Jack of all grades

Versatility is the name of the game for evolving graders

by Allen Zeyher

A motor grader bristling with attachments has the potential to solve many different problems for a road construction contractor. In addition to the standard blade, the motor grader may carry a dozer blade on the front or the side for bulk leveling, a push block for pushing other equipment, a scarifier or ripper for tearing hard surfaces, a broom for cleaning up or a loader for lifting. In winter, the same grader can be fitted with a V-plow, snow wing, windrow eliminator or other attachments for clearing snow.

This versatility makes the motor grader an especially valuable tool for the contractor. John Marshall boasted that Volvo makes a complete line of attachments for its motor graders, formerly known under the name Champion. The change in the name of the motor graders took place in January. Volvo Construction Equipment, Goderich, Ontario, Canada, bought Champion Road Machinery in 1997.

Marshall is marketing manager for the motor grader line at Volvo. He said another feature of Volvo's graders also gives them an advantage: the transmission. He told ***ROADS & BRIDGES***, "We use an eight-speed forward, four-reverse transmission, with gear speeds that are matched to application."

The Volvo 8400 fully sequential, direct-drive, powershift transmission offers evenly stepped speeds up to 27.9 mph. Marshall explained that this configuration provides "a nice low speed for fine grading, lots of good medium-range speeds for all the attachment and grading applications and a good high-range for snow plowing and road speeds."

Komatsu America International Co., Vernon Hills, Ill., also touts the transmission on its new Laterra line of motor graders. "The bottom line is that the Laterra motor graders give the operator the best of both worlds," stated Bob Post, Komatsu's product manager for motor graders.

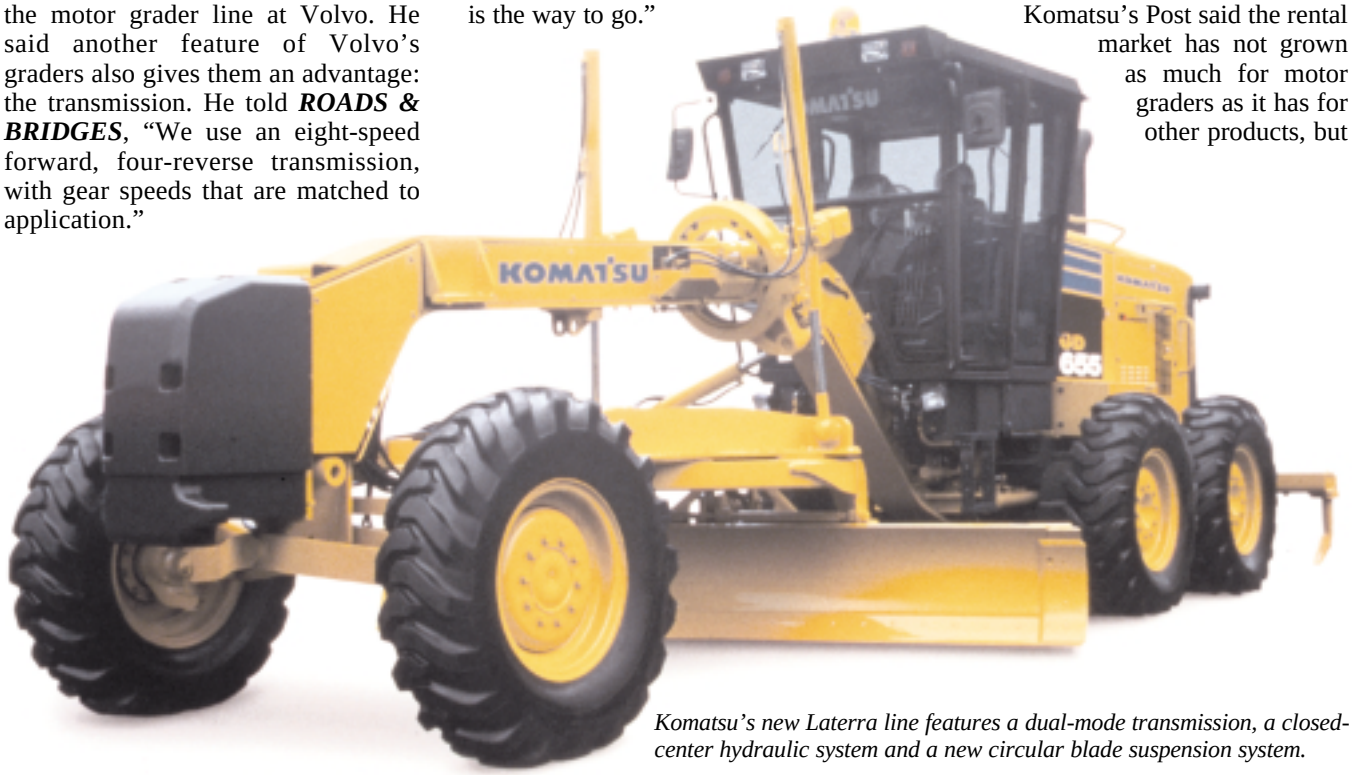
The transmission for the Laterra line offers both a torque converter drive and a direct drive. "This allows the operator to use the type of powertrain he is used to," Post told ***ROADS & BRIDGES***. "For fine grading, the torque converter gives an advantage. For high-speed applications, the direct drive is the way to go."

One of the driving forces in designing the mechanism for controlling Volvo's transmission was the operators who use it. "We initially invented a dual stick controller," said Marshall. "One stick had the forward-neutral-reverse, or mode lever, and the other stick had the gear selector, or pulser lever. Operators loved our transmission," but they asked to have all the controls on one stick, so Volvo gave it to them. Marshall said the modification was a result of Volvo's Voice of the Customer program, a system they like to call "design by operators for operators."

The transmission control feature that Komatsu trumpets is the ease of shifting between drive modes.

Post commented, "The operator has the ability, with the flip of a switch, to choose to work in torque converter or direct-drive mode."

Versatility, growing ease of operation and the recent weakness in the economy all make the motor grader an attractive machine for the rental market. Komatsu's Post said the rental market has not grown as much for motor graders as it has for other products, but



Komatsu's new Laterra line features a dual-mode transmission, a closed-center hydraulic system and a new circular blade suspension system.

Volvo's Marshall was more enthusiastic. "The rental business for us is growing at a very rapid rate," he commented, saying that when the economy was a little better, a company would own a spare machine, but that is not the case now. "You just don't have that spare gear sitting around," he said. "When you need it for peak times, you go to the rental house and get it."

New Holland's two brand new motor graders—the RG80 and RG100—feature a long wheel base for increased stability and articulation for maneuverability.

Ease of operation is important for operator comfort and also for accommodating the operator's level of experience, according to Post.

"A critical issue for the motor grader market is the loss of the older, experienced grader operators. It takes a very long time to develop competent grader operators who can do finish grading," he said. "The new Laterra graders have an advantage here, because it is much easier to learn how to operate a motor grader with a torque converter. The operator can concentrate on the controls and not worry about stalling the engine."

Marshall agreed, saying that traditionally motor graders have been more difficult than other equipment to operate skillfully, but that is changing: "Now we're finding that they are becoming easier to operate, and you can take a less experienced person and put them on and at least get a reasonably flat job out of the machine."

To get a really flat job requires the precision of a computer, and that is where motor graders are heading, according to Marshall. He expects to see more computer control of graders. The actual contours of a site will be scanned with laser beams. The desired contours will be programmed into a computer. And the grader blade will be guided around the site by the computer based on its laser-beam sensors. Marshall noted, "There's more and more of that type of technology requested by our customers." Komatsu's Post concurred.

The trend in the U.S. toward sealed pavement means a shrinking role for motor graders in leveling gravel roads, but the recent increases in federal funding for road construction, combined with a promising export market (Volvo sells its graders in 94 countries), should sustain to motor grader market for many years to come.

Volvo's 700 Series

The 17 motor graders in Volvo's 700 Series range 80-235 hp. They feature high-torque engines in either variable horsepower or standard power models. These engines produce up to 53% net torque rise, permitting the machine to sustain power under load. Model 726A VHP, for example, delivers a blade down pressure of 17,403 lb and a blade pull, in all-wheel drive mode, of 28,689 lb. The machine has a total weight of 33,550 lb.

Three of the models have an all-wheel drive system that provides even distribution of power through independent variable-displacement pumps and high-torque motors at each front wheel. Speed sensors control the relative front-to-rear wheel speed.

The all-wheel drive grader's heavy front end maximizes front-end traction and increases both blade down pressure and blade pull.

The Volvo motor graders feature a Moveable Blade Control System (MBCS), which allows the operator to accurately position the blade on either side of the grader at any angle up to 90˚ for bank sloping and to 21˚ downward for ditching. The blade, which has the longest reach outside the tire profile in the industry, can be set safely and easily at the required angle simply by repositioning the MBCS lockbar to any one of seven positions.

The MBCS receives hydraulic power through a load-sensing, closed-center hydraulic system, with feathering capability for precise blade handling.

For blade stability, the parallel blade lift cylinders have a wide stance to reduce end-to-end moldboard corrections when doing fine grading.

Deere's C Series motor graders feature the PowerShift Plus direct-drive countershaft transmission, which was built especially for the C Series.

Four compact models of Volvo 700 motor graders are available with a turning radius of only 16 ft 6 in. These compact graders feature a simple trunnion-mounted blade lift system, with a dual-cylinder, direct-acting circle turn system. Hydraulic control features include detent-style float valves and optional twin flow hydraulics.

Volvo all-wheel drive models offer a creep mode for low-speed, fine grading applications. Creep mode disengages the rear drive and pulls the grader in hydrostatic front-wheel drive only. This arrangement puts the power where it needs to be for fine grading and allows the moldboard to be navigated around the tightest corners without the rear wheels "scuffing" the finished grade.

The Volvo cab offers a 360˚ view around the grader to watch the road and attachments, a clear view down to the blade area and an unobstructed view around the front wheels. All of the operator controls are located either in the fully adjustable steering pedestal or in the right-hand console.

Laterra firma

Komatsu's Laterra line of new motor graders consists of three models—the GD555A-3, the GD655A-3 and the GD675A-3—ranging in weight 30,525-34,390 lb and in horsepower from 140-180 hp.

The Laterra graders feature a closed-center hydraulic system of valves that allows fluid to flow to each individual implement, making the operation of multiple controls easier than before. Laterra also incorporates a variable-displacement pump and a load-sensing system that give the operator the right amount of power for the particular situation.

The Laterra line also features a new circular blade suspension system that enables 90˚ banksloping. The feature makes for easy positioning, according to the company, while providing exceptional reach and ground clearance.

In the cab, the Laterra graders are equipped with a digital message center that minimizes unplanned downtime by monitoring and tracking the operating condition of the machine and providing diagnostic data that assures optimum performance. The system monitors a variety of parameters, such as engine coolant level, engine coolant temperature, hydraulic oil temperature, transmission oil temperature, transmission clutch pressure and the brake system.

An ergonomically designed cab offers good visibility of the blade, front tire, tandem tires and rear ripper from both the front and rear windshields, which extend all the way down the side of the door.

Expanding the small

Two brand new motor graders from New Holland Construction, Carol Stream, Ill.—the RG80 and RG100—are designed for the utility, municipal, light duty and finishing markets. They range in weight 15,500-16,250 lb and in horsepower 76-101 hp. These models fit into the smaller end of the spectrum, according to the company, but retain many of the powerful productivity features that characterize the larger models in the New Holland line.

Delivering power to the new graders is New Holland's 304-cu-in., four-cylinder Genesis engine. Both models have a torque converter drive. The powershift, electronically controlled transmission

Caterpillar's 143H comes with a turbocharged diesel engine that produces 185 hp.

has six forward and three reverse gears.

Sixty-five percent of that torque is transmitted to the axle, according to the company. Super Max Trac limited slip differentials allow the operator to put the most power to the ground. Automatic differential lock reduces tire slippage and results in better performance and longer tire life.

The RG80 and RG100 feature a long wheel base for increased stability and articulation for maneuverability. Their 25˚ articulation angle, combined with a 40˚ steering angle, provides for a very tight turning radius and precise control.

The new models also feature a roll-away moldboard designed to roll material away from the moldboard rather than simply pushing it. The moldboard reduces the force needed to move material and conserves fuel. The end bits and cutting edges are replaceable. The moldboard can be mounted on the optional five-point saddle, a configuration that allows the operator to rotate the blade 90˚ and adds to the versatility of the machine.

The graders incorporate a slanted rear hood for improved visibility of rear attachments.

Power shifting

The C Series motor graders from John Deere Industrial Equipment Co., Davenport, Iowa, feature the PowerShift Plus direct-drive countershaft transmission, which was built especially for the C Series.

According to the company, the PowerShift transmission delivers smooth shifts between eight forward and eight reverse gears. Gear ratios are closely matched to working conditions. With four gears under 6.5 mph, the gearbox offers a broad work range. Speed and drawbar pull are nearly the same in both directions, providing faster work cycles and the power to back up inclines and get out of trouble spots.

Supplying power to the transmission is a six-cylinder Powertech turbocharged diesel engine, which is lighter for a better horsepower-to-weight ratio and improved fuel efficiency. A deep skirt makes the engine quieter, with less vibration. The engines also comply with EPA emission standards.

All Deere C-Series graders, except the 670C, are equipped with a wastegate turbocharger that delivers high torque and superior lugging ability and provides improved performance at lower engine rpm settings and higher altitudes.

The C Series features a closed-center hydraulic system. To prevent cross-contamination, the hydraulic system has a separate oil lubrication, filtration and cooling system.

In the cab, the driver has an eight-way adjustable fabric-covered seat, with armrest tilt and lumbar support. A 16-function LCD readout displays the status of transmission gear, engine speed, ground speed and other vehicle data.

Cat scratching

The H Series motor graders—in seven models—from Caterpillar Inc., Peoria, Ill., improves on the G Series by delivering more power to the ground, better visibility, enhanced controllability and more comfort. The company estimates that these improvements increase the operator's productivity 15-25%.

The H Series' transmission is designed specifically for motor graders and is electronically controlled for smooth shifting. More closely spaced gears in the working range increase grading speed in most applications.

A repositioned moldboard, a redesigned blade linkage, an increased glass area, an angled rear cab window and a tapered rear hood all improve the H Series operator's view of the work area. Also, interior sound levels in the H Series (75 dB) are about half of those in the G Series. A muffler under the hood and standard engine side doors reduce exterior sound levels 11-37%.

The H Series' proportional, priority, pressure-compensated hydraulic system provides more efficient hydraulic flow proportioning, producing consistent implement speeds with no interruptions, regardless of how many controls are used simultaneously.

The control levers in the H Series' cab have the same short throw as the G Series but with half the effort. The H Series models also offer more foot room, in-cab gauges and an optional Cat Contour Series seat. Additional refinements include an integrated air circulation and distribution system for heating, defrosting and air conditioning.

The 120H, 12H and 140H are replacements for the G Series models. Caterpillar added two models, the 135H and

the 160H. The 135H is sized between the 12H and the 120H, making it a compact and responsive alternative for governmental road maintenance and contractors working in urban areas, according to the company. The 160H combines the size of the 140H with higher weight and horsepower, making it an excellent choice for governmental users in snow country and for private contractors who need responsiveness in high-speed blading work.

New engine, please

The latest upgrade to the M-850-C Maintainer compact grader by Huber Construction Equipment, Iberia, Ohio, combines a new engine, braking system and hydrostatic transmission. The revamped Maintainer has smoother, more economical and powerful operation with less frequent maintenance, according to the company.

The new engine, which generates 80 hp at 2500 rpm, is a "quiet, clean-burning" Cummins 4B3.9 diesel with a two-year or 2,000-hr warranty. The new brakes feature internal, wet-disc operation that is applied in the differential. The transmission permits the operator to accelerate, brake and shift to forward or reverse with a single lever for faster, smoother operation and less operator fatigue.

At 14 ft long and 7 ft 5 in. wide, the Maintainer is designed for grading jobs from base to finish work, as well as spreading asphalt, stone, fill dirt and other materials. It is available with five hydraulic attachments: bulldozer, front-end loader, scarifier, side dozer and berm leveler.

Bolt-on wings

Like e-mail messages, motor graders sometimes come with attachments, but these attachments are not electronic. In this case, the snow wings made by Weldco-Beales Manufacturing Inc., Edmonton, Alberta, Canada, are made to be tough enough to conquer harsh winters in the Great White North.

Weldco-Beales' snow wing attachments feature all-hydraulic design, bolt-on kit form and a rear push pole that is adjustable in length to change the plowing angle and spring-assisted to absorb the shocks experienced while plowing.

The design incorporates a shear pin in case the wing hits an object while plowing. Hydraulic down pressure can be applied with the snow wing. The wing can be carried above ground level if benching of the windrow is required or if the operator needs to push the snow past barriers, such as guardrails.

The wings are available in lengths of 10, 12 and 14 ft, with a standard 38-in. bench height and an optional 52-in. bench height. Front attachments include: a straight blade; a manual angle front blade; a hydraulic angling front blade; a one-way blade; a V-plow; and a U-V hydraulically angling blade. All of the front attachments are available with quick-attach mounts or bolt-on mounts. RB