



MACHINE CHOICES

MOTOR GRADER SELECTION GUIDE



CHOOSING THE RIGHT MACHINES FOR THE JOB

Every job estimate starts with putting together the list of equipment needed. It isn't enough to ask yourself, **Which machine can do the job?** It's more important to figure out which machine(s) can perform the required tasks as quickly and cost-effectively as possible.

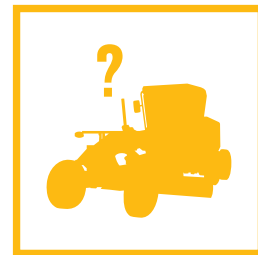
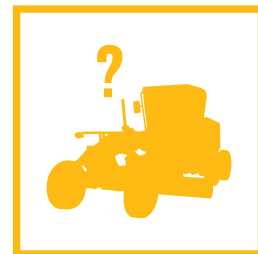
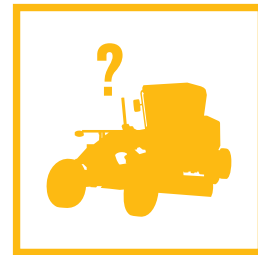
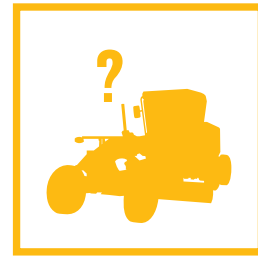
With so many choices among the types and models of construction machines available today, **How can you make sure the machine you select is precisely the right one for your job?**

And given the investment you make in a machine up front plus operation and maintenance over its life, the question also becomes, **Which machine will do the most to make you more competitive and more profitable?**

INFORMATION IS YOUR MOST POWERFUL SELECTION TOOL

Of course the key to making the best choice is pulling together good information that helps you compare options, costs and projected returns. Here's a checklist of information must-haves:

- Define the requirements for the equipment such as steering controls
- Evaluate underfoot conditions and need for tandems or all wheel drive
- Consider any regulatory requirements
- Know the application characteristics
- Calculate your cost-per-hour targets and compare with each model choice
- Match machine specifications such as power and weight to your application needs
- Consider technology features and options
- Consider moldboard, attachment and tire options
- Check the availability of parts and service
- Compare financing options
- Review equipment safety features





MOTOR GRADERS – DEPENDABLE FOR ROUTINE TO HIGH PRODUCTION WORK

Motor graders are versatile and dependable machines, whether your need is simple, routine maintenance work or high precision work requiring the latest technology. Your jobsite needs are diverse and so are the available motor grader options. From moldboards to technology to equipment size options, there is a motor grader built for your application.

TYPICAL APPLICATIONS

Motor graders can be used for a variety of applications. Technology has improved their safety, productivity and efficiency. You should consider a motor grader for these types of applications:

- Material spreading
- Sloping a bank
- Snow removal
- Road building and maintenance
- Finish grading
- Ditch cutting and cleaning
- Mixing aggregate
- Scarifying

CONFIGURATION OPTIONS

- Drive
- Controls
- Moldboards
- Tires/Wheels
- Technology
- Hydraulics
- Cab
- Rear Attachments
- Weather Packages
- Blade Lift Accumulators
- Lights
- Cab Packages
- Comfort Packages
- Fans
- Snow Equipment Mounts
- Front Attachments
- Mid Mount Scarifier
- Mirrors
- Guards
- Fenders

DID YOU KNOW?

Motor graders make easy work of slopes. When operating on a slope, articulate the tandems down the slope to widen the footprint of the machine. This places the majority of the machine weight downhill, making it more stable—which adds to increased safety and performance.



CAT

MOTOR GRADERS

<p>PERFORMANCE:</p>	<p>Cat® Motor Graders are built based on decades of design experience. Designed for production work, they offer world-class cabs, advanced hydraulics, choice of controls and scalable technology options, all to ensure your projects are completed on time and at a lower cost.</p>
<p>GC:</p>	<p>If you simply need everyday maintenance and grading tasks done, Cat GC models are built for you. Designed to deliver on jobs that don't require advanced technology, GC models offer dependable performance at a lower acquisition cost.</p>
<p>AWD:</p>	<p>All Wheel Drive (AWD) motor graders are available for both Performance and GC models. AWD transfers power to the ground as needed, allowing you to work more efficiently in mud, gravel, snow and sand. It increases traction and maneuverability in loose material.</p>
<p>CONTROL OPTIONS</p>	<p>WHAT WORKS FOR YOU?</p> <p>Because familiarity and choice matter, you can choose between a steering wheel/lever or joystick controls. Both control choices are available on most Cat Motor Graders. So whether it is operator familiarity and comfort with a steering wheel, or the 78% reduction in hand and arm movement provided by a joystick, there is an option for you and your operator.</p>



KEY SELECTION CONSIDERATIONS

SITE AND APPLICATION

When choosing a motor grader, take a close look at what tasks you need it to perform—and in what type of conditions and materials. Is it simple maintenance and clean-up work requiring minimal flexibility and technology? Or is the work in a high-production environment where precision matters? What about working conditions such as snow, mud, aggregate, compacted or loose materials? If working on roads, how wide or narrow are they? All of these factors will drive not only the size, power requirement and type of motor grader, but also what attachments and moldboards are the most efficient matches.

TECHNOLOGY

Today's technology can provide tremendous productivity, performance and safety improvements. Consider your needs and applications and review what technologies will work best for you. If you're not familiar with motor grader technology, you may want to start small so you can learn how to use it. Once you see the benefits it can provide, you can determine how to move on to more advanced options. For example, you might begin with the Cat Grade Attachment Ready Option (ARO) and then upgrade to Cat Grade with Cross Slope or Cat Grade with 3D.

OPERATOR PRODUCTIVITY AND MACHINE SERVICEABILITY

Your operator's comfort and safety are critical to maximizing productivity, as is ease-of-use of the machine itself. Just as important are features that maximize uptime by making maintenance easy and economical. Be sure to take a closer look at accessibility and maintenance intervals when making your motor grader selection.



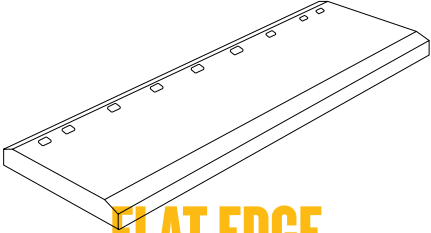
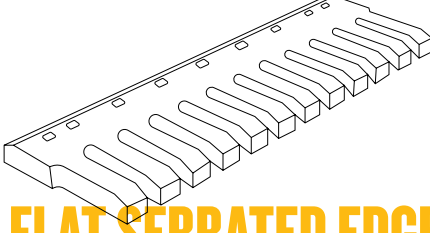
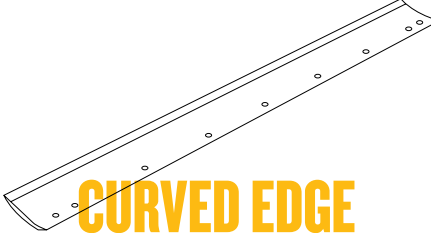
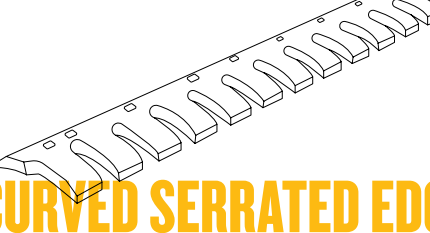
MOLDBOARD AND ATTACHMENT SELECTION

Moldboard and attachment selection is critical when it comes to motor graders. The right size, configuration and wear life will impact performance and safety. Options are plentiful. Here is a sampling of common moldboard and attachment options, so be sure to talk to your Cat dealer about the full list of available options to ensure the best fit for your job.

<p>STRAIGHT FRONT BLADES</p> <p>Effective for snow removal, grading, land-leveling or dozing. Multiple widths and heights are available to better match your application and machine size.</p>	<p>MANUAL/HYDRAULIC ANGLE FRONT BLADES</p> <p>Similar applications and benefits of the straight front blade while also featuring 30 degrees of hydraulic left- or right-angle capacity.</p>	<p>SCARIFIERS</p> <p>Available in front, mid and rear mounts to give you ultimate flexibility in breaking up compacted materials.</p>
<p>SNOW REMOVAL BLADES</p> <p>All types of configurations are available to provide you with maximum versatility—from U/V angle blades, V plows, masted and mastless snow wings.</p>	<p>MUCH MORE!</p> <p>From push blocks and counterweight options to lift groups to front-mounted hydraulic brooms, you have many more options.</p>	

MOLDBOARD EDGE SELECTION

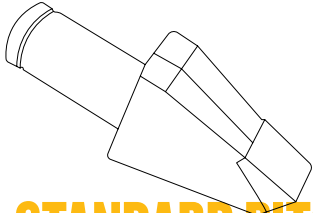
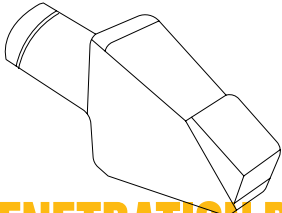
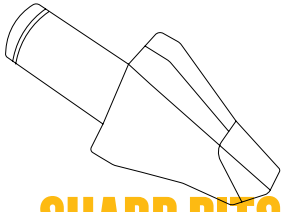
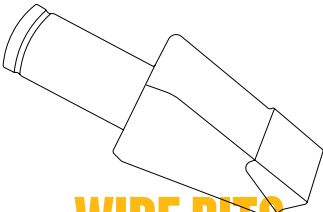
Edge selection is critical for enhancing production and keeping costs to a minimum. Application affects the cutting edge shape, metallurgy and style. Impact, penetration and abrasion define your application environment.

EDGE MATERIALS		
<p>THROUGH-HARDENED STEEL EDGES</p> <p>Most Cat edges are through-hardened steel, which offers high impact resistance.</p>	<p>HIGH-CARBON EDGES</p> <p>High-carbon edges have good surface hardness and perform well in high-abrasion, low-impact applications such as finish work. However, high-carbon edges will not withstand the impact level of a through-hardened edge.</p>	<p>TUNGSTEN CARBIDE EDGES</p> <p>Tungsten carbide cutting edges combine through-hardened steel with the wear resistance of tungsten carbide. When used in high-abrasion, low-impact applications, they can provide up to 20 times the life of a standard through-hardened edge.</p>
 <p>FLAT EDGE</p> <ul style="list-style-type: none"> » Heavy road maintenance » Maximum strength and available wear material » Best option for abrasion and impact resistance 	 <p>FLAT SERRATED EDGE</p> <ul style="list-style-type: none"> » Better penetration than a continuous edge (greater down pressure per inch of edge contact) » Designed to penetrate packed gravel, frozen earth and ice » For severe impact conditions, install over a 6" (152 mm) edge to reduce tooth breakage 	
 <p>CURVED EDGE</p> <ul style="list-style-type: none"> » Provides superior penetration and rolling action necessary for fine grading and finish work » Finishing tolerances less than 1/4" (6 mm)—the best value may be in selecting a narrow and thin cutting edge 	 <p>CURVED SERRATED EDGE</p> <ul style="list-style-type: none"> » Penetrates better than a straight serrated edge with a forward moldboard 	
<p>DID YOU KNOW?</p>	<p>EDGE WIDTH EQUALS WEAR MATERIAL</p> <ul style="list-style-type: none"> » An 8" (203 mm) edge provides twice the wear material as a 6" (152 mm) edge at about 35% more cost » Hardware cost and removal and installation downtime are reduced by 50% 	



CAT® GRADERBIT SYSTEM

GraderBit adapter board options are 3' (914mm) and 4' (1219mm) sections. Two holespacing patterns are available to control aggregate flow. Standard bits are used for most roadways.

 <p>STANDARD BITS</p> <ul style="list-style-type: none"> » Baseline bit - 30mm wide » Moderate penetration » Standard Board Bit Gap: 32mm » Mining Board Bit Gap: 48mm 	 <p>PENETRATION BITS</p> <ul style="list-style-type: none"> » Narrower than standard bit - 23 mm wide » Wider gap allows larger aggregate to flow through » Standard Board Bit Gap: 40mm » Mining Board Bit Gap: 55mm
 <p>SHARP BITS</p> <ul style="list-style-type: none"> » 50% narrower than the standard bit - 15.5 mm wide » Allows larger aggregate to flow through » Standard Board Bit Gap: 45mm » Mining Board Bit Gap: 62mm 	 <p>WIDE BITS</p> <ul style="list-style-type: none"> » Can configure as a continuous edge » Twice as wide as the standard bit (60 mm) » Standard Board Bit Gap: 3mm » Mining Board Bit Gap: 18mm
<p>MIX AND MATCH</p>	<ul style="list-style-type: none"> » Mix and match bits to control the size of the aggregate left behind » Use wide bits on the end of the moldboard to prevent excessive wear



STAY ON TRACK WITH THE RIGHT TIRES

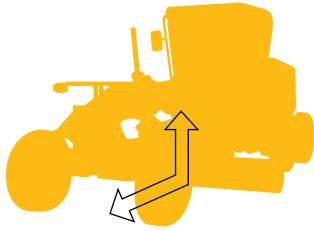
When it comes to tires, traction and ride are the two critical factors for the grader operator. Operators need a tire that delivers excellent traction to plow through the snowdrifts in the winter and muddy or hard-packed ground in other weather conditions throughout the year. Because operators can spend long hours in the motor grader, tires that provide good ride comfort are important to reduce operator fatigue. While some tire characteristics come down to operator preference, here are some tips to help you select the right tire for your motor grader applications.

RADIAL OR BIAS	
<p>RADIAL TIRES</p> <p>Tend to flatten out more and provide a more solid platform. Radials also tend to roll over obstacles better. The sidewalls allow them to absorb the impact of obstacles like large rocks.</p>	<p>BIAS TIRES</p> <p>Have a stiffer sidewall and tend to prevent the grader from shifting side to side, but absorb less of the impact of the road surface on ride comfort.</p>
<p>TIRE PRESSURE CAN IMPACT ACCURACY</p>	<p>Tire pressure can affect a number of performance factors: stability, traction and flotation. Even grade accuracy can be impacted by changes in tire pressure. If pressures fluctuate to the point that blade height changes, it can impact the calibration of the grading system and make reaching final grade more difficult.</p> <p>Like haulage and loader tires, motor grader tire pressure should be matched to the load. A general rule of thumb is: For every 1% change in the load on the tire, air pressure must be increased 2% to a maximum of 14% (to the air pressure).[*] Of course, load should not exceed Caterpillar's recommendations for your motor grader model and the pressure should not exceed the tire manufacturer's specifications.</p> <p><small>[*](https://www.tirereview.com/selecting-best-winter-grader-tire)</small></p>
<p>MATCH TREAD PATTERN TO APPLICATIONS</p>	<p>Like choosing tire type, tread patterns can have an impact on overall performance. Some tread patterns are designed for finish grading and smoother finishes. Aggressive tread patterns may provide better traction, but leave unwanted footprints in the final surface. Match treads to your work. Mismatched tires can also create issues. Make sure you are using tires that are the same size, same type and same tread.</p> <p>Caterpillar offers a range of tire and rim options to match your applications.</p>

MOTOR GRADERS

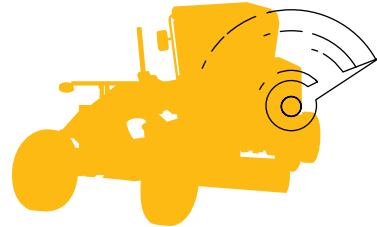
PRODUCTIVITY TIPS AND FACTS

For increased productivity, greater efficiency in moving material and improved fuel efficiency, consider the following best practices when operating your motor grader.



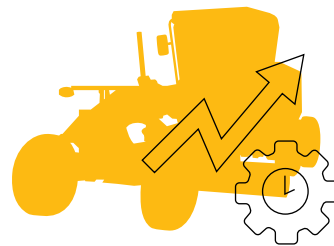
The moldboard should always be correctly positioned. In general, the top of the moldboard should be rolled forward 2 to 4 inches from the cutting edge to make the edge blunt. This also results in better rear visibility to the moldboard and allows the operator to finish the task more easily.

The operating speed of the motor grader highly affects the quality of work. When ditching or blading, don't get in a hurry. Higher speeds can sometimes cause the motor grader to bounce and gouge the surface rather than smooth it. In extreme cases, this can cause the operator to lose control of the grader, producing a potential accident situation. Generally speaking, keep the travel speed within a 3 to 5 mph range.



When turning the motor grader around, the wheels should always be leaning in the direction in which the turn is being made. This will help the motor grader turn with ease and reduce tire wear. Auto Articulation is for joystick machines only; not available on steering wheel and lever machines.

Operators can spend a lot of time working to control motor grader bounce so it doesn't reduce the quality of the graded surface or damage machine components. Each time the operator works to control bounce, speed is reduced and the surface may have to be reworked. Cat Stable Blade technology eliminates bounce automatically by sensing bounce earlier than the operator can and correcting for it without operator intervention. This saves time and boosts operator productivity.



TECHNOLOGY CAN ADD SPEED AND EFFICIENCY

Finding seasoned equipment operators has become an ongoing challenge, and this shortage can significantly slow down productivity on any job. Equipment manufacturers are continuously searching for ways to make machines easier to run for operators across all skill and experience levels, as well as to provide a safer work environment. Technology has become the go-to solution to help address these challenges.

To choose a motor grader with the right level of technology requires an understanding of the technology and how it can benefit your business.

TECHNOLOGY	WHAT IT DOES	KEY BENEFITS	INVESTMENT
Cat Product Link™	Collects from any machine, any brand, information such as location, hours, fuel usage, productivity, idle time, maintenance alerts, diagnostic codes and machine health	Hardware and subscriptions designed to be scalable to meet your needs	Standard on all motor graders
Auto Articulation	Automatically matches articulation angle to steering angle	<ul style="list-style-type: none"> · Improved maneuverability in tight quarters work · Improved productivity on sites with curves, obstacles and turnarounds · Reduced operator fatigue 	Optional from the factory or as a field retrofit kit
Stable Blade	Automatically reduces engine speed to help reduce machine bounce	Improves finish surface quality by eliminating scalloping	Optional from the factory or as a field retrofit kit
Cat Grade Attachment Ready Option (ARO)	<ul style="list-style-type: none"> · Allows the motor grader to be equipped with a Cross Slope, Sonic, Laser, GNSS or UTS electronics kit · Included are sensor-ready swivel, mounting for sensors, connectors and blade mast brackets 	Simplifies installation of the grade control system, making it faster and more efficient	Optional, factory integrated or aftermarket
Digital Blade Slope Meter	Shows real-time blade slope on the integrated machine display	Reduces the need for manual grade checking, helping keep sites safer	Option from factory as well as aftermarket
Cross Slope Indicate	Shows the machine cross-slope and fore/aft orientation on the primary display	<ul style="list-style-type: none"> · Quick and easy reference for moldboard position · Precisely manages material resulting in less waste 	Option from factory as well as aftermarket
Cat Grade Cross Slope	<ul style="list-style-type: none"> · An integrated system that automates the cross slope of the blade · The operator manually controls one end of the moldboard and the system automatically controls the other to maintain the cross slope entered through the monitor in the cab 	<ul style="list-style-type: none"> · Allows the operator to do more in the same amount of time · Cost-saving benefits include lower fuel consumption and up to 40% less material usage 	Option from factory as well as aftermarket

TECHNOLOGY	WHAT IT DOES	KEY BENEFITS	INVESTMENT
Cat Grade with 3D	<ul style="list-style-type: none"> · Integrated blade guidance that helps operators get to grade faster and more efficiently · Uses two GNSS receivers to automatically adjust blade movements as you follow the design 	<ul style="list-style-type: none"> · Reduces the cost of rework, labor and materials · Can be used on all phases of the job in multiple applications · Mastless system maintains visibility · Saves more on materials with automated blade functions and gets the job done quicker with more accuracy 	Can be installed and calibrated at the factory on new machine orders or as a field retrofit for existing models. Retrofit kits are available for pre- and post-2019 M Series models equipped with or without the Attachment Ready Option (ARO).
E-Fence	<ul style="list-style-type: none"> · Prevents the moldboard from contacting the tires and ladder · Stops the circle from potentially damaging the link bar 	Provides extra protection so operator can focus on the job	Option included with Cat Grade with 3D
Caterpillar Production Measurement for Motor Graders (CPM)	<ul style="list-style-type: none"> · Application Segmentation records on a map when the unit is blading, ripping, roading or waiting · Efficiency Coach displays an icon to the operator when to gear up to maximize fuel efficiency 	Fuel savings up to 15% while maintaining load and machine productivity	Can be installed at the factory on new machine orders or as a field retrofit for existing models. Requires additional subscription for the Advanced Productivity App.
Remote Services	Includes Remote Flash for direct ECM updates and Remote Troubleshoot to connect with your dealer technician remotely	<ul style="list-style-type: none"> · Keeps downtime to a minimum · Eliminates unnecessary service trips · Speeds repairs 	Available as a subscription service with Product Link
VisionLink®	Use this interface to see data and reports and make informed decisions that boost productivity, lower costs, simplify maintenance, and improve safety and security on your jobsite	<ul style="list-style-type: none"> · Can be viewed online through web and mobile applications · Available with cellular or satellite reporting or both 	Standard for all motor graders

HOW DO I KNOW WHAT I NEED?

Technology is an investment, so take into account some of the following questions and considerations before you make decisions on what you do or don't need.

- Know what types of tasks you need to accomplish and where.
- Try out technology on a rental machine or in your dealer's demo area.
- Understand how factory-integrated technology differs from aftermarket systems.
- Ask about the differences between 2D and 3D options.
- Identify how long will it take to get your machine calibrated and ready to work.
- Determine if on-site training is needed/available.
- Allow yourself a couple of months of using it before determining its effectiveness.

For more complete information on Cat products, dealer services and industry solutions, visit us on the web at www.cat.com

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Materials and specifications are subject to change without notice. Featured machines in photos may include additional equipment. See your Cat dealer for available options.

