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p. 50

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CONSTRUCTION EQUIPMENT

July 2006 • Vol. 109, Issue 7

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COLUMNS & DEPARTMENTS

PRODUCTS

Cover photo by George Pfoertner®

FEATURES

HANDS-ON EARTHMOVING

Yanmar is betting that the compact dimensions, versatility and performance of its new CBL40 will appeal to buyers who find full-size backhoe-loaders frequently too big for the job, or who want more application flexibility than skid-steers or compact wheel loaders can provide. Professional operator Frank Bogden tries the CBL40 and offers his opinions.

FLEET MANAGEMENT

Machines are often traded or replaced at some multiple of the engine life, with transmissions, hydraulic pumps and undercarriage influencing the decision to various degrees, depending on machine and working conditions. Manufacturers forecast component costs based on what engineers call the B_{20} life — the life at which 20 percent of all components in a particular group have failed. But the quality of maintenance is an important variable. Excellent maintenance reduces the risk of failure.

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CONSTRUCTION EQUIPMENT

July 2006 • Vol. 109, Issue 7

HANDS-ON TRUCKING

46 Roomy Yukon XL Now E85 Capable

GM is building cars and trucks that can burn an ethanol-gasoline mixture. These include pickups and SUVs that are commonly used in the construction industry. One is the 2007 GMC Yukon XL you see here. Except for its fuel, it runs like any of the other big SUVs that were available for driving by customers, dealers and press reporters at a recent "all brand" event in Nashville, Tenn.

COVER STORY: Buying File

50 No Bad Choices in This Lot

Today's mid-size wheel loaders — models with net horsepower ratings of 200 to 300 — have the versatility to competently perform any number of tasks. Plus, these machines are more environmentally friendly than ever before and, overall, probably easier and less costly to maintain than their predecessors. This group of loaders includes models on the low end with standard buckets of 3.5 to 4.0 cubic yards, and models on the high side with standard buckets typically in the range of 5.0 to 6.0 cubic yards. What all have in common, though, are powerful performance, refined hydraulics, and cabins that exude a comfortable sense of refinement. This issue's Buying File provides the facts on these popular wheel loaders.

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Lifestyle Affects Resale

Customers are speaking, and machine manufacturers' ears have perked up. Time and again, equipment managers emphasize uptime, reliability and productivity. Now, as more equipment professionals move from maintenance supervisors to asset managers, they've discovered the importance of residual value.

And to their credit, manufacturers are listening and beginning to promote their machine-management services. It's not that these services are just becoming available (most manufacturers offer them), but end-users now recognize their value.

End-users, particularly those with smaller fleets, are learning that machines are not tools to be used up and discarded. With proper care and management, their fleets can retain value over time that can be converted into a new machine when appropriate. Instead of running a machine into the ground, executing jobs at high operating expense, and losing margin and profitability, equipment managers are finding that simple care can extend the life of the machine and keep profit margins competitive.

Rod Sutton, Editor in Chief

As executive editor Larry Stewart explains this month in "Lifecycle Research Justifies Investing in PM," preventive maintenance is a foundational part of every machine-management strategy that aims to attain maximum life and maximum resale value.

This is where manufacturers' programs should be evaluated. Machine-monitoring systems allow machine owners to transmit data directly to product-support folks, whether it's their own in-house shop or a distributor's. Determining appropriate preventive-maintenance activities and scheduling the work is far simpler than it used to be.

Stewart also points out that knowledge of a machine's expected component lifecycle provides additional input into a machine-management strategy. *Construction Equipment* has published two exclusive research reports over the past couple of years denoting component lifecycles for backhoe-loaders, articulated dump trucks, wheel loaders, excavators and crawler dozers. Both of these studies are online at ConstructionEquipment.com in our Magazine Archives section, from July 2005 and July 2004.

Managers who want more than a machine run to destruction must plan ahead in order to recoup the residual value available in that machine. Pay attention to PMs and component lifecycles. And read up on strategies at ConstructionEquipment.com. Type "residual value" in the keyword search box and choose from 18 articles we've done over the years.

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A SUMMARY OF THE MONTH'S PRIMARY MACHINE INTRODUCTIONS AND MODEL CHANGES

MARKET WATCH

By KATIE WEILER, Managing Editor

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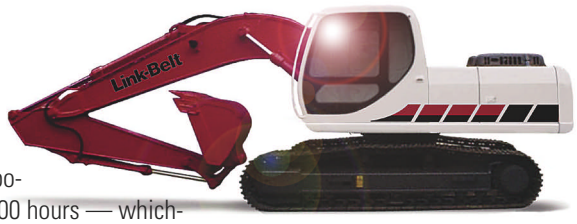
LBX Link-Belt



All Link-Belt excavators will now feature the XtraStructure warranty, which covers certain components for three years/10,000 hours — whichever comes first. The following items are covered in the event of a deficiency in material/ workmanship: arm, boom, rotating joint, car body, engine frame, main frame, side frame, swing frame, turntable bearing and track frame (not including tracks/rails/ rollers). Also, the company says this warranty is transferable.

Visit ConstructionEquipment.com/info and enter 185

Bomag

Bomag replaced its 813 RT ProPaver with the 15,700-pound 814-2 and 815-2, exchanging an 80-hp Isuzu diesel for an 85-hp Cummins 4B 3.3T. The new models carry half a ton more in the hopper and pave 58 fpm faster than the 813 RT. Heavy-duty crawler undercarriages and thicker steel in many fabrications increased operating weight by more than 1,000 pounds. The new Unimat 2 screed delivers paving ranges of 8 to 14 feet and 8 to 15 feet, respectively.

Visit ConstructionEquipment.com/info and enter 186

Vermeer

TG7000 tub grinder uses a Cat 3412 E diesel engine with two options available in 860 and 1,000 horsepower. The machine weighs 73,500 pounds without a loader and 84,500 pounds with a loader. It has an inside tub diameter of 10 feet, a depth of 56 inches, and an 11 foot-4 inch loading height. The patented Thrown Object Restraint System reduces the quantity and distance of thrown objects.

Visit ConstructionEquipment.com/info and enter 187

Gehl

The 7810E skid-steer loader has an SAE rated load capacity of 3,850 pounds which, according to Gehl, is tops in the industry. It uses a 99-hp Cummins diesel engine that develops 305 pounds-feet of torque. The 7810E features a vertical-lift loader mechanism that provides nearly 12 feet of lift height, and it is equipped with the company's Power-A-Tach universal-type coupler. The implement hydraulic system operates at a pressure of 3,300 psi, and the standard auxiliary circuit delivers a flow of 29 gpm; the optional high-flow system is rated at 41 gpm.

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Market Watch

Terex/Fuchs

The increased weight and lift capability of the 350 MHL material handler, says the company, enables the machine to use larger grapples and magnets, as well as to employ longer-reach packages. A wider undercarriage features larger outrigger cylinders and wider stabilizer-support beams. According to Terex, the MHL 350's new boom design enables greater lifting capability across the full operating range. Swing torque is up nearly 20 percent. The machine is fitted with a Tier-3, 198-hp, turbocharged Deutz diesel.

Visit ConstructionEquipment.com/info and enter 191

Komatsu

The D155AX-6 crawler dozer has the company's Sigma-dozer blade, which is said to increase soil-holding capacity and eliminate sideway spillage. New frontal design forces material to the center of the blade, reducing digging resistance. With blade capacity of 12.3 cubic yards, it has an operating weight of 87,100 pounds and is powered by the company's SAA6D 140E-5 diesel that produces 354 horsepower. Suggested retail, with dozer blade and ripper is $537,000.

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Caterpillar

The PM-200 cold planer, which replaces the company's Bitelli SF 200RS, includes many of the features incorporated in Cat's PM-201. The PM-200 is powered by a 575-hp, Tier-3 Cat C18 diesel engine. This 68,000-pound machine is hydrostatically driven and uses a dual-displacement hydraulic motor for each of the four tracks. An operator-controlled positive-traction control valve provides equal traction to all four motors to boost tractive effort in tough cutting situations. Fitted with 178 carbide-tipped tools, the PM-200 has a maximum cutting depth of 12.5 inches.

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MEC

Models 3072 and 3772 rough-terrain scissor lifts feature the Quad-Trax four-wheel-drive system. Three drive modes are available: High Speed, for traveling quickly from point A to point B; Mid-Range, for average terrain applications; and High Torque Range, for extreme terrain conditions. All drive modes can be selected while the machine is moving and will shift automatically. Working heights extend to 36 and 43 feet; width is 72 inches.

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Terex

TX970B is an all-wheel-steer backhoe-loader with four equal-sized tires and a backhoe dig depth of 15 feet 11 inches. Pilot-hydraulic controls allow the operator to change joysticks from SAE or ISO operating patterns without leaving the cab. The 17,633-pound unit is powered by a 94-hp Perkins turbo diesel and powershift transmission. Terex standard warranty covers the machine for 12 months and unlimited hours.

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Market Watch

Hitachi

Zaxis 27u-2 compact excavator has increased operating speeds, 50-percent more drawbar pull, and automatic shifting between high and low travel speeds. Cycle times have been cut by 18 percent, the company says. The operator's station is 5 inches wider, and hand- and foot-control levers have been repositioned for more room and easier operation.

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Conymet Duratray

Suspended Dump Body (SDB) for off-road haul trucks increases payloads and dump body wear life, says the company. SDB is also said to reduce shock, vibration, noise and operator fatigue, as well as improve truck reliability and ambient environmental conditions. It can be customized to fit all types of mining and quarry trucks.

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Toyota

Bigger, bolder Tundra pickup, slated for production in early '07, is 10 inches longer, 5 inches higher and 4 inches wider than the current 7/8-size Tundra. Three cabs, two beds and two engines, plus three levels of cab trim, will comprise 30 different models, the company says. A new 5.7-liter V-8 and six-speed automatic transmission can tow a 10,000-pound trailer.

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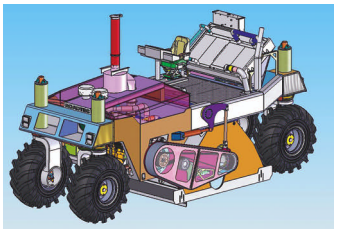

Roadtec

To complement its existing range of paving and milling machines, Roadtec announced that it will introduce its first soil stabilizer in late-summer 2006. The new machine will have a 700-hp, Tier-3-compliant Caterpillar engine and will cut to 8.5 feet.

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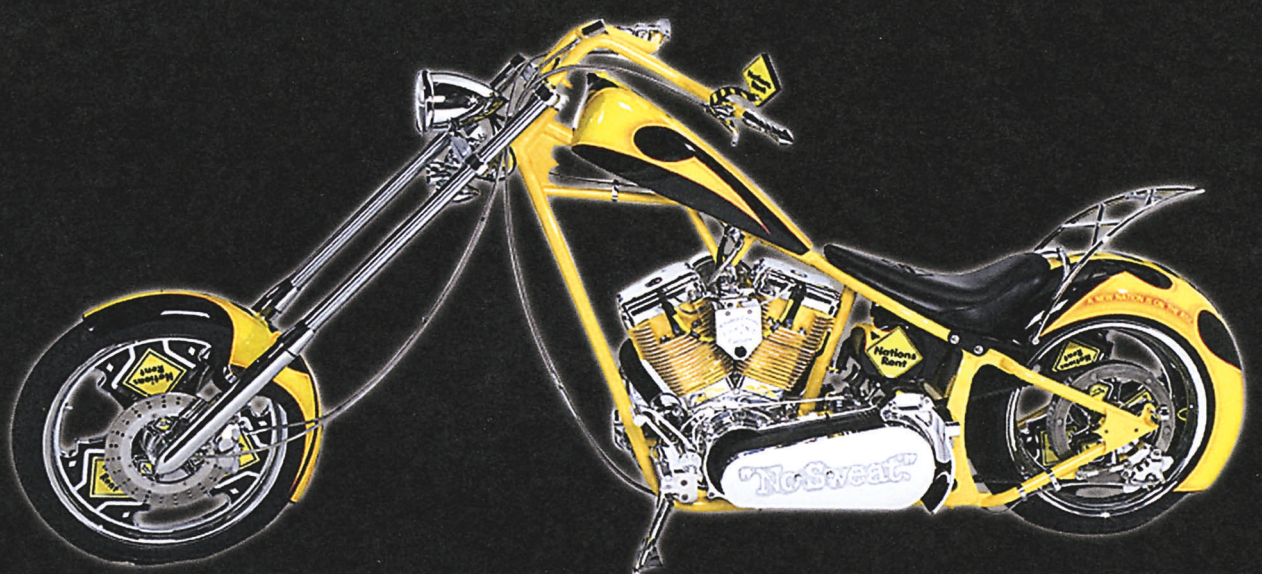

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Elliott Equipment

Elliott offers the optional SuperLink A-frame outriggers that can be extended on one side and dropped vertically on the other for use in confined spaces as narrow as 15 feet. Crane users can attain full penetration on the extended side and non-extended side. A proximity switch locks out users from rotating to the non-extended side. The fully extended spread is 21 feet; with one side extended, spread is 14 feet.

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John Deere

Rated at 99 horsepower, the 605C crawler loader uses the same drive train and undercarriage as does the company's 650J crawler dozer, including the engine, hydrostatic pumps and motors, transmission controller and final drives. In addition, the new 605C shares its operator's station, instrumentation, controls and boom/bucket design with the larger Deere 655C and 755C Series II machines. This commonality of design, says Deere, provides big-machine features for the 605C.

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Doosan Daewoo

The new DL300 and DL400 feature Tier-3-compliant diesel engines. The DL300 uses the Doosan DL08 engine and the DL400 uses the Cummins QSL9. The DL300 and DL400 use four-speed, powershift ZF transmissions that can be operated in an automatic mode. The implement hydraulic system for the DL300 employs a tandem vane pump with automatic wear compensation, and the system for the DL400 uses two load-sensing, variable-displacement axial-piston pumps.

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Bomag

MPH362-2 and MPH364-2 asphalt recycler/soil stabilizers have new 360-hp Cummins QSM11 diesels to meet Tier 3 Stage III standards. Other drive-train components on the 79-inch rotor width machines were upgraded, too. The rear drive system is now a double reduction planetary, propelled by a pair of axial-piston, variable-displacement motors. MPH362-2 is rear-wheel drive; MPH364-2 is four-wheel drive.

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Caterpillar

The M325D MH and M325D LMH wheel material handlers are designed for scrap, demolition and bulk-materials-handling. The models, which replace C-Series counterparts, feature a Tier-3 Cat C7 with ACERT technology. The C7, a six-cylinder, 7.2-liter, turbo diesel, is rated at 190 and 204 horsepower, respectively, and has electronic controls for its mechanically actuated, unit-fuel-injection system.

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Market Watch

Morbark

The 1600 tub grinder is capable of grinding 10-foot stumps with a 6-foot hammermill. The base diameter is 11 feet 2 inches with a tub capacity of 20 cubic yards. It can be fed using a 13-cubic-yard bucket, the company says. The discharge system has a 60-inch belt. Standard three-auger system eliminates damage from steel contamination and provides for a pressure sensor that stops the tub if overloaded.

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Hitachi

Powered by a 54-hp engine, the ZX75US zero-tail-swing excavator delivers 12,350 pounds of drawbar pull. It also has the company's HIOS engine/hydraulic system that adjusts power delivery and balances hydraulic pressure and flow. Cab features include climate control with an automatic, high-capacity blend-air system, multiple vents and oversized glass sunroof hatch for maximum air flow.

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Up-N-Atom

The Retriever is designed for transporting heavy equipment. Features include light weight, low deck height, and more payload per shift. It uses the truck's air system as the power source to raise and lower the curved, hinged deck and bi-fold ramp. The company says the truck bed can move heavier payloads with smaller vehicles — non-CDL trucks can handle payloads up to 13,000 pounds; tandems can handle 30,000 pounds legal payload.

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Komatsu

The 118,385-pound WA600-6 is powered by a Komatsu six-cylinder diesel, with cooled exhaust gas recirculation and air-to-air charge air-cooling, producing 502 horsepower — a 12 percent increase. Top travel speed increased to 23.4 mph. Automatic Joystick Steering replaces the steering wheel. Komatsu claims the new model is 28 percent more productive. The 8.4-cubic-yard bucket and 13-foot dump clearance allow it to load haul trucks up to 70 tons.

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Sakai

The CR270 features 35.4-inch-wide drums and a 4,000-vpm frequency, which allows 10 impacts per foot at 4.55 mph. This hydrostatically driven, articulated roller provides a combination of rear-drum static forces and internal front-drum vibration with centrifugal forces up to 2,975 pounds.

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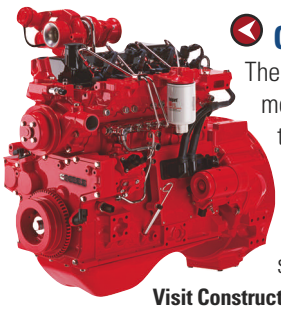
Market Watch

By LARRY STEWART, Executive Editor



Cummins

The first 3.3-liter diesel with electronic fuel injection and high-pressure, common-rail fuel system, Cummins' Tier-3 QSB3.3 leaps up to ratings from 80 to 110 horsepower, and directly into competition with engines that are 30 percent larger and heavier. It sprang from the B3.3 platform developed by Komatsu and marketed by Cummins through their joint venture. Cummins says the QSB3.3 rated 110 horsepower at 2,600 rpm delivers the same fuel efficiency as the Tier-2 B3.3 rated 85 horsepower at 2,200 rpm.

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Trimble

The GCS600 brings flexible, entry-level grade control to excavators. Adding the AS300 Angle Sensor allows the system to work with articulated booms or tilt buckets. It displays required depth and working slope, and lets the operator work across a greater area and slope distance without returning to the laser transmitter each time the machine moves. As part of Trimble's Grade Control System family, GCS600 is easy to upgrade.

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Komatsu

PC800LC-8 hydraulic excavator has an improved Tier 3 SAA6D140E-5 diesel that produces 487 horsepower. Operating weight is between 179,400 and 192,240 pounds with bucket capacities ranging from 2.23 to 5.93 cubic yards. Two working modes match engine speed, pump flow and system pressure to specific tasks. New arm quick-return circuit returns a portion of oil flow directly to the hydraulic tank for arm dumping, which reduces pressure loss and increases loading speed. Suggested retail is expected to be $950,000.

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New Holland

The E215-ME Multi-Function adds two elements to the conventional boom and stick of a standard E215 using a special support. The entire assembly gives the E215-ME digging reach of 48 feet 4 inches with a wider working range — especially close to the 54,700-pound excavator and on deep vertical walls — than traditional long-reach machines. The extra elements can be removed for a standard excavator configuration in less than three hours.

Visit ConstructionEquipment.com/info and enter 211

Volvo

Meeting Tier 3 emissions limits meant replacing the L150E wheel loader's 9-liter engine with a Volvo D12D diesel. It's the same V-ACT 12-liter as is in the L180E and L220E. The D12D mirrors power and torque output of the 9-liter (284 horsepower and 1,056 foot-pounds at 1,600 rpm) and produces 37 percent more torque at engine-idle speeds. The loader can do more work at lower engine speed, reducing strain on the engine and minimizing fuel consumption and noise.

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MAINTENANCE MANAGEMENT

How to Reach Hydraulic Cleanliness Targets

Caterpillar recommends maintaining cleanliness ratings for various fluids in order to get maximum life from the components they lubricate. Operating cleanliness of ISO 18/15 tolerates only 2,500 particles of contaminant 6 microns and larger per milliliter of hydraulic fluid, and no more than 320 particles 14 microns and larger. You get there by starting maintenance with a regular hydraulic-oil sampling program to monitor contaminant levels and respond as necessary to control run-away conditions.

Each ISO number increase represents a doubling of the amount of contaminant in the oil.

Take the example of a hydraulic system with a 32-gallon-per-minute pump. In 200 days, working eight hours per day, that pump will pass 79 pounds of dirt if the oil has a consistent ISO 18/15 cleanliness rating. If the ISO rating jumps to 21/18, the pump moves 630 pounds of dirt.

Use a kidney-loop or off-machine filtration cart to clean oil and reservoirs regularly.

Also, observe good shop keeping:

- keep floors clean
- clean up spills using absorbent mats (granular oil dry and kitty litter create a lot of dust)
- protect packaged parts and oil from contamination before they are installed
- prevent contamination of hoses while in storage by capping their ends
- use dedicated, clean containers to transport oil to a machine.

Install highly efficient, desiccant breather filters on reservoirs and bulk storage tanks to remove particles and moisture.

Filter fill oil coming out of storage tanks and while pumping it into machine reservoirs, if possible.

Fluid Contamination ISO Targets

Fill Oil	ISO 16/13
Fuel (recommended)	ISO 18/16/13
Hydraulic Systems	ISO 18/15
Transmissions (electrically controlled)	ISO 18/15
Transmissions (mechanically controlled)	ISO 21/17
Filtered Differentials & Wheel Groups	ISO 18/15
New & Rebuilt Engine	ISO 18/15
Component Rebuilds	ISO 16/13

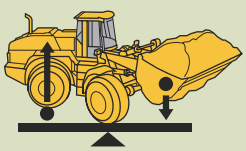
Source: Caterpillar

Operating cleanliness of ISO 18/15 tolerates only 2,500 particles of contaminant 6 microns and larger per milliliter of hydraulic fluid, and no more than 320 particles 14 microns and larger.

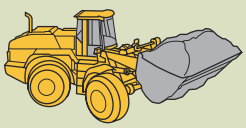
EQUIPMENT TIPS

Wheel-Loader Basics

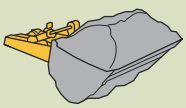
A Liebherr brochure graphically explains several items that routinely appear in wheel-loader specification sheets.



Tipping load, articulated is the most critical static-load position for a wheel loader. This figure is the load at which the machine just begins to tip over the front axle when it is fully articulated with boom horizontally positioned.



Payload, based on ISO standard 7546, says Liebherr, must not exceed 50 percent of the static, articulated tipping load.



Bucket capacity, expressed in cubic yards, is determined by dividing the allowable payload (in pounds) by the specific bulk weight of material (in pounds per cubic yard). These calculations likely are based on the heaviest materials the machine might handle, such as wet sand and gravel at nearly 3,400 pounds per cubic yard.

RENTAL NEWS

NES Rentals Sold

Crain's Chicago Business reports that NES Rentals will be purchased by private equity firm Diamond Castle Holdings for $850 million. Diamond Castle expects to retain the company's name, chief executive and main product lines, which include construction equipment, aerial-work platforms and portable traffic safety equipment. Chicago-based NES emerged from bankruptcy protection in February 2004 and put itself up for sale last January. NES shareholders were scheduled to vote on the sale June 23.

CONSTRUCTIONEQUIPMENT.COM NEWS

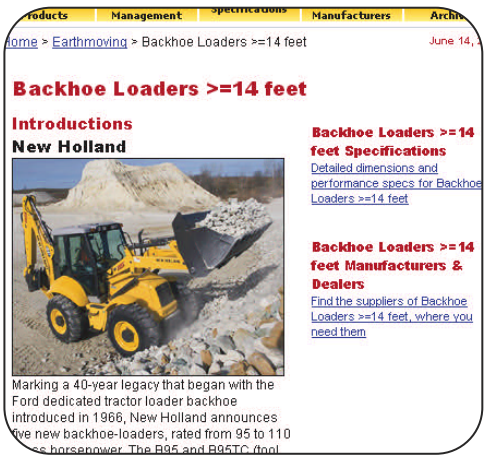
Landing Pages Set Stage For Product Research

Within one click, equipment buyers can find the perfect starting place for their research at ConstructionEquipment.com.

Simply choose the product from the left nav bar (we're using backhoe-loaders < or = 14 feet in our example) for the product's landing page.

From here, you're one click away from our exclusive online specifications through Spec Check, where you can see how the 14-footers line up against each other. You can also access a listing of manufacturers and dealers.

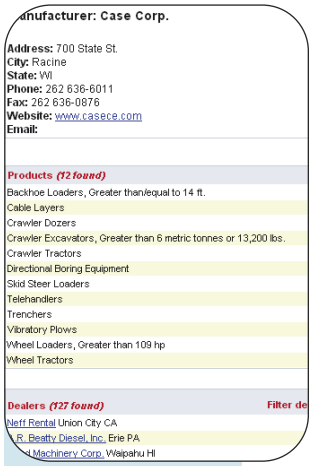
And, we have a link to all articles written about backhoe-loaders, by manufacturer name.



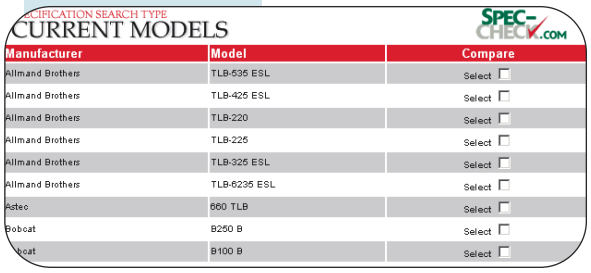
How to Use ConstructionEquipment.com

Choose from the list of categories and subcategories to find all information the site has to offer on a specific type of equipment.

The search option provides results for all site content — from editorial archives to manufacturer and dealer information.



From Specifications in the horizontal-navigation bar, compare specs on 63 types of construction and forestry equipment at no charge.



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Read information on maintaining and managing fleets, as well as magazine archives, in the horizontal-navigation bar.

From Find Dealers & Manufacturers in the horizontal-navigation bar, drill down to manufacturer contact information, the products made by the company, and dealers as available.

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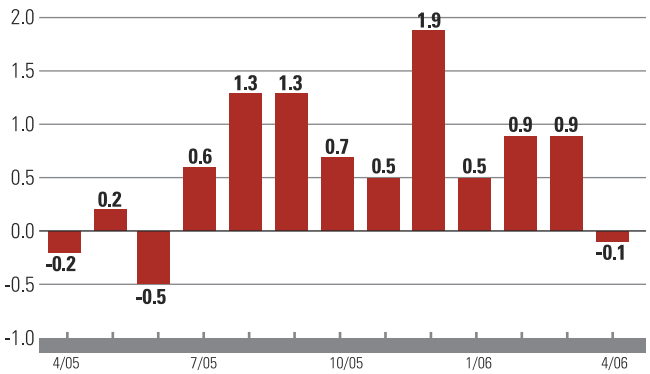
By JIM HAUGHEY, Director of Economics

↔ TOTAL CONSTRUCTION SPENDING

Spending dipped 0.1 percent in April after rising for 10 months. This is the beginning of a period of little change while cutbacks in residential construction offset rapid expansion in the rest of the construction market. The value of starts measured by Reed Construction Data suggest near double-digit expansion of both nonresidential building and heavy construction well into next year. Housing starts will stabilize around the 1.9 million range later this year.

(% change from previous month)

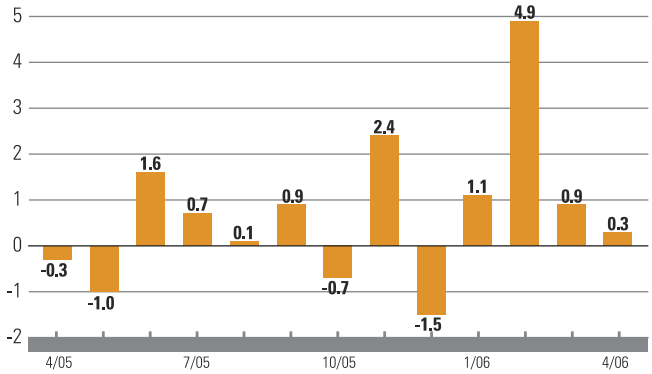


Source: U.S. Department of Commerce

↔ HIGHWAY CONSTRUCTION SPENDING

Spending is currently 10 percent higher than a year ago after a surge in the last three months. Yet more than half this gain is from inflation with materials costs for highway construction 13.7 percent higher than a year ago. Project starts are only 6 percent higher year-to-date vs. 2005, but according to Reed Construction Data, April starts – especially for bridges – were more than triple April 2005 starts. Spending will outpace inflation in states able to supplement federal funds.

(% change from previous month)

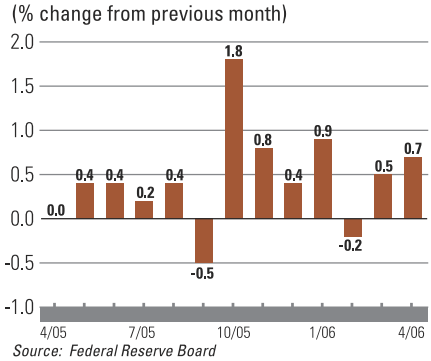


Source: U.S. Department of Commerce

↑ INDUSTRIAL PRODUCTION

Factory production expanded at a 6-percent pace through April to support double-digit gains in exports and business investment and to rebuild inventories. Production will continue to expand faster than the economy through next year as both the investment and export sectors continue to grow more than twice as fast as the domestic economy. The fastest expansion is for durable equipment. The output of nondurable goods will slip further below the overall pace of economic growth.

(% change from previous month)

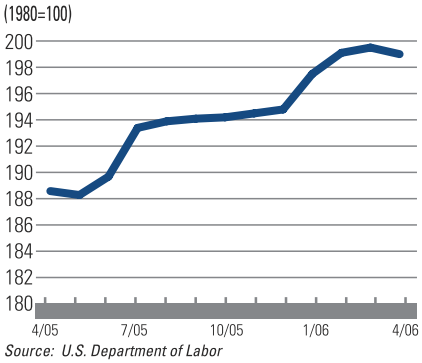


Source: Federal Reserve Board

↔ CONSTRUCTION EQUIPMENT PRICE INDEX

Equipment prices are 5.5 percent higher than a year ago. Expect slower price increases ahead even though overall inflation in the economy will increase slightly and equipment import costs will rise as the value of the dollar is declining again. The price trend turnabout will come from both weak steel prices, due to foreign supply increases, and from the peak in capacity pressure on manufacturers at the end of last year.

(1980=100)

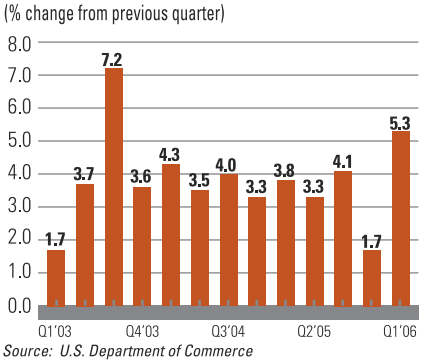


Source: U.S. Department of Labor

↑ GROSS DOMESTIC PRODUCT

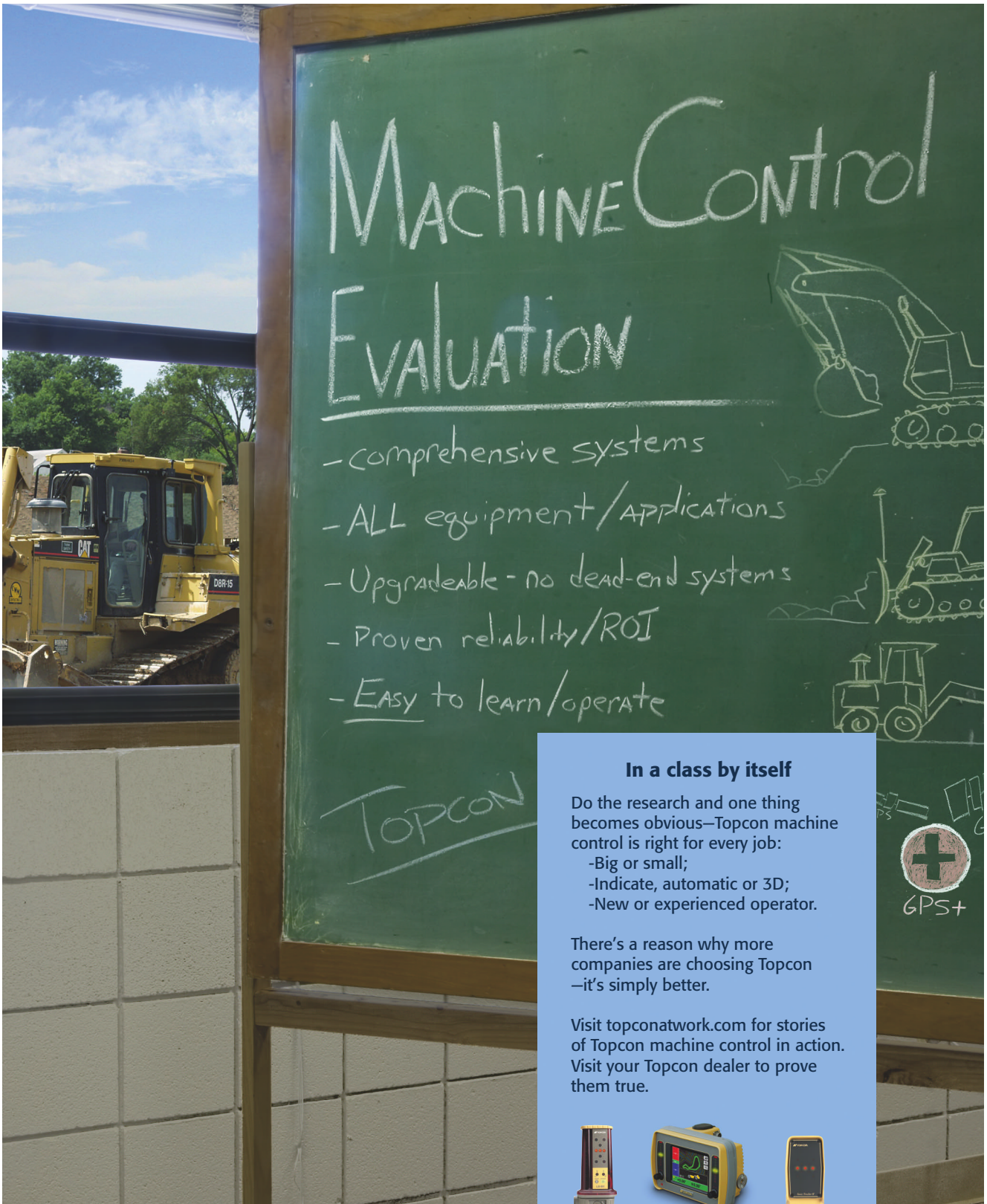
Economic growth has slowed to 3.5 percent (averaging the post-hurricane decline and rebound quarters) and will slow further to a 3-percent pace by late next year. This is enough to support real construction spending growth at almost the same 3-percent rate. But it is also enough to cause modest further tightening in materials, labor and equipment supplies. Unusually strong exports and investment spending are largely offsetting weaker spending growth by consumers struggling with rising inflation.

(% change from previous quarter)



Source: U.S. Department of Commerce

For the full text of this month's economic analysis, check Magazine Archives/Economics at **ConstructionEquipment.com**



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By WALT MOORE, Senior Editor

Yanmar's CBL40 Earns "Multi-Tasker" Title

Professional operator Frank Bogden tests the capabilities of Yanmar's new compact backhoe-loader and tells us what he thinks

During the trenching, backfilling and truck-loading exercises, the CBL40 proved hydraulically capable, while exhibiting plenty of tractive effort, speed and controllability.

Yanmar, a company that soon will celebrate 100 years in business, is betting that the compact dimensions, versatility and performance of its new CBL40 will appeal to buyers who find full-size backhoe-loaders frequently too big for the job, or who are looking for a bit more application flexibility than even big skid-steers or compact wheel loaders can provide. The CBL40 is, at heart, a sturdy backhoe-loader. But with a universal coupler up front, and with a backhoe that can be removed to allow using attachments with the machine's optional three-point hitch or PTO shaft, the CBL40's potential is significantly expanded.

Construction Equipment had the opportunity for a close look at the design and performance of the new Yanmar in mid-May, when the company loaned us a CBL40 that was on a demonstration tour in northern Illinois. We, in turn, placed the machine in the capable hands of Frank Bogden, an instructor/operator at Local 150's (International Union of Operating Engineers) Apprenticeship and Skill Improvement facility in Plainfield, Ill.

Bogden used the machine to trench in some tough rocky fill, backfilled the cut, loaded trucks with crushed limestone, took the CBL40 on a couple of load-and-carry runs, then switched the bucket for a set of forks to handle lengths of 8-inch ductile iron pipe. He and Local 150 instructor/technician Dale Brown then separated the machine from its backhoe (in the field) to check the difficulty of doing so and, in the process, gave us a look at the optional category-1, three-point hitch installa-

tion and the optional PTO.

Overall, Bogden spoke highly of the CBL40's design and performance, but did have a number of suggestions for making the machine more accommodating and useful from the operator's point of view. Judging from the way several visitors from Yanmar listened and took notes during the evaluation, however, we'd guess that most of Bogden's suggestions soon will be incorporated.

On site from Yanmar to give us a walk-around introduction to the machine and to answer questions were Takayuki Fujiwara, marketing manager; Bill Gearhart, assistant marketing and product manager; and Lee Haack, regional sales manager.

Photos: George Pfoertner©

With a universal coupler on the front, the CBL40 can handle a variety of skid-steer loader attachments, provided they're size-appropriate. Soon to be available is an aftermarket quick-coupler for the backhoe.

Quick CBL40 design tour

Even though Yanmar has deep roots in the agricultural business, the company strongly makes the point that the CBL40 is not a converted farm tractor. It is, says Yanmar, a machine designed exclusively for the construction industry, and one that builds on the structural durability of the company's wheel loaders and on the hydraulic sophistication of its compact excavators.

The backbone of the new machine is an integral, one-piece frame designed to handle digging and loading forces at either end. A three-cylinder, turbocharged Yanmar diesel engine, generating 35.4 net horsepower, drives a closed-loop, load-sensing, two-speed "hydro-mechanical" propel system that, in turn, powers a mechanical gearbox that delivers its output to the conventional front and rear axles via drive shafts. An in-cab control disconnects the front axle for sustained high-speed travel.

The machine's implement hydraulic system, which draws oil from a reservoir separate from the drive system, employs two, variable-displacement, axial-piston pumps. A lever in the cab's right console switches the configura-

With the tilt-up hood raised, access to routine service points seems no problem. The CBL40 uses an oil cooler for its implement hydraulic system placed in front of the radiator.

The design of the CBL40's backhoe boom allows exceptionally good lines of sight to the bucket in the trench.

The CBL40's operator station is roomy and features suspended pedals and a swing-around seat. Controls for shifting the two-speed travel system and for the rear-differential lock are positioned at the left of the seat base. An aftermarket cab soon will be available for the CBL40.

The load-and-carry exercise proved the CBL40 a stable machine with a tight turning circle.

tion of the hydraulic system between loader and backhoe operation, and in the backhoe position, ensures constant speed for the digging arm when another function is also engaged.

At the loader end, the CBL40 is fitted with a 70-inch-wide general-purpose bucket, but a universal-style quick coupler allows the use of size-appropriate skid-steer-loader attachments. Piping for auxiliary hydraulics to the front (as well as to the backhoe) is optional, but the auxiliary valve sections are already in place. The loader mechanism uses slab-steel lift arms and a geometry that allows parallel lift and automatic self-leveling.

Working the CBL40

The CBL40 has a swing-around seat (not a flip-over type) for switching from the loader to the backhoe position. Backhoe controls are two mechanical (not pilot operated) joysticks that can be configured in either a backhoe or excavator pattern by switching pin positions in the linkage at the main valve. The linkage is easily accessible through a panel at the rear of the operator's compartment and, says Yanmar, changing patterns is accomplished in just a few minutes.

When we asked Bogden which pattern he preferred, he said that either would be fine, and he went to work trenching in the wet, cobble-laced clay at the site.

After this exercise, he had a few suggestions for Yanmar. First, give the seat vertical-adjustment capability. The seat is comfortable enough, Bogden said, but some operators prefer to sit higher. Also, make provisions for pinning the outrigger pads in place, because they sometimes flipped from the dirt side to the smooth-pavement side during repositioning, requiring him to exit the cab to remedy the problem. And another helpful change, he suggested, would be a backhoe lock that's easier to manipulate from the seat, because the lock's present configuration requires the operator to lean well forward from the backhoe position to reach the handle.

Aside from these observations, Bogden was quite complimentary about the CBL40's backhoe performance, especially its hydraulics.

"Plenty of power and very responsive. The system does a good job of allowing you to simultaneously arm in and boom up. The controls have a good, smooth feel. I was concerned at first that since the machine has a hydrostatic-type drive, it would be difficult to reposition, but it rolled easily when I pushed back."

Bogden particularly liked the good visibil-

(continued on page 40)

Toolbox Tips

Sponsored by Hertz Equipment Rental

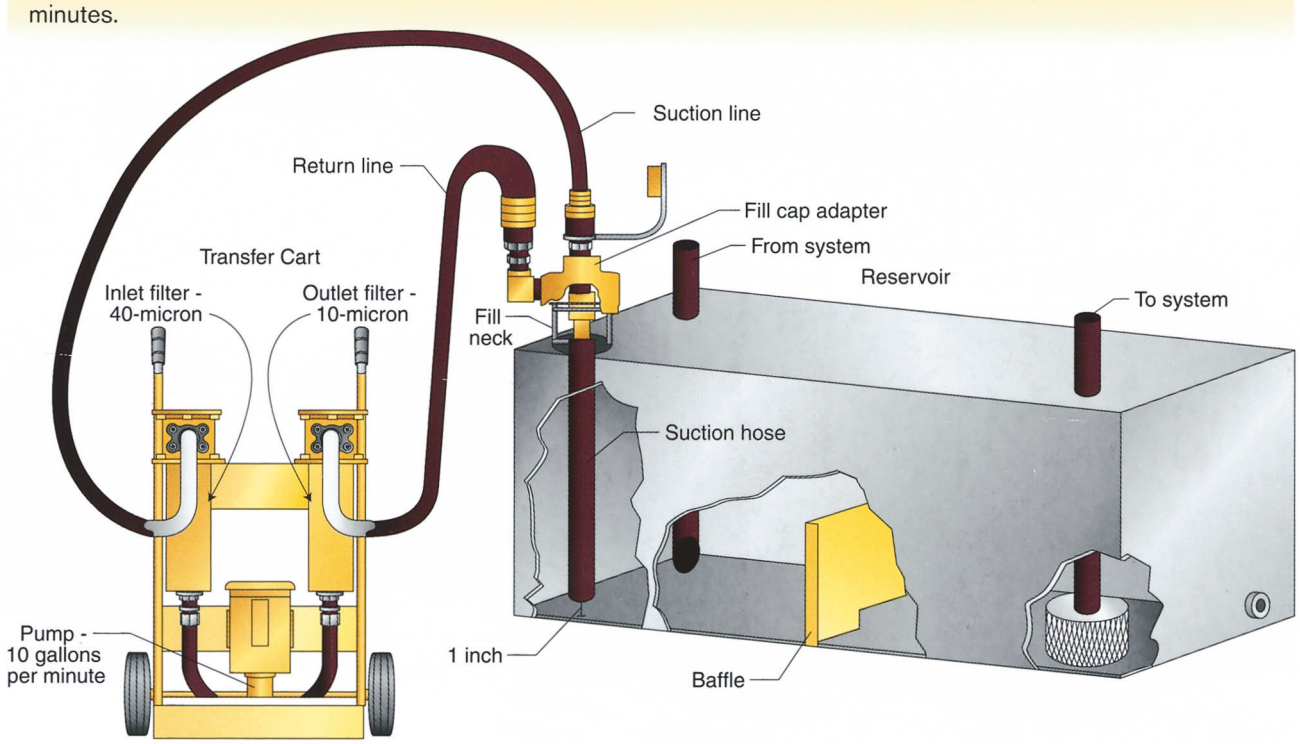
July 2006

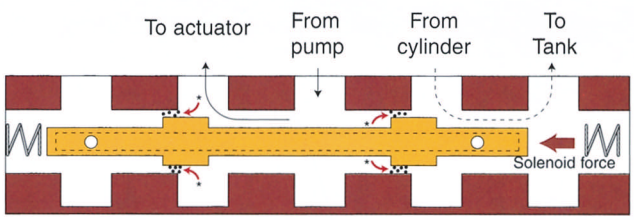
No. 21 in a Series

Off-Line Filters Stretch Oil and Component Life

Kidney-Loop It Clean

The proper length of filtering time that an off-line filter like this transfer cart needs to reach the desired cleanliness level is a function of filter efficiency and flow rate, contamination level and reservoir capacity. A filter vendor can help calculate proper filter time. Parker estimates its unit will scrub 50 gallons of oil to Caterpillar specifications in 30 minutes.





Silt Sticks Valves

Contamination working its way into tight clearances between a valve spool and body can cause shuddering or halting hydraulic performance. Severe silting can erode pathways for oil to leak past spools, causing cylinders to drift.

Toolbox Tips

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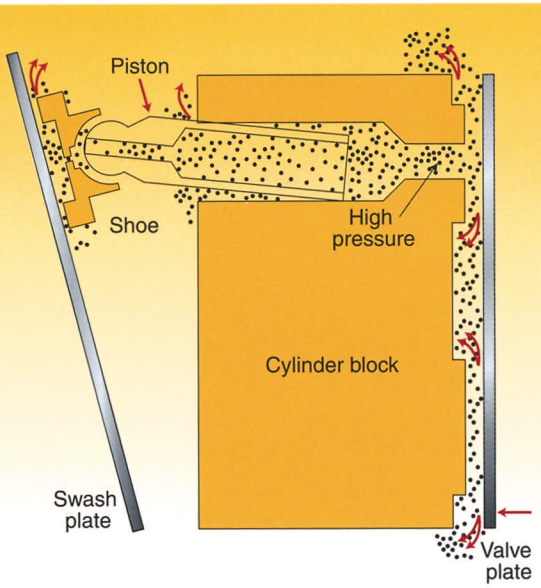
Silt Sucks Power

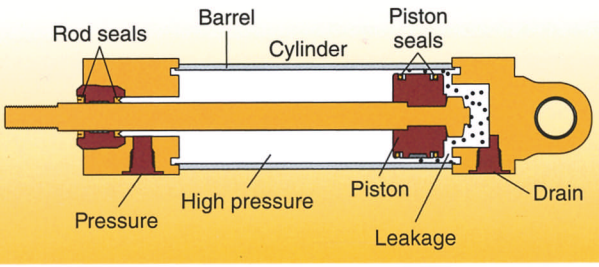
Fine dust in any hydraulic system works hardest where high oil pressure pushes it through very close clearances. The resulting wear allows internal leakage that robs power, generates heat, and speeds the expensive pump's demise. Keeping the oil clean will extend system life.



QUICK TIP

Count Particles

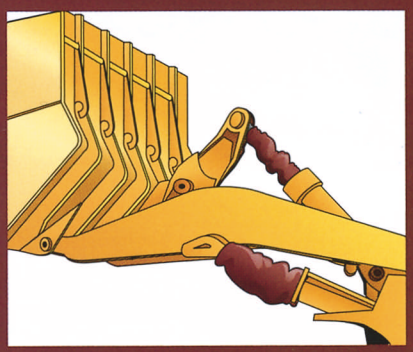
"Our tests confirm that most operators will loose up to 20 percent of the efficiency of a machine before they notice any change in performance," says Carmen Rose, from Caterpillar. Regular particle counting is a better way to determine how much contaminant is in the oil, and when it needs extra filtration to keep performance from degrading. The count's are very accurate, and have become the hydraulic industry's standard for determining cleanliness.



Silt Steals Lift

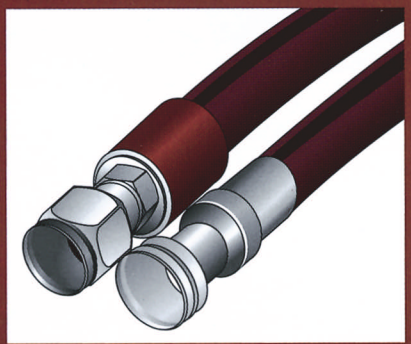
Fine dirt will wear leak paths in a cylinder's piston and barrel, letting high-pressure oil squeeze over to the resting side of the rings and reducing lifting power. Internal silt will also ruin rod seals, which will allow more dirt into the system.

Housekeeping Hints



Working in lots of fine dust, banked rock, or corrosive material? Protect rod surfaces with heavy-duty covers. Maintain the seals and they'll stop a lot of contamination.

Use tight-fitting drum covers. Store drums of hydraulic oil indoors if possible, and always cover drums with lids that will keep airborne dust and moisture out.



Any time hoses are disconnected, whether they're in the storeroom or hanging from a machine, they should be capped to keep dirt out.

Source: Caterpillar

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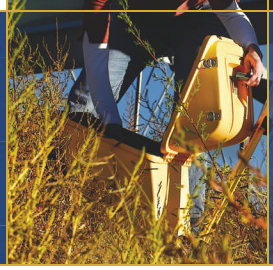

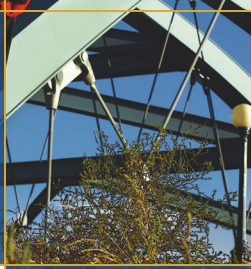

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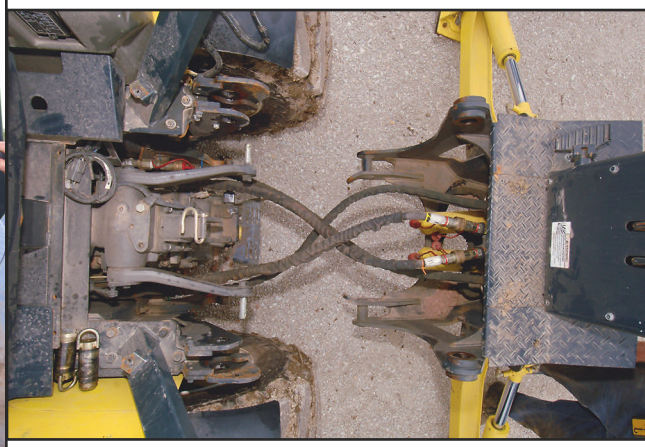

Operator Frank Bogden and technician Dale Brown removed the CBL40's backhoe in about 10 minutes, an operation entailing the removal of an access panel (two cap screws), left, and two mounting pins, center, then lifting the assembly off the stationary lower pins (using the outriggers), right. We didn't disconnect the hydraulic lines. With the backhoe removed, the optional rockshaft (which controls the three-point hitch) and the 540-rpm, 24-hp PTO shaft are accessible. Indexing the pin-mounting holes during reinstallation took a few minutes, but practice likely would make that task easier.

ity into the trench — the result, he said, of Yanmar's keeping the backhoe's boom narrow.

Although Bogden said he didn't have that much experience with hydrostatic-drive machines, he liked the way the CBL40 pushed strongly into the spoil when backfilling the trench. But what the machine could really use, he said, is a simple "bucket-level" indicator somewhere on the loader linkage.

After making a number of short-cycle passes between the crushed-limestone stockpile and a small truck, he commented favorably on the machine's speed and its hydraulic capability when handling heavy material. Also noted were the CBL40's good dump height and reach — "enough reach to easily place loads in the center of the truck." Also, he said, he liked the machine's controllability when approaching the truck.

With the bucket full of crushed rock, Bogden took the CBL40 on several circuitous routes to test its load-and-carry capability.

"The machine handles well — it feels very stable, and the turning radius is tight, which makes it very maneuverable. Although I didn't take the machine into any really rough areas, the ride quality seemed fine, and the steering and brakes were responsive — no objections there."

As a final exercise, Bogden swapped the bucket for a set of pallet forks, took the machine through some moderately sloppy ground to reach the pipe stockpile, then loaded and maneuvered with long sections of pipe.

"I was impressed with the good visibility to the load," he said. "Granted, the loads we were handling probably weren't much of challenge, but the machine seems to have plenty of lifting power, and the hydraulics, again, are quite smooth. And the parallel-lift feature is always a plus."

We also had in mind to use the CBL40 to do craning with the backhoe, but Bogden noted that the machine had no lifting eye on the bucket. He suggested that the addition of that item would be a handy feature — which would encourage operators to rig loads in a safe manner.

So, Frank, any final thoughts about this compact Yanmar?

"I think, overall, it would be a very handy piece of equipment for a contractor. It has a lot of versatility built in, especially with the three-point hitch. It's a good 'multi-tasker' — a well-thought-out machine."

CBL40 Basic Specifications

Horsepower (net)	35.4
Operating weight (lb.)	7,750
Maximum hydraulic flow (gpm)	11
Implement-system pressure (psi)	3,000
Loader breakout force (lb.)	4,375
Loader lift height, to bucket pin (ft.)	9.5
Backhoe bucket force (lb.)	5,798
Backhoe digging arm force (lb.)	3,582
Transport length (ft.)*	19.6
Transport width (ft.)*	5.8
Transport height (ft.)*	8.6

*With loader bucket and backhoe

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By LARRRY STEWART, Executive Editor

Lifecycle Research Justifies Investing In PM

Industry-average life is the key to reasonable estimates of savings you can expect from maintenance that stretches component life

Machines are often traded or replaced at some multiple of the engine life, with transmissions, hydraulic pumps, and undercarriage influencing the decision to various degrees depending on the type of machine and working conditions.

Manufacturers forecast component costs based on what engineers call the B_{20} life — the life at which 20 percent of all components in a particular group have failed. But the quality of maintenance is an important variable. Excellent maintenance reduces the risk of failure if components stretch beyond B_{20} toward B_{50} life.

Maintenance excellence is characterized by a high percentage of scheduled maintenance being completed on time, use of high-quality fluids and filters, and consistent oil analysis and machine inspections that help anticipate and prevent component failures.

Few operations manage maintenance at this level. Focusing on expenses, rather than overall cost, leads to shopping for cheaper fluids and filters. Tight labor markets make it hard to find and keep good service people. Maintenance schedules take a back seat to production schedules.

That's why equipment manufacturers emphasize the B_{20} life as the time to start watching components closely, if not the point at which to schedule preventive repair (in-frame rebuild, rebearing/reseal, or exchange

Average annual hours increase 20 percent for machines in severe applications to more than 1,480 and B_{20} engine life (the age at which 20 percent of engines have failed) drops 500 hours, but machines in both types of work are expected to last about 8.5 years.

Excavator Life (>= 20,000 lb.)

	B_{20}	B_{50}	B_{80}
Engine	7,500	**10,000**	12,000
Hydraulic pumps	4,000	**8,000**	12,000
Hydraulic motors	4,000	**8,000**	12,000
Undercarriage*	4,000	**6,000**	9,000
Hours in production	6,000	**9,000**	12,000

* Replacing at least the chain
Source: Construction Equipment *lifecycle research*

Comparing ownership and operating costs using different component lives will only be effective for guiding lifecycle decisions if all shop overhead — including facilities and tooling costs — is included in each machine's hourly cost.

with a remanufactured component).

Some equipment manufacturers measure component life for every machine model in their product lines. The data, containing the B_{20} and B_{50} lives, are made available to some customers — usually those who have pursued the information and secured special access.

Construction Equipment strives to offer insight to component life by surveying equipment users to accumulate a broad range of real-world experience. We compile their responses into real-world B_{20} and B_{50} numbers for components in key machines. The results are the industry's only independent benchmarks for judging whether or not your experience is "normal." They also offer some interesting numbers to work with when deciding how much to invest in maintenance and repair.

The decision is really about how much risk of component failure you can handle. Once a component ages beyond B_{20}, its chances of failure increase dramatically. For example, 20 percent of all engines in 30-ton articulated dump trucks have failed by about 9,000 hours. Another 30 percent of the population fails within the next 1,000 hours, or less than two-thirds of a typical year's use. Not all components are quite this risky, but the odds of having a machine fail on the job stack up quickly after the B_{20} age. For example, 20 percent of transmissions in 14-foot backhoe-loaders wear out by 5,000 hours. The next 30 percent wear out (the B_{50} life, or median age) by 8,000 hours.

Perhaps the most practical application of lifecycle research is in helping estimate what you might expect from

The risk of pushing wheel loaders from B_{20} to B_{50} life is that only 20 percent of engines fail before 8,000 hours, and another 30 percent of the entire engine population fails within the next 2,000 hours. The reward is another three years of production.

Wheel-Loader Life (>= 2 cu. yd.)

	B_{20}	B_{50}	B_{80}
Engine	8,000	**10,000**	15,000
Transmission	6,000	**10,000**	14,000
Hydraulic cylinders	4,000	**7,000**	10,000
Tire wear-out*	2,000	**4,000**	7,500
Hours in production	6,000	**10,000**	18,000

* Does not include tires failed due to puncture
Source: Construction Equipment *lifecycle research*

an investment in maintaining a fleet. With B_{20} or B_{50} life values to plug into ownership and operating cost equations, it's not hard to calculate reasonable cost estimates for the "run-to-destruction" maintenance philosophy and compare that to operations designed to "preserve and protect" the company's equipment capital.

Thanks to a simple Microsoft Excel worksheet created by Case for its dealers called the Ownership and Operating Cost Model, it's easy to simulate the input costs and component lives under various styles of maintenance management.

Case built the model so that dealers can walk through the ownership-and-operating-cost (O&O) calculation with customers, filling in the customer's own numbers for the various inputs. In most cases, for comparison purposes they inserted original-equipment-manufacturer (OEM) prices for machines, fluids, filters and repair parts. They estimated repair costs assuming B_{20} component lives, a mix of remanufactured component exchanges and standard rebuilds, and $70 per hour for a fully burdened labor rate.

For example a 65,000-pound excavator operated moderately for 1,600 hours per year over five years in dusty conditions could be expected to cost about $66 per hour. That's without operator labor, but the exact number doesn't matter nearly as much as the amount of change that results with variations in maintenance and component life.

What might happen to the overall cost of that 65,000-pound excavator if you put parts people to work cutting parts bills, for example? Suppose they were able to buy all of the fluids and filters needed to maintain that machine for 25 percent less than OEM-part prices, and able to cut repair parts costs by 25 percent.

If everything works perfectly and components reach the same life as Case assumed using OEM parts, repair costs over the 8,000-hour life of that excavator are about $9.70 per hour and the machine's total hourly cost drops 2.4 percent from $66.71 to $65.12.

But what if component reliability slips just a little and you save only 10 percent of the OEM repair-parts costs because you have to repair more failures? Even if repair labor climbs less than 20 percent over the life of the machine, its O&O cost per hour of $66.44 approaches the same as if you were buying OEM parts.

Turn this example on its head, now, and consider the possible results of developing top-notch maintenance. To deal with difficulties finding and keeping good service people, commit to reducing maintenance demand by stretching service intervals by 60 percent. The basic A service — engine-oil and filter change — goes from 250 to 400 hours. This is not out of line. Many equipment manufacturers are recommending oil changes at 500 hours on new excavators and other equipment, and there are contractors all over the country extending oil-change service to 350 and 400 hours on older machines. You buy OEM repair parts and high-quality maintenance supplies — perhaps even overspend — paying 30 percent more than OEM prices for lubes and filters.

Using extended-life coolants, change intervals extend to 12,000 hours or more. Splurge on the hydraulic oil, spending 37 percent more than OEM prices, or $32 per gallon, on some premium stuff. Push hydraulic-oil life more gently, taking it to 4,800 hours (OEMs recommend 5,000-hour changes for most of today's excavator hydraulic systems).

There is no big savings in maintenance

Crawler-Dozer Life (>= 75 hp)

	B_{20}	B_{50}	B_{80}
Engine	6,000	**9,000**	12,000
Transmission	5,500	**8,000**	10,000
Hydrostatic drive	4,000	**7,000**	10,000
Undercarriage*	2,500	**4,000**	6,000
Hours in production	6,000	**9,000**	15,000

* Replacing at least the chain
Source: Construction Equipment *lifecycle research*

Crawler dozers achieving B_{50} component life work at about $3.60 per hour less than those only reaching B_{20} life (based on OEM maintenance intervals and repair-parts costs). And longer-lived components stretch the machines' endurance for primary production about 2.5 years.

costs. You spend about $2.25 per hour on preventive maintenance (PM), which is about 47 cents per hour less than if you bought PM supplies from the OEM and went by the standard service intervals. It's a little more than the bargain hunter's PM cost.

Now consider the affect of paying closer attention to maintenance scheduling and lubrication quality. Suppose you can stretch engine and hydraulic-pump life from B_{20} to B_{50}. That would take the engine from 7,500 to 10,000 hours, eliminating a major repair during the time you own the machine, and take hydraulic-pump life up from 4,000 toward 8,400 hours. Pump life does not have to double, though, to have the same affect on the machine's life cost. In fact, if your conservative approach to hydraulic-system maintenance yields even a 25-percent increase in pump life, to 5,000 hours, it eliminates one of two major repairs while you own the machine.

The same thinking applies to undercarriage. Adding half a season's work — 800 hours — to a 4,000-hour undercarriage earns a substantial savings.

Operating cost drops to $36.94/hour, yielding total hourly cost of $62.74. That's nearly $4/hour less than a machine maintained at standard OEM intervals and material costs — $32,000 in savings over the machine's five-year life. It's about $2.40/hour less than a bargain hunter's best-case-scenario costs, or $19,000 better over the machine's five-year life.

Emboldened by the success of the maintenance program, suppose you decide to keep the machine for an additional two years. Field prejudice against older machines may cut into annual hours a bit in those last two years, so assume the machine reaches about 10,850 hours in its seven-year life. An engine rebuild and undercarriage rebuild will be necessary, but spreading ownership and repair costs over an additional 2,900 hours reduces overall cost to $58.17. Compared to the bargain parts buyer's best bet ($65.12/hour), the meticulously maintained machine works 11 percent cheaper — saving $6.95/hour or about $10,800/year.

It's worth belaboring the simple math here. If there are 10 machines in the fleet on which you can consistently save $10,800, preserving the fleet with top-quality maintenance will cut more than $100,000/year from equipment costs.

Of course, the key is consistency, and that will likely cost a little more. But don't forget that this approach reduces PM demand by nearly 60 percent, which alleviates some pressure to find, train and keep good service people. It also cuts machine downtime by a similar amount. It's worth working through these scenarios with your own cost numbers to get a more accurate estimate of the baseline savings before you decide how much these less-tangible benefits might affect your operation. CE

Backhoe-Loader Life (14- to 15-foot models)

	B_{20}	B_{50}	B_{80}
Engine	6,000	**8,500**	12,000
Transmission	5,000	**8,000**	12,000
Axles	5,000	**9,000**	10,000
Tire wear-out*	1,750	**3,000**	5,000
Hours in production	5,500	**8,000**	12,000

* Does not include tires failed due to puncture
Source: Construction Equipment *lifecycle research*

Engine, transmission and axle life clustered around the expected hours in primary production suggest that all of the main components in backhoe-loaders are worn out by the time most owners replace them.

Articulated-Dump-Truck Life (30-ton models)

	B_{20}	B_{50}	B_{80}
Engine	9,000	**10,000**	12,500
Transmission	7,000	**10,000**	12,000
Axles	9,500	**10,000**	20,000
Tire wear-out*	2,500	**5,000**	6,000
Hours in production	7,500	**12,000**	18,000

* Does not include tires failed due to puncture
Source: Construction Equipment *lifecycle research*

As the number of hours separating B_{20} and B_{50} lives is reduced, the risk of managing machines to the longer life increases. ADTs are a good example, as 20 percent of all engines fail before 9,000 hours, but another 30 percent of the entire engine population fails within the next 1,000 hours.

By TOM BERG, Truck Editor

Roomy Yukon XL Now E85 Capable

GM includes full-size SUVs in its boosting use of corn-derived ethanol to get us away from imported oil

General Motors is bullish on ethanol, and top executives feel they have some good reasons. You've heard them before: America is far too dependent on foreign oil, especially because much of it comes from unfriendly and/or unstable countries. Alternative fuels can help us get away from oil, and a logical variety is ethanol refined from corn and other home-grown crops. It could put a big dent in the oil market, resulting in fewer geopolitical problems and lower energy prices.

GM is putting its money where its mouth is, building cars and trucks that can burn an ethanol-gasoline mixture. These include pickups and sport-utility vehicles that are commonly used in the construction industry. One is the 2007 GMC Yukon XL you see here. Except for its fuel, it runs like any of the other big SUVs that were available for driving by customers, dealers and press reporters at a recent "all brand" event in Nashville, Tenn.

Yes, hybrid power trains get a lot of attention from the press. But hybrids, which GM and other builders also make, are relatively expensive. And they're effective only in city driving, where frequent stops generate energy that's reused for launches. Ethanol, if you can get it, can work in all kinds of driving, so I was drawn to this big black Yukon with its FlexFuel badge.

A big, black Suburban — actually GMC's Yukon XL version — dwarfs a little gold Chevy HHR. They are two very different approaches to what constitutes an SUV.

For fun I posed it with another SUV that's worth considering as a fuel-saver: Chevrolet's HHR, a happy looking compact with snappy performance, "retro" styling and up-to-date utility. It's got decent interior space for passengers and gear, and most seats fold down flat to maximize cargo room. It reminded me more of Chrysler's PT Cruiser than any truck, though the HHR's roof is lower and its styling suggests late '40s rather than the PT's late '30s. Once you've stomached their compact size and anemic-sounding engines, these cars are as useful as many light trucks.

As with the PT, the HHR's four-cylinder gasoline engine actually delivers sparkling acceleration. It delivers fuel economy well into the 20-mpg range, compared to the teens turned in by full-size trucks and SUVs. If all you're going to haul around is yourself, and assuming you're not of outsize proportions, wouldn't you like to save hundreds and maybe thousands of dollars a year in fuel by using something like this?

Maybe not, and certainly not if you regularly transport lots of people and gear, pull heavy trailers, or just like the feel of a big truck. That's why GM's Suburban has grown popular since its introduction about 70 years ago. For years it was a panel truck with windows and an extra bench seat, and it did things that car-based sedans and station wagons couldn't.

Like the pickups on which they're based, Chevy and GMC Suburbans grew more comfortable and capable over the years. A few years ago, in a move toward badge differentiation, the GMC version got the Yukon XL moniker and slight front-end styling modifications. Chevy and GMC light trucks and SUVs are otherwise virtual clones, but that doesn't detract from the fact that they're fine vehicles. Yes, sales of all SUVs are down since the latest fuel-price spikes, but they're still useful and price cuts and rebates keep them affordable.

Last fall, GM updated its full-size SUVs, primarily the shorter Chevy Tahoe and GMC Yukon but also the sumptuously appointed Cadillac Escalade (now the Number One selling executive fleet vehicle, GM says) with sleeker exteriors and upscaled interiors. Those changes also affected the Suburban and Yukon XL (meaning extra long), like the 1500-series half-ton one you see here. The styling includes Caddy-like projector-beam headlights, and nice SLT interior trim has leather-covered seats, so the vehicle was a pleasure to see and be in.

FlexFuel V-8 is a Vortec 5300 that operates on eight or four cylinders, and can burn an ethanol-gasoline blend or straight gasoline. The vehicle's fuel system is also toughened against alcohol's corrosive tendencies.

XL could also mean extra large, and it took me a few minutes to get accustomed to the vehicle's 18.5-foot length. There are three rows of seats and enough real room for seven adults and their baggage, because there's still several feet of cargo room behind the third row. But the XL proved surprisingly nimble and very quiet and comfortable.

The ride immediately showed up as smooth and steady, though I didn't take it over any pavement or off-road terrain that was anywhere near rough. Later I drove a Chevy Suburban over a longer course that included freeways and city streets, some of

TEST SET

Truck: 2007 GMC Yukon XL 1500 2x4, 8-passenger, full-size sport-utility vehicle

Engine: 5.3-liter (235-cubic-inch) Vortec 5300 V-8, 310 hp @5,400 rpm, 335 lbs.-ft. @ 4,200 rpm, w/FlexFuel ethanol capability and V-8/4 Electronic Fuel Management

Transmission: Hydra-matic 4L60 four-speed w/0.70 overdrive

Suspensions: Independent, coil over shock front, five-link with coil springs rear

Rear axle ratio: 3.73

Wheelbase: 130 inches

Tires and wheels: P255/70R17 on brightened aluminum discs

Payload and towing capacities: 1,593 lb.; 8,200 lb.

Fuel capacity: 31.5 gallons

Eight people can be accommodated in the big Yukon XL, and there's still nearly 4 feet of cargo space behind the third row of seats. They can be removed to make even more room.

them with broken pavement, and the improved suspension — with an independent front and five-link rear, all on coil springs — and long 130-inch wheelbase sopped up anything it encountered.

The 5.3-liter (325-cubic-inch) V-8 had good power and operated well with the Hydra-matic four-speed automatic transmission. A 6-liter (364-cubic-inch) V-8 is also available; and the zoot-suity Denali trim package, which rivals the Caddy Escalade, includes a new 6.2-liter (378-cubic-inch) V-8 and equally new six-speed Hydra-matic that I didn't get to sample.

The Vortec 5300 and 6000, as they're called, have a feature called Active Fuel Management that can save some gas money. Formerly called Displacement on Demand, the system electronically cuts fuel to four cylinders and allows their pistons to freewheel. This saves about 10 to 12 percent in fuel compared to a full-time V-8. If you observe carefully, you might hear or feel a sort of click as the engine goes from eight to four cylinders and back again, but most of the time you can't tell unless you look at a readout on the dash, which indicates which mode it's in. This works whether an engine is burning gasoline, as it was this day, or a gasoline-ethanol blend.

The strategic idea of the FlexFuel feature is to displace petroleum-derived gasoline with ethanol. Almost any vehicle in the country will handle fuel with 10 percent ethanol, which is sold in several farm-belt states. California and other states are replacing the toxic MTBE oxygenating additive with 10 percent ethanol, which does the same thing while helping boost octane. Eventually this fuel — call it E10 — will be common.

A FlexFuel engine will burn any amount of ethanol. But it takes a higher percentage to cut emissions and greenhouse gases, and 85 percent ethanol, or E85, is the practical maximum because a small amount of gasoline is needed for cold starting. That much ethanol will eat up pieces of a normal vehicle's fuel system, so a FlexFuel vehicle's system has special materials that are impervious to ethanol.

The capability to burn straight gasoline is important because E85 filling stations are now scarce. There are only 700 E85 stations in the United States, most of them in the Upper Midwest, especially Minnesota. GM says it's working with oil companies and other car/truck builders to increase that number. They hope it'll be 2,000 stations in a few years. That's still not enough, but the capability to burn E85 makes "big-picture" sense for the nation, even if the owner can't always use it.

Fuel flexibility is what made consumers in Brazil finally embrace ethanol as a workable fuel in the early '90s. They understand that it delivers 25 percent fewer miles per gallon compared to gasoline, but if it's cheaper, the costs even out. Brazil began working on its "alcool" (Portuguese for alcohol) program back in the early '80s, and the country reportedly now produces more energy than it imports. Refiners there use sugar cane, grown on vast land tracts in near equatorial heat, as the source of ethanol.

We don't grow a lot of sugar cane in the comparatively cool United States, but sugar beets, wood chips, saw grass and other sources of cellulose could be refined into ethanol, GM says. It touts corn because we grow a lot of it and people understand it. So you could say that FlexFuel is a corny, good-ol'-USA solution to a vexing problem. We'll see where the feature takes us. If it's in a Yukon XL or its Chevy Suburban counterpart, we'll get there in style and class while hauling just about anything.

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By WALT MOORE, Senior Editor

No Bad Choices In This Lot

Today's mid-size wheel loaders exhibit notable refinement in design and operator friendliness — plus they're as versatile as switch-hitters

Average List Prices and Hourly Rates

HP Range	List Price	Hourly Rate*
200-224	$211,652	$59.96
225-249	$263,037	$70.77
250-274	$318,698	$87.42
275-349	$366,031	$97.75

*Calculated from monthly ownership costs (based on list price and 5.125 percent interest), plus operating expenses (including fuel at $2.49 per gallon and mechanic's wages at $40.18), divided by 176 hours.

Source: www.EquipmentWatch.com, 800-669-3282

If you've had occasion to operate any of the new mid-size wheel loaders in today's market, you might agree that most have several fundamental characteristics in common: they're powerful and smooth as glass to run; cabins are comfortable, convenient and exude a sense of refinement; and most exhibit a just-right blend of tractive effort and hydraulic power that let's you charge the pile aggressively and heap the bucket quickly with virtually no wheel spin.

On top of this, as a group, they're competent at any number of tasks, more environmentally friendly than ever before and, overall, probably easier and less costly to maintain than their predecessors. We're defining "mid-size" here as models with net horsepower ratings of 200 to 300, a range that includes models on the low end with standard buckets of, say, 3.5 to 4.0 cubic yards, and machines on the high side with standard buckets typically in the range of 5.0 to 6.0 cubic yards.

But your choice of buckets for these versatile models is usually quite broad, and can range from smaller rock buckets to light-material configurations that provide capacities well in excess of standard ratings. And in most instances, these machines are available with a high-lift-boom option, which particularly suits them for loading bulk materials into high-volume trailers.

Mid-size wheel loaders can competently handle a variety of applications, whether in forestry, basic earthmoving, sand-and-gravel operations, rock quarries or scrap yards.

While most mid-size loaders will spend their lives with a pin-on bucket in material-handling operations, they're more than capable of taking on a wide range of tasks. A sizeable market for these machines, for example, is waste handling. For models on the upper side of our arbitrary horsepower scale, for instance, scrap handling is big business. Equipped with solid tires, a set of special forks and extra guarding for the cab and power train, these machines are adept at handling auto carcasses and all other manner of scrap metal. Or in yard-waste-processing operations, models typically on the smaller end of our scale may be loading stumps and log sections into tub grinders, or using large specialty buckets to load green waste into horizontal grinders and shredders.

In the aggregates industry, you'll not only

Tier-3 engines, hydraulic refinement and operator-environment enhancements characterize many of the wheel loaders in the 200- to 300-hp class.

frequently find these machines handling sand-and-gravel, but also doing some fairly demanding work in rock quarries. Or, fitted with grapple forks, these loaders become natural log handlers in forestry applications.

Most every conventional wheel loader, of course, can be made even more versatile with the addition of a coupler, allowing it to switch quickly between work tools — more often than not between a bucket and a set of forks, but sometimes between different bucket types, or perhaps between a bucket and a specialized work tool, such as a lifting jib, grapple or rotary broom. The coupler, however, may not be a good investment for every wheel-loader user, and installing a coupler should be predicated on frequency of use and economic considerations — that is, how much time will it actually save you, and how much extra production will it allow.

The operator's environment of today's mid-size wheel loaders provides exceptional visibility, powerful heating and cooling systems, comfortable accommodations, electronic monitoring and diagnostic capability, flexible transmission-shift systems, and the ability to tailor operating functions, such as adjusting the transmission-declutch/brake-application threshold.

Cleaner engines, fuel economy

The Environmental Protection Agency (EPA) set January 2006 as the date for off-road diesel engines in the range of 174 to 301 horsepower to be Tier-3 compliant. Thus, most of the models listed in the accompanying spec table use a Tier-3-compliant engine, but perhaps not all — yet.

According to Bruce Farrar, manager of off-highway communications for Cummins (whose engines from 174 to 751 horsepower are Tier-3 compliant), the EPA has given certain engine manufacturers and equipment makers limited extra time for completely complying with Tier-3 standards. The EPA has done this with two "flexibility" programs: Averaging, Banking & Trading (for engine manufacturers) and the Transition Program for Equipment Manufacturers, which detail strict guidelines for Tier-3 implementation.

Probably safe to say, however, is that those models not now equipped with a Tier-3 engine, soon will be. For wheel-loader buyers, this may be a point of no consequence, unless local air-quality standards specifically mandate the use of Tier-3 power. What may concern the wheel-loader user, though, is how Tier-3-engine fuel consumption will compare with that of previous engines.

Engine manufacturers have taken various technical routes to Tier-3 compliance, and it's probably safe to say that the specific technology employed will affect the engine's fuel usage. But, in general, say most engine manufacturers, Tier-3 fuel economy is on par with that of Tier-2 and, in some instances, might be better.

If, for example, a mechanically injected Tier-2 engine is replaced with a Tier-3 version having electronic fuel injection, fuel economy may well improve.

But the real concern of the wheel-loader buyer should be fuel efficiency, that is, the amount of material moved per gallon of fuel. Fuel efficiency involves not only the fuel-usage characteristics of the engine, but also how efficiently the overall design of the machine utilizes available horsepower. For example, more wheel loaders today are being equipped with hydraulically driven fans, which potentially can save significant fuel by operating only when (and at the speed) actually required, versus running continuously via a belt drive and, therefore, always draining horsepower.

Along with hydraulic fans, the use of variable-displacement piston pumps in the wheel loader's implement-hydraulic system is on the rise. These "load-sensing" systems conserve fuel by virtue of their pumps not moving any more oil than is actually required and, thus,

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	Horsepower (Rated)	Operating Weight (lb.)*	Bucket Range Or Nominal Bucket (cu. yd.)**
Case			
921C	248	50,600	5.25
Caterpillar			
962H	209	42,700	3.5-5.0
966H	262	52,300	4.5-5.5
972H	287	55,500	5.0-6.0
Changlin			
ZL50-7	211	36,500	3.9
ZL60H	240	40,900	4.6
ZL75H	290	51,700	5.5
Doosan Daewoo			
DL 300	217	38,200	3.5-4.6
DL 400	280	50,000	4.8-6.1
Dressta			
530E	205	36,400	3.7-5.9
Hyundai			
HL760-7	205	39,500	4.0
HL770-7	266	50,300	5.2
Intensus			
WL50G	205	39,700	3.9
JCB			
456 ZX	205	48,100	4.6
John Deere			
644J	221	38,900	4.3
724J	241	40,700	4.8
744J	288	51,200	5.8
Kawasaki			
80ZV	208	38,900	3.6-4.8
85ZV	235	45,800	4.1-5.2
90ZV	275	51,300	4.3-5.9
Komatsu			
WA400-5	200	41,200	4.1-5.6
WA450-5	261	49,300	4.7-6.8
WA480-5	271	54,100	5.0-8.0
Liebherr			
L 566	259	50,500	5.3-11.3
L 580	272	54,500	6.6-11.3
New Holland			
W190B	213	38,200	3.5-4.5
Terex			
TXL 300-1	200	40,800	3.8
TXL 400-1	292	48,600	5.1
Volvo			
L110E	209	40,000	3.5-12.4
L120E	223	42,400	3.9-12.4
L150E	284	50,700	4.1-15.7

* Approximate operating weight; exact weight varies with specific configuration
**Approximate bucket capacities

using no more horsepower to drive the pumps than is actually required.

But, that said, about half the models listed in the accompanying spec chart employ gear- or vane-pump-type hydraulic systems, many of which also incorporate load-sensing features to improve efficiency and horsepower utilization. Gear- and vane-pump systems remain effective, durable and economic in design, and continue to serve wheel-loader users well.

Hydraulic-control systems also have received considerable attention in today's mid-size wheel loaders. Conventional two-lever designs (separate levers for boom and bucket control) typically use short-throw, low-effort levers that often are pilot operated. Most machines also offer a single joystick controller, which may be electric-over-hydraulic in operation.

Along with hydraulic controls, the cab environment, generally, for these machines continues to be refined. On the list are more effective HVAC systems, enhanced visibility, transmissions with flexible automatic-shift capability, adjustable transmission-cutoff settings, and electronic monitoring systems that provide up-to-the-second information on operating parameters. These electronic systems also may allow extensive diagnostic investigation, as well as the capability to tailor machine settings to the individual operator.

And as a final — but vitally important — aspect of these machines, routine serviceability is less of a chore. Assisting in this regard are features such as ground-level access to routine service points, extensive use of sight gauges, central lubrication banks, vertical spin-on filters, remote drains, remote pressure taps and easily accessible oil-sampling ports.

Considering the overall design of today's mid-size wheel loaders, you might say that they are characterized by an attention to detail, which, in the final analysis, makes them more productive.

Web Resources

Find wheel-loader-manufacturers' websites in the online version of this story at **Construction Equipment.com.** Just click on Archives, Buying File, and you'll find a link to this story.

LIEBHERR

Hydrostatic Drive and Fuel Efficiency

Liebherr's new Generation-6 wheel loaders, the L 566 2plus2 and the L 580 2plus2, use Liebherr engines that are Tier-3 compliant. They also feature an advanced cooling system that combines larger capacity with a hydraulically driven fan. Cabs for the new models are 28 percent larger than their predecessors, and feature more powerful air-conditioning systems.

Number of models: 2

New models: L566 2plus2, L580 2plus2

Product-line features: The L566 and L580 retain the hallmark feature of Liebherr's loader range, namely, the "2plus2" hydrostatic drive system, which employs two hydraulic drive motors that are used singly or in tandem as operating conditions dictate. According to the company, the design advantages afforded by the drive system can reduce fuel consumption up to 40 percent, compared to competitive models.

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VOLVO

New Volvo Power And Transmissions

The new Tier-3-compliant D7E Volvo diesel engine powers the L110E and L120E wheel loaders, and the new D12D powers the L150E. Both new engines feature electronic control, charge-air cooling, and use hydraulically driven cooling fans that operate only on demand. These loaders employ the company's third-generation automatic powershift transmission, which allows selecting among four operating modes.

Number of models: 3

New models: L110E, L120E, L150E

Product-line features: Volvo wheel loaders are fitted with the company's Torque-Parallel (TP) loader linkage system and proprietary coupler. TP linkage, says Volvo, provides parallel lift and high breakout force throughout the entire lifting range. These machines also feature variable-displacement, load-sensing implement hydraulic systems, circulated-oil brake cooling and the Volvo Contronic system.

Visit ConstructionEquipment.com/info and enter 158

CASE

Electronic Transmission Control

The Cummins-powered Case 921C features electronic control of its torque-sensing "autoshift" transmission and uses hydraulically actuated, maintenance-free, multiple-wet-disc brakes (with an accumulator) at all four wheels.

Number of models: 1

New models: 921C

Product-line features: The 921C uses a tandem vane-type hydraulic pump that delivers 68 gpm at 2,850 psi to the loader implement hydraulic system. The open-center control valve can be equipped with up to four spools, including those for auxiliary functions. Electromagnetic detents are used in the float, raise and rollback circuits.

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Gallery of Wheel Loaders

HYUNDAI

Electronic Communication and Auto Shift

Using a CAN (Controller Area Network) system, the three electronic control units (engine, transmission and machine) in the Hyundai HL760-7A and HL770-7 wheel loaders can communicate, says the company, to ensure optimal performance. These machines also use power-shift transmissions that provide two automatic shift modes.

Number of models: 2

Product-line features: Transmissions feature proportional control valves that allow "precise control of the clutches" by monitoring operating parameters and selecting a specific shift curve accordingly.

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NEW HOLLAND

Tier-3 Compliant and Variable Pumps

The new W190B wheel loader from New Holland will be available in the fourth quarter of 2006. The new machine will feature a Tier-3-compliant New Holland engine and will use axial-piston, variable-displacement hydraulic pumps in its implement hydraulic system. Larger, more accommodating cabs will be an integral part of the overall package.

Number of models: 1

New models: W190B

Product-line features: The wheel loader line has seven models, including three tool-carrier models. Along with the launch of the 213-net-hp W190B, New Holland will also announce the new W170B.

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KOMATSU

Multi-Mode Power and Shifting

Komatsu loaders in 200-to-300-hp category feature a two-mode engine-power feature, which provides "normal" mode for general loading and fuel-efficiency, and a "power" setting for hard digging or hill-climbing situations. In addition, the machines feature a four-mode transmission shifting system including a manual-control setting and three "auto" settings.

Number of models: 3

Product-line features: Loaders have a variable transmission cutoff feature that allows the operator to select the point at which the left pedal neutralizes the transmission. Also part of the design is a dual-speed hydraulic system, which generates extra hydraulic flow in lifting and loading situations, but diverts that power to tractive effort in hard digging.

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JOHN DEERE

Smart-Shift Technology

J-Series wheel loaders have the "smart-shift" system, which continuously senses speeds and loads and adjusts clutch pressures accordingly. J-Series also provides three operator-selected clutch-cutoff settings to match the grade.

Number of models: 3

Product-line features: When designing the J-Series, Deere precisely counterweighted the machines to "provide optimum fore and aft stability and a low center of gravity," making these models "the only machines in their class that can accomplish a 40-degree articulation and still deliver exceptional tip-load stability," says the company.

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The New H-Series

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CATERPILLAR®

Gallery of Wheel Loaders

JCB

Stainless-Steel Exhaust

Among the 456ZX wheel loader's features is a stainless-steel exhaust system designed for long life. But beneath the beauty, says JCB, are such features as a load-sensing hydraulic system that uses twin, variable-displacement piston pumps and a fully automatic ZF "Smoothshift" transmission with modulated gear changes.

Number of models: 1

Product-line features: A number of attachments fit directly to the wheel-loader linkage or via the company's "quick-hitch" coupler. Attachments include pallet forks, crane jibs, high-dumping buckets and timber grapples.

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DRESSTA

Long List of Standard Features

The Dressta 530E's Komatsu S6D114E-1 diesel engine drives into an electronically controlled four-speed powershift transmission that offers both manual or automatic gear changing. The loader's implement hydraulic system employs three vane pumps and operates at a relief pressure of 3,000 psi. A joystick controller is standard, as is air conditioning.

Number of models: 1

Product-line features: The wheel-loader line includes five models, from 120 to 415 horsepower. Dressta, the joint-venture of Komatsu America International and the Huta Stalowa Wola (HSW) manufacturing company in Poland, supports it products in North America through three subsidiary companies and an extensive network of independent dealers.

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DOOSAN/DAEWOO

Refined Technology

The new Doosan/Daewoo wheel loaders, the DL300 and DL400, feature Tier-3 compliant diesel engines. The DL300 uses the Doosan DL08 engine and the DL400 uses the Cummins QSL9. Both six-cylinder engines feature electronic high-pressure common-rail fuel injection and charge-air cooling.

Number of models: 2

New models: DL300, DL400

Product-line features: The DL300 and DL400 use four-speed, powershift ZF transmissions that can be operated in an automatic mode. The implement hydraulic system for the DL300 employs a tandem vane pump with automatic wear compensation, and the system for the DL400 uses two load-sensing, variable-displacement axial-piston pumps. Both models incorporate hydraulically driven fans.

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KAWASAKI

High-Efficiency Hydraulics

Kawasaki's hydraulic system uses a separate pump for steering and loader functions — a design, says the company, which maintains "light-touch" steering even at low engine speeds. When steering requirements are satisfied, the steering pump's excess flow is diverted to the loader circuit for faster response.

Number of models: 3

Product-line features: Loaders feature heavy-duty, torque-proportioning differentials, automatic transmissions, an adjustable transmission "declutch" feature, box-frame rear chassis and flat glass to facilitate replacement.

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CATERPILLAR

New Load-Sensing Hydraulic System

According to Caterpillar, the combination of its Tier-3 ACERT engine technology and the new load-sensing hydraulic system in its H-Series medium wheel loaders (announced last fall) results in a 4- to 7-percent "improved fuel benefit." This closed-loop system, says the company, also uses the M3PC Priority Pressure Compensated Valve, which can "set priority of one function over another to ensure no work stalls."

Number of models: 3

New models: 962H/IT962H, 966H, 972H

Product-line features: H-Series wheel loaders feature hydraulically driven cooling fans (part of new, "more balanced" cooling system); "electro-hydraulic" implement controls; and the optional Command Control steering system, allowing full machine articulation through only 70 degrees of steering-wheel movement. Sound levels for the operator and bystander also are significantly reduced.

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TEREX

Exceptional View

Among the many features Terex promotes for its wheel loaders is the visibility afforded by their high-glass-area cabs, allowing good sight lines to the bucket corners and to the surrounding jobsite. Also on the list of features are Daewoo diesel engines, both charge-air cooled, four-speed powershift transmissions and hermetically sealed final drives.

Number of models: 2

Product-line features: According to Terex, the "high-torque-rise" fuel system used in these loaders delivers a controlled increase of fuel as the engine lugs back from rated speed, resulting in "horsepower greater than rated power and thereby improving response and providing greater rimpull, more lift force and faster cycle times."

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INTENSUS

Closed-Center Hydraulic System

According to Intensus, its WL50G wheel loader is equipped with a closed-center hydraulic system with pilot control, resulting in smooth, responsive operation. The WL50G uses a Cummins 6CT8.3-C diesel engine and a model ZF4WG200 powershift transmission and ZFAP axles.

Number of models: 1

Product-line features: The wheel loader range includes three models: the WL50G at 205 horsepower, and the WL40G and WL30G, rated at 170 and 125 horsepower, respectively. These machines are available with a high-lift boom and selection of buckets, including those for soil, snow and coal, plus a clamp-type and sidedump.

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CHANGLIN

Cummins Power and Canadian Distribution

The Changlin wheel loader range includes nine models, which range in horsepower from 35 to 290. Changlin Canada imports five of these models, beginning with the ZL30H at 65 horsepower, through the ZL75H at 290 horsepower. Whether Changlin will opt to market in the United States is still an open question.

Number of models: 3

Product-line features: The wheel loaders in this Buying File category are powered by Cummins diesel engines and feature powershift transmissions based on ZF technology and Graziano or Volvo wet-type axles with DL multi-disc limited slip differentials.

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VOLVO

By WALT MOORE, Senior Editor

Equipment Trailers

BIL-JAX

The six models of Escalate trailers provide capacities from 1,500 to 12,000 pounds and are designed for hauling small to mid-size equipment, including skid-steer loaders, boom lifts, mini-excavators, small rollers and trenchers. The deck lowers hydraulically (manually on the two smallest models) and provides a shallow, 6-degree loading ramp. An adjustable hitch on the trailer allows moving the coupler to accommodate the hitch height of the tow vehicle.

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DITCH WITCH

The T7B (tandem-axle) and S6B (single-axle) trailers are built with structural steel frames and torsion axles. Standard features include steel-mesh, skid-resistant ramps; steel, skid-resistant bar-grating decks; tie-down points; and a complete lighting package, including shock-mounted clearance lights for highway driving. The trailers are built with a no-tilt feature, and storage space is provided in front for transport of attachments, such as buckets, pallet forks, trenchers and augers.

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VERMEER

The TLR30 trailer is designed to carry walk-behind trenchers and small stump cutters. The tilt-bed design and 12-inch loading height are aimed at facilitating loading and unloading without ramps. A composite, slip-resistant lining sprayed on the steel deck is designed to provide longevity and traction in most weather conditions. "Binderless" tie down is an optional feature for this 141-inch-long, 71.5-inch-wide trailer.

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JLG INDUSTRIES

Triple-L trailers incorporate a Power Deck hydraulic system that allows lowering and raising the deck hydraulically in less than 15 seconds. The trailers require no ramps, ascending grades or additional personnel. Capacities range from 2,000 to 10,000 pounds, and decks are available in sizes up to 6 feet wide by 14 feet long. Features include a quick-adjust tongue jack, heavy-duty tie down rings and a 12-volt electrical system to power the hydraulic pump. Optional accessories include extended side rails, surge brakes, loading winch, trickle charger and four-wheel brakes.

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LANDOLL

Model 400 Series traveling-axle trailer, a four-beam unit with either a tandem- or triple-axle configuration, is available in 48-, 50- or 53-foot lengths. The 48- and 50-foot versions are California legal. These trailers feature a 6.5-degree load angle, and the model 435's upper deck transition has been flattened to provide extra-low clearance. The trailer features a deck rating of 50,000 pounds within 10 feet standard with a 38-inch loaded deck height. All Landoll trailers feature LED lights, apitong hardwood deck, 25,000-pound axles, full 4S2M ABS braking system, two-speed landing gear and hub-pilot wheels with outboard brake drums.

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TRAIL KING

Advantage Series trailers are equipped with the company's patented, detachable-gooseneck system, which features self-lifting hydraulic cylinders, non-ground-bearing design and a V-shaped alignment guide. The four-beam deck is designed to handle a wide range of loads, and full-depth outriggers span the entire side of the beam for hauling extra-wide loads. Loading ramps are double-hinged and reinforced with a support ledge. In the wheel area, center I-beams are thicker and reinforced to allow eliminating the front cross member for accommodating excavators and boom-type equipment. Advantage Series models are available in 35-, 40- and 55-ton capacities.

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TRAIL-EZE

The new TE70XT features a low load angle with no moving axles, allowing equipment with small tires, says the manufacturer, to load as easy as larger equipment with concern for axle alignment or for parts wearing out and not being able to push back under the load. To these features, the TE70TXT (pictured) adds the capability to lift the entire bed to assist in unloading without the use of a hydraulic upper deck ramp. These two trailers were designed with hard-to-load equipment in mind.

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ROGERS BROTHERS

This custom-designed, 55-ton-capacity Rogers Brothers trailer has a detachable gooseneck with front folding ramps, removable wheel pockets and centerboards, air-ride suspension and auxiliary battery power to allow lights and safety lights to function when disconnected from the tractor.

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EAGER BEAVER

The 50-ton, self-lifting, detachable-neck lowboy (black) has standard air-ride suspension, third lift axle, all-wheel ABS, spring brakes on all axles, outboard drums, hub-piloted Bud wheels and Michelin tires. This lowboy has a true 100,000-pound payload capacity, says Eager Beaver. The red tag trailer is a 25-ton Paver Series with front lift axle and an 8-degree load-angle beaver tail. The Paver Series also incorporates all-wheel ABS, spring brakes, outboard drums, hub piloted Bud wheels and Michelin tires.

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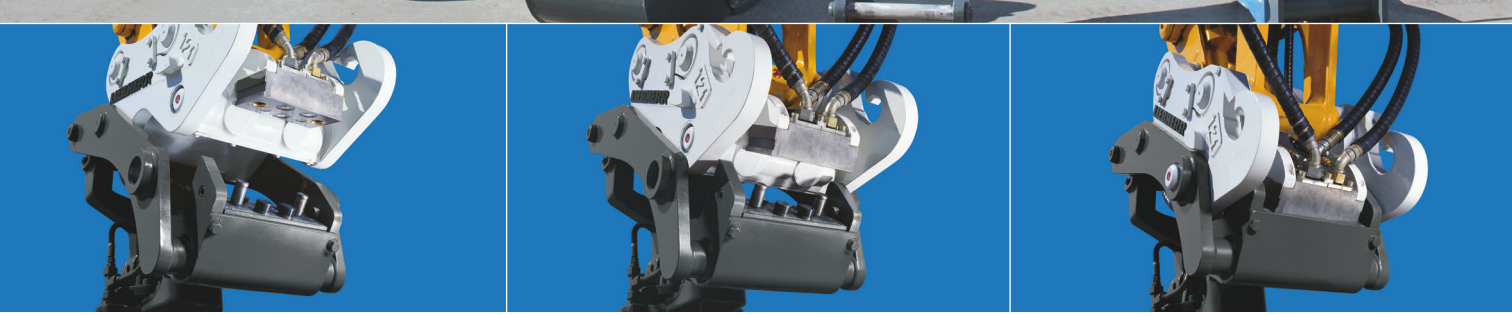

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TRANSCRAFT

Beavertail Drop Deck Trailer (DTL-2100) and Extreme Duty (DTL-3000) feature the "level-deck" Beavertail ramp system. The standard system has a level-deck at the rear and adjustable, spring-assisted ramps that slide from side-to-side. The DTL-2100 has a beam capacity of 60,000 pounds in a 10-foot area, or 55,000 pounds in a 4-foot area. The DTL-3000 has an 85,000-pound beam capacity in a 10-foot area, or 80,000 pounds in a 4-foot area. Each ramp has a loading capacity of 10,000 pounds. The Beavertail is equipped with Hendrickson Quick-Align air-ride suspension, and the trailers feature a special wiring system to protect against corrosion from moisture.

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ETNYRE

The new Blackhawk Classic Series 55-ton capacity trailers have four-position kingpin heights with four deck height/ground clearance settings. These trailers require no shim blocks or trap doors; just move the lever to the setting desired. The "+3/-3" height-control valve allows adjustment at the rear of the deck by turning the spring-loaded leveling valve. The boom well has an extremely low first cross member to reduce the stick height of excavators being transported. Blackhawk Series trailers are designed to deliver the lifting capacity and travel (above and below ground level) to clear obstacles encountered on the road.

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By MIKE VORSTER, Contributing Editor

Six Functions of Machine Management

No two fleets are managed in exactly the same manner, but all successful operations include six key functions

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

Equipment management touches nearly every aspect of a company's operations. The skills required vary from the master mechanic to the finance specialist, and organization structures depend more on the personalities involved than on careful planning and forethought. Yet every company approaches the complex and difficult task of equipment management in its own way.

There are, however, six functions that must be competently performed, presented graphically in the diagram below. An equipment-using organization should cover all these functions and ensure that everyone understands their responsibilities and contribution to the business. For each function, consider its importance, who is responsible, and how success is measured.

1. Acquisition and disposal. Effective acquisition and disposal is not just a question of buying low and selling high. Acquisition makes up a major portion of total owning cost and requires that long-term technical and commercial decisions are based on knowledge of the market and the relationships established with manufacturers and finance organizations. Managers need to develop specifications tailored to their needs; have policies on standardization; and know how to structure purchase, lease, rental-purchase or rental agreements suited to their financial and tax situation.

Disposal of equipment at the best possible price requires that managers understand the used-equipment market, explore every possible alternative, and maintain effective relationships with dealers and agents.

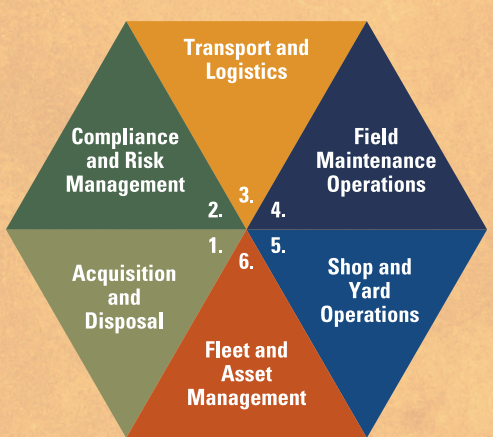
2. Compliance and Risk Management. This function makes up the second portion of total owning cost and covers the steps needed to ensure that fleet assets comply with all regulations and are licensed, insured and inspected as needed. On the surface, it appears to be a relatively simple, routine task. This task is, however, growing in cost and complexity as we see more emphasis on complex insurance requirements, emissions standards and safety regulations. This function becomes extremely complex when operations are performed in many states or in international markets. It simply cannot be neglected.

3. Transport and Logistics. Acquisition and disposal ensure that we have the required equipment in our fleet; compliance and risk management ensure that it is legal. The transport and logistics function moves it to the right place at the right time.

Effective dispatch and tracking operations are essential for fleet utilization, and many companies run large transportation fleets that move equipment on a daily basis. Questions often arise as to whether the costs should be part of the equipment rate or be charged directly to the projects involved. Regardless, it is another cost that must be controlled, and another equipment-management function that must be competently performed.

4. Field Maintenance Operations. This function

Focus on Functions



An effective equipment-management strategy must include these six functions. Everyone involved in the fleet must understand responsibilities, function and measurements of success.

covers all the actions needed to make sure that the equipment on site is available and able to work on a daily basis. It includes fueling and daily inspections, periodic and preventive maintenance, and the replacement of wear parts. The costs involved form part of total operating cost and must be included in the equipment rate.

Questions arise when it comes to deciding who sets field-maintenance standards, who is responsible for differences between actual and budgeted costs, and who is responsible for field-maintenance mechanics. Clearly, small projects can't assume these responsibilities; clearly, large projects can and, perhaps, should.

Questions arise when it comes to deciding who sets field-maintenance standards, who is responsible for differences between actual and budgeted costs, and who is responsible for field-maintenance mechanics

5. Shop and Yard Operations. Changes in machine design, shortages of field personnel, and the need to work under controlled conditions means that very little repair, renovation or rebuild work is done in the field. Shop and yard operations, either self-performed or outsourced, lie at the heart of a process whereby machines come off field assignment and are made ready for their next job.

The costs involved make up the second component of total operating cost, and the success of this function determines the long-term capability and reliability of the equipment fleet. It is critical for the success of the company, and many aspects of shop and yard operations can benefit from the efficiency and specialization achieved through outsourcing.

6. Fleet and Asset Management. This function is responsible for strategic decisions regarding fleet composition, fleet average age, capital expenditure, finance, tax and return on investment. It absorbs data from the other functions; interfaces with the company strategic-planning process; and develops the rates, estimates, budgets, benchmarks and standards needed to manage the whole process.

A focus on this function can achieve substantial benefits in terms of capital structure, tax planning, cash management, and return on investment. Successful companies excel in this area and make strategic decisions that balance the technical, operational and financial aspects of managing the fleet as a major corporate asset.

Steps to organization

Using the six functions and their arrangement in the hexagon, we can draw some general conclusions regarding the way we organize our company to better manage the fleet.

The three functions in the top half of the hexagon (compliance and risk management, transport and logistics, and field maintenance operations) are short-term immediate issues of primary concern to the jobsite. They want equipment that is legal, in the right place, and working. Project teams can and, in many situations, should manage these functions within a framework of clear and strongly enforced policies.

The three functions in the bottom half of the hexagon (acquisition and disposal, shop and yard operations, and fleet and asset management) are long-term strategic issues of primary concern to the company and its long-term future. There is no doubt that these are the province of the equipment professional and should be managed for the long run. Competence in these functions is a corporate responsibility and a prerequisite for success in the upper three functions.

Functions 1 and 2 make up owning costs; functions 4 and 5 make up the operating cost. Each has a long-term "invest for the future" component (1 and 5), and each has a monthly or hourly cost component (2 and 4). Function 6 ensures that the fleet age, size and composition match corporate requirements; function 3 makes sure the fleet is deployed in the right place at the right time.

It should be possible to review each of the functions and assess its importance to your company. It should also be possible to identify the individuals or teams who have primary responsibility for each function and see whether they have the knowledge, guidance and authority needed to succeed.

Next month, we will use the functions to differentiate between centralized and decentralized organizations and to develop metrics to measure success. CE

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By LARRY STEWART, Executive Editor

Bomag Vies for Commercial-Paving Leadership

First all-Bomag pavers from the acquired Gilcrest facility go toe-to-toe with the biggest pavers under 19,000 pounds

Bomag stepped into the big leagues of commercial pavers (those with operating weights less than 19,000 pounds) with the product of recent investments in the acquired Gilcrest manufacturing facility. Replacing its 813 RT with the 814-2/815-2 (one tractor with either 14- or 15-foot maximum screed width), Bomag gained half a ton of hopper capacity, ability to use electronic grade controls, and 58 feet per minute of paving speed (an increase of nearly 50 percent). It's the only commercial-class paver with Cummins power.

This introduction also pits the 815-2 at 15,700 pounds against LeeBoy's 8500 and 8515, the Mauldin 1750-C, and Ingersoll Rand's 3020/3120. Bomag is following the category creep, as machines at the large end of the commercial asphalt paver class continue to grow. Two years ago, only LeeBoy's 8500 and the Mauldin 1750C were heavier than the 15,400-pound 814-2, and none were more powerful than its 85-hp Cummins. But in the past two years, Ingersoll Rand claimed the heavyweight title with machines approaching 17,000 pounds, and LeeBoy added the 15,900-pound 8515.

Despite weighing in as much as 1,200 pounds lighter than these competitors, Bomag's 815-2 matches their key capacity specs — maximum paving width and depth — and delivers unmatched paving speed of 180 feet per minute and 4-mile-per-hour travel speed.

The standard screed is the new UNIMAT 2, offering paving widths that can be adjusted hydraulically on-the-go from 8 to 14 or 15 feet. Material augers mounted directly to the screed extensions deliver asphalt consistently at all paving widths. The augers are reversible and can be automatically or manually controlled.

The vibratory screed can be crowned or inverted 2 inches and is heated by propane. Hydraulic depth controls come standard.

The only commercial-class paver with Cummins power also manages power for fuel efficiency with a load-sensing hydraulic system.

The 815-2 is available with Topcon's System Four Screed Automation. Using a non-contacting sonic sensor, Screed Automation matches joints without skis or string lines.

A low deck with dual control stations keeps the operator close to the work. The new paver tractor has an 8-ton hopper, Bomag's largest, and dual-slat conveyors carry the material to the screed. The hopper can be raised more than 6 feet for access to the undercarriage and the conveyor system.

The 814-2/815-2 is expected to retail for about $100,000, and Bomag's standard 12 month/1,000-hour warranty applies.

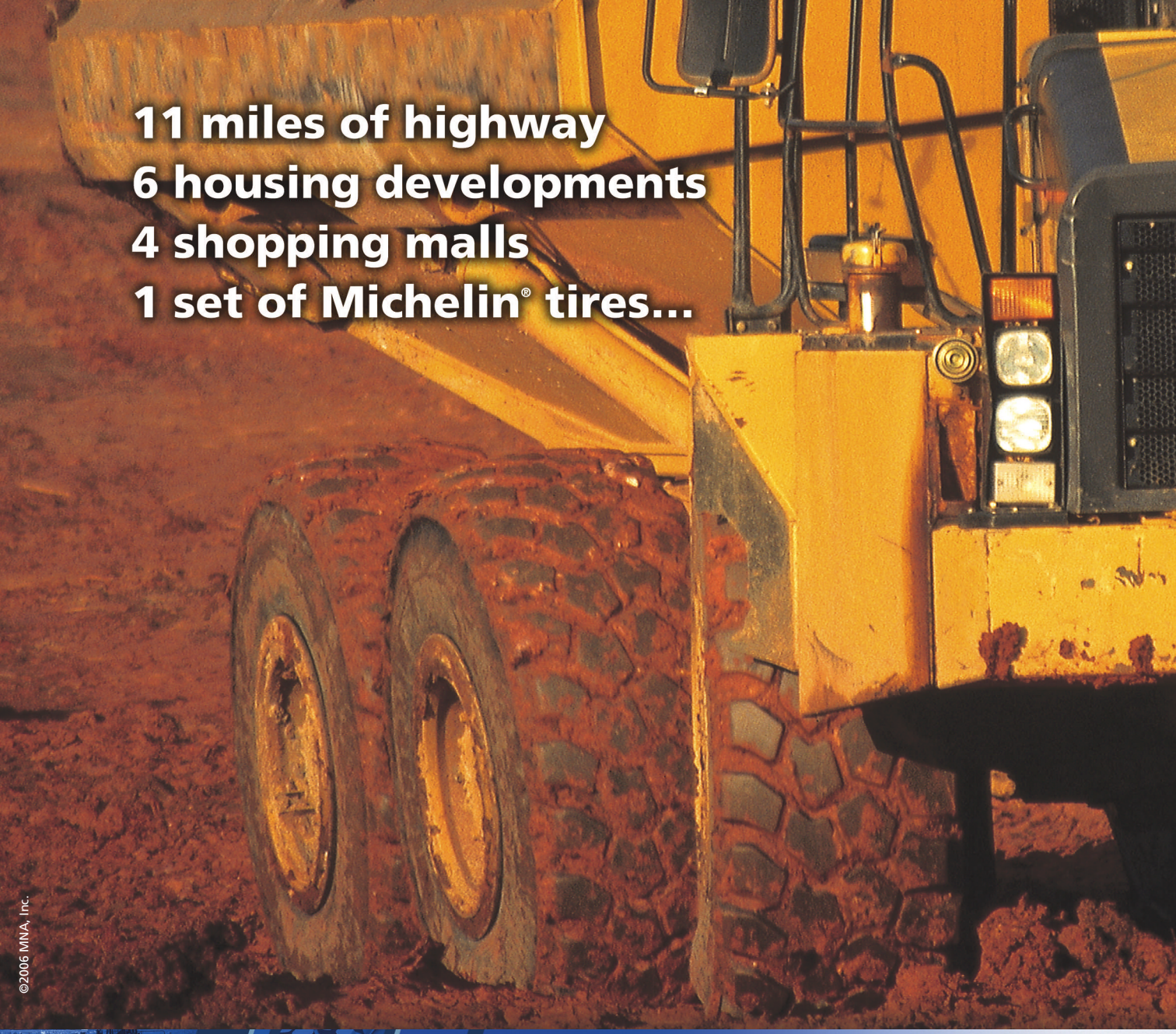
Visit ConstructionEquipment.com/info and enter 183

Top Asphalt-Paver Competitors

Model	Operating Weight* (lb.)	Max. Paving Width	Hopper Cap. (tons)	Engine Make / HP	Max. Paving Speed (fpm)
Bomag 814-2	**15,400**	**14′ 0″**	**8**	**Cummins / 85**	**180**
Bomag 815-2	**15,700**	**15′ 0″**	**8**	**Cummins / 85**	**180**
LeeBoy 8500	15,700	15′ 0″	8	Hatz / 74	140
Mauldin 1750-C	15,700	16′ 0″	7.5	Deere / 80	140
LeeBoy 8515	15,900	15′ 0″	7.5	Hatz / 74	160
Ingersoll Rand 3120	16,958	15′ 0″	8	Kubota / 87	120

* With smallest screed
Source: www.Spec-Check.com

While not the heaviest pavers in the top end of the commercial class, Bomag's 814-2/815-2 match most key performance specs and deliver the fastest paving and transport speeds. To compare more paver specifications, go to ConstructionEquipment.com.



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MICHELIN
A better way forward

By KATIE WEILER, Managing Editor

Truck Bed Uses Air to Lift Deck, Ramp

Designed for transporting heavy equipment, the Retriever is powered by a truck's auxiliary air system instead of hydraulics

Joe Simons owned and operated a construction/industrial equipment distribution business as well as rental companies for 28 years. He experienced first-hand the hauling challenges and high truck-maintenance costs facing today's contractors. As a result, Simons led an engineering team to bring a more affordable hauling solution to life.

The Retriever low-profile truck bed features low deck height, light weight, and eliminates the need for a heavy, complex hydraulic system.

The Retriever low-profile truck bed is said to replace pickup trucks and trailers, hydraulic roll-back trucks, hook loaders, and even semi-trailers for hauling heavy equipment, according to Simons. It features low deck height, light weight, and eliminates the need for a heavy, complex hydraulic system. The Retriever taps into a truck's own air system as the power source to raise and lower the patented, curved, hinged deck and bi-fold ramp. It is isolated from the brake system by a protection valve that cuts off air to the Retriever if the system pressure drops below the minimum required for the braking system. And because the unit uses air instead of hydraulic oil, the deck operation is unaffected by cold weather.

"There is so little that can go wrong, a Retriever will easily outlive the truck it's mounted on," says Simons. "That's why we can provide a lifetime warranty...the only one in the industry."

Loading angles of 10.8 to 13.5 degrees (19 to 24 percent grade) can be achieved, and there is no "breakover" when loading tracked equipment. There is also a traversing winch mount that travels the full width of the deck, making side-by-side loading or off-center hook-ups faster and safer, says Simons.

The Retriever is offered in three capacity ratings: 7.5 tons for chassis to 30,000-pound GVWR (class 6); 10 tons for chassis to 33,000-pound GVWR (class 7); and 15 tons for chassis to 54,000-pound GVWR (class 8). All models are available in 20- to 28-foot lengths in 2-foot increments. They can be ordered with either dual, lightweight, aluminum slide-out ramps or with a full-width, air-operated, steel folding ramp. Plus, all models can be configured for loading-dock access.

According to the company, customers typically buy a new or used truck chassis and have the Retriever installed at its Waukesha, Wis., plant or through designated installation contractors in the United States and Canada.

The Retriever lists for $25,000 to $40,000, depending on model, length and options.

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KA05

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Market Watch Lite

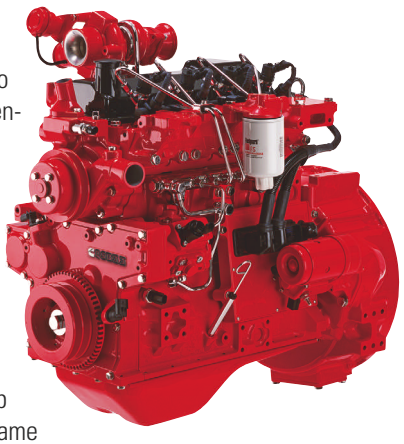
By HEATHER BURLINGAME, Senior Production Editor

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

Leica

The 3D laser ScanStation incorporates four "core" total station features, including full field-of-view, survey-grade dual-axis tilt compensation, survey-grade accuracy, and excellent useful measuring range, according to Leica. Maximum range is 300 meters.

Visit ConstructionEquipment.com/info and enter 213



Cummins

With a power range from 80 to 110 horsepower, the QSB3.3 engine meets Tier 3 and is the first industrial engine of its size to incorporate full-authority electric controls and a High Pressure Common Rail fuel system, says Cummins. The QSB3.3 engine evolved from the B3.3 platform, and the top-rated 110-hp QSB3.3 engine achieves the same fuel efficiency as the 85-hp B3.3 engine at Tier 2. The HPCR fuel system enables high-pressure fuel injection from 11,600 to 16,000 psi to be maintained independent of rpm.

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Yanmar

Billed as having the smallest direct-injection system available, Yanmar's LV Series engines have intermittent horsepower ratings of 4.7/3,600; 6.4/3,600; and 9.1/3,600. The three models — L48V, L70V and L100V — are Tier 2 compliant and counter balanced for high-speed operation. Multiple PTO shafts are available. Recoil start with manual decompression and auto-return lever is standard. The engines are ideal for gen sets, pumps, small compressors and sprayers.

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Leica

GX1230 GG and ATX1230 GG sensors for surveying applications now support both GPS L2C signals and Glonass satellites. They are designed to track future GNSS signals, such as GPS L5 and Galileo.

Visit Construction Equip ment.com/info and enter 216

Subaru Robin

This line of compact gasoline generators uses the company's EX series overhead cam engines. Models RGX2900, RGX3600, RGX4800 and RGX4800E offer maximum outputs ranging from 2,900 watts to 4,800 watts. Gen sets weigh less and are smaller than previous models due to the engines' compact design, the company says. RGX2900, RGX3600 and RGX4800 feature standard recoil start, and the RGX4800E has a standard electric start as well as a backup recoil starter.

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Oilgear

For large equipment, the PVV open-loop, axial piston pump is available in three displacements and multiple frame sizes. With horsepower to 560 and maximum pressure of 6,500 psi, the pumps run on low-viscosity or other special fluids. A quiet port-plate design minimizes noise at typical electric motor speeds.

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Atlas Copco

The company has added a line of five hydraulic power packs to its offering, for use with hydraulic handheld tools, through its acquisition of Lifton. Packs range in weight from 163 to 256 pounds. LP 9-20 P and LP 13-30 P have 9- and 13-hp Honda gasoline engines, respectively, and have a power-on-demand system that increases engine speed only when a tool is engaged.

Visit ConstructionEquipment.com/info and enter 218

Market Watch Lite

Chromalox

Model HVH blower heater can be mounted on the wall or ceiling. Its compact size allows placement in tight spaces. A pilot light indicates normal operation of the heater. An outlet screen prevents objects from coming in contact with the fan. Access to internal components is achieved through a large door at the bottom of the unit and a removable case front.

Visit ConstructionEquipment.com/info and enter 220

Stihl

TS 700 Cutquick cut-off machine features the X2 long-term air-filtration system with twice the filter life than that of former systems, says Stihl. It is lightweight, balanced and equipped with a 5-point, dual-element, vibration-control system. The handle is adjustable to operator height, and large rubber dust guard helps protect the operator from debris.

Visit ConstructionEquipment.com/info and enter 221

GrimmerSchmidt Compressors

MonoBlock compressors use a Chrysler 5.7-liter engine. One bank of the V8 engine controls power; the other is used to compress air. Model 185E provides 185 cfm and can handle two breakers. The fuel-injected engine starts without cold weather aids to -20F. At 1,560 pounds, the 185E consumes 3.3 gph at full load, says the company. To reduce maintenance costs, the unit's design eliminates the air end and oil system associated with the rotary-screw diesel units, which eliminates the compressor oil, oil filter and separator element.

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Market Watch Lite

Blastrac

The BMP-250-X scarifier comes in gas and electric models for removing coatings, paint, traffic lines, mastics, adhesives and rubberized coatings. When used with a dust-control system, the 10-inch units control dust while scarifying, planning, cleaning and resurfacing concrete, asphalt and steel. A side-loading drum provides access to quick-change drums and cutters — without tipping the machine. Other features include twin-system depth control, sealed bearings to reduce maintenance and a toothed pulley/belt-drive system to prevent slipping.

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Hobart

The McKay Tube-Alloy AP-O self-shielded flux cored wire works well for build-up and overlay on austenitic manganese steel, but also for welding on carbon and/or low-alloy steel. Ideal for hard-surfacing applications on a wide range of equipment, the product helps parts sustain high levels of impact by hardening rapidly. Hobart says Tube-Alloy AP-O improves corrosion resistance compared to mild steel or conventional manganese steel hard-surfacing welding wires, and is not limited to a maximum number of build-up layers. It can be used for single or multiple passes in the flat and horizontal position, or for welding vertical surfaces using the horizontal shelf technique.

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Hotsy

Super Skid HSS series pressure washers pump between 4.8 and 9.5 gpm. Four models make up this range of diesel-powered hot-water washers, producing between 2,500 and 3,200 psi of water pressure. Rated for continuous use, they can be installed on a truck bed or trailer for use with a water tank. Lombardini engines have electric start and a ¾-inch schedule 80 heating coil. All units have a 2,000-watt generator. The belt-drive pump comes with a 7-year warranty.

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John Deere

The High-Visibility Coupler, which matches Deere's 444J, 544J and 624J wheel loaders, have hooks farther apart (in-line with the boom arms) and higher for mounting the tools closer to the machines and enhanced visibility. Hook-on type buckets that work with the coupler include 2.0-, 2.5-, 3.0- and 3.5-cubic-yard versions. Fork frames are available in 60- and 90-inch widths with 48- or 60-inch tines and an optional backrest.

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Oilgear

To 3,600 rpm with a maximum pressure of 4,250 psi, PVM open-loop axial piston pumps are available in three frame sizes with multiple displacements. With hardened steel shoes running on a hardened swashblock surface, the pumps provide optimal contamination resistance and allow high-pressure operation and longer pump lifecycle, says the company. The port plate converts right-hand driven pumps to left-hand driven pumps, or vice versa.

Visit ConstructionEquipment.com/info and enter 227

Handy Hitch

Grader-mounted packer/rollers come in 90- and 120-inch models. Billed as the most compact and lightweight packer/rollers available, they require no separate lift assembly. The contour feature allows the units to follow the shape of the road. List price is under $20,000.

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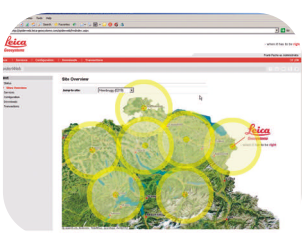
Leica



Designed for GPS reference stations and networks, the V2.1.0 update for Spider software features an enhanced user interface with consistent map views supporting now-loadable background maps and graphical, continuous raw-data status view. The Spider update supports the company's GMX902 monitoring GPS receiver. Both real-time positioning and post-processing (to monitor slow moving objects) support data rates to 20 Hz. Leica has also introduced SpiderWEB software for Internet access to GPS reference-station data. The software can be used for single or multiple stations.

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Market Watch Lite

Atlas Copco

The MB 1200 hydraulic breaker has high single-blow energy and an impact frequency of 680 blows per minute. For use on excavators between 15 and 26 metric tons, the breaker has a maximum hydraulic flow of 37 gpm at 2,610 psi. AutoControl monitors the hammer and adapts frequency and power output to match operating conditions. StartSelect also adapts to jobsite conditions, allowing start-up and shut-off to be adjusted. Warranty is 12 months, excluding expendable wear parts, and the price is $48,240.

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Landa

The PC3-30124 cold-water pressure washer is powered by a 9-hp Subaru EX27 engine. The engine requires 30 to 40 percent less recoil pulling force, says Landa, and has a chain-driven overhead cam and high pent-roof combustion chamber. The unit delivers 3 gpm and 3,000 psi of power. Brass manifold carries a lifetime warranty, and oil end of the pump is warranted for seven years.

Visit ConstructionEquip ment.com and enter 234

Stow

CS-7060 walk-behind saw has stay-level handles that minimize operator fatigue and reduce the risk of back injury. With a 60-hp Deutz diesel engine, the 1,725-pound saw has a 36-inch blade capacity and a maximum cutting depth of 15 inches.

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Leica

MobileMatriX GIS Version 1.51 allows field crews to attach several sensors and measure various sensors simultaneously. Synchronizing data, the unit manages measurement processes and storage in one common database directly, says Leica. Sensors include total stations, GPS, level instruments, laser range finders and others.

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Ridge Tool

Rigid SeekTech ST-305 transmitter provides portability for users while locating utility lines. Designed for use with SeekTech SR-20 utility locator, the transmitter has a fully adjustable power output, transmits at up to five watts of power, and has four frequencies from 1 to 262 kHz. It can transmit two frequencies at the same time for diagnosing complex locates. The 2.5-pound transmitter measures 4.7 inches, and is small enough to be stored in a SeekTech SR-20 case.

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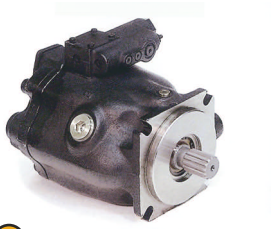

Parker Hannifin

For open-circuit applications on mobile equipment, P1 series medium-pressure, variable displacement axial-piston pumps feature a compact, round housing, billed as being smaller and quieter than conventional pump designs. Rated for continuous service at high drive speeds, three models with maximum displacements of 75 cc/rev, 100 cc/rev, and 140 cc/rev are available. A variety of control options are available.

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Trimble

The GCS900 Grade Control System now offers increased flexibility and in-cab control. Version 10 includes the ATS Construction Total Station configuration, which allows dozers to work in confined spaces, or perform high-precision grading. Single GPS configuration for dozers is ideal for site preparation and bulk earthmoving and is upgradeable to the Dual GPS or ATS system. The new Auto Side Shift option for motor-grader blades is designed for grading linear sections.

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By KEITH HADDOCK, Contributing Editor

The Quick-Way Grademaster

Versatile Gradall telescoping excavators found competition in early years

The cable/hydraulic hybrid design of the Chore-Master attachment was replaced in 1960 by a new single-purpose fully hydraulic machine known as the Grademaster.

The well-known Gradall excavator, with its rotating and telescoping digging boom, has served a niche market since the early 1940s. Its unique bucket movements and array of attachments enable it to perform far more than your average excavator, with an extra payback on finishing work for which there is no equal. Now owned by the Alamo Group headquartered in Seguin, Texas, the Gradall Co. still builds its excavators in the factory at New Philadelphia, Ohio, where more than 15,000 have been built since 1950.

But in the early years, Gradall didn't have it all its own way. Several other manufacturers tried to take advantage of the Gradall principle and brought out similar versions of a telescoping excavator. In America, Link-Belt's Rotascope, Warner & Swasey's Hopto Hydro-Scopic, and Quick Way's Grademaster experienced varying degrees of success.

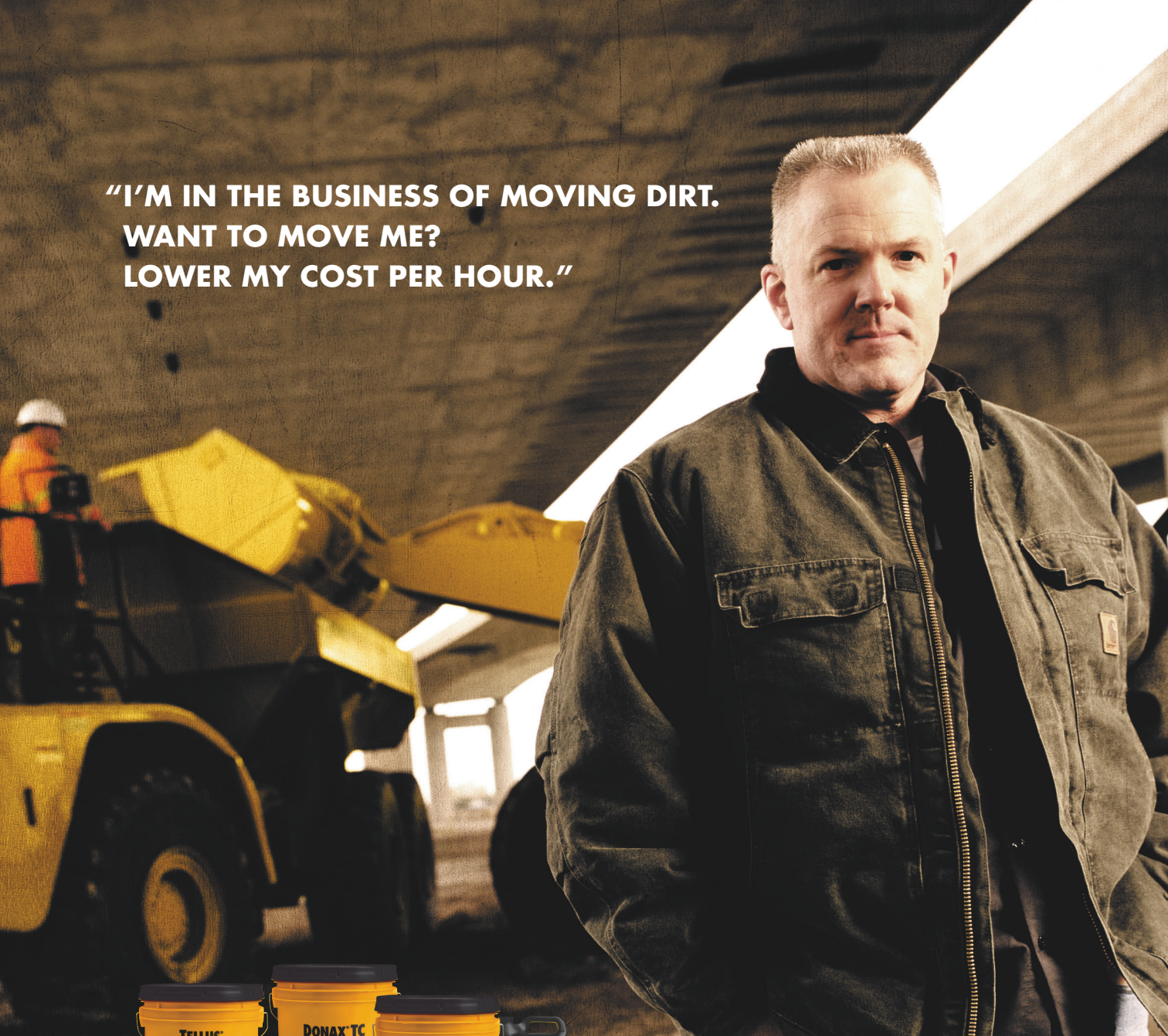
The Grademaster, designed and built by Quick-Way Truck Shovel Co. of Denver, Colo., was initially developed from an earlier attachment to the company's regular truck cranes. Founded by Luke E. Smith, the Quick-Way company had achieved significant success with its truck cranes and claims to have built America's first truck-mounted shovel in 1929.

The crane attachment, originally known as the "Chore-Master," was announced in 1957 as "the first interchangeable hydraulic grading-digging attachment that makes dozens of jobs possible with one machine." Its part-cable, part-hydraulic design incorporated a telescoping boom with a rotating bucket at its end. The boom itself did not rotate. Two large hydraulic cylinders and one hydraulic motor operated the bucket rotation, bucket tilt and telescoping boom, but hoisting the boom was by cable from the crane's standard winding drums. The Chore-Master could be interchanged for a regular crane boom to work as a crane, dragline, clamshell or pile driver.

The cumbersome cable/hydraulic hybrid design was replaced in 1960 by a new single-purpose fully hydraulic machine known as the Grademaster. It was equipped with a fully rotating boom that could telescope 14 feet to achieve a working radius of 31 feet 8 inches. Power came from a 99-hp gasoline engine and the hydraulic system operated at a maximum pressure of 1,600 psi. When mounted on a 6x4 carrier with a 182-hp International Harvester gasoline engine, the Grademaster could dig down 18 feet with a ¾-yard bucket, and the entire outfit weighed 44,500 pounds.

Marion Power Shovel Co. of Marion, Ohio, looking to expand its small machine line, was attracted to Quick-Way products and acquired the company in 1961. It continued as the Quick-Way Crane-Shovel Co. and operated as a division of Universal Marion Corp. A short time later, Marion changed its focus to larger machines serving the surface mining industry, and the Quick-Way products were discontinued.

You can read more about the evolution of construction equipment in Keith Haddock's book "Giant Earthmovers an Illustrated History" available in most bookstores. Also, consider a membership in the Historical Construction Equipment Association, www.hcea.net. Be sure to visit ConstructionEquipment.com for past Iron Works features.



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