assets that had no LoJack devices.

The types of equipment most frequently stolen are (in order):

1. Skid steers
2. Backhoe loaders/skip loaders/wheel loaders/track loaders
3. Generators/air compressors/welders
4. Light utility/work trucks and trailers
5. Forklifts/scissor lifts
6. Dump trucks
7. Light towers
8. Mini excavators

These equipment types represented more than 80 percent of all construction-equipment recoveries documented by LoJack in 2007. More than 74 percent of the equipment stolen and recovered was five years old or less.

States with the highest theft rates include:

1. California
2. Florida
3. Texas
4. Arizona
5. Georgia and Nevada
6. Maryland and New Jersey
7. North Carolina
8. New York and Pennsylvania
9. Illinois
10. Colorado and Louisiana

To improve the chances of recovering stolen equipment, LoJack recommends marking machines in multiple locations with unique identifying numbers, including product identification numbers (PIN) and owner-applied numbers. Keep an accurate inventory, recording the manufacturer, model number, year, purchase date and PIN for each piece of equipment and serial numbers of each major component. Consider registering machines with a national database.

MANUFACTURER NEWS

Manitowoc Chopper Unveiled at Conexpo



Paul Teutul, of Orange County Choppers, celebrates a blast from Manitowoc's crane chopper.

Manitowoc Crane welcomed Paul Teutul and his sons Paul Jr. and Mikey, proprietors of Orange County Choppers and stars of the popular cable TV series, "American Chopper" to the company's stand at Conexpo 2008. The OCC team was at the booth to present their creation, a crane-inspired custom motorcycle commissioned by Manitowoc.

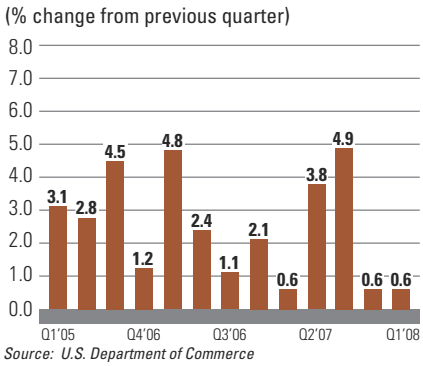
An OCC visit to the factory in Manitowoc, Wis., along with the presentation at Conexpo were included in an "American Chopper" television episode on TLC. The chopper will be displayed at regional events and Manitowoc dealerships throughout North America for the remainder of 2008. Afterward, it will return to Manitowoc where it will be on display at the company store.

STATUS & FORECAST

GROSS DOMESTIC PRODUCT

GDP growth was 0.6 percent in the first quarter, during which inventory accumulation more than offset a decline in construction spending. This was the weakest quarter since 2001. A 0.5- to 1.0-percent drop is expected in the second quarter as manufacturers and importers work down surplus inventories. Then, GDP growth will resume progressively, rising to 2.5 to 3.0 percent by the end of 2009. GDP growth overestimates the demand for building and facility space, because the trade sector is expanding faster than the domestic economy.

For more analysis, visit Economic Outlook at ConstructionEquipment.com.



Source: U.S. Department of Commerce

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Barbara Smith
Albian Sands Energy, Inc.



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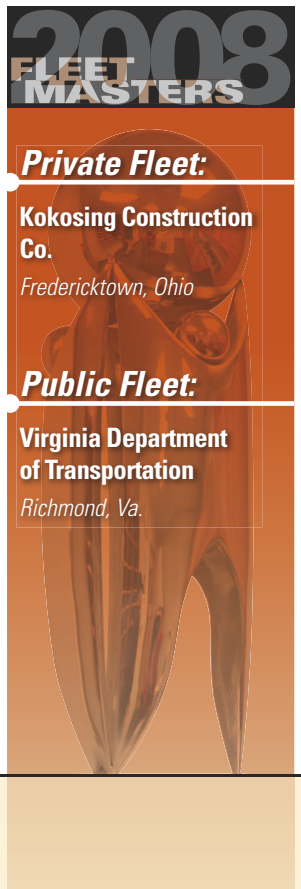
By MIKE ANDERSON, Senior Editor

FLEET MASTERS

The Nation's Top Fleets

Fleet Masters recognition honors the expertise needed to succeed with mixed equipment fleets



They call it a business. But the reality of trying to run a mixed fleet of on- and off-highway equipment in the most reliable and cost-effective fashion is a multitude of businesses rolled into one.

This is precisely why the Association of Equipment Management Professionals (AEMP) and *Construction Equipment* created the annual Fleet Masters Award to recognize top-notch fleet professionals for managing just the right elements to maximize their organizations. That the discussion such recognition generates may also help others manage more productive fleets is at the very core of all AEMP efforts to support the equipment industry's best and brightest managers.

The following pages profile the organizations and their strategies that piloted the 2008 public- and private-fleet winners to the top of the Fleet Masters competition, including the first-ever, two-time Fleet Masters winner. The awards were presented at AEMP's 26th Annual Management Conference and Annual Meeting, held March 9-10, 2008, on the eve of Conexpo-Con/Agg 2008 in Las Vegas.

Fleet Masters was created by *Construction Equipment* and AEMP to honor those fleets exemplifying best practices in human relations, vendor relations, asset management, maintenance management and technology. Applications can be found at www.aemp.org. The Fleet Masters Award program is sponsored by Castrol, Caterpillar, John Deere, Komatsu, Manitowoc, Qualcomm and Volvo Construction Equipment.

If you know of an organization that should be considered for the next Fleet Masters competition, please go to www.aemp.org to find out how to submit a nomination. All equipment-managing organizations are welcome to enter the competition.

A Little Healthy Competition

Measuring and reporting results throughout Virginia is key to continued success for VDOT's equipment-management team



Erle Potter, State Equipment Manager

Don't tell Erle Potter there isn't competition within a public fleet.

And, to prove the point, the Virginia Department of Transportation (VDOT) has again made Fleet Masters history. The first public-fleet winner of a Fleet Masters Award in 2004, VDOT is now the first-ever two-time winner of a Fleet Master Award, be it a public or private fleet.

For Potter, state equipment manager, the 2008 Fleet Masters Award is recognition that the business process plan for which the 2004 award was earned has, indeed, been put into action.

"The big thing that really helped us move to the next level was performance measurement and reporting. We started identifying things that we could measure in areas that needed improvement, and then we started measuring our accomplishments and reporting out those accomplishments," says Potter, PE, CEM. "That created competition among the nine districts.

"It goes back to the old saying that what gets measured gets done. We have a great deal of improvement in those areas in which we have measured and reported our accomplishments."

Within VDOT, semi-annual reports from the equipment-management team go to the state transportation commissioner, deputy commissioner, chiefs and district administrators. It was anticipated the latter officials would naturally, in turn, go straight to their equipment managers to ask why certain numbers weren't at the levels of other districts, says Potter.

"Those questions were asked," says Potter, "and those folks immediately focused their attention in the areas that needed improvement. As a result, the whole state has come up."

The very first result the state's equipment-management team reported on was preventive maintenance — the goal being to hit 95 percent of all PM tasks on time.

"We had one district that was up around 99 percent, the others were in the 80s, and one district was much lower than that," recalls Potter. "After we started reporting and publishing that information, then the districts with the real low numbers came up into the 90s, and now to the point where they're all up in the 95-plus range."

Part of the method is a clear identification as to what Potter and his team is and does.

"I try to stay away from the term 'asset management,' because it's confusing. If you go to VDOT and you talk about asset management, they think you're talking about pavements and guardrails. I focus in on equipment management because that is what we do."

Hence, 37-year VDOT veteran Potter heads the equipment-management team — "it's exactly what it is," — comprised of two CEM-certified assistant state equipment managers, Richard Bonistalli and Larry Maready; technical consultant and CEM Commission member Blair Kinker; and the equipment managers of the nine districts. An award-winning technician training program has resulted in the largest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Photos by Mark Mitchell Photography

Members of the VDOT equipment-management team include, front row, from left: Larry Maready, Erle Potter, Richard Bonistalli, John H. Puzenski, James Pearman and John Brunette. Back row, from left: L.T. Williams, Kevin Holden, Bryan Maul, Carl Stevens, Blair Kinker and Jim Brewbaker. Absent: Charles Cheatham.

number of certifications among public agencies in the United States, and VDOT employees have won AEMP national technician-of-the-year awards more than a dozen times since 1989.

As with any public agency, VDOT walks a tightrope of sorts when it comes to managing assets. On one hand, residents of the Commonwealth of Virginia demand their hard-earned tax money be spent in the most prudent manner possible; on the other hand, it is likewise expected that full resources be instantly available when a bridge gives way to a flood or trees are blown across a highway. "It is a balancing act," says Potter, "to be lean enough to be cost-effective, but at the same time have enough resources available to respond to emergencies."

Part of the solution for the equipment-management team has been the development of standing state-wide equipment rental agreements that naturally bring a better price via quantity, but are also based on a short-term concept, "so that if you need a piece of equipment for a day, then you don't have to rent it for the whole month," says Potter. "We've developed these contracts, put them out to bid, and have gotten some very good equipment, where the contract requires the equipment be delivered within so many hours of notice."

This has allowed for some older, idle equipment that would formerly be kept around "just in case" to be moved off the state's books.

Equipment owned by VDOT is rented to the particular district, as accounted for in the state-wide financial management system. That system in turn provides equipment-utilization data to the equipment-management system as part of an information network that allows for VDOT's financial-management, equipment-management and automated-fuel-management systems to share and leverage pertinent information.

And with the data in circulation, know that the competition is always on.

Virginia Department of Transportation

Headquarters: Richmond, Va.

Specialty: Construction, maintenance and operation of a state transportation network

Equipment Value: $534 million

Fleet Makeup: 30,000 total items and 9,000 items of rolling stock representing all classes, including 3,300 light-duty trucks and 1,000 tractors/mowers

VDOT Equipment Program: 13-member equipment-management team headed by Erle W. Potter, state equipment manager, and including nine district equipment managers; the program is managed in a decentralized fashion through the district equipment managers, who report to the district administrators

Facilities: A central office in Richmond, supported by nine districts, with 72 total equipment maintenance shops

Market Range: Commonwealth of Virginia has the third largest state-maintained highway system, behind only Texas and North Carolina; VDOT owns, operates and maintains 57,867 miles of roads and supporting infrastructure

The Ability to Exceed Expectations

In endeavoring to reach beyond its customers' needs, Kokosing Construction Co. creates "win-win" situations with suppliers and employees



Barth Burgett, VP Equipment & Support Operations

JPGS in all positions soft bottem edge on primary photo to come

If a vendor has a suggestion for Kokosing Construction Co., Barth Burgett and his colleagues want to hear it. Those vendors can expect the same in return.

"You've got to be involved in the industry," says Burgett. "If you're not involved in the industry and hoping to improve the product, then you've really got nothing to complain about."

As Kokosing's vice president responsible for the equipment maintenance division, Burgett joins general field equipment manager and 36-year company veteran Dean Rinehart on annual jobsite visits with individual key suppliers to discuss how both parties can improve their operations. "We want a win-win relationship," says Burgett, pointing out how discussions initiated in such meetings have led to tangible results on both sides. Kokosing reps have been invited to manufacturers' factories to participate in product enhancements that ultimately better equip the contractor; Kokosing has taken the advice of vendors to enhance direct communication of its buying intentions, so that those vendors can be prepared for future business from Kokosing.

A multi-million-dollar general contractor at work in the heavy highway, industrial, underground, asphalt paving and marine markets, the Fredericktown, Ohio-based Kokosing is the private-fleet recipient of a 2008 Fleet Master Award — an honor Burgett says recognizes his family's long-standing business philosophy.

"The family's always looked at equipment as an opportunity," he says. "A lot of people look at equipment as a necessary evil, and we've always looked at equipment as a way to lead into other things. Therefore, we're always looking down the road at what's coming up. Is this something we want to get into our operations? How else can we use it? My father, William B. Burgett, was always strong in equipment and in hiring the right people to maintain it.

"First of all, you've got to hire the right people. Then, you've got to give them the tools to do the job, you've got to give them the expectations of the end result, and then give praise and credit for a job that meets the expectations."

The right employee, says Burgett, includes equipment managers who strive to improve the process of their work. "The construction industry is intensely competitive; you have to be constantly reviewing existing processes," he says. "One of Kokosing's goals is to be the industry benchmark for equipment management."

For equipment operators, a recently implemented expectations program starts right at the time of job orientation with special training pertaining to safe operation, care of equipment and communication of equipment concerns. Equipment managers then follow up on how the operators are achieving in meeting expectations by auditing the crew foremen on key indicators. "A good score means the crew is achieving expectations," says Burgett. "Individuals also are recognized who show great determination in equipment care in the company and maintenance newsletters."

As for giving Kokosing maintenance staff the correct tools, this was accomplished by incorporating a system "mirrored off other indus-

Photos by Ken Frick Photography



The Kokosing equipment management team, front row, from left: Chuck Hoffner, Tim Truex, Dean Rinehart, Barth Burgett and Doug Rinehart. Back row, from left: Wayne Queen, Carl Uhinck and Steve Green.

tries" explained to Burgett at a seminar by total productive maintenance expert Terry Wireman in the mid-1990s.

"Technicians tend to be very good at repairing assets, but sometimes one of their strengths isn't paperwork and the coordination of certain managerial duties, so what we have here now are parts planners, who each have five to seven mechanics who work with them," says Burgett. "The mechanics order their parts through their planner, and the planner is responsible for getting the parts, getting those parts delivered to the jobsite, and taking down any pertinent information," such as warranty claims, equipment history and time-card data. "Does the parts planner supervise the mechanic? No. They are there to support the mechanic, so the mechanic can concentrate on what he's good at — communicating with the jobsite, meeting the jobsite's needs — and not having to worry about the periphery stuff."

The trust the planner-mechanic relationship has actually goes back to Kokosing's key vendor relationships, under which equipment suppliers are required to provide supplementary data that ranges from tire sizes to how many bolts there are on a particular cutting edge. This info is placed into Kokosing's "quick-hit" computer system at the point of purchase.

"Whether it's Komatsu, Cat, Werk-Brau or John Deere, they know that's part of their responsibility," says Burgett. "If I have the asset, the purchase is not completed until the supplementary data and the manuals are given to us.

"Let's say the mechanic's not the one calling in, but rather the superintendent out there calling in for teeth on a backhoe bucket. If he gives us the backhoe bucket number, we know what the shank is, what the tooth is, what the keeper part number is. It keeps you from having to go do that research over and over again."

Having complete product information up front has led to a more efficient parts and maintenance operation for Kokosing, which had grown its major equipment count by 93 percent to 1,143 pieces in the 10 years ending in 2007, but conversely had cut its internal parts department's inventory from $4 million to $1.5 million in the last three of those years.

Burgett is particularly proud of the fact many of the employees in Kokosing's mechanics pool — who work in a career renowned for regular job changes — stick around once they arrive.

"We don't want them welding up bolts or anything like that. We want them to do the job right and to use their talents to do what they're good at," he says.

"One of our core ideologies about anything we do is we try to exceed the customer's expectations."

Kokosing Construction Co.

Headquarters: Fredericktown, Ohio

Specialties: Heavy highway, heavy industrial, underground utilities, asphalt paving, marine

Equipment Replacement Value: $199 million

Fleet Makeup: 1,143 total pieces, including 386 pick-up trucks, 93 excavators, 92 dozers, 79 mechanics trucks, 56 backhoes, 55 forklifts, 49 compactors, 40 dump trucks, 39 off-road trucks, 38 scrapers, 34 cranes

Support Staff: 213 maintenance division personnel, including 161 technicians, 21 foremen and leads, 21 support and 10 supervisors

Facilities: 5 permanent maintenance facilties in Ohio, 1 permanent maintenance facility in Michigan, 3 temporary or mobile maintenance structures

Market Range: Based in Midwest, but currently at work in 7 states including Hawaii



When the urgent call comes in, Kokosing's complete equipment parts records avoids staff "having to go do that research over and over again."

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By LARRY STEWART, Senior Editor

Construction Races Toward Using Biofuels

When emissions reductions of alternate-diesel/exhaust aftertreatment combos are verified, the cost of compliance with in-use diesel exhaust limits will plummet

FIFTH
In A Series

Witness the perfect storm from which alternate fuels will emerge as viable energy sources: A barrel of OPEC crude oil selling for more than $130 ushers pump prices of regular gasoline above $4.00 per gallon and on-highway diesel up to $5.00. War and saber rattling in the Middle East inflate domestic energy production to national-security status. Heavily populated regions grapple with air quality so poor that it threatens the immune systems of infants and the aged. The developed world ramps up its fight against global climate change by curbing carbon emissions.

The Energy Independence and Security Act of 2007 that President Bush signed into law in December 2007 includes the Renewable Fuels Standard, which raises the U.S. biofuels production target to 36 billion gallons by 2022 in a progression that starts at 9 billion gallons this year (about 5.3 percent of total annual gasoline and diesel consumption). Europeans are driving to meet an EU directive to replace 10 percent of the Union's fossil energy by 2020.

As 174 world governments that ratified the Kyoto Protocol work to cap greenhouse-gas emissions, world demand specifically for biofuels rises. Today's search for carbon-dioxide-neutral fuels — fuels that release no net CO_2 to the environment — leads toward biofuels because plant feedstocks remove as much or more CO_2 from the environment than burning the fuels releases.

Biofuels address energy-independence and air-quality issues most clearly. In fact, combinations of biofuels and aftertreatment devices may be able to save some of the Tier 0 and Tier 1 diesels that otherwise would have to be replaced in order to comply with California's new off-road in-use diesel rules. But biofuels may not deliver an obvious greenhouse-gas or fuel-cost victory.

The debate over whether or not biofuels create more greenhouse gas and deepen this world's shameful inability to feed starving underprivileged people is a complex one. Both sides quote and attempt to discredit various studies of resources consumed making fuels and CO_2 production, deforestation and economic stimulus, food-price inflation and personal-income growth in Asia.

Politics notwithstanding, the amount of money already invested — more than 60 new ethanol plants currently under construction — and tax dollars promised —



The first diesel Grand Prix winner is in this Audi, which has taken LeMans two years running, fueled by Shell GTL — synthetic diesel made from gaseous feed stock. Fed with plant biomass, the process could deliver high-performance diesel and satisfy political, environmental and economic renewable-fuel imperatives.

Source: Audi Motorsport

Congress authorized $700 million of federal support each year until at least 2014 to develop our biofuels industry — suggests that biofuels are coming to a pump near you. The good news is that gasoline and diesel engines have little to fear.

Biofuels such as biodiesel and ethanol enjoy particular advantages in a world amending fossil-based energy systems. Biofuels can be delivered to market without creation of completely new distribution systems. Existing gasoline and diesel engines require no real modification to run on ethanol blends or biodiesel.

The Energy Security Act sets a specific target of 1 billion gallons of biodiesel produced by 2012. A diesel engine's efficiency advantage easily outweighs fuel-efficiency losses that gasoline-powered cars might experience running on lighter ethanol fuels. Automakers know that, and there are more than 20 models of diesel-fueled cars and light trucks planned for introduction here by the 2010 model year; six models by 2009. Increasing demand for diesel will encourage broader distribution of low-emission heavy-duty fuels.

The construction industry will be drawn to diesel-fuel alternatives at the crossroads of energy independence and air-quality regulation. Some firms are already using diesel-fuel surrogates — attracted by economics, compelled by regulation, or both. The California Air Resources Board's (CARB's) emissions rule for in-use, off-road heavy-duty diesel vehicles sets the stage for putting some veggies in heavy iron's all-fossil diet.

Owners of off-road diesels in California should already be calculating fleet-average emissions of nitrogen oxide (NOx) and particulate matter (PM), comparing their numbers to CARB's targets for a matching variety of equipment, and taking action to hit those targets. Today, the only way to reduce fleet-average emissions enough is to replace Tier 0 and Tier 1 machines — anything built before 1997 — up to a maximum of 8 percent of the fleet per year with brand-new equipment. A few larger pieces can be repowered cost effectively with Tier 3 engines. Existing Tier 2 and Tier 3 machines can be retrofit, up to a maximum of 20 percent of the fleet per year, with emissions-control devices from CARB's Verified Technologies List.

But there are combinations of fuel modifications and exhaust aftertreatment waiting to be verified that could bring Tier 0 and Tier 1 machines into compliance so they can be retained rather than replaced.

Emissions Technology markets a platinum-based diesel-fuel catalyst and a system for introducing it into the engine's air intake that promises more complete combustion of the fuel charge in the cylinder and a 50 percent or greater reduction in soot produced by older diesels. The company is working to get the CARB to verify its catalyst in combination with an exhaust aftertreatment filter.

"Our field data show that combining the Combustion

The construction industry will be drawn to diesel-fuel alternatives at the crossroads of energy independence and air-quality regulation



Source: Volvo Construction Equipment

Volvo's designers chose hybrid power for the Centaur concept hauler which, when powered with a downsized engine and fueled with high-cetane synthetic diesel, seems certain to slash emissions to near zero and produce significantly improved performance.

Catalyst System with a Level 2 diesel oxidation catalyst (a lower-cost exhaust aftertreatment device) gives Level 3 performance on a Tier 0 or Tier 1 engine — an 85-percent reduction in PM emissions. Plus, we see 8 to 10 percent fuel savings on a typical diesel engine," says George Malouf, vice president of technology at Emissions Technology.

Biodiesel delivers similar reductions in combustion soot, and it is also in the process of being adding to CARB's verified list in combination with appropriate aftertreatment. As these fuel/exhaust treatment pairings verify for use with pre-1997 diesels, they could slash the cost of fleets' compliance with California's emissions limits for in-use diesels.

This good news won't be confined to California for long.

"I think there's an outstanding possibility we'll see this (California rulemaking adopted) in 15 or 20 states after the EPA grants California its waiver," says Mike Buckantz, president of Justice & Associates, a Long Beach, Calif., environmental consulting firm. Buckantz believes the Environmental Protection Agency will grant the California ARB the waiver necessary for the state to fully implement its in-use, off-road diesel rule by the first or second quarter of 2009. "You can just look at a map of areas in PM 2.5-hour nonattainment (to identify states where the California rulemaking will be adopted next).

"All these other states have to do is go through the steps required by state law to adopt a new regulation," says Buckantz. He suggests they could begin enforcing off-road diesel rules in mid-2010. Deadlines are likely to be pushed back to reflect the later start date, but the working provisions of the rulings will, by law, be identical to the California regs.

National Average Fuel Prices

	Per Gallon	Per Diesel-Equivalent Gallon*
Regular Gasoline	$2.99	$3.33
Diesel	$3.40	$3.40
CNG**	$2.15	$2.15
Ethanol (E85)	$2.51	$3.96
Propane	$3.12	$4.80
Biodiesel (B20)	$3.37	$3.42
Biodiesel (B2-B5)	$3.31	$3.32
Biodiesel (B99-B100)	$3.69	$4.05

* Diesel-equivalent gallons = amount of fuel that contains the same energy as a gallon of diesel

** Compressed natural gas, in diesel-gallon equivalents

Source: U.S. Department of Energy, October 2007

It's prudent to wait until some alternate fuels are CARB verified to buy them, but now's the time to get educated on the technology and politics of biofuels. At this stage in their development, your economic and political actions may influence local availability of certain fuel types.

Biodiesel is made by processing vegetable oils or animal fats. The most common feed stocks in the United States are soybeans or corn. Biodiesel mixes readily with conventional diesel, and today is available mostly as B5 (5 percent biodiesel) and B20 (20 percent biodiesel). Virtually all engine manufacturers approve the use of B5, and most support engines run on B20.

Biodiesel is said to have slightly less energy than fossil diesel, but an aggregates producer with operations using B99 for three years reports no significant reduction in material moved per gallon of fuel burned in 150 pieces of its equipment that have been running in Iowa, Nebraska, Illinois and Indiana.

Biodiesel acts as a solvent, which cleaned out the quarry equipment's fuel systems and required fuel-filter changes as often as every other day for the first 500 or 600 hours of use, but caused no long-term problems. The 15,000-hour teardown of a Cat C18 engine powering an underground mining truck showed a hint of sludging in the head, but at acceptable levels. Main bearings looked good, and there were no fuel-system problems.

Biodiesel helps the quarry meet the Mine Safety and Health Administration's (MSHA) more stringent air-quality standards for underground mines without having to invest in additional ventilation shafts. The company is also buying B99 at lower cost than fossil diesel.

Biodiesel is an ester, and esters tend to attract water, so biodiesel tank farms and dispensing systems require careful attention to housekeeping practices. Well-maintained fuel-water separators on machines are also critical.

Raw biodiesel also tends to have a higher cloud point than conventional diesel, although it varies with the quality of feed stock, processing and additives. The National Biodiesel Board (NBB), the biodiesel industry's trade association, claims that additives and blending with the right kinds of conventional diesel can keep

biodiesel blends working in very cold climates. The organization has collected several testimonials from biodiesel users — the City of Brooklyn Park, Minn., Yellowstone National Park, City of Denver, Colo., City of Ann Arbor, Mich. — that work through freezing winters with B20 blends.

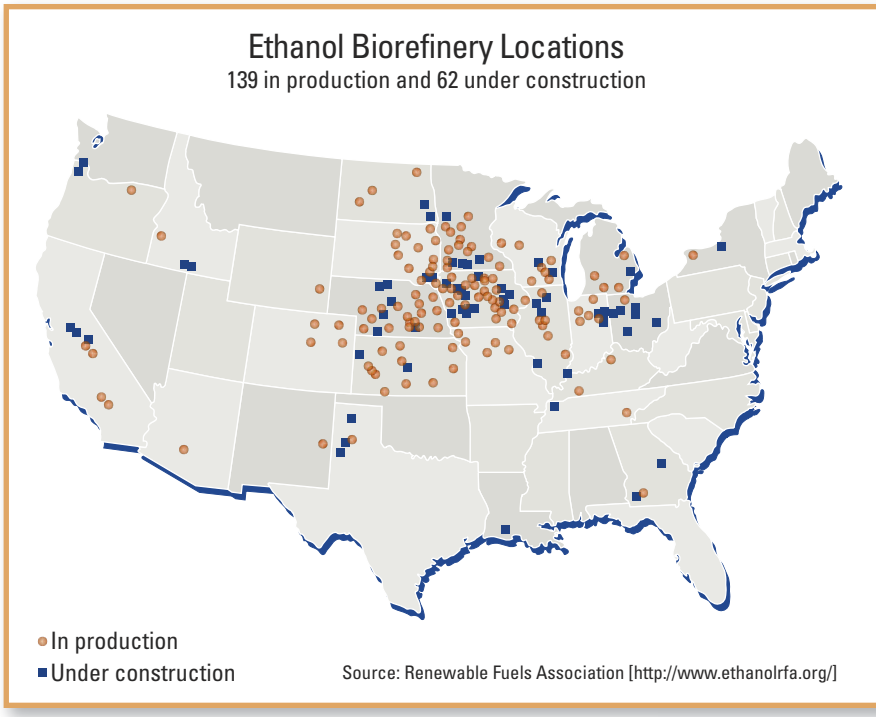
The NBB is cataloging states' authority to regulate fuels; their status in adopting ASTM D6751 as the fuel specification for biodiesel; and assessments of their capacity to analyze fuel samples. Information gathered from this project will be presented on NBB's State Fuel Quality Index web page.

Ethanol production shares some energy-efficiency concerns often expressed concernning the cost to make biodiesel. Fermenting fuel-quality ethanol from grains such as corn or corn sorghum is energy intensive, but comparing 2001 production data to 2006 data, a study by Argonne National Laboratory suggests that American ethanol producers have reduced water use nearly 27 percent, electricity use nearly 16 percent, and reduced total energy use nearly 22 percent. The domestic ethanol industry simultaneously increased production nearly 300 percent.

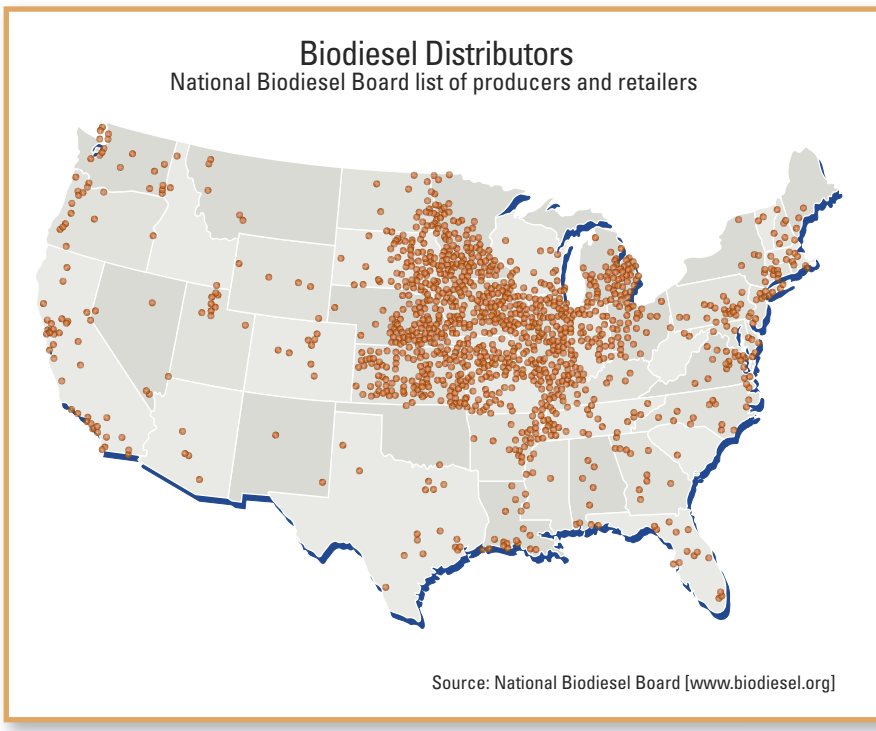
Making ethanol from cellulose, rather than grain, expands the types and amount of available raw materials to produce ethanol, including many materials now regarded as wastes such as corn stalks, rice straw and wood chips. So called "energy crops" of fast-growing trees and grasses can also provide cellulose feed stock. A recent Stanford University study asserts that switchgrass produced 540 percent more renewable energy than the amount of nonrenewable energy consumed in making it.

Sugar cane is an even better ethanol raw material. Brazilian sugar growers produce feed stock for 45 percent of that country's ethanol production on only 1 percent of its arable land. Brazil is nearly energy independent, thanks largely to the size of its ethanol industry.

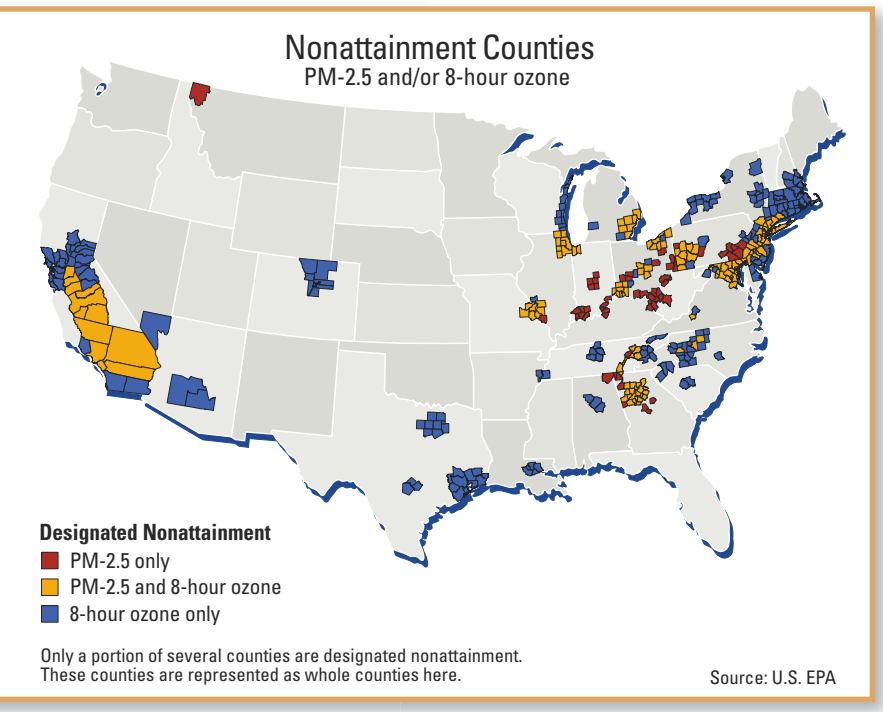
Opponents to grain-derived biofuels argue that cropland diverted to growing fuel feed stocks must be replaced given a growing, increasingly meat-fed world population. They warn that using more grain for biofuels contributes to market dynamics that have been in-



The Energy Security Act authorizes $700 million of federal support each year until at least 2014 to develop the U.S. biofuels industry.



The National Biodiesel Board is accrediting producers and marketers of biodiesel with a program based on ASTM's D6751 standard for biodiesel and systems quality.



Fifteen or 20 states with counties that do not attain EPA particulate standards will very likely adopt California's rules aimed at upgrading existing off-road diesel engines to like-new emissions levels.

flating food prices out of reach of the poorest portion of world population.

Markets are much too complex to either vilify or exonerate biofuels for encouraging the slashing of rainforests or rise in food prices. In reality, elevated fuel costs are the primary source of food-price inflation and, ironically, increasing biofuels use is likely to reduce fuel costs. Rapidly growing middle classes in Asia and India are buying more dairy and meat products, too, which greatly intensifies demand for agricultural land (it takes about eight times as much corn to produce the same number of calories from meat as from bread).

Use of marginal land in the United States, where subdivision and mall development costs nearly three acres of farmland every minute, is controlled fairly carefully. So it should be no surprise that the rate of rainforest deforestation, in countries without strong controls on land use, shadows grain prices. Losing rainforest releases CO_2 and diminishes the earth's ability to absorb more of the greenhouse gas.

The jury is still out on how grain-derived fuels will affect greenhouse gases, but sugar and waste-stream feed stock such as wood waste appear to be better for the environment and global food economics than fossil-derived fuel. Refinement of cellulosic and biomass conversion suggests that biofuels makers are moving toward even more convincing solutions.

Commercialization of a process called Fischer-Tropsch converts natural gas or biomass to an ultra-clean, diesel fuel. Not only does this gas-to-liquid (GTL) synthetic diesel fuel reduce particulate matter and NOx emissions from current diesel engines, but when using biomass as the feed stock the process gasifies the whole plant. The result is that converting biomass to liquid fuel by way of Fischer-Tropsch uses less land area per unit of energy compared with grain biodiesel or ethanol.

It seems the stepping stone for developing GTL-fuel processing will be remote natural gas reserves — too expensive to bring to market in gaseous form. One PetroSA plant in South Africa and Shell's Indonesian plant currently produce GTL fuels suitable for heavy-duty diesels. Discussions are under way to develop GTL production in Alaska. Existing technology, pipeline capacity and North Slope gas reserves are adequate to deliver more than 1,000,000 barrels per day.

Synthetic diesel powers a range of diesel engines overseas. Southern-California testing with International Class 6 delivery trucks retrofit with Johnson Matthey diesel particulate filters proved that Shell GTL reduced emission of hydrocarbons, carbon monoxide and particulate matter by 99 percent, and reduced NOx by 14 percent. No maintenance or component-life problems were reported in 24,000 miles of use. Fuel economy didn't change significantly.

Cetane number of GTL fuels is usually greater than 74, much higher than conventional diesel. This may be a hint of what has pushed a diesel-powered Audi to two straight road-race wins at Le Mans, and claiming first and second places in this spring's Long Beach Grand Prix. Audi's R10 is the first grand-prix winner with a diesel engine, and it is fueled by a version of Shell's GTL synthetic diesel.

With governments pushing increased production of biofuels and the promise of safe, high-performance fuels such as biodiesel and synthetic diesel, the economics to simply convert today's construction equipment to a cleaner fleet have never been better.

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By TOM BERG, Truck Editor



Addi-Drive

Delivers Enhanced Traction On- or Off-Road

Hydrostatic front-wheel drive turns a 4x2 or 6x4 truck into a 4x4 or 6x6, while Creep-Drive allows very low speeds for specialty work

Going off road to make a delivery or pick up a load? Most of the time you can do it in a heavy- or medium-duty truck with a conventional axle configuration — one or two drive axles and a non-driving steer axle. But you might get stuck if the ground is soft or muddy. Yes, you can send another truck to pull the first one out, or call a wrecker. Either way costs money and time, and you risk damage to the vehicle.

That's why some operators specify front-driving axles, typically on concrete-mixer chassis or trucks that haul blocks, pipe, wallboard or other construction materials. An alternative is a central tire inflation system (also called tire-pressure control), which can deflate tires for travel over rough terrain, then air them up when it's time to return to paved or graded roads. This is especially effective in deep sand, in places like Florida and eastern Minnesota, and we've described this product in previous Hands-On Trucking articles.

Now there's another alternative: hydrostatic front-wheel drive, which sends power and torque to the truck's front end to enhance traction and give it a more secure stance on slopes and hills. It's called Addi-Drive by Poclain Hydraulics and EZ Trac by Tuthill Drive Systems, which collaborated on its development. Poclain supplies a hydraulic pump and motors and electronic controls; while Tuthill, the maker of Mud Hog hydraulic drives for agricultural implements, machines hubs that house the motors at the front wheels.

Both companies are promoting it; Tuthill has begun selling kits to retrofit existing trucks and Poclain is talking with truck manufacturers and expects some to soon offer the system as a factory-installed option.

The system turns a 4x2 or 6x4 truck into a 4x4 or 6x6. It places hydraulic motors in front-wheel hubs and powers them with pressurized fluid from a pump driven by an engine or transmission-mounted PTO. Addi-Drive/EZ



Poclain's Sterling demonstrator has its tag axle fully extended so the drive axle is off the ground and its wheels are spinning and spewing dust. Yet the truck moves ahead under power from the hydraulically driven front wheels.

Trac can thus take the place of a heavy, bulky mechanical front-driving axle and transfer case. Hydraulic apparatus is comparatively compact, so a truck's standard chassis and cab height can be maintained. Lower stance means the truck is less top heavy, and less likely to roll over in turns on the street or highway, or on hills during off-road running.

Poclain has installed a system on a Sterling L-Line 6x2 truck to demonstrate the concept, and did so during the recent ConExpo in Las Vegas. That's where I got to drive it, on a gravel lot on the city's south side. About a dozen people watched it run during one demo, and while there was nothing rough about the conditions, we did see how the system improves traction.

Poclain's truck also had another new product, called Creep-Drive, which provides very smooth propulsion at very low speeds. This uses a hydraulic motor on the drive shaft; it, too, is spun by pressurized fluid from the PTO pump, and can move the truck from a barely perceptible forward or rearward motion to 5 or 6 mph. This allows a highway truck to double as a low-speed work truck.

"Hydrostatic ground drive is used separately from tools," explained Homer Hawk, a Poclain application engineer. "You can set your engine speed to run the tools — pavement cutter or groover, bridge inspection boom, paint striper, or street sweeper. Then you independently move the truck with the Creep-Drive."

After preliminarily driving the truck with its normal power train, which included a Mercedes diesel and an Allison automatic transmission, I began operating the creeper. With Hawk as the instructor, I first put the Allison's floor-mounted shifter in Neutral, turned on the PTO and set engine speed at about 1,000 rpm, then turned a rotary switch on an adjacent control box to Rear Creep. This activated the driveline motor.

I grasped a small joystick and moved it forward or rearward, and the truck moved accordingly. Speed adjustment is infinite, with road speed (what there is of it) depending on how much up or back I moved the stick. Speed would also depend on how fast the engine is running, though that is pretty much limited to the PTO pump's designed speed.

Each front wheel has a Tuthill hub with a Poclain motor inside. Hydraulic lines carry pressurized fluid from the PTO-driven pump and back to it.



Creep motor mounted on the driveshaft twists it smoothly for slow, precise forward or rearward movements.

Hawk said creeping speed is smoother and slower than what it would be with a 5- or 6-speed Allison and normal rear-axle gearing, without dragging the brakes. And a manual transmission wouldn't have to be one with a low-low range.

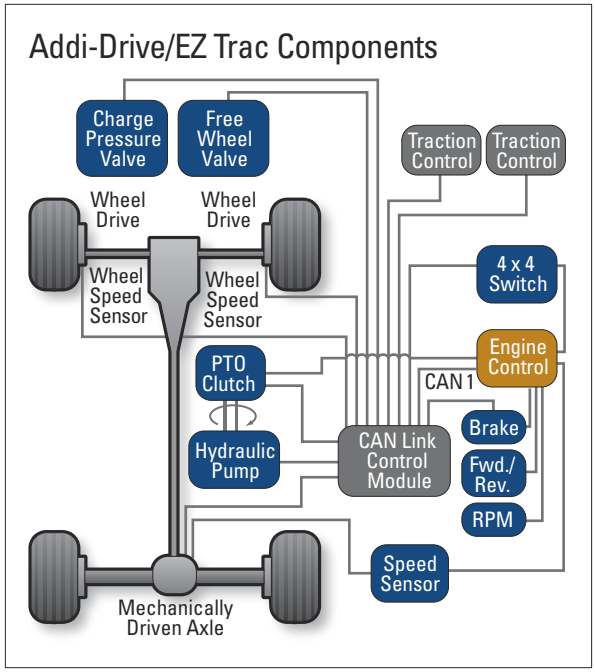
On the dashboard was a color LCD panel with gauge-shaped displays showing road speed, horsepower, and system pressure, but I didn't pay much attention to it.

Okay, now I was ready for front-wheel drive, so he directed me to turn the rotary switch to Assist. Tuthill calls this Automatic mode, because the system operates automatically, in conjunction with the truck's power train. We turned off the fast idle and I shifted the Allison into Drive, then pushed the accelerator. Off we went, to the end of the gravel lot, then backwards in Reverse to the other end. The truck went as fast as the engine and transmission would allow.

I turned the truck around and ventured onto a nearby street, accelerating past the system's 20-mph cut-off speed. It disconnected smoothly, and I braked, did another turnaround, and returned to the lot with the front



Next to the Allison shifter on the floor is a control box with the rotary switch (with Off, Assist, Front Creep and Rear Creep settings) and joystick for fore and aft truck movements. On the dash is a display showing hydraulic pressure, among other items.



Schematic shows how mechanical and electronic components tie together. Sensors on the drive axle and the front wheels allow an electronic control unit to coordinate power from the hydrostatic front drive with that from the truck's standard power train. Front wheels will also work alone.

wheels again pulling, though there was no pull in the steering wheel.

Hawk explained that Addi-Drive senses the speed of the rear wheels and reacts by driving the front wheels at a matching speed, or just a little faster. This way it pulls the truck when the rear wheels begin spinning.

They set up the Sterling to simulate such conditions by equipping it with an adjustable tag axle; adding pressure to its air bags raised the rear of the chassis and lifted the driving wheels so they spun in the gravel, or completely off the ground, so only the front wheels propelled the truck. Sure enough, it worked.

Addi-Drive can also double as a creeper, and the rotary switch had a Front Creep setting. Here I could use the joystick to move the truck using only the front-drive system. This setting locks in the system (Tuthill calls it Manual mode for EZ Trac) and, as in automatic Assist, operates in conjunction with the normal power train. So someone buying the front-drive system wouldn't need the driveline-mounted Creep-Drive, though he could buy it that way, and could operate the two together if he wanted four- or six-wheel traction in Creep mode.

Sales representative Don Quigley said about 5,000 front-drive systems are at work on trucks in Europe, many of them on MAN 4x2s that, of course, are now 4x4s. Some are on highway trucks whose owners bought an Addi-Drive "just to have it." They operate in hilly terrain where conditions are sometimes slippery, and this ensures that they'll keep going.

He related that when the Sterling was being loaded onto a transporter trailer for the trip from Poclain's home in Sturdivant, Wis., to Las Vegas, its rear wheels lost traction; but he directed the driver to use the Addi-Drive and it just walked up the ramps. "Boy, I'd like to have this on my tractor," the driver said.

Aside from on/off-road construction applications, an Addi-Drive might allow use of a less brawny truck for snow plowing (it will operate at speeds faster than 20 mph), and would help get trash trucks into and out of spongy landfills. But, Hawk said, it's not meant for constant off-road use. He explained that hydraulic motors act much like electric motors in that they apply high torque at zero rpm. The two 55-horsepower motors in Addi-Drive/EZ Trac make up to 5,500 pounds-feet initially, but that falls off as the motors begin turning. So Addi-Drive is muscular.

And while it's not light weight, it saves about 800 pounds compared to a mechanical front-driving axle, transfer case and forward driveline, he said. Total system weight includes the two 64-pound motors and the special hubs (they don't differ much in weight from stock hubs), plus the PTO gearbox, P90 pump, and associated hoses and controls, which might add another 150 pounds.

Tuthill now makes hubs and steering knuckle ends for 20,000- and 14,600-pound-capacity steer axles; they are machined to fit most steer axles, and have a 10-stud 335-millimeter-diameter pattern for hub-pilot-mount disc wheels.

All the above details constitute the upside of an Addi-Drive. Its downside is that it isn't cheap, and in fact might cost close to what a mechanical front-drive system does. That depends on what the truck manufacturer charges, but it's in the neighborhood of $20,000 for a Class 8 truck. Quigley said a truck builder would also set the price of an Addi-Drive, so he wouldn't guesstimate any dollar figures.

Tuthill was vague on the price of an EZ Trac retrofit kit, which includes all instructions, manuals and service support. For comparison, Dana Spicer's Tire Pressure Control system costs thousands less, but we're told it doesn't work as well in mud as in sand.

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By WALT MOORE, Senior Editor

Compact Wheel Loaders: Underutilized Resource

The compact wheel loader (ranging in horsepower from around 30 to 109) seems to be an equipment resource still being discovered

Heavy Equipment Forums (www.heavyequipmentforums.com) is an online site where owners and operators ask questions and trade ideas about construction equipment. Recently, a contributor to the site commented about compact wheel loaders, saying, that in his opinion, these machines are underutilized and underrated. The reason, he says, is that many equipment users simply don't recognize the compact wheel loader as a logical step between larger skid steer loaders and, say, wheel loaders that have minimum bucket capacities of 2.50 cubic yards or so. This means, he says, that these users are missing the compact wheel loader's efficiencies by perhaps using machines that are too small, too large, or less versatile than the application requires.

The "efficiencies" noted by the contributor, as he compared the compact wheel loader with "large-frame skid steers," included faster truck loading, greater lift capacity ("with more stability," he said) and less ground disturbance. Other than being somewhat more difficult to transport than a skid steer loader, the compact wheel loader's only downside, he said, was the relatively low oil flow from its auxiliary hydraulic system, which precludes the use of certain high-flow attachments, such as planers. Compared to the small "full-size" wheel loader, he said, the compact wheel loader is a more maneuverable package, gets substantially better fuel economy, and offers the prospect of using a skid-steer-type coupler, which opens the door to a wide range of attachments.

These are insightful comments, and generally supported by two knowledgeable spokesmen in the industry: Jeff Aubrey, compact-wheel-loader manager, Komatsu Utility; and Joel Powell, product specialist group manager for Volvo Compact Equipment. When commenting on the North American market for compact wheel loaders, both noted a "good-news/bad-news" situation.

"The good news," says Aubrey, "is that the compact-wheel-loader market since 2001, the first year out of the last down turn, has more than doubled. The bad news is that the market is still only about 5 percent that of the skid-steer-loader market. There are a lot of manufacturers vying for a piece of a very small market. But this won't deter major suppliers, because they have large markets in Europe, where most of these machines are presently sold."

Small market numbers aside, says Powell, North American buyers are substituting compact wheel loaders for larger skid-steer loaders at an increasing pace — as long as space constraints and transportability are not issues.

"The compact wheel loader is becoming a more feasible choice for some buyers for a variety of reasons," says Powell. "The annual market still pales in comparison with that for the skid-steer loader, with 2,700 compact wheel loaders being sold last year, versus perhaps 53,000 skid-steers. But that said, more buyers are recognizing that there's a time and a place for both machines."

Perfect fit, long-term benefits

According to Aubrey, the compact wheel loader fits perfectly into applications where one or more of several factors exist. If, for example, the user needs more flotation and more ground clearance than can be had from a skid-



Compact wheel loaders typically are available with a selection of bucket sizes and options. Buckets for this New Holland W80TC, for example, range in size from 1.25 to 1.75 cubic yards; and options include teeth, bolt-on cutting edges and a multi-purpose type.

The Cost of Ownership

Size	List Price	Hourly Rate
to 39 HP	$45,518	$19.41
40-59 HP	$63,407	$25.94
60-69 HP	$64,991	$27.79
70-79 HP	$77,051	$32.08
80-99 HP	$95,785	$37.63
100-109 HP	$97,442	$39.80

Hourly rates start with monthly ownership cost divided by 176 (hours per month) and add hourly operating cost. Inputs used to derive the costs include diesel fuel at $3.95 per gallon, mechanic's labor at $44.79 per hour, and interest rate of 4.75 percent.

Source: "Contractors Equipment Cost Guide," published by Equipment Watch – (800) 669-3238

steer, or requires greater lift capacity (and possibly greater lift height) than large skid-steers can provide, then the compact wheel loader is a viable candidate for the job. Or, if the user would benefit from a higher cab position — up out of the dust and debris of certain applications (and with a sealed and air-conditioned cab as part of the package) — then the compact wheel loader could, again, be the machine of choice.

Also on the list, says Aubrey, is the user's concern about machine longevity.

"We have customers tell us that the compact wheel loader will last longer in harsh applications," says Aubrey. "I know a customer who runs both skid steers and compact wheel loaders on a sod farm. He says that skid steers are excellent machines and needed in the operation, but can't fill the whole bill. When he buys a skid steer, he expects it to last two to four years. The wheel loaders he has intentions of keeping for 10 years."

Volvo's Powell is of the same opinion.

"Users are beginning to see that the long-term benefits of the compact wheel loader possibly can outweigh the return-on-investment for the skid steer," says Powell. "One item, of course, is tire wear, which can be a fairly large expense for skid steers, depending on the application and the operator. The compact wheel loader's articulation eliminates this problem. Also, the compact wheel loader's greater breakout forces, higher hinge-pin heights and larger bucket capacities translate into greater productivity in load-handling situations."



Pallet forks, such as those used on this Kubota R420, are a popular attachment for the compact wheel loader.

In addition, says Powell, the compact wheel loader's overall productivity also might be enhanced by its typically larger, more-comfortable cab with better visibility, its higher travel speeds — usually in the teens — and by greater service access due to an overall larger frame.

Changing design philosophy

According to Aubrey, a general design trend for today's compact wheel loaders is a greater adaptation of the skid-steer-loader concept by providing a universal coupler as a standard feature — or possibly as an option. This feature eases the transition from a skid steer to

a compact wheel loader, he says. Powell agrees, noting that skid-steer users are understandably concerned about wanting to capitalize on the investment they've made in skid-steer attachments.

On the issue of universal couplers, some compact-wheel-loader manufacturers offer them as standard equipment only on smaller models in their lines, say, in the popular 50-to-60-horsepower range, but use a proprietary coupler on larger models. Other manufacturers may opt to use the universal coupler also on considerably larger models. While it's probably safe to say that the majority of compact wheel loaders can be equipped with a universal coupler via an adapter from an aftermarket source, doing so might not always be a good idea. The concern, of course, is that the greater mechanical forces generated by the wheel loader's linkage could jeopardize the structural integrity of some skid-steer attachments, such as buckets.

On the other hand, attachments such as brooms, forks, grapples and power rakes can be used with no problem in many instances, as long as the requirements of hydraulically powered attachments are satisfied by the compact-

Compact-Wheel-Loader Specifications

Make/ Model	Static Tip Load Full-Turn (lb.)*	Operating Weight (lb.)	HP
Bobcat			
A300	6,111	8,673	81
Case			
21E	6,457	10,202	52
121E	6,795	10,893	57
221E	8,002	11,976	59
321E	8,277	12,727	72
Caterpillar			
904B	5,511	9,810	52
906H	3,197	12,412	70
908H	3,638	14,253	80
914G	11,675	16,297	95
IT14G	10,094	18,632	95
Compact Power			
726DT	na	1,874	26
732DT	na	2,271	32
749DT	na	3,440	49
Coyote			
C5C	5,512	6,834	42
C6**	4,520	8,377	52
C8C-4	na	10,900	62
C12	na	11,100	62
C14-4	5,732	11,464	75
C15	na	11,800	70
C16-4	na	11,354	85
C17-4	na	14,330	100
C18-4T	na	13,200	85
C20-4T	na	16,530	100
CS50***	na	9,100	40
CS90***	na	13,500	70
Deere			
244J	7,718	11,552	59
304J	9,315	13,404	73
Deere *(continued)*			
344J	12,522	18,408	98
Doosan			
DL160	na	17,500	106
(preliminary specs)			
Gehl			
AWS36**	na	9,921	60
AWS46**	na	13,700	78
JCB			
4067,275	11,204	62	
409ZX	8,628	11,571	75
411HT	11,061	19,343	99
Kawasaki			
50ZV	12,720	17,500	96
Komatsu			
WA30-5	3,727	6,040	29
WA50-3	5,073	8,200	37
WA65-5	6,889	10,274	54
WA70-5	7,606	11,155	60
WA80-5	8,135	12,500	60
WA100M-5	10,494	15,123	82
WA150-5	13,304	17,262	96
Kubota			
R420S	3,850	7,450	43
R520S	4,410	8,980	49
MultiOne			
S30D	na	1,780	31
SL30D	na	2,156	30
SL32D	na	2,090	32
SL35D	na	2,178	35
SL40DT	na	2,090	40
GT45D	na	3,430	50
GT50D	na	3,520	50
MultiTrac			
XT1400	na	2,840	35
XT2400	na	5,060	50
Mustang			
ML28**	5,181	7,055	39
ML48**	7,496	9,921	59
ML48T**	6,746	11,684	59
ML68**	8,730	12,015	75
New Holland			
W50TC	6,489	10,173	51
W80TC	8,277	12,727	72
Power Trac			
PT-1430	2,400	2,560	30
PT-2430	2,400	3,350	30
PT-1445	3,600	3,920	45
PT-2445	3,600	4,260	45
PT1460	4,800	5,620	60
PT-2460	4,800	5,980	60
Swinger			
1K	na	5,600	48
2K	5,000	8,500	65
Takeuchi			
TW50	5,975	8,708	51
TW60	7,055	10,251	61
TW65	7,143	10,362	59
TW80	8,294	12,677	73
TCM			
E804	3,890	6,140	29
E806	4,990	7,630	35
E820	7,744	11,110	56
Terex			
TL60	5,456	8,598	50
TL65	5,788	9,040	50

wheel-loader's auxiliary hydraulic system. A complaint that a user of a large skid steer might have against the compact wheel loader, however, is the general lack of high-flow auxiliary hydraulic systems on the latter. But manufacturers seem to be recognizing that shortcoming, and optional high-flow systems are becoming available. Caterpillar's new 906H and 908H models, for example, can be equipped with an optional high-flow system, which provides 33 gpm, up substantially from the standard system's 22 gpm.

"Auxiliary hydraulics are typically standard," says Powell, "but now the trend is toward higher-flow systems. The high-flow system is an option, because not every application or attachment requires it — and it carries a higher acquisition cost due to a more complex hydraulic and cooling system."



Illustrating the point that compact-wheel-loader manufacturers are continually refining their products to suit user needs, this new V4-6 has a reduced overall height, says Yanmar, to make it more compatible with enclosed-carrier transport.

Buying considerations

In Powell's opinion, the debate between buying a skid steer loader or a compact wheel loader usually distills down to three major issues: space constraints, transportability, and capital cost. The cost of acquiring a compact wheel loader can be a tough nut to crack for some buyers, because, typically, the machine commands a hefty premium above the list price of a large skid-steer loader. It's at this point, says Powell, that buyers must weigh the merits of the wheel loader and determine its value for their specific applications.

Of course, if transportability is an issue (can the buyer's present truck and trailer accommodate the wheel loader?), or if space constraints in typical applications are an overriding factor, then the big skid-steer will likely get the nod.

But if the compact wheel loader seems a viable choice, says Aubrey, keep in mind that machines of essentially the same horsepower will provide varying degrees of capacity at very different price levels. He suggests that the most critical specification is full-turn tipping load, because that specification will determine if the machine will have adequate capacity in a given application. Then, he says, pay attention to weight, which can be an indicator of a machine's overall durability — provided that the unit is not simply "over-counterweighted."

(Keep in mind as you read the accompanying specification chart that the upper horsepower limit for compact wheel loaders is 109, which is the figure used by *CE*'s Spec-Check. Low-end horsepower is more difficult to pinpoint, because the line between compact wheel loaders and mini loaders is somewhat blurred.)

Make/ Model	Static Tip Load Full-Turn (lb.)*	Operating Weight (lb.)	HP
TL80	7,563	11,240	60
TL100	9,305	13,230	74
TL120	10,275	15,656	84
TL160	14,002	20,283	102
Volvo			
L20B	6,175	9,945	54
L25B	7,495	10,650	60
L30B PRO	8,490	12,040	68
L35B PRO	9,480	13,710	75
L40B	10,252	17,417	94
L45B	11,574	18,519	99
L50E	11,140	19,050	101
Wacker			
WL18	1,640	3,960	25
WL25	2,950	5,500	33
WL30	3,647	6,600	48
WL50	5,608	11,000	75
280**	4,409	7,040	49
850**	7,055	9,900	66
Waldon			
4500B	2,800	6,920	61
5100	3,500	7,100	57
6000C	5,400	9,000	76
7000	6,750	11,000	80
Willmar			
4550 Wrangler	4,840	8,160	83
Yanmar			
V3-6	3,924	6,801	30
V4-6	5,158	8,058	40

** Static Tip Load—Full turn will be moderately affected by bucket size and type*

*** Four wheel steer (not articulated)*

**** Swing loader*

na (information not available)

Gallery of Compact Wheel Loaders

WACKER NEUSON

Articulated or All-Wheel Steering

Wacker recently introduced six compact wheel loaders to the North American market, four articulated-frame models and two all-wheel-steer models. The four articulated models (WL 18, WL 25, WL 30 and WL 50) have horsepower ratings from 25 to 75, and full-turn tip ratings from 1,640 to 5,608 pounds. The all-wheel-steer models (280 and 850) are, respectively, rated at 49 and 66 horsepower and have rated tipping capacities of 4,409 and 7,055 pounds with standard buckets.

Number of models: 6

New models: WL 18, WL 25, WL 30, WL 50, 280, 850

Product-line features: All Wacker loaders feature four-wheel, hydrostatic drive. The four articulated models feature a "side-tilting" operator's platform to facilitate access to the engine and hydraulic components.

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GEHL

New, All-Wheel-Steer Models



Brand new for Gehl are the AWS36 and AWS46 compact wheel loaders, which feature an all-wheel-steering system that allows a tight turning radius, respectively, of 8 feet 4 inches and 9 feet 4 inches. These hydrostatic-drive machines are equipped with a hydraulic "quick hitch" and feature air conditioning as a standard item.

Number of models: 2

New models: AWS36, AWS46

Product-line features: Both of the new Gehl loaders use a four-cylinder, water-cooled Deutz diesel engine with net horsepower ratings, respectively, of 60 and 78. These hydrostatic-drive loaders are capable of speeds to 12.4 mph, and the front and rear differentials feature "45-percent" locking capability.

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CATERPILLAR

Newly Designed Models Offer Many Enhancements

Caterpillar's five-model range of compact wheel loaders was recently enhanced with redesigned 906H and 908H models. These new machines feature a skid-steer-type coupler, differential lock, parallel-lift Z-bar loader linkage, transmission inching function and an oscillating chassis designed to improve traction and stability. Caterpillar's C3.4 diesel engine powers both, at 70 and 80 horsepower (net), respectively.

Number of models: 5

New models: 906H, 908H

Product-line features: Models in Caterpillar's compact-loader line range in net horsepower from 52 to 95 and feature two-speed hydrostatic drive systems. Dump clearance (full height at discharge) for these models ranges from 7.8 to 8.75 feet, and standard bucket sizes range from .78 to 1.8 cubic yards.

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JCB

409ZX Newest in JCB Range

The newest compact loader in JCB's range — the 75-horsepower 409ZX — is fitted with a lower, larger cab (compared with its predecessor model), and the new cab features increased glass area and wider doors. The hydrostatically driven 409ZX's standard bucket is rated at 1.3 cubic yards, and with optional pallet forks, the machine handles 5,500-pound loads. The 12,831-pound machine has an oscillating central pivot to enhance wheel-to-terrain contact.

Number of models: 3

New models: 406, 409ZX

Product-line features: The JCB compact-loader range also includes the 62-horsepower 406, with an operating weight of 11,204 pounds; and the 411HT, a 99-horsepower model that incorporates a high-torque (HT) linkage design.

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KOMATSU

Wide Range of Choices

Komatsu's compact-wheel-loader line ranges from the 29-horsepower, 6,040-pound WA30-5, to the 96-horsepower, 17,450-pound WA150. The two smallest models — the WA30-5 and WA50-3 — are four-wheel-drive, hydrostatically propelled units that use an oscillating rear axle. Models WA65-5, WA70-5, WA80- and WA100M-5 feature two-speed hydrostatic drive systems and limited-slip differentials in both axles. The WA150-5 features Komatsu's HST drive system.

Number of models: 7

Product-line features: An optional "creeper gear" system on selected models allows maximum hydraulic flow to attachments, while controlling ground speed at suitable rates. The WA150-5's hydrostatic drive system employs one pump and two motors for allowing the operator (using the machine's Variable Shift Control) to closely match machine performance to the application.

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TAKEUCHI

Differential Locks Front and Rear

A late-2006 exclusive agreement with Atlas Weyhausen allowed Takeuchi to add four compact wheel loaders to its product range. The four models (TW50, TW60, TW65 and TW80) range in horsepower from 51 to 73 and in operating weight from 8,700 to 12,700 pounds. The two smaller units are Perkins powered, and the two larger models use Deutz power.

Number of models: 4

Product-line features: Takeuchi loaders feature differential locks in both axles and use an oscillating articulation joint. A two-speed hydrostatic-drive system provides travel speeds in excess of 12 mph, and an inching pedal allows slow ground speeds at high engine speeds for attachment control.

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Gallery of Compact Wheel Loaders

SWINGER

Independent Articulation Oscillation Joint



Swinger, a division of NMC-Wollard, has completely redesigned its two compact-loader/tool-carrier models, the 1K and 2K. These machines have rated lift capacities of 1,500 and 2,500 pounds, respectively, and both use a Cummins four-cylinder diesel engine — a 48-horsepower (net) A2300 in the 1K and a 65-horsepower (net) B3.3 in the 2K. A gear-pump system delivers 17.3 gpm of hydraulic flow for steering and auxiliary equipment.

Number of models: 2

New models: 1K, 2K

Product line features: Swinger models use a hydraulic pump and a two-speed hydraulic motor to power a reduction gear case at the rear axle, which channels power to the front axle. Both axles use planetary reduction, and both models use an independent articulation/oscillation joint.

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YANMAR

More Power, Greater Strength, New Looks

Both Yanmar compact wheel loaders, the V3-6 and the V4-6, have been extensively refined, compared with their "dash-5" predecessors. Equipped with I-Tier-4-compliant engines delivering 30.3 and 40.4 horsepower, respectively, these new loaders feature reinforced frames, thicker loader arms, increased lift capacity, and greater travel speed. Machine height also is significantly lower to facilitate overall maneuverability.



Number of models: 2

New models: V3-6, V4-6

Product-line features: In addition to refined styling and a new paint scheme, Yanmar's new loaders, with operating weights (respectively) of 7,154 and 8,411 pounds (with cab), feature an "automatic hydrostatic" drive system, four-wheel drive and wet multi-disc brakes.

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JOHN DEERE

Oscillating Stereo Steering

Deere's three compact wheel loader models — 244J, 304J and 344J — use John Deere PowerTech engines with net peak horsepower ratings of 64, 73 and 98, respectively. All three machines have a two-speed hydrostatic drive system that allows travel speeds to 18.6 mph. These models feature Z-bar loader linkage and can be fitted with an optional four-function, pressure-compensating hydraulic valve.

Number of models: 3

Product-line features: The hallmark feature of Deere's compact-wheel-loader range is Oscillating Stereo Steering, which combines the coordinated action of frame articulation with rear-axle steering. The system can deliver tight turns with minimal articulation — a beneficial capability, says Deere, when maneuvering with heavy loads.

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KUBOTA

Optional Backhoe



Kubota's R420S and R520S compact wheel loaders, rated at 43 and 49 horsepower, respectively, feature a standard quick-coupler (mechanical on the R420S, hydraulic on the R520S) and can be fitted with an optional backhoe in lieu of the counterweight. Auxiliary hydraulics to the rear are standard.

Number of models: 2

Product-line features: Both Kubota loaders feature electric shuttle-shift, which allows on-the-go directional changes without clutching or braking, load-sensing transmissions, which automatically adjust torque and speed to load conditions, four-wheel drive, limited-slip front differential and rear-frame oscillation.

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COMPACT POWER

700-Series New to Line

Compact Power recently added three compact wheel loaders to its line of compact utility equipment. The new 26-horsepower 726DT uses a Daihatsu diesel engine, and the 32-horsepower 732DT and 49-horsepower 749DT use Yanmar diesels. These new loaders have operating capacities, respectively, of 1,124, 1,488 and 2,260 pounds.

Number of models: 3

New models: 726DT, 732DT, 749DT

Product-line features: Compact Power's new loaders feature hydrostatic drive systems, articluated-frame steering and four-wheel drive. These machines use telescopic boom arms and provide hinge-pin heights of 105, 117 and 146, respectively.

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CASE

Versa-Boom Linkage Adds Flexibility

The Case compact-wheel-loader line features Versa-Boom loader linkage, which is designed to provide parallel lift, along with enhanced reach and visibility to the bucket. The linkage allows the bucket to be nearly inverted for dragging material away from tight spots.

Number of models: 4

New models: 121E

Product-line features: Case compact wheel loaders feature a standard hydraulic skid-steer coupler, and the E-Series cab features single-lever loader control with integral directional-shift switch and transmission-speed button.



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POWER TRAC

Built to Handle Attachments

According to Power Trac, each of the six compact-loader models in its range can be fitted with more than 30 attachments. Three of the six models (high-lift versions) have an available rear-mounted, removable backhoe that provides digging depths from 9.5 to 10.5 feet.

Number of models: 6

Product-line features: All Power Trac machines feature inverted Z-bar linkage, articulated-frame steering and four-wheel hydrostatic drive.

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TCM

Standard Hydraulic Coupler, Easy Maintenance



The three Series-2 TCM compact wheel loaders, all powered by a Kubota diesel engine, feature hydrostatic drive, inboard wet-disc brakes and range in horsepower from 28.9 to 56. The standard hydraulic coupler, says the manufacturer, accepts most skid-steer attachments.

Number of models: 3

Product-line features: TCM loaders feature special oil-integrated bushings in the loader linkage to extend greasing intervals, provide an automatic air-bleed for purging and priming the fuel system, and use side-by-side coolers for the radiator and hydraulic system.

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Gallery of Compact Wheel Loaders

TEREX

Extensive Compact Range



The Terex line of compact wheel loaders includes seven models that range in horsepower from 50 to 102. All of the Terex loaders feature hydrostatic drive and parallel-lift loader linkage, except for model TXL 160-1, which uses a 4F/3R powershift transmission and Z-bar-type linkage. All hydrostatic-drive models use limited-slip differentials front and rear, with a rigid front axle and an oscillating rear axle.

Number of models: 7

New models: TL60, TL65, TL80, TL100, TL-120, TL160

Product-line features: Standard equipment for the two smallest hydrostatic-drive models is a universal skid-steer-type coupler, and an integrated hydraulic quick-mount hitch is standard for TL80, TL100 and TL120. The TL160 and TLX160-1 use pin-on buckets, but the hydraulic coupler is available for the TL160.

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MUSTANG

All-Wheel Steer and Intelligent Drive

The four Mustang compact wheel loader models (ML28, ML48, ML48T and ML68) feature a four-wheel steering system and an "intelligent" hydrostatic drive system that automatically adjusts the machine's speed and pushing power to suit operating conditions.

Number of models: 4

Product-line features: The ML48T uses a telescopic loader linkage designed to provide extra lift height. Mustang units are fitted with a hydraulic "quick hitch," and an optional Skid-a-Tach adapter allows use of skid-steer attachments.

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WILLMAR

Universal Coupler

The 83-horsepower Willmar Wrangler 4550 uses a four-cylinder Deutz diesel engine and features a four-wheel-drive hydrostatic propel system. Rated operating load with the standard bucket is 2,450 pounds, and with forks, 1,575 pounds. Turning radius is 11 feet.

Number of models: 1

Product-line features: The Wrangler 4550 uses a universal coupler and provides hydraulic flows up to 19 gpm from its heavy-duty piston-type pump.

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DOOSAN

New DL160 Soon to Arrive

While the new Doosan DL200 shown here has more horsepower than our definition of "compact" allows, it reflects the same general refinement of a new, soon-to-arrive Doosan compact, the DL160. Preliminary specifications indicate an estimated net horsepower of perhaps 106 or 107 for the DL160, and an operating weight of around 17,500 pounds.

Number of models: 1

New models: DL160

Product-line features: The new DL-Series wheel loaders use Doosan diesel engines that feature a common-rail fuel system, four valves per cylinder, electronic control and enhanced torque characteristics. A refined, three-speed powershift transmission can be operated in a manual, automatic or semi-automatic mode, and limited-slip differentials are available for both axles. In addition, the operator's environment has been significantly refined, and serviceability is enhanced.

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KAWASAKI

Cummins Power and Powershift

Reflecting a design typical of larger wheel loaders, the Kawasaki 50ZV uses a 96-horsepower Cummins B4.5T diesel engine, single-stage torque converter, 3F/3R powershift transmission, and semi-floating-type axles with torque-proportioning differentials and inboard-mounted wet disc brakes. The 50ZV uses Z-bar loader linkage and two high-lift loader arms are available.

Number of models: 1

Product-line features: The 50ZV features single-lever transmission control, and the transmission can be "declutched" by either brake pedal. Cab features include viscous isolation mounting, single-lever loader control and air-ride seat. Options include ride control and quick-attach coupler.

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BOBCAT

All-Wheel or Skid-Steer Modes



Construction Equipment's Spec-Check includes the 81-horsepower Bobcat A300 in its compact wheel loader classification. This 8,673-pound machine allows the operator to select a steering mode, either all-wheel steer or skid-steer, depending on the application. The machine has a rated operating capacity of 3,000 pounds.

Number of models: 1

Product-line features: The A300 uses a Kubota V3300-DI-Turbo diesel engine and a hydrostatic drive system that provides a 6.9-mph travel speed and a 4-mph inching mode. An optional two-speed system provides speed to 12 mph. Auxiliary flow for the A300 is 37 gpm.

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NEW HOLLAND

Universal Link Design

New Holland's compact wheel loaders feature a new boom design that uses one lift cylinder and one bucket cylinder. Standard equipment includes a hydraulic quick-coupler that is "skid-steer-loader attachment compatible," except for buckets. Also standard is a third-function hydraulic valve.

Number of models: 2

Product-line features: The W50T and W80T use a two-speed hydrostatic-drive system that allows 12.4 mph, but an optional transmission for the W80T has a top speed of 21.7 mph. The hydraulic system employs two pumps, one for the implement and steering circuits, the second for the braking and hydraulic-fan circuits. Optional equipment includes ride control and anti-drop valve.

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MULTIONE

Extensive Range of Small Machines

Construction Equipment's Spec-Check identifies seven models in the MultiOne product range that qualify as compact wheel loaders. These models are classified as S-Series, SL-Series and GT-Series units. They range in horsepower from 30 to 50 and in operating weight from 2,156 to 3,520 pounds.

Number of models: 7

Product-line features: All MultiOne loaders use a four-wheel-drive hydrostatic propel system and are diesel powered, using Yanmar or Daihatsu engines, depending on model.

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COYOTE

Articulated or Swing Loaders



From Coyote's extensive product line, 11 of its articulated wheel-loader models and three of its swing-loader models qualify as "compacts" under our definition. The swing loaders are four-wheel-steer units (not articulated) and feature a loader mechanism (boom arms and bucket) that swings 90 degrees to either side of the machine to facilitate working in constricted spaces.

Number of models: 14

New models: C5C, C8, C10

Product-line features: All Coyote loaders are hydrostatically driven and use a hydraulic attachment coupler, which can be adapted to a universal type. Two of the Coyote articulated models (C18-4T and C20-4T) feature telescopic booms that reach to slightly above 13 feet.

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VOLVO

Choose from Loader-Linkage Designs



The two largest models in Volvo's six-model compact-wheel-loader range (L40B and L45B) feature the company's proprietary Torque-Parallel (TP) loader linkage, designed to combine parallel-lift with the breakout power of Z-bar systems. The two smallest models (L20B and L25B) use parallel linkage, and the two middle models (L30B Pro and L35B Pro) use Z-bar. Coupler systems allow using a variety of attachments.

Number of models: 6

Product-line features: Volvo compact loaders feature hydrostatic drive with 100-percent differential locks on both axles. All use a proprietary articulating/oscillating joint, and provide an inching brake pedal to control ground speed when operating hydraulic attachments at high engine speeds. A third-function hydraulic valve is standard.

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MULTITRAC

New Models Are "Xtreme"

MutiTrac's new Xtreme Series models (XT1400 and XT2400) replace models RT30DT and RT50DT. Operating weights for the new machines are 2,840 and 5,060 pounds, respectively.

Number of models: 2

Product-line features: The hydrostatic drive systems used for the new Xtreme Series models provide travel speeds of 8.5 and 13.8 mph, respectively. Both new machines use liquid-cooled Yanmar diesel engines, rated, respectively, at 35 and 50 horsepower. The telescopic boom arms on these units provide additional reach — 30 inches for the XT1400 and 41 inches for the XT2400.

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WALDON

Z-Bar Linkage



The four models in the Waldon compact-loader range feature Z-bar loader linkage and a 2F/2R hydrostatic-drive system. The operating weights for these models (4500B, 5100, 6000C and 7000) range from 6,900 to 11,000 pounds, and horsepower ratings from 61 to 80. Diesel engines used in these models include a Continental for the 4500B, a Nissan Industrial for the 5100, and Cummins for the two largest models.

Number of models: 4

Product-line features: Manufactured in Fairview, Okla., since 1968, Waldon loaders provide bucket capacities of 0.55 to 1.25 cubic yards and bucket-hinge-pin heights from 111.3 to 133.0 inches.

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Bobcat

For use with a universal coupler, the Bobcat SG30 stump grinder, with a 36-inch width, is designed for use in limited-access areas. A larger model, the SG60, features a 32-inch cutting height and a 58-inch reach — capabilities that allow an entire stump to be processed without repositioning the machine. Mounting the stump grinder at a 90-degree angle to the cab provides a wide view of the cutting area, while rubber deflecting shield and screening provide operator protection.

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Grabtec

The Grabtec GC-Series grapple buckets are designed for larger compact wheel loaders and feature a "Quick On-Off" system that allows the bucket to be used with or without the grapple. All pivot pins in the grapple incorporate no-maintenance bushings and wiper seals, and the pins are tapered for easy installation. The hook and retaining pins that mate with the machine's coupler are chrome-plated to resist corrosion. The bucket also can be fitted with a "quick-attach" system that requires a custom mounting kit be welded to the back of the bucket.

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Sweepster

The Sweepster WLA Parallel Linkage Angle brooms are designed for larger compact wheel loaders and are available in 10- and 12-foot models. The 36-inch-diameter brush is driven by dual motors to yield high-torque operation, and according to the manufacturer, parallel-arm brush suspension allows the brush to conform to ground contours independent of the loader. The broom can be angled hydraulically via a 24-volt electric valve and control box, and a turnbuckle-style adjuster controls the brush pattern.

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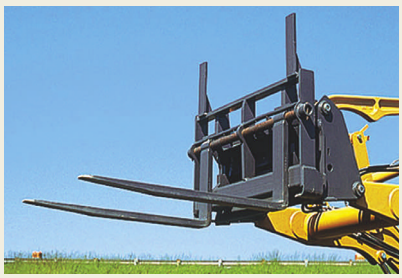
ACS

The ACS extendible Jib Boom (right) is designed for handling pipe and manholes. The boom features two-piece tubular construction (three section is an option) and can be extended to multiple lengths. The ACS Construction Duty Fork features an open-frame design (to enhance visibility), forged and heat-treated tines that can be adjusted to the appropriate width. Both the boom and the fork are available in either pin-on or coupler-equipped configurations.





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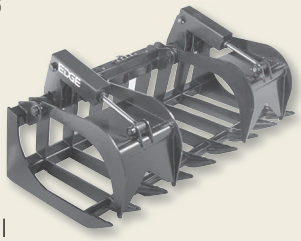
CEAttachments



The EDGE Brush Root Grapples feature independently operating grapples to handle uneven loads, and the tines are designed to slide under awkward loads. The open floor of the grapple allows dirt and small debris to fall through, while retaining larger material. The grapple uses hardened pins, cushioned cylinders and guards for cylinders and hoses.

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National Attachments



The REMU screening bucket, says National Attachments, allows loading and screening to be done simultaneously with one wheel loader. The good screening characteristics of the REMU bucket, says the supplier, is the result of a special rounded blade design that repels large objects instead of attempting to crush them. Using different blade types and adjustments, various types of material can be screened more effectively to suit the application. Six models are available for wheel loaders.

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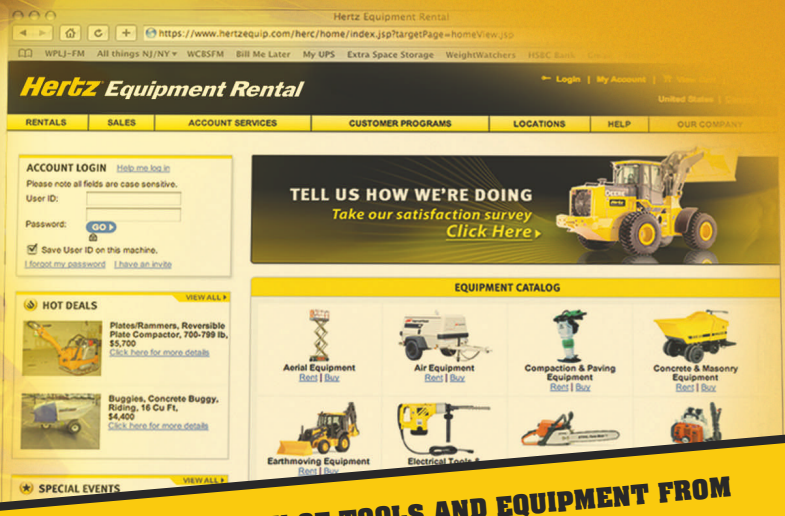

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By LARRY STEWART, Executive Editor

Rubber Tracks

MCLAREN

McLaren engineered the NextGen TDF line of heavy-duty rubber tracks to counteract cracks, cuts and wear better than traditional tracks. A proprietary rubber formula is said to prevent minor damage from spreading extending belt life by as much as 50 percent. McLaren also claims the continuous SpoolRite Belting improves tensile strength, "making the tracks more durable than the standard continuous wire technique used by most manufacturers." A unique tread pattern with multiple lugs per pitch protects the track body and improves the ride.

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ASV



Users of ASV's mid-sized machines now have the option of outfitting their machine with Extreme Terrain Tracks that are 1½ inches wider than standard 15-inch track, with more aggressive treads for added traction. The new tracks reduce machine ground pressure by 10 percent. Wider spacing between tread lugs makes them self-cleaning. Extreme Terrain Tracks are currently available for ASV PT-50 and PT-60 Rubber Track Loaders, and also the ST-50 Tracked Utility Vehicle. They will also fit on earlier ASV RC-50, RC-60 and Scout SC-50 models.

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LOEGERING

Genie has approved use of Loegering's QTS track modules as an aftermarket application to its S60 and S65 aerial work platforms. The QTS undercarriages bolt directly to the standard hubs of most boom lifts. Genie promises to honor all machine warranty commitments from the torque hubs to the platform per the standard warranty agreement. Coincidentally, Terex announced its purchase of Loegering shortly after Genie's QTS announcement. Terex also owns Genie.

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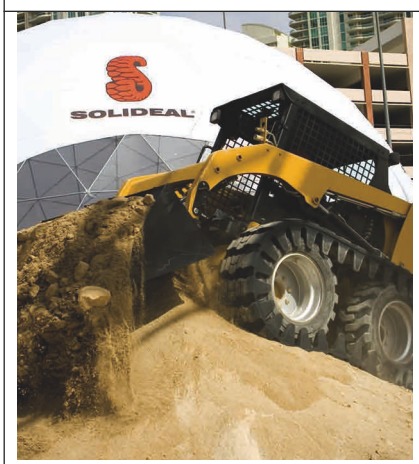

SOLIDEAL

Solideal's new LifeMaster OTT has been upgraded with a new tread profile, longer wearing natural rubber compounds, and redesigned joints. The belt can be installed over the skid-steer's tires in about 30 minutes to improve traction and traverse fresh asphalt or concrete without scarring.

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BLS

Tufpads Blues were developed for the toughest applications, specifically asphalt milling machines. The company says its blue polyurethane product has proven to last 15 to 30 percent longer than premium black polyurethane. Tufpads Blues are available as original Tufpads track pads, polyurethane bonded directly to a steel triple grouser; or as Poly Bolt-On Tufpads track pads, with the polyurethane pad bolting to the steel triple grouser.

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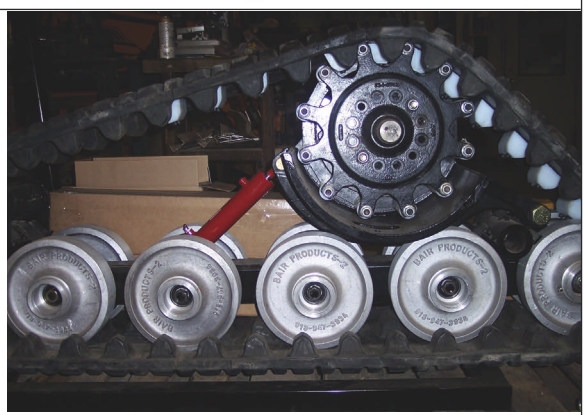

BAIR

Bair makes aftermarket track repair parts for Caterpillar and ASV compact track loaders, including what the company calls "Larry Lugs," reusable drive lugs that bolt into the track replacing rubber lugs that are worn out or delaminated. They can be installed without removing the track. Bair also offers replacement idlers and bogie wheels, outer sprocket tubes, and grease-gun-operated track tensioners to replace the track systems' jack screws.

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SOUCY

Soucy makes track for ASV, Caterpillar, Bombardier and other OEMs, and the company began marketing directly to agricultural users several years ago. Soucy exhibited its ST-900 heavy-duty track modules on a JCB telehandler at Conexpo 2008 as its official introduction to the construction market aftermarket. Soucy does not use high belt tension to transfer drive torque to the belt. Instead, they make their track belt with two or three rows of drive lugs so there are 10 or 12 lugs engaged with the sprocket at all times. Track modules come in 15-, 20-, 25-, and 32-inch widths for drives from 30 to 500 horsepower. The ST-900 tracks in this photo are 25 inches wide and weigh about 2,000 pounds each. The complete kit costs about $55,000.

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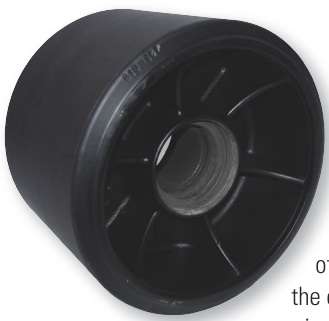

SUPERIOR TIRE & RUBBER

Superior launched a program for factory reconditioning bogie and idler wheels. Superior's unique process removes all of the existing failed rubber from the original steel hub and applies a proprietary Xtreme Polyurethane, renewing the wheel "beyond OEM worklife standards." Superior says its polyurethane is proven to provide maximum cut and tear strength and a lower coefficient of friction, reducing heat build-up and bond failures. Xtreme Polyurethane is UV stable and resistant to diesel fuel and other solvents. Superior Xtreme Wheels are available for all types and models of equipment including Case Quadtrac, Challenger, John Deere T-Series, Blaw Knox pavers, Caterpillar pavers, and many more.

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By MIKE VORSTER, Contributing Editor

How to Use Budget Variances

Knowing the fleet is off budget is the first step toward fine-tuning performance or identifying underlying problems



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

Those that assign monthly or quarterly budgets regardless of utilization develop the misguided belief that machines can be "on budget" even if they do not work at all.

Cost management is a simple three-step process. Set a budget to accomplish what you want to do, determine the actual money spent to achieve the result, and calculate the variance between the budget and the actual cost. It's a simple process, but you achieve little if that's all you do. Success requires that you understand what caused the variance and that you act to achieve the desired results.

There are two basic approaches to setting budgets. You can create a budget by adding up the expected expenditures; or you can use recent experience, make a few adjustments, and assume that the future will look much like the past. Many cost categories, such as depreciation or loan repayments, are inked when the deal is struck and are easy to estimate. Others (such as repair parts and labor) depend on age, application and utilization and are extremely difficult to determine in advance.

An important issue arises when you need to estimate how much of your budget you have earned at a given point in the year. Let's assume that the annual depreciation budget for a dozer is $30,000 and that you expect the machine to work 2,000 hours in that year. Let's also assume that you have only worked 400 hours by the end of the first quarter, due to some bad weather. Have you earned a budgeted amount of $7,500 (a quarter of the annual budget) or have you earned a budgeted amount of $6,000 (400 hours at the depreciation rate of $15 per hour)?

Most companies correctly assume that machines earn their keep through utilization. They calculate budget earned at any point in time by multiplying hours worked by a budgeted hourly rate for both the fixed and the variable portions of owning and operating cost. Those that assign budgets on a monthly or quarterly basis regardless of utilization easily develop the misguided belief that machines can be "on budget" even if they do not work at all.

Actual owning and operating costs are relatively easy to record, and the vast majority of companies determine these at a unit level. Owning costs (such as depreciation, loans, leases, insurance and property taxes) are mostly annual costs and do not vary with the number of hours worked by the machine. Operating costs (such as fuel, ground-engaging tools, maintenance and repairs) are mostly variable and depend on the cost of the resources (fuel, labor) used as well as the hours worked.

The fact that owning costs are largely independent of utilization, and operating costs vary directly with utilization makes it absolutely essential to budget and manage owning and operating costs as two separate parts of the equipment cost equation.

Here's an example to help us understand why we need to analyze variances and take appropriate action. Data for our example company are summarized by equipment class in the accompanying table. Budgets and actual costs enable us to calculate the variances shown in the last three columns. The fleet has earned a total budget of $493,100 vs. a cost of $494,650. The $1,550 variance for the fleet overall appears to be of no concern at all. Yet, if we look into the details, a different story emerges.

Let's look at the owning costs for Class 5. We have an earned owning cost budget of $36,000 against an actual cost of $62,000. The actual owning costs are incurred on a monthly basis and are relatively easy to estimate. The negative variance of $26,000 is thus likely due to low utilization rather than to errors in estimating. This kind of variance is known as a "volume variance": The volume of work done (900 hours) was insufficient to recover the fixed cost of $62,000. If full utilization was supposed to be sufficient to recover the $62,000 fixed cost, then the overall

utilization for Class 5 for the period was 58 percent. Class 2 exhibits the same characteristic.

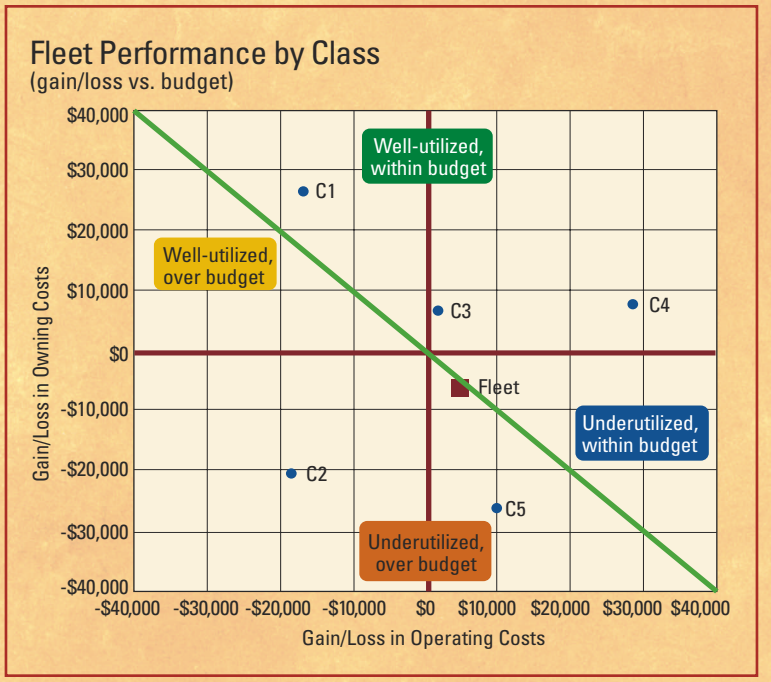
Now, consider the operating costs for Class 1, where there is a negative variance of $17,100; costs of $114,300 exceeded a budget of $97,200. The class worked 1,800 hours, which drives both actual and budgeted costs. The variance is thus a "buying variance": We bought more resources than expected or resources were more expensive than expected when we prepared the budget. Class 2 also shows a large buying variance.

The performance of our fleet and each of its five classes is represented graphically in the accompanying diagram. The vertical axis measures the variance in owning costs. Plots above the zero line show a positive variance and indicate good utilization. The horizontal axis measures the variance in operating costs. Plots to the right of the zero line show performance within hourly operating cost budget. The diagonal line indicates where overall variance equals zero: The sum of owning and operating cost variances balance out.

Class 4 is well utilized and is working within its operating cost budget. It shows a total gain of more than $30,000. Class 2 is underutilized, working over its operating cost budget and shows a total loss in excess of $30,000. The fleet overall is slightly underutilized, working within the operating cost budget and close to breaking even.

Equipment budgeting, as well as the variance analysis and corrective action that it enables, is not an exact science. But you can generate budgets based on utilization, distinguish between owning and operating costs, and understand the difference between volume variances and buying variances. If you do, it is safe to assume that owning-cost variances are caused by low utilization and operating-cost variances are caused by increases in the cost or quantity of resources needed to run the fleet.

Presenting the data as shown in the diagram helps direct corrective action. If the plots are below the horizontal, push for increased utilization. Downsize the fleet, sharpen your estimating pencil or improve field operations. If the plots are to the left of the vertical, push to reduce operating costs. Look to lowering cost and improving efficiency in the shop.



Classes that produce plots above and to the right of the green line (total of owning and operating variance equals 0) are "making money." Those below and to the left of the green line are "losing money."

How Variances Work

	Hours worked	Budgeted hourly rate			Budget earned			Actual costs experienced			Variance		
		Owning	Operating	Total	Owning	Operating	Total	Owning	Operating	Total	Owning	Operating	Total
Class 1	1,800	$58	$54	$112	$104,400	$97,200	$201,600	$78,000	$114,300	$192,300	$26,400	-$17,100	$9,300
Class 2	700	$32	$35	$67	$22,400	$24,500	$46,900	$43,000	$43,050	$86,050	-$20,600	-$18,550	-$39,150
Class 3	1,700	$18	$14	$32	$30,600	$23,800	$54,400	$24,000	$22,100	$46,100	$6,600	$1,700	$8,300
Class 4	1,900	$24	$33	$57	$45,600	$62,700	$108,300	$38,000	$34,200	$72,200	$7,600	$28,500	$36,100
Class 5	900	$40	$51	$91	$36,000	$45,900	$81,900	$62,000	$36,000	$98,000	-$26,000	$9,900	-$16,100
Total fleet					**$239,000**	**$254,100**	**$493,100**	**$245,000**	**$249,650**	**$494,650**	**-$6,000**	**$4,450**	**-$1,550**

This fleet analysis shows how each class of machine performs against budget. Variances are given in the last three columns.

By MIKE ANDERSON, Senior Editor

Asset Pros Draw Line on Excavator Repairs

Majority willing to spend up to half of full-size excavator's original purchase price before turning over asset

The majority of fleet managers are willing to spend up to half of a full-sized excavator's original purchase price on repairs and parts before turning that machine out, reveals *Construction Equipment*'s Reader Advisor Board.

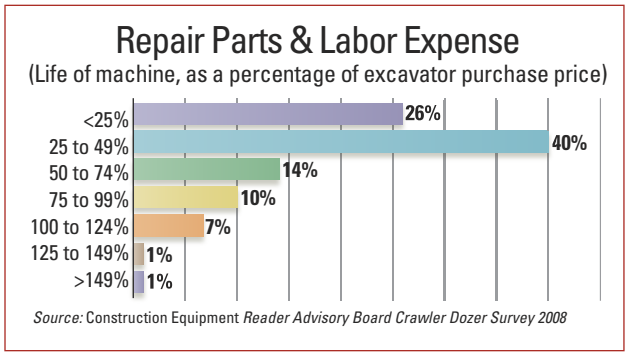
A hand-selected group of contractors committed to the accurate control of equipment costs, the Reader Advisory Board substantially diverts its interest in spending on repairs and parts once the 50-percent mark of the original equipment purchase price is achieved. Of the respondents to the recent excavator survey, 66 percent will normally spend up to and including 49 percent of the original purchase price on repairs and parts. Another 14 percent of respondents will spend up to and including 74 percent of the purchase price, and an additional 10 percent will go up to and including 99 percent of the purchase price, leaving only 14 percent who will spend 100 percent of the purchase price or beyond.

And when they do decide to turn out their excavators, almost half of respondents to the survey co-sponsored by Case Construction Equipment report the equipment brings back 20 to 34 percent of original purchase price, reflecting a balance between working an asset and knowing when to cash it in. While 20 percent of respondents fetch between 5 and 19 percent of original purchase price for their excavator upon resale, 47 percent pull in between 20 and 34 percent, and another 16 percent will get from 35 to 49 percent. A further 16 percent will fetch between 50 and 80 percent.

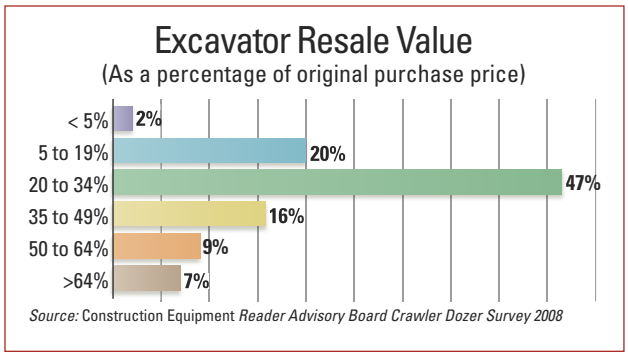
The monitoring of hydraulic oil is a key to excavator fleet management. Of the *Construction Equipment* advisors, 86 percent calculate particle counts as part of their routine maintenance on hydraulic oil and 86 percent change the hydraulic oil at regular hourly intervals, at a mean average of 1,564 hours.

Of the respondents to the excavator survey, 63 percent work in the heavy/highway sector, either exclusively or along with the general building sector, and they are based in 35 different states representing all regions. The replacement value of their fleets is likewise spread over the spectrum, from those of less than $5 million to those in excess of $100 million, and their excavators are almost equally balanced in the three size classes of 11 to less than 19 metric tons, 19 to less than 35 metric tons, and 35 to 66 metric tons.

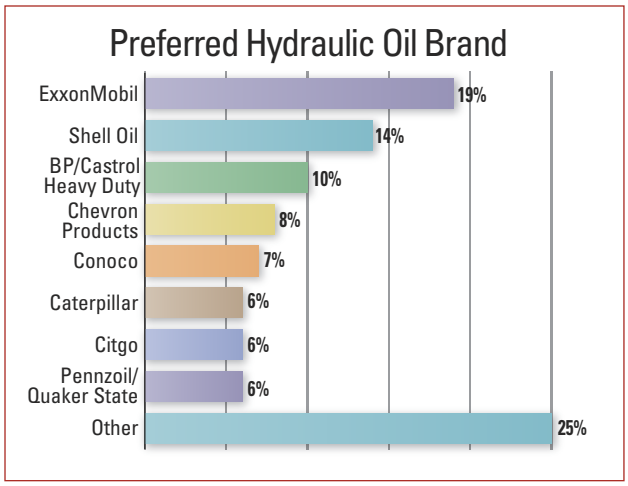
Reader Advisory Board research is co-sponsored by Case Construction Equipment.



Fleet managers with the largest excavators in the sampling, those from 35 to 66 metric tons, actually have a smaller percentage of their machines in the core 25- to 49-percent expenditure group.



Fleet managers with excavators in the mid-sized range, those from 19 to less than 35 metric tons, have a higher percentage of machines actually earning a greater return than the core.



Among survey respondents who change their excavators' hydraulic oil at regular hourly intervals, 38 percent do so between 1,000 and 2,000 hours, and an additional 36 percent stretch it beyond 2,000 hours.



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CONSTRUCTION EQUIPMENT

By TOM BERG, Truck Editor

Mack's Titan Boasts Big Power And Extra-Strong Chassis

Severe-service model is designed for heavy transport and construction applications

Big power, extra-strong chassis components, bold styling and a posh interior are among features of Mack Trucks' Titan, a severe-service model designed for heavy transport and construction applications. Due out late this fall, the Titan will be powered by a new 16.1-liter MP10 diesel with up to 605 horsepower and 2,060 pounds-feet.

Titan is based on the Granite vocational series, and gets Mack back into the heavy-transport market it left when it dropped the CL long conventional more than a year ago and the RW Super-Liner before that. Titan is "our flagship, the top of the top," said Steve Ginter, the builder's vocational segment product manager who headed the team that designed the new model. He and other Mack executives announced it at the Conexpo-Con/Agg show in Las Vegas in mid-March.

The Super-Liner was available with a 998-cubic-inch V-8 — which made as much as 500 horsepower — while the modern 984-cubic-inch MP 10 will produce 105 more horsepower and its exhaust will be 99.9 percent cleaner, Ginter said. The new engine is an adaptation of the D16 offered by Volvo Trucks, Mack's sister company. Like other current Mack and Volvo diesels, the MP 10 will be made by Volvo Powertrain in Hagerstown, Md., while the Titan will be assembled at Macungie, Pa.

The Mack Power 10 will propel the Titan. It is an inline six-cylinder diesel with a single overhead cam, high-pressure fuel injection, and rear-mounted geartrain. In addition to the 605-horsepower/2,060-lbs.-ft. rating, it will also be available at 515 and 565 horsepower with 1,860 lbs.-ft.

High-capacity chassis components will allow Titan to have gross combination weight ratings as high as 300,000 pounds. They will include front axles rated from 12,000 to 20,000 pounds and rear tandems from 46,000 to 65,000 pounds. Frame rails will come in thicknesses of 8, 9.5 and 11 millimeters, with partial or full 5-mm inserts. The MP 10 will be matched with 10-, 13- and 18-speed Mack T300ES transmissions or certain vendor gearboxes.

Titan has high ground clearance to let it pass over off-road obstacles. Its long hood gives the MP10 engine plenty of room, while cooling is aided by placing the cab back and up on the chassis to allow good air flow from under the hood, and for classic looks and excellent driver visibility.

Twin cowl-mounted "growler" air intakes are finished with polished metal and LED lights. They are fully functional, as they minimize moisture and screen debris from reaching the air filter elements, which are under the cab for easy servicing. Piping between the intakes and the elements is smooth and non-restrictive for high-volume airflow.

Titan's large grille surround is fashioned of chromed cast aluminum, complemented by similarly cast headlight bezels. Headlights have impact-resistant Lexan lenses and easy-to-replace bulbs. Chrome and bright finish appliances include air horns; "eyebrows" on the edges of front fenders; sun visor, in 10- or 13-inch widths; skirts; 6-inch-diameter dual exhaust stacks mounted at cab corners; and metal bumper with integrated driving lights.

Titan's cab is made of galvanized steel, and has carefully engineered features to reduce noise and vibration. The interior is available in three trim levels. The cab has numerous overhead storage bins and four-point lighting. The dash is available in woodgrain or brushed nickel finishes. The standard instrument cluster features large, easy-to-read displays and gauges to help keep drivers focused on the road.

The standard Mack Co-Pilot display provides real-time fuel economy numbers with "sweet-spot" indicator and trip data, detailed maintenance and fault summaries, and supplemental sensor readings. The available Lectronix T7000 navigational radio integrates entertainment; navigation; a blind-spot camera display; and vehicle, trip and tire-pressure monitoring systems.

Initial Titan production will be of daycabs; then sleepers will be offered, Ginter said. A 38- to 42-inch box sometimes needed by loggers and heavy haulers is likely to be the first type. Production is scheduled for November.

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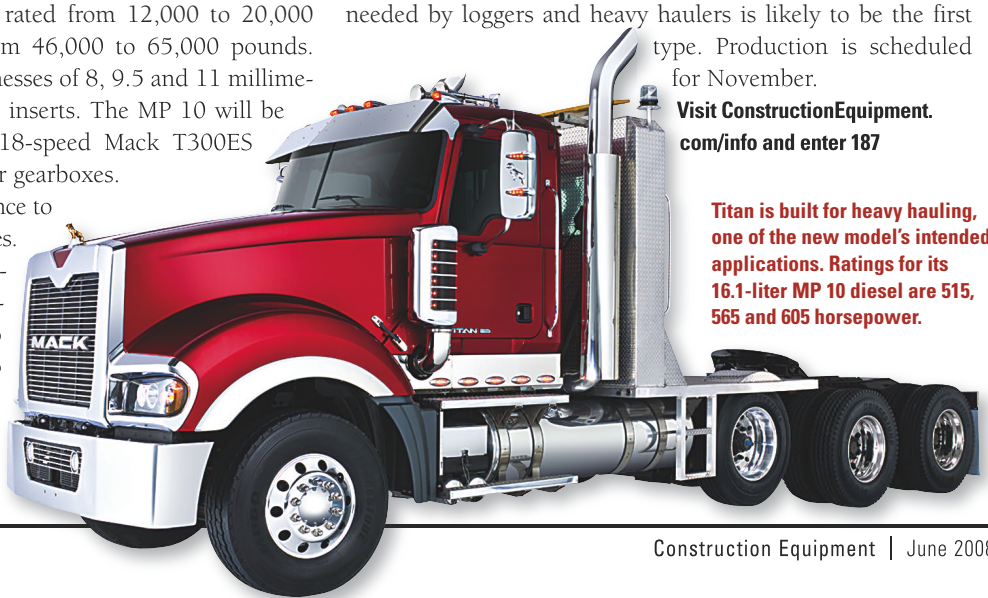

Titan is built for heavy hauling, one of the new model's intended applications. Ratings for its 16.1-liter MP 10 diesel are 515, 565 and 605 horsepower.

By LARRY STEWART, Executive Editor

Vibrating Beam Rubblizes Pavement Fast

Resonant Machines reduces a lane-mile of 26-inch concrete to 6-inch-minus rubble every day

Resonant Machines has been operating since 1984 as a subcontractor, using its own resonant-beam technology to reduce concrete pavement to rubble on highway and airport jobs in 36 states, China, Russia, Canada and Chile. A private-equity firm purchased the subcontractor/equipment manufacturer last June and made Eaton veteran Tom Schneider president and CEO.

Schneider recruited his resources from the hydraulics industry to rework the Resonant Machines hydraulic system, and now the company is renewing its efforts to market the machines.



The shoe attached to the front of the steel beam vibrates at just ½ to ¾ of an inch in amplitude, so only the concrete is broken.

The Asphalt Institute defines rubblization as "The process of fracturing Portland cement concrete pavement into small pieces. The sizes will be from sand size on top to 9 inches on the bottom portion of the slab. Steel or wire mesh shall be debonded from all pieces of the broken pavement. Fractured pieces shall have an angular interlock"

RMI says its Resonant Machine breaks concrete up to 26 inches thick to suit the Asphalt Institute definition — and many states' specifications — at a rate of about one lane mile (7,000 square yards) per day. The machine moves briskly, at 5 to 8 miles per hour, making as many as 18 passes to properly rubblize some pavements. Each pass is just a foot wide.

A 500-horsepower Cat C15 diesel drives a series of Sauer Danfoss 250 and 180 pumps through a Rexroth bent-axis motor and Parker oscillators that vibrate the RB550's 8,000-pound steel beam at a variable frequency. The operator can tune the frequency to suit the concrete to be broken.

A shoe fixed to the horizontal beam vibrates along the pavement surface. The hydraulic system agitates the beam at up to 55 hertz. Schneider says the RMI shoe breaks the slab at a 45-degree angle to the surface. The slab is fractured through, debonding concrete from reinforcing steel. Since the shoe is vibrating at just ½ to ¾ of an inch in amplitude, only the concrete is broken.

Large drop hammers can compact the road base and drive broken concrete down into it. In the same way, drop hammers can damage utilities under the pavement.

RMI says resonant rubblizing shatters the slab in a jigsaw pattern, without displacing the interlocking pieces. Schneider claims the resulting material — typically in the 3- to 6-inch pieces specified by major resonant-rubblizing users at the Louisiana and Arkansas departments of transportation — can be compacted and overlain with little risk of reflective cracking. He says the rubblized roadway can be overlain with concrete or hot mix. RMI experience suggests that overlaying rubblized pavement costs about half that of removing and replacing concrete

If specifications call for removal of the pavement, rubblized concrete debonded from the reinforcing steel is easier to load into trucks with an excavator than large chunks. Each truck can haul significantly more rubblized material than slabs because of the increased fill factor.

The 60,000-pound RB550 retails for about $880,000.

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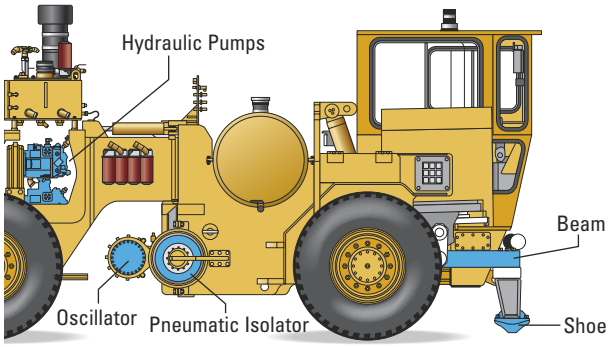
Resonant Gear



A Caterpillar C15 diesel engine drives Sauer pumps through a Rexroth motor and Parker oscillators that vibrate the RB550's 8,000-pound horizontal steel beam at up to 55 hertz.

By ROD SUTTON, Editor in Chief

Vögele Brings "Vision" to the States

New series of asphalt pavers designed for all-around visibility, with self diagnostics that allow crews to focus on paving

Vögele America Vision series asphalt pavers includes two tracked machines and two wheeled, one each at 8- and 10-foot widths. Vision 5200-2 is a 10-foot tracked paver, 5203-2 is 10-foot wheeled, 5100-2 is 8-foot tracked, and 5103-2 is 8-foot wheeled.

Vögele introduced the series during Conexpo-Con/Agg, focusing first on the machines' forward and all-around visibility. The operator can see the sides, the hopper and the conveyors in the back, without having to move around. The machine's sloped design plays a factor, but the key features are swing-out operator stations (on both sides) and sliding control console. The console slides from one side of the platform to the other, and also swivels and tilts.



Vision series swing-out operator's stations and sliding consoles provide all-around visibility without the operator having to move around.

In addition to emphasizing operator visibility, the new series is designed to free the paving crew from many tasks associated with the machine. Fluid levels and other inspection points are now monitored from a display panel, and a hydraulic front apron (a long-time Vögele feature from overseas) is an option on the Vision series. The apron prevents forward spillage of the mix, eliminating much shoveling in front of the paver, the company says. As the hopper closes, the front apron rises. Self-tensioning conveyors permit the crew to focus on the asphalt, too. Conveyors have hydraulic cylinders that keep them adjusted.

Independently operated hopper wings can be dumped one side or the other, or both at the same time. Vögele eliminated flow gates and designed the Vision series with independent conveyor and auger drives.

Service access is available from the deck and from each side of the machine, with generator, air cleaner, pumps, filters and dipsticks all accessible from one location. Lube points for conveyors and augers are located in the same place, with an automated lube system available. The pavers feature a Controller Area Network (CAN) bus system in which controllers execute much of the work of operating the paver, using single wires instead of bundles of wiring harnesses.

Three electric screeds will be available for the 10-foot machines, including the Carlson EZ-III 1017 and EZ-IV 1019 screeds with front-mounted extensions and the HR 500 E rear-mounted screed. No diesel-heated screeds will be available. With ErgoPlus controls at the screed, paver functions are logically arranged and clustered in groups reflecting the needs of the paving site. Direct access to paver functions is achieved via push buttons. Reversal of auger rotation, for instance, can easily be done by the screed operator at the touch of a button.

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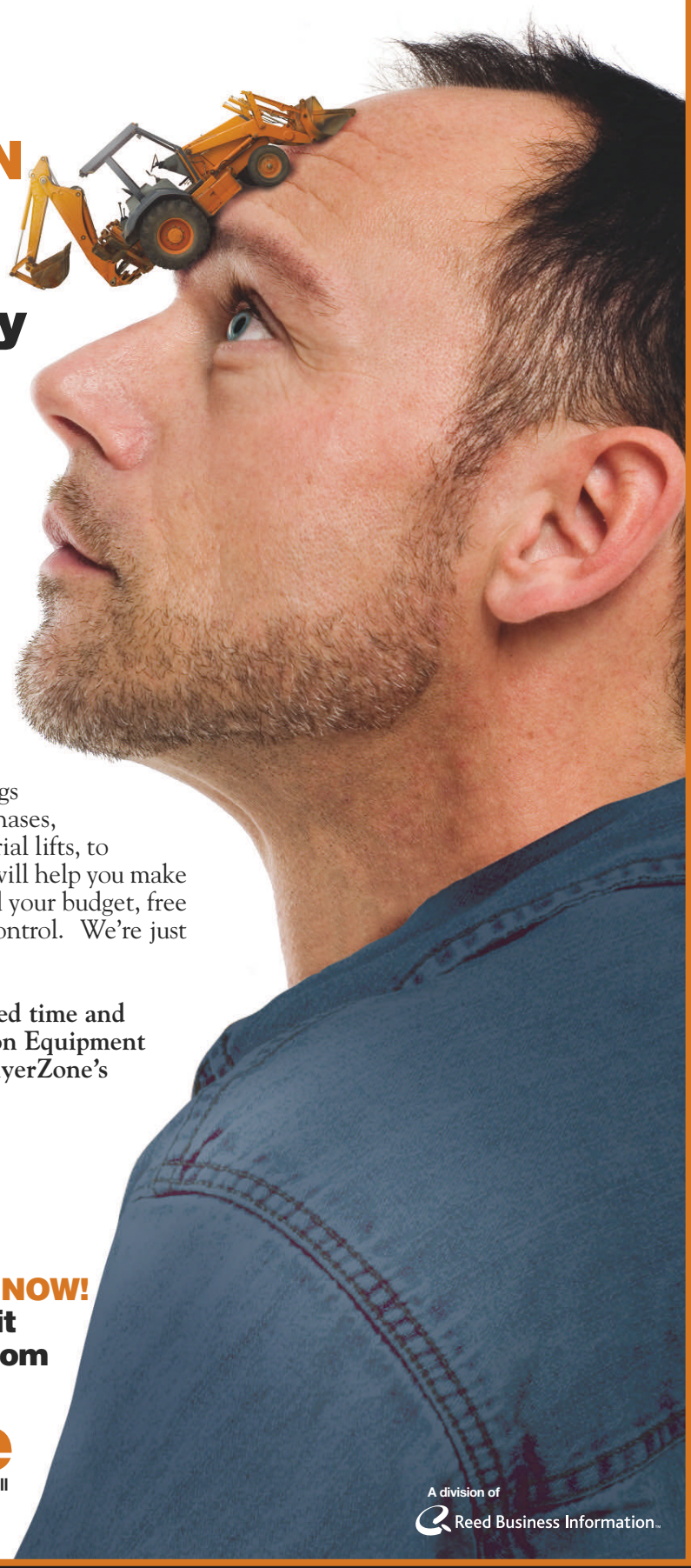

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By KATIE WEILER, Managing Editor

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Topcon Positioning Systems

SiteLINK offers wireless communications mapping, data logging, reporting and asset management for off-road equipment. According to the company, the system will work with any make, model or type of machine. It can also pinpoint machines via GPS and can provide theft protection with the addition of geofencing. SiteLINK monitors fuel levels, oil pressure, temperature, and hours; it can also collect data on productivity.

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Ditch Witch

Ditch Witch 250R/T locating system is used for locating and avoiding buried telephone, CATV, power, gas and water lines. The 250T transmitter and 250R receiver can reach depths to 15 feet. It picks up tones derived from the actual signals radiating from the pipe or cable. It can apply 33-kHz signals via direct connect, induction clamp, or other options.

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Stone

For maximum traction when compacting on inclines, a "positraction" system powers both drums on Stone's new walk-behind roller. Powered by a 10-horsepower Lombardini diesel engine, the double-drum WBR650 offers compaction force of 2,925 foot-pounds with a drum width of 25.5 inches. Its 10-inch curb clearance and 1-inch side clearances allow for operation in tight areas.

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Bridgestone

Bridgestone L315 on/off-highway tire is a wide-base tire for "superior traction and outstanding flotation," the company says. The tire is for axles carrying extra-heavy loads, such as front-discharge cement mixers, or for applications requiring high levels of traction, such as dump trucks. Design distributes footprint pressure and the tire can carry 12,300 pounds at 120 psi. It is available in the 445/65R22.5 size in "L" load range.

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HammerHead

Catamount Active Head easy-start tools feature "smart head" technology that eliminates the need for a mechanical spring, which is a common source of failure in trenchless tool designs, according to Earth Tool Co. The Catamount design takes advantage of reciprocating-head technology by increasing production in both tough and softer soils while, at the same time, reducing tool swim at any operating pressure.

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Atlas Copco

GA oil-injected air compressors are designed to be energy efficient, the company says. Asymmetric rotor profiles reduce volumetric losses. The units use oil injection, flow and temperature to keep the compression process at the coolest possible temperature.

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Market Watch Lite



MICO

Providing more than triple the flow capacity of a traditional electro-hydraulic brake valve (EBV), the new S12 Series has been able to replace either two standard EBVs operating in parallel or an EBV and relay valve, when utilized in large spring-applied, hydraulic-release brake applications. The S12 uses the MICO auto-relieving feature to get more travel and flow capacity out of the proportional solenoid valve.

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Stanley LaBounty

BLS 2000 and BLS 3000 bucket linkage shears have been upgraded. The company's Saber Series blade system gives the shears a 180-degree reversible Saber Tip. Tapped cutting blades allow the blades to be easily removed. Multi-machine mounting brackets allow them to pin on several carriers within their weight class. Shears do not require additional hydraulics to operate.

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E-Z Drill

With the new 240B SRA "combo" drill system, E-Z Drill is touting "a new concept in concrete drills." It combines standard features of the 210B SRA model with the ability to convert to a pneumatic core drill, thus catering to both rock drilling and core drilling jobs, and eliminating the need for separate systems. The unit can core and drill holes from 0.625 to 2.5 inches in diameter, up to 18 inches deep.

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Chicago Pneumatic



Chicago Pneumatic has introduced a 12-model line of hydraulic breaker attachments. Three heavy-duty models are suitable for excavators weighing from 26 to 75 metric tons. Four medium models are for use on 9- to 34-metric-ton carriers. Five light models round out the line and are suitable for smaller 1.3- to 12-metric-ton carriers. The new breakers feature an enclosed-box design and elastic damping elements.

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Husqvarna

Small and mid-range drill stands have been designed to reduce column flexing and twisting. The line includes DS 250, 240, 150 and 180. A tiltable column allows for angle drilling, and a threaded ceiling jack allows for overhead support anchoring. Models have a stronger combination base than previously; self-cleaning leveling screws; and a longer, stronger anchor slot.

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Chevron Delo

Delo Extended Life Coolant/Antifreeze - Nitrite Free (DELO ELC-NF) is for on- and off-road equipment that requires a nitrite-free OAT formulation. It offers a service life of 600,000 miles, 12,000 hours, or six years with no chemical extender needed, the company says. It also offers corrosion protection and lower electrical conductivity; and protection against pitting, corrosion and erosion.

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Vermeer



The design of Vermeer's newest stump cutter reduces the need to reposition the entire unit during cutting operations. A four-position linkage design allows the SC852's cutter wheel to move away from the machine as the boom drops down toward the stump. At the same time, the cutter wheel guard remains parallel with the ground, so it does not limit movement over obstacles. A machine width of 35 inches provides the unit with a compact footprint for maneuverability on confined jobsites.

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Cummins Power Generation



Cummins introduces a line of generator sets with Tier IV-compliant, four-cycle diesel engines. Rated at 10, 15, 20 and 25kW, sets come with weather-protective and/or sound-attenuated enclosure. Cooling system design allows the generator to run at full standby load in up to 131F ambient air temperatures.

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Market Watch Lite

Toro



TRX-15 and TRX-19 walk-behind tracked trenchers have ground pressure as low as 4.1 psi, the company says, and trench up to 36 inches. Three controls operate all traction and trenching functions. Both the 15- and 19-horsepower models have 4-cycle, V-twin gasoline engines with a large oil reservoir for low engine temperatures.

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Horton



In anticipation of the 2010 and Euro V emissions standards, Horton introduces a new line of viscous fan drives for heavy- and medium-duty applications, including off-highway equipment. Managed by the engine's electronic control unit for precision fan speed control, the directly controlled Stratis viscous fan drives are designed to cool higher-horsepower, hotter-running engines.

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Chevron Delo

Chevron Delo Heavy Duty EP greases are designed for use in on- and off-road equipment. Greases resist water washout and spray-off, the company says, and offer "excellent" shock load extreme pressure (EP) protection for severe-service applications. Two versions are also available: Moly 3% and Moly 5%, where molybdenum content is required for OEM warranty requirements.

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Geith

Precision attachments are designed for demolition and scrap processing. The line includes nine models of multiprocessors for excavators ranging from 3.5 to 70 metric tons; five rotating and two fixed pulverizers; six models of rotating steel shears for excavators from 15 to 100 metric tons; seven mechanical crushers; and a mechanical grapple fitting excavators from 4.5 to 82 metric tons.

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Solesbee

Solesbee SERG-173 rock grapple attachment for skid steers is available in widths of 66, 72 and 84 inches. Bucket teeth are replaceable.

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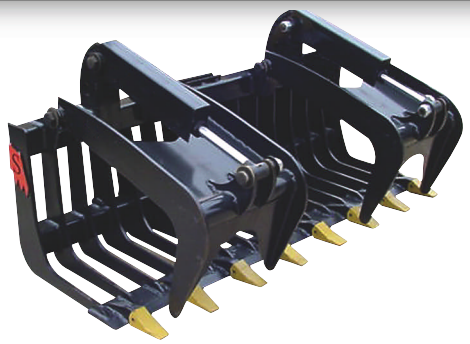

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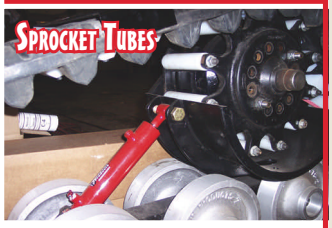

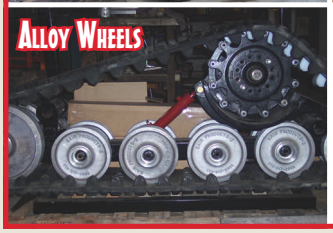

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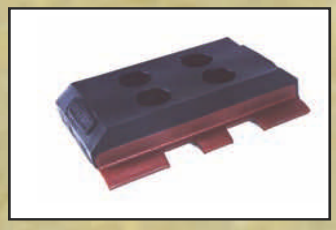

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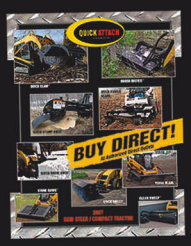

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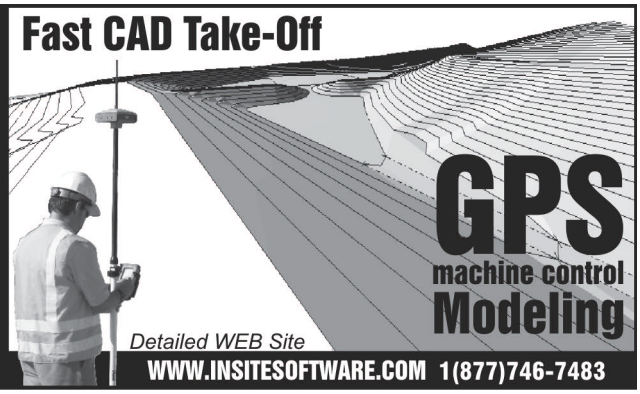

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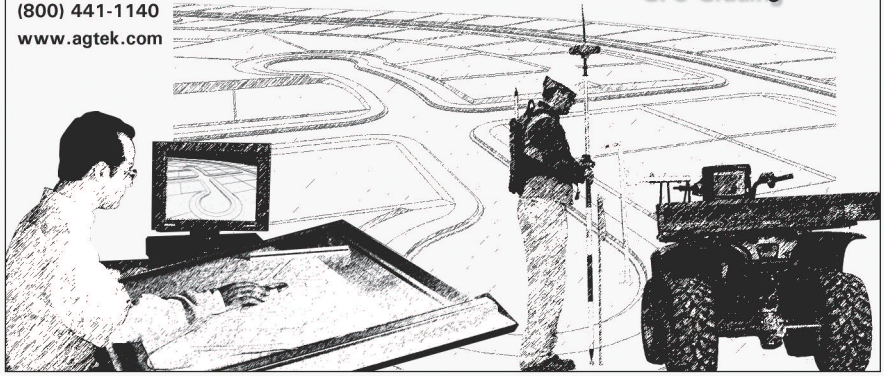

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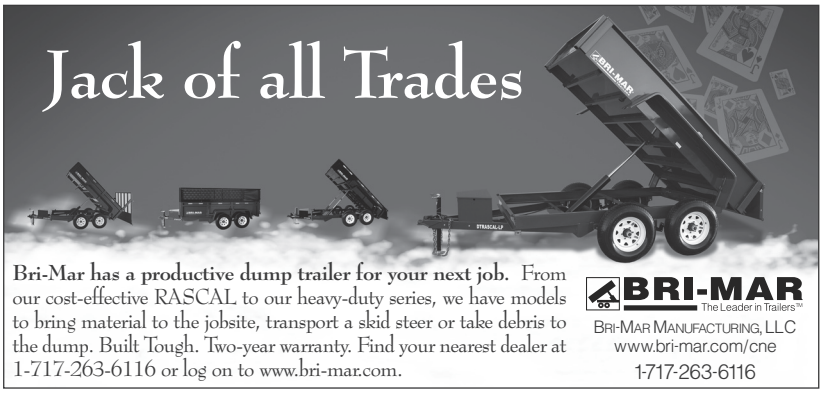

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By KEITH HADDOCK, Contributing Editor

P&H Stik-Clam

Ahead of its time, Harnischfeger's "Stik-Clam" was one of the world's first mini excavators



The Stik-Clam boasted features like a hydraulic swing motor with 360-degree continuous rotation, double-acting bucket cylinder, a propel motor in each crawler assembly providing independent power steering, and a patented swivel block to rotate the clam in any position.

When P&H described its new Stik-Clam hydraulic excavator in a 1965 sales brochure as "absolutely nothing like it," the statement was perfectly true — there was nothing like it on the market. As probably the world's first hydraulic mini excavator, it was equipped with a clamshell on a sliding arm mounted on a boom, instead of the usual backhoe attachment most familiar today. It was also likely the first ever zero-tail-swing excavator.

Known as the P&H model S-20 Stik-Clam, the compact excavator was built by Harnischfeger Corp. of Milwaukee, Wis., a company better known for its massive mining shovels, draglines and blast hole drills. The machine was so advanced for its day that the observer can be forgiven for mistaking it for a new product. In fact, when Dave Geis, whose restored Stik-Clam appears in the photograph, recently demonstrated it at a Historical Construction Equipment Association exposition, more than one observer was heard to say: "Is that a prototype machine from P&H?" and "When are they bringing it out on the market?"

The Stik-Clam boasted features like a hydraulic swing motor with 360-degree continuous rotation, double-acting bucket cylinder, a propel motor in each crawler assembly providing independent power steering, and a patented swivel block to rotate the clam in any position. These are features we've come to expect from any hydraulic excavator today, but in 1965, they were the latest technology. The sliding arm was driven by chain and hydraulic motor. The rotating clam enabled the machine to dig flush against buildings or underneath obstructions in the trench. The machine was advertised as ideal for residential and commercial builders, septic-tank excavation, nurseries, cemeteries, and for all underground services.

Specifications show an operating weight of 4,200 pounds, and a 24-horsepower Wisconsin air-cooled gasoline engine provided power for a 27-gpm hydraulic pump. This generated hydraulic pressure at 1,800 psi for all machine functions. The clamshell capacity was rated at two cubic feet, and the machine could lift a load of 500 pounds at an eight-foot radius. The hydraulically driven, six-foot-long undercarriage embodied eight bottom rollers as well as driving sprocket and main idler. With 10.5-inch shoes, the machine exerted a low 3.7 psi on the ground.

P&H provided an interesting option in the form of a trailer designed specifically to transport the Stik-Clam. P&H claimed the machine could be loaded and ready to go within two minutes; then hauled at speeds up to 60 mph behind a regular pickup truck. The machine was driven on board with the trailer in the tilted position, and secured in position with special safety locks built into the trailer.

The Stik-Clam demonstrated great potential. P&H's vision for a zero-tail-swing excavator in a compact size was certainly accurate, but here was another classic case of a machine too far ahead of its time. With little interest expressed by contractors, the Stic-Clam was withdrawn from the market in 1966, just one year after its introduction. Two decades later, the mini-excavator concept took hold and now has become one of the most popular compact machines.

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Read more about the evolution of construction equipment in Keith Haddock's fully illustrated book, The Earthmover Encyclopedia now available in bookstores. Also, consider a membership in the Historical Construction Equipment Association, www.hcea.net. And be sure to visit ConstructionEquipment.com for past Iron Works features.

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