MAXIMIZE PRODUCTION
MINIMIZE COSTS

CAT® MINING MOTOR GRADERS

CAT®

MAXIMIZE POSSIBILITIES

MINIMIZE CHALLENGES

EFFICIENCY.

PRODUCTIVITY.

COST PER TON.

While these terms may not have been familiar to those who invented the first motor grader in the early 1900s, this revolutionary piece of earthmoving equipment certainly had an effect on them. Replacing a horse-drawn implement with a self-propelled model improved earthmoving by leaps and bounds. And when Caterpillar entered the marketplace in 1928, innovations and new product introductions quickly put Caterpillar in a leadership position.

Motor grader development is credited to the Russell Grader Manufacturing Company, whose early units were frames built around a tractor and generally referred to as a motor patrol. Caterpillar purchased Russell in 1928 and just three years later introduced the first rubber-wheeled grader, the Caterpillar Auto Patrol, which was seen as the industry's first true motor grader. For the first time, the drivetrain and grader were designed as a single unit. The rear-mounted cab helped improve balance and visibility, and high-pressure pneumatic tires yielded higher speeds.

No. 9 Auto Patrol — 1931

No. 11 — 1934

Diesel No. 12 — 1938

No. 16 — 1963

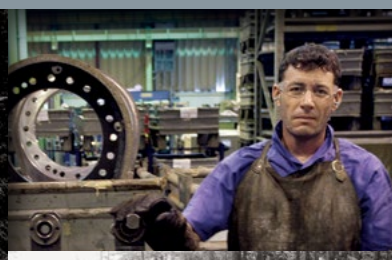
G Series — 1973

H Series — 1995

24H — 1996

M Series 16M & 24M — 2007

16M3 & 18M3 — 2015



New Cat® products and innovations continued with:

- Tandem tires, introduced in 1933, and Caterpillar diesel engines, introduced in 1934.
- The Diesel No.12, a line introduced in 1938 that still exists today.
- The No.16, which was the largest of its kind when it was introduced in 1963, weighing in at 21 092 kilograms (46,500 pounds).
- The six-model G Series, which brought the advantages of an articulated frame to the motor grader market when it was introduced in 1973.
- The H Series, launched in 1995, which offered the first all-wheel drive machines in the 143H and 163H.
- The largest Cat motor grader, the 24H, introduced in 1996 to meet the need for larger graders to maintain haul roads designed for large trucks with big payloads.
- The revolutionary joystick control, introduced in 2007 on the M Series, which dramatically improved operator comfort and productivity.
- The 16M3 and 18M3, both introduced in 2015. An updated version of the popular 16 model, the 16M3 was improved to enhance performance, serviceability and safety, and to reduce overall operating costs. The 18M3 added power and a wider moldboard to increase coverage and productivity in small- to medium-size mining operations.

While motor graders have come a long way since the days of horse teams — days when efficiency, productivity and cost per ton were not common concerns on mine sites — there are still improvements to be made and innovations to discover. And Caterpillar will continue to be in the forefront of the evolution.

Our 16 and 18 models are built in a state-of-the-art facility in North Little Rock, Arkansas, USA, that was designed specifically for motor grader manufacturing. Our largest model, the 24, is manufactured in Decatur, Illinois, USA, to take advantage of its commonality with the large mining trucks manufactured there.

The 24M motor grader is designed to meet the specialized requirements of large mining operations, particularly those maintaining haul roads for trucks with capacities of 172 tonnes (190 tons) or more. Easy serviceability is a key feature in the M Series, with grouped service points for reduced maintenance time, ground level service access wherever possible, and a bolt-on rear axle to provide easy access to components. Extended service intervals, automatic lubrication, and fast fill and drain capabilities for fluids also contribute to easier maintenance.

MAXIMIZE PERFORMANCE
MINIMIZE OBSTACLES

Our mining customers measure profitability by the ore they produce—and the more cost-effectively they do that, the more successful they are. There are dozens of variables that impact operations, and mines continually look for ways to improve productivity and reduce costs to improve their bottom line.

While drills, draglines, loaders and haul trucks are responsible for producing ore, motor graders have a direct impact on how productively these machines can operate—in particular in their role in haul road maintenance. Motor graders help create and maintain constant grade and proper drainage. When haul roads are kept in top condition, trucks run faster and more safely, cycle times improve and more ore is produced. Good road conditions also reduce truck maintenance, lower fuel costs and reduce tire damage.

In addition to enabling the productivity of other equipment, Cat motor graders are productive machines themselves, giving customers the lowest cost per unit of material moved in the industry. Our superior hydraulic system handles up to seven functions at once and provides fast, smooth and predictable response. We've optimized the combination of weight and balance to improve traction and the ability to keep ground speed, especially when carrying a large load on the board. The Engine Compression Brake option lets the operator increase downhill grading speeds significantly without sacrificing service brake life.

An improved operator environment, state-of-the-art technologies, easier serviceability and high availability also play a role in making durable Cat motor graders one of the most productive—and productivity-enhancing—machines on site.

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SAFETY.CAT.COM™

1. Operator visibility is improved by the forward view made possible by a unique raised cab design, one-piece front window on the 24, and hexagonal shape of the 16 and 18. The front glass window is laminated for enhanced safety.
2. Rear view cameras with in-cab monitors further enhance line of sight to help increase operator awareness of their surroundings. In addition, Detect, a capability set of Cat MineStar™ System, includes a number of sensing and reporting systems designed to assist the operator in avoiding collisions. The systems include proximity awareness of fixed and mobile equipment as well as detection of smaller objects.
3. An optional fire suppression ready system (standard on the 18M) allows fast and easy mounting of a fire suppression system without compromising other machine components.
4. Seat belt indication, standard on the 16 and 18, provides a visual and audible alert to the operator when the seat belt is not used and generates and records a code.
5. An optional access platform provides a full second access path to the engine compartment and cab of the machine, allowing access to the cab from both sides.
6. An optional service access platform provides ladders, walkways and handrails for enhanced fall protection, and access to the engine compartment from both sides of the machine. The operator can access the cab through the regular ladders.
7. LED enclosure service lights provide visibility for service and maintenance activities as well as enhance nighttime walk-around inspections.

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MAXIMIZE SAFETY

MINIMIZE RISK

Our customers consider the safety of their workers a top priority. And we're doing our best to help them meet their safety goals. Caterpillar considers the safety of everyone in, on or around Cat equipment when we build new products or develop enhanced safety features for existing products.

Cat motor graders are designed with protection in mind. We've installed grab irons, platforms, handrails and steel tandem walkways to help make access and egress safer. Integrated safety features like an operator-not-present monitoring system, hydraulic lockout, ground level engine shut-off and backup alarm enhance safety for operators, maintenance personnel and others on site. And isolation mounts for the cab, engine and transmission help minimize sound and vibration to help reduce operator fatigue.

We've increased cab visibility with a tapered floor and angled doors, dramatically improving sight lines to critical working areas. Glare-reducing paint, Light Emitting Diode (LED) lighting options and a rear vision camera also contribute to improved visibility.

Machine control systems are also designed to improve operator safety. Speed-sensitive steering and a secondary steering system enhance operator control. The circle drive slip clutch protects the drawbar, circle and moldboard from shock loads when the blade encounters an immovable object, and also reduces the possibility of abrupt directional changes in poor traction conditions. Brakes are located at each tandem wheel to eliminate braking loads. In addition, brake systems are redundant and utilize accumulators to enable stopping in case of machine failure. Blade lift accumulators help absorb impact loads to the moldboard and also help reduce impact loading for enhanced operator safety.

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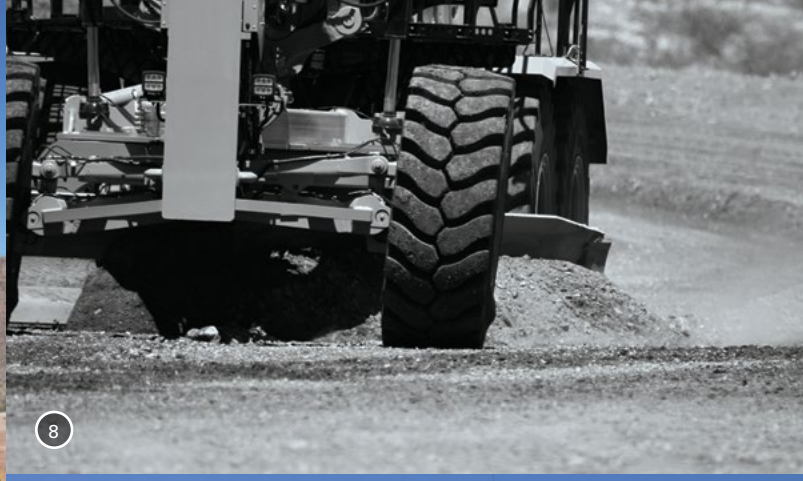

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8. Speed-sensitive steering increases operator confidence and control by making steering less sensitive as ground speed increases.
9. Two strategically placed grab handles and a non-slip step improve access to tandem walkways, particularly when fenders are installed.
10. The secondary steering system automatically engages an electric hydraulic pump in case of a drop in steering pressure so the operator can safely steer the machine to a stop.

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MAXIMIZE COMFORT

MINIMIZE EFFORT

A comfortable operator is a productive operator. So we've made the cabs in Cat motor graders the most spacious and comfortable in the industry, and designed our control system to minimize effort, reduce fatigue and increase efficiency.

Two electro-hydraulic joysticks replace levers, reducing hand and wrist movement by nearly 80 percent. Electronically adjustable control pods help operators position joysticks for optimal comfort, visibility and proper operation. The control pattern is extremely intuitive, allowing both new and experienced operators to get up to speed quickly.

Operators have plenty of space and greater visibility. The comfortable suspension seat features six-way adjustment controls, and an optional heated and ventilated seat provides

enhanced comfort in extreme weather conditions. Armrests, wrist rests and pedals may be repositioned for greater comfort and reduced fatigue. Multiple isolation mounts significantly reduce sound and vibration for a more relaxed work environment.

The cab also features a multi-color touchscreen Information Display that serves as the operator's gateway to monitoring machine performance. It's a convenient way to modify machine parameters to tailor performance to the current task and to access service information for initial troubleshooting.

These enhanced ergonomics and an improved environment make it possible not only for operators to more comfortably work a long day, but also to enjoy longer careers.

By polishing the skills of experienced operators and properly training new ones, our customers can maximize the potential of their Cat equipment. Caterpillar operator training programs offer hands-on and simulator training as well as e-learning opportunities for every level of skill.

The 18M3 builds on the success of the 16 and offers additional power, a wider moldboard and the possibility to use a more aggressive blade angle, making it an ideal fit for mining operations that run 172-tonne (190-ton) or smaller trucks. The 18M3 enhances operational efficiencies by increasing coverage and reducing the number of passes required to complete the width of the road in certain applications.

MAXIMIZE ACCOUNTABILITY MINIMIZE IMPACT

Social and environmental responsibility is a way of life at Caterpillar. It's mandated in our Code of Conduct that we follow sustainable policies and practices in the way we design, engineer and manufacture our products.

Our customers, too, make running a safe and environmentally responsible business a top priority. They want engines that burn less (or different) fuel, machines that work more productively and mine sites that are more efficient. Some want to repair, rebuild and upgrade their current equipment instead of buying new. And we're committed to finding solutions that address these needs.

By leveraging technology and innovation, we strive to make our products more efficient and productive, so our customers can use resources more efficiently and minimize the impact their operations have on the environment.

Our motor graders, for example, are powered by engines with ACERT™ Technology — which meet today's emission standards and are poised to take on tomorrow's challenges as well.

We preserve raw materials, conserve energy and reduce emissions through Cat Reman, which returns end-of-life components to like-new condition, and the Cat Certified Rebuild program, which delivers a cost-effective second and third life for our machines.

We're also researching how our machines can operate with alternative energy sources like biofuels, liquefied natural gas, electric power and hybrid technology.

We strive to make our motor graders as environmentally friendly as possible. Even simple improvements can have a big impact — like hose seals designed to prevent leaks and ecology drains that prevent spills and allow fluids to be easily captured for recycling or proper disposal. Fuel-saving features like Engine Economy Mode help decrease overall fuel consumption. Cat motor graders are quieter both inside and out to improve working conditions and help minimize noise in the communities where they operate.

MAXIMIZE KNOWLEDGE
MINIMIZE GUESSWORK

The last decade has seen a revolution in technologies—those that are improving the way mine sites operate and those that will be the foundation for work of the future. Caterpillar is exploring every innovation and leveraging those that are proven to benefit customers by improving safety and sustainability, lowering costs, increasing profitability and boosting efficiency.

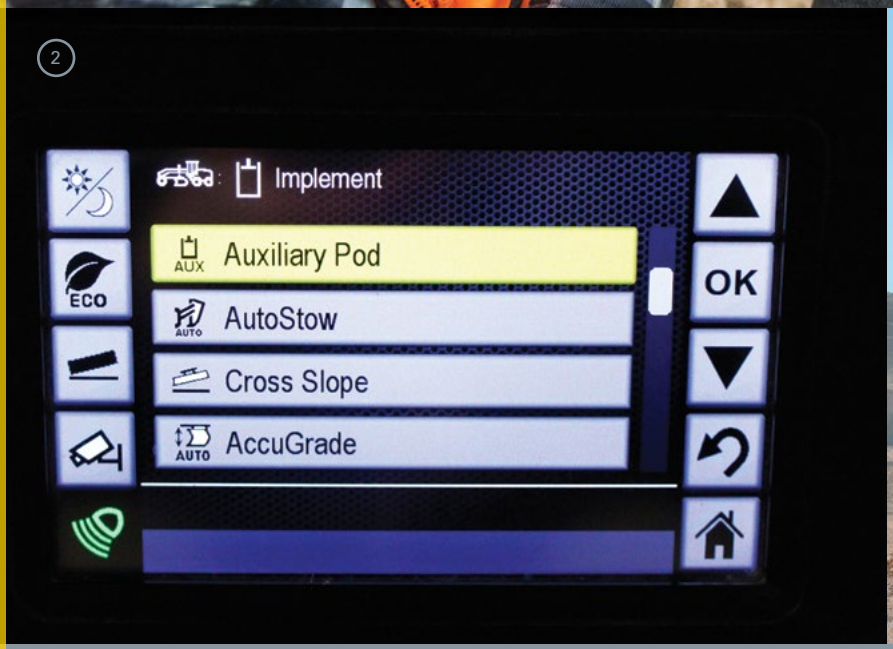
Cat mining motor graders are enhanced by productivity solutions like the optional AccuGrade™ Control System and the standard Cat Grade Control. These solutions increase accuracy, drive efficiency and improve safety—delivering value to the bottom line. Grade control technologies automatically control the blade so operators can reach grade faster and in fewer passes. Cross Slope uses sensors to calculate necessary blade slope positioning to achieve the desired cross slope of the surface.

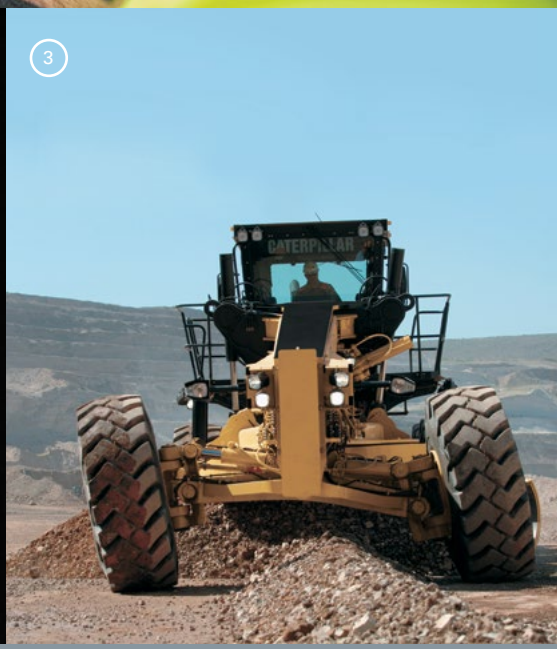
Health diagnostic and monitoring systems such as Cat Messenger, Cat Electronic Technician and Product Link™ help you take the guesswork out of equipment management. They gather and report important machine data that can be managed and analyzed to lower operating costs, reduce failures, extend component life and improve maintenance practices.

Other systems protect machines from potential damage, like automatic engine deration, which automatically lowers engine torque output and alerts the operator if critical conditions are detected.

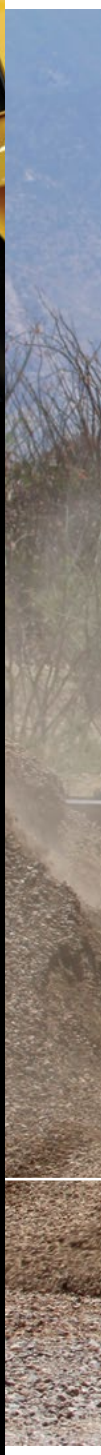
Other technologies, like Cat MineStar Detect and Terrain, enhance safety by enabling improved awareness of operations—both in the areas immediately surrounding equipment and the overall mine site.

Sites of the future will combine proven Cat technologies with equipment, people and processes to change the way they operate, lowering operating costs while minimizing their impact on the environment and enhancing safety.





1. Cat Product Link Elite gives you and your dealer easy access to machine location and diagnostics information like hours, fuel usage, idle times and event codes.
2. Cat Grade Control Cross Slope a standard, fully integrated, factory installed grade control system that helps your operator more easily maintain desired cross slope by automatically controlling one side of the blade.
3. Cat MineStar is a suite of technology offerings that help mine sites be more productive, efficient and safe. For mining motor graders, the Detect capability offers an Object Detection system that helps operators of large mining machines determine if vehicles or other objects are close during start-up and the first few seconds of machine movement.



MAXIMIZE SUPPORT

MINIMIZE STRESS

Caterpillar has been making and improving motor graders for nearly 100 years and recently introduced a new model to fill a gap in the mining industry. But one of our biggest differentiators isn't our products themselves. It's our dealer network. When it comes to service and support, customers make one call — to their local Cat dealer.

From parts availability to expert service diagnosis, from planned maintenance programs to component rebuilds, Cat dealers partner with customers to help them maximize machine productivity and minimize costs. They share their knowledge, helping customers understand their machine ownership and operating costs so they can make informed decisions about rebuilding and replacement options.

They use technologies like wireless data communications, machine monitoring, diagnostics, and job and business management software to lower costs, improve efficiency and increase productivity. And they partner with customers to develop and implement Continuous Improvement projects designed to improve safety, operations, maintenance, and supply and inventory efficiencies.

Cat customers can count on superior products and world-class service from one reliable source — Caterpillar and Cat dealers.

The 16M3 motor grader has been improved to offer greater fuel efficiency, more operator comfort and safety features, as well as enhanced serviceability. The 16M3 meets U.S. EPA Tier 4 Final/EU Stage IV emission standards with an emissions reduction system that is transparent to the operator.

GLOBAL DEALER NETWORK
We've built an extensive network of nearly 200 locally owned businesses in over 200 countries. So wherever you operate, there is a dealer nearby to provide world-class service and support for your Cat equipment. To locate a dealer, visit www.cat.com/dealer.

MOLDBOARD	DIMENSIONS
Standard	4.9 m x 787 mm x 25 mm / 16 ft x 31 in x 1 in

RIPPERS	MAX PENETRATION FORCE	PRYOUT FORCE	MAX PENETRATION DEPTH
3-shank	13 749 kg / 30,311 lb	19 822 kg / 43,700 lb	452 mm / 17.8 in

Ripper accommodates up to four extra shanks (order separately).

16M3

ENGINE	C13 ACERT VHP
POWER	216 kW / 290 hp
DISPLACEMENT	12.5 L / 763 in^3
OPERATING WEIGHT, TYPICALLY EQUIPPED	32 411 kg / 71,454 lbs
BLADE DOWN PRESSURE: BASE	13 945 kg / 30,743 lb
BLADE DOWN PRESSURE: MAX	19 895 kg / 43,861 lb
TRANSMISSION	Direct Drive, Power Shift Countershaft
TOP SPEED: FORWARD	51.7 km/h / 32.1 mph
TOP SPEED: REVERSE	40.8 km/h / 25.4 mph
ROPS / FOPS	ISO 3471 / ISO 3499
MOLDBOARD WIDTH	4.9 m / 16 ft
OPERATOR SOUND	72 dB(A)
TIRES	23.5R25

APPLICATION

The 16M3 is the ideal fit for small- to medium-size mining operations that run 136-tonne (150-ton) or smaller hauling trucks. In addition, the 16M3 can complement a 24 size motor grader fleet in larger mining operations where additional versatility is required for ditch and berm building and cleaning, maintenance of secondary narrower roads or side/bank slope work.

SOME FEATURES AND OPTIONS MAY NOT BE AVAILABLE ON ALL MODELS. CONSULT YOUR DEALER FOR A COMPLETE LIST OF STANDARD AND OPTIONAL FEATURES.

MOLDBOARD	DIMENSIONS
Standard	5.5 m x 787 mm x 25 mm / 18 ft x 31 in x 1 in

RIPPERS	MAX PENETRATION FORCE	PRYOUT FORCE	MAX PENETRATION DEPTH
3-shank	13 749 kg / 30,311 lb	19 822 kg / 43,700 lb	452 mm / 17.8 in

Ripper accommodates up to four extra shanks (order separately).

18M3

ENGINE	C13 ACERT VHP
POWER	227 kW / 304 hp
DISPLACEMENT	12.5 L / 763 in^3
OPERATING WEIGHT, TYPICALLY EQUIPPED	33 713 kg / 74,324 lbs
BLADE DOWN PRESSURE: BASE	15 426 kg / 34,008 lb
BLADE DOWN PRESSURE: MAX	19 895 kg / 43,861 lb
TRANSMISSION	Direct Drive, Power Shift Countershaft
TOP SPEED: FORWARD	51.7 km/h / 32.1 mph
TOP SPEED: REVERSE	40.8 km/h / 25.3 mph
ROPS / FOPS	ISO 3471 / ISO 3499
MOLDBOARD WIDTH	5.5 m / 18 ft
OPERATOR SOUND	72 dB(A)
TIRES	23.5R25

APPLICATION

The power and coverage offered by the 18M3 make it the ideal fit to improve productivity on small- to medium-size mining operations that run 172-tonne (190-ton) or smaller hauling trucks. This model also allows the operator to use a more aggressive blade angle and still be able to deposit the windrow away from tires to protect them from damage. Using a more aggressive angle allows the machine to better maintain ground speed for cutting passes, and reduce loads for improved performance.

SOME FEATURES AND OPTIONS MAY NOT BE AVAILABLE ON ALL MODELS. CONSULT YOUR DEALER FOR A COMPLETE LIST OF STANDARD AND OPTIONAL FEATURES.

MOLDBOARD	DIMENSIONS
Standard	7.3 m x 1067 mm x 50 mm / 24 ft x 42 in x 2 in

RIPPERS	MAX PENETRATION FORCE	PRYOUT FORCE	MAX PENETRATION DEPTH
3-shank	13 601 kg / 29,985 lb	18 621 kg / 41,052 lb	454 mm / 17.9 in

Ripper accommodates two extra shanks, or nine scarifier teeth (order separately).

24M

APPLICATION

Ideal for the toughest mining conditions, the 24M is our largest motor grader and the best match for applications running ultra-class mining hauling trucks, larger than 172 tons (190 tons). The weight, power and balance of the 24M provide the down pressure and load capabilities required to cut into the ruts produced by these heavy trucks, even in the most demanding underfoot conditions. The 7315-millimeter (24-foot) blade offers the best coverage to grade these wider roads in less time.

SOME FEATURES AND OPTIONS MAY NOT BE AVAILABLE ON ALL MODELS. CONSULT YOUR DEALER FOR A COMPLETE LIST OF STANDARD AND OPTIONAL FEATURES.

ENGINE	C18 ACERT
POWER	397 kW / 533 hp
DISPLACEMENT	18.1 L / 1,104.5 in^3
OPERATING WEIGHT, TYPICALLY EQUIPPED	65 840 kg / 145,141 lb
BLADE DOWN PRESSURE: BASE	31 563 kg / 69,583 lb
BLADE DOWN PRESSURE: MAX	34 316 kg / 75,654 lb
TRANSMISSION	Automatic, Electronic Power Shift
TOP SPEED: FORWARD	40.9 km/h / 25.4 mph
TOP SPEED: REVERSE	39.2 km/h / 24.4 mph
ROPS / FOPS	ISO 3471 / ISO 3449
MOLDBOARD WIDTH	7.3 m / 24 ft
OPERATOR SOUND	74 dB(A)
TIRES	29.5R29

MAXIMIZE PRODUCTION

MINIMIZE COSTS

Cat Large Motor Graders are one of the most productive — and productivity-enhancing — machines on any mine site. While they may not be responsible for producing ore, they have a direct impact on how well other production machines can operate. They play an essential role in haul road construction and maintenance—so trucks can run faster and operate more safely. In addition, good roads save mine sites money on machine maintenance, fuel and tires. The integration of Cat technologies further enhances productivity by increasing accuracy, driving efficiency and improving safety. The end result is a lower cost per ton.

Cat Large Motor Graders are the industry leader — and for good reason. Our mining graders have the size, horsepower and weight to cover haul roads of any width. And they're equipped with a number of features that set them apart from the competition:

- Improved serviceability, fuel economy and reduced maintenance, to meet high mechanical availability requirements.
- Major components that are modular in design, so most can be removed and reinstalled without disturbing other components.
- Engine Economy (ECO) Mode, which can be activated to control high engine idle speed and ensure the engine is performing as efficiently as possible with respect to fuel consumption for additional fuel savings.
- Additional weight along with adjusted weight balance for the 16M3 and 18M3, which enhances performance by improving traction and the ability to keep ground speed especially when carrying a large load.

16M3


18M3

24M

BUILT FOR IT.™

CAT® MINING MOTOR GRADERS

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