

Trimble Productivity: Finish Faster with Fewer Machines.



**TRIMBLE GCS900 GRADE CONTROL SYSTEMS**



# TAKE THE GUESSWORK OUT OF EARTHWORKS. ONLY FROM THE LEADER. TRIMBLE.

## *The Connected Construction Site*

*An interesting thing happens when you connect your office, people and machines. Productivity jumps. Rework disappears. Cash flow improves. Profits soar. Only one company has the technology and experience to connect your site. The leader ... Trimble.*

Performing earthworks smarter, faster and more profitably is critical to success in today's highly competitive construction industry. You need to perform all parts of the job faster and more accurately than ever before. From estimating to completion, the Trimble GCS900 Grade Control System is truly revolutionizing the total construction process.



### FULLY UPGRADEABLE

The Trimble GCS900 Grade Control System is flexible, fully upgradeable, and can be installed on machines from any manufacturer. Using the industry-standard Controller Area Network (CAN), you can easily add sensors and upgraded software to meet specific machine and application requirements. The upgradeable wiring harness is designed for plug-and-play flexibility, allowing you to upgrade the system from a single sensor control to a multi-functional GNSS 3D solution.

### EQUIP YOUR ENTIRE FLEET

Whether you are using excavators for mass excavation, dozers or scrapers for bulk earthworks, motor graders for finished grading, or compactors for material density - the Trimble GCS900 family has a solution to meet your needs. Our flexible and upgradeable GCS family can be installed on a wide range of machines—dozers, compactors, motor graders, scrapers, excavators and more. You can use a common platform across your entire fleet, while at the same time choose the best option for the machine and the application.

### TRIMBLE READY™ MACHINES

Trimble has worked with leading machine manufacturers to reduce the effort required to install 2D and 3D grade control components. Today, Trimble Ready machines come pre-plumbed with wiring and brackets for common system configurations. This simplifies installation and lets you easily move the system from one machine to another.





Trimble offers you the most complete line of Grade Control Systems. From laser or sonic-based through to 3D, these rugged systems are easy to use, fully upgradeable and flexible enough to meet a wide

range of application and jobsite requirements. Quite simply, there is no better solution to meet the challenges of today's schedules and budgets.

Gain a competitive edge and streamline your operations with the next generation of grade control systems from Trimble, the company that invented grade control.



#### **FASTER JOB CYCLES**

Spend more time being productive and less time waiting for surveying and grade checking. With site plan and grade information displayed in the cab, operators can finish jobs faster with minimal supervision—even in dusty, windy or dark conditions.

#### **FLEXIBLE**

Perform a wide range of work, from mass excavation through to finished grade, on both large and small jobs. Trimble machine control products are designed to adapt to a variety of machines and jobsite applications.

#### **LOWER OPERATING COSTS**

Getting the job done right the first time eliminates rework. With design information at your fingertips, the need for stakes, hubs or stringlines is reduced. Through improved productivity, personnel and machine costs are also reduced. Plus, accurate grading helps you carefully control material usage.

#### **RETURN ON INVESTMENT**

The Trimble GCS900 Grade Control System quickly pays for itself—often on the first project! Faster completion, less rework, less staking, less checking, lower costs, and improved material yields all add up to a stronger bottomline for your company.

# 2D GRADE CONTROL SYSTEMS FOR UNCONVENTIONAL PRODUCTIVITY.

Trimble productivity-enhancing grade control systems are extremely scalable and can be configured for just about any machine or job. 2D systems begin with a single laser receiver system, and progress through combinations of laser receivers, sonic tracers, angle sensors

## TRIMBLE GCS900 GRADE CONTROL SYSTEM 2D SINGLE OR DUAL ELEVATION CONTROL



The Trimble 2D single elevation control option uses a single LR410 Laser Receiver to control the lift of the machine blade. Ideal for smaller construction projects, it is an excellent first investment in grade control.

The Trimble 2D dual elevation control option controls both the lift and tilt of the blade by connecting two LR410 laser receivers or one LR410 and an AS400 Slope Sensor

to the system. By controlling both functions, the system allows the operator to control the material more accurately, especially across larger jobsites.

Easy to set up and use, the system is designed primarily for use on dozers; however, they can be used on other machines.

### APPLICATIONS:

Finished Grading

Housing Pads

Commercial Building Sites

Sports Fields

## TRIMBLE GCS900 GRADE CONTROL SYSTEM 2D CROSS SLOPE CONTROL



The Trimble 2D cross-slope option is designed to be used on motor graders for fine grading work. The system uses two AS400 angle sensors and an RS400 rotation sensor to calculate the cross-slope of the blade. The system allows the operator to select which side of the blade is controlled and switch sides on the return pass. Providing a high degree of flexibility, the AS400 has

100% slope capability making the system ideal for a wide range of applications, including cutting road slopes, ditches and embankments.

### APPLICATIONS:

Road Maintenance

Road Construction

Sports Fields

Embankments

Road Ditches



and rotation sensors. All Trimble grade control components have been designed for ease of use, quick setup and extreme durability to ensure the highest uptime and longest life possible in jobsite conditions.

### TRIMBLE GCS900 GRADE CONTROL SYSTEM 2D CROSS SLOPE AND ELEVATION CONTROL



The Trimble 2D cross-slope and elevation control option is designed to be used on motor graders for fine grading work. The option uses two AS400 angle sensors and an RS400 rotation sensor to calculate the cross-slope of either side of the blade; in addition it uses an LR410 laser receiver or an ST400 sonic tracer to provide elevation control. Using the ST400, the system allows for stringline,

previous pass, or curb and gutter tracing. Using one or two LR410 laser receivers, the system can be used for fine grading of plane surfaces. The 2D cross-slope and elevation system is ideal for applications with tight tolerances and finished grade work.

#### APPLICATIONS:

Small-to-Large Housing  
and Building Site Pads

Road Construction

Highway Construction  
and Maintenance

Runways

### TRIMBLE GCS900 GRADE CONTROL SYSTEM 2D FOR EXCAVATORS



The Trimble 2D for excavators is a depth and slope control system for excavation, trenching, grading and profile work. The system uses an AS450 Angle Sensor, AS460 Dual Axis Sensor and LC450 Laser Catcher to measure the relationship between the body, boom, stick and bucket to determine where the cutting edge is and should be, directing the operator to the desired depth and slope.

Designed for both tracked and wheeled hydraulic excavators, it is ideal for earthmoving contractors looking for an economical and easy-to-use grade control system to improve their excavation productivity and profitability.

#### APPLICATIONS:

Mass excavation

Grading and sub-surfaces

Trenching, ditch and  
finished slope work

Dredging

Waterways

# FLEXIBLE SENSOR OPTIONS FOR ALL YOUR JOBSITE REQUIREMENTS.



## TRIMBLE CB450 CONTROL BOX

Designed for use in harsh construction environments, the Trimble CB450 Control Box gives the operator a full-color graphical display for easy viewing and guidance to grade. Priced for maximum return on investment, the CB450 offers the following key features:

- 4.3" full color LCD display with adjustable backlight controls
- Audible tones for real-time grade guidance or warnings and alerts
- Four LED lightbars to provide grade guidance at a glance



## TRIMBLE CB460 CONTROL BOX

The Trimble CB460 Control Box is the premium display for the Trimble CCS900 Compaction Control System and all machine types in the Trimble GCS900 Grade Control System portfolio. The CB460 offers the same key features as the CB450, plus:

- A large, easy-to-read 7" full color LCD display,
- Support for external lightbars,
- Faster data transfer via Ethernet connection with the on-machine radio



**TRIMBLE GCS900 2D MACHINE CONTROL SYSTEMS**

Configuration	Target Machines	Description	Key Components
<b>ELEVATION CONTROL</b>	Dozers Graders	Single control system that uses a laser receiver to control the lift of the machine blade for flat work and finished grading	Laser Laser receiver Control box
<b>DUAL ELEVATION OR ELEVATION AND BLADE SLOPE CONTROL</b>	Dozers Graders	Dual control system that controls both the lift and tilt of the machine blade for flat, slopework and finished grading	Laser 2 Laser receivers -or- Laser receiver Slope sensor Control box
<b>CROSS-SLOPE CONTROL</b>	Dozers Graders	Cross-slope control system to be used on motor graders for fine grading work for road maintenance, ditches and slope work	2 angle sensors Rotation sensor Control box
<b>CROSS-SLOPE AND ELEVATION CONTROL</b>	Graders	Highly flexible cross-slope and elevation control system for fine grading work with tight tolerances for road maintenance and construction, embankments, flat and slope work	2 angle sensors Rotation sensor Laser receiver -or- Sonic tracer Control box
<b>DEPTH, SLOPE, AND ELEVATION</b>	Excavators	Highly flexible system for excavation, trenching, grading and profile work	Angle sensors Laser catcher Control box
<b>GRADE AND SLOPE CONTROL</b>	Asphalt Pavers	Grade and slope control system for paving of base material and asphalt	Sonic tracer Sonic Averaging Beam Contact sensor Slope sensor Control box

**TRIMBLE SONIC TRACERS**

The Trimble ST400 Sonic Tracer mounted to the blade of the motor grader uses a physical reference such as curb and gutter, stringline, existing or previous pass as an elevation reference. Using a sonic tracer, the system can match curves and accurately get to grade in fewer passes. This reduces operator fatigue, saves material and reduces the need for grade checkers.



**TRIMBLE LASER RECEIVERS**

The Trimble LR410 Laser Receiver is fully linear and has smooth corrections the full length of the receiver. It is mounted to a mast on the blade and connected to the machine hydraulics to control lift to an accuracy of 3-6 millimeters (0.01 to 0.02 feet). In auto mode, the system uses the LR410 grade information to automatically move the blade up or down to the on grade position.



# MORE PRODUCTIVITY FOR EVERY MACHINE AND EVERY JOB.

From bulk earthmoving through grading to finished material compaction, Trimble has a 3D grade control solution for your machine type and application requirements. Just select the appropriate 3D sensor option – GNSS with or without laser augmentation,

## MASS EXCAVATION



The Trimble GCS900 Grade Control System is ideal for bulk earthmoving applications such as land reclamation, dam and reservoir construction, new infrastructure projects, landfills and waste deposits.

With GCS900, design information and live cut/fill indications are displayed in the cab, allowing excavation to be done in a safer, stakeless environment - even at night.

The system provides real-time information for monitoring

avoidance zones and simultaneously collects as-built data as the machine cuts to grade. With these capabilities, operators can keep tighter control over safety issues and see precisely where dirt is being moved on site.

Used on a dozer, excavator or scraper, GCS900 allows even lesser skilled operators to work faster, more consistently, and with less rework.

### IDEAL CONFIGURATIONS:

Trimble GCS900 with dual GNSS on an excavator

Trimble GCS900 with single GNSS on a dozer

Trimble GCS900 with dual GNSS on a dozer

Trimble GCS900 with single GNSS on a scraper

## GRADING



Using the Trimble GCS900 Grade Control System on a dozer or grader allows the operator to get to grade faster than ever, even with complex designs.

The on-board Trimble control box determines the position of each tip of the blade and compares it to the design elevation to compute cut or fill to grade. The cut/fill data is used to drive the valves for automatic blade control or is passed to in-cab lightbars that

provide visual guidance to the operator.

Ideal for residential site prep and subdivision construction, single house pads or the entire neighborhood – project infrastructure can be constructed better and faster using GCS900.

### IDEAL CONFIGURATIONS:

Trimble GCS900 with dual GNSS on a dozer

Trimble GCS900 with dual GNSS on a grader

Trimble GCS900 with the Universal Total Station on a dozer

Trimble GCS900 with the Universal Total Station on a grader



or the Trimble SPS730 and SPS930 Universal Total Stations---then use the same components across your entire fleet, through the life cycle of the project.

## COMPACTION

## FINISHED GRADE



Once grade is achieved, most earthworks projects require that sub-surface material is compacted to a target density for increased durability, stability, and load-bearing capacity.

The Trimble CCS900 Compaction Control System enables the contractor to accurately control the compaction process, while reducing unnecessary passes that result in over compaction.

The system achieves compaction density faster, more accurately,

with less rework. The early detection of sub-surface material anomalies means that soft spots and hidden obstructions can be excavated and re-graded or compacted prior to the more costly phases of the construction process such as paving.

Compaction results are recorded and stored for analysis and generation of documentation deliverables at the end of the project.

The Trimble GCS900 Grade Control System allows the operator to achieve finished grade to millimeter accuracy with fewer passes.

Trimble GCS900 is quite simply the market leading solution for fine-grading application. Used on motor graders and dozers, it is ideal for new road construction and widening, airport construction, fine grading for concrete pours and slab placement, and commercial site preparation requiring the highest accuracy.

By maintaining tight tolerances every time, GCS900 results in higher quality work delivered to the client. Finished grade materials can be placed more accurately and in a shorter time period, keeping the material costs to a minimum and realizing better profits.

With more confidence in the cost of operations and quicker completion to finished grade, the equipment owner is able to lower bids and gain more business in every phase of the project.

### IDEAL CONFIGURATIONS:

Trimble CCS900 with the dual GNSS on a compactor

Trimble CCS900 with the Universal Total Station on a compactor

### IDEAL CONFIGURATIONS:

Trimble GCS900 with the Universal Total Station on a grader

Trimble GCS900 with dual GNSS and laser augmentation on a grader

Trimble GCS900 with the Universal Total Station on a dozer

Trimble GCS900 with dual GNSS and laser augmentation on a dozer

# TRIMBLE GCS900 GRADE CONTROL SYSTEMS. 3D AUTOMATIC CONTROL FOR ULTIMATE PRODUCTIVITY.

## TRIMBLE. THE LEADER IN GRADE CONTROL SYSTEMS.

Trimble is focused on driving your productivity at all stages of the construction process. Here are just a few of the reasons why Trimble should be your productivity partner:

### BETTER SATELLITE POSITIONING UPTIME

Trimble GNSS systems are guided by the most powerful RTK engine on earth. Stronger signal acquisition from more satellites means you can run faster, longer and without interruptions and downtime.

### CONSTRUCTION TOUGH

Trimble components have been designed to withstand the beating they can take on big machines and rough sites. More robust components mean less downtime and more productivity.

### FINISH FASTER

Trimble positioning systems let you run at higher speeds without losing accuracy thanks to faster data transfer, fully linear receivers and faster valve response.

### TWO ANTENNAS ARE BETTER THAN ONE

Trimble's patented dual GNSS antenna system gives you exact course and blade position... not the estimated position.

### SMART PRODUCTIVITY

Only Trimble offers the Smart GNSS Antenna ... an integrated GNSS receiver and antenna designed to provide maximum portability, flexibility and accuracy.

### MAKE EVERY OPERATOR GREAT

The displays in Trimble Grade Control Systems are intuitive and simple to use ... maximizing operator productivity.

### EASIER AND FASTER SET UP

Trimble systems set up easier and faster than zone systems, which means you can get the work started sooner.

### FUTURE READY, NOW

Trimble 3D grade control systems support modernized GNSS signals and will track the GPS L5 signal when it becomes available. You won't have to invest in new systems to take advantage of the latest signal capabilities.



## Trimble Total Stations



Trimble SPS Series Universal Total Stations can be used for even greater accuracy when performing fine or finished grading, with blade guidance to 2-5 millimeters (0.007 to 0.016 feet).

## Integrated Laser Receivers



When improved vertical accuracy is needed, the GNSS systems can be enhanced with integrated laser receivers that can provide blade control to 3-6 millimeters (0.01 to 0.02 feet).



**TRIMBLE GCS900 3D GRADE CONTROL SYSTEMS**

Configuration	Target Machines	Description	Key Components
<b>SINGLE GNSS</b>	Dozers Graders Scrapers Excavators	Cost effective, full 3D control system that measures the position and slope of the blade and compares that to design data for rough grading and mass excavation on complex design surfaces	Angle and rotation sensors Single Smart GNSS Antenna Control box Rugged on-machine radio
<b>DUAL GNSS</b>	Dozers Graders Scrapers Excavators	Full 3D control system that measures the exact position, cross slope and heading of the blade, bucket, drum for rough grading and mass excavation on steep slopes and complex design surfaces	Dual Smart GNSS Antennas Control box Rugged on-machine radio
<b>SINGLE OR DUAL GNSS</b>	Soil Compactors	Continuous compaction control and documentation for Soil Compaction with real-time material compaction mapping and detection	Single or dual Smart GNSS Antenna(s) Compaction sensor Control box Rugged on-machine radio
<b>SINGLE OR DUAL GNSS WITH LASER AUGMENTATION</b>	Dozers Graders	Single and dual GNSS systems enhanced with laser augmentation to improve vertical accuracy for high accuracy guidance to complex design surfaces such as super-elevation grading for rough through finished grade work	Single or dual Smart GNSS Antenna(s) Laser receiver Control box Rugged on-machine radio
<b>UNIVERSAL TOTAL STATION</b>	Dozers Graders Excavators Soil Compactors	Total station based system for applications requiring extreme accuracy for lift and layer control, material monitoring, or for jobs where GNSS is not the ideal solution because of overhead obstructions	Single on-machine active target Control box Rugged on-machine radio Universal Total Station
<b>UNIVERSAL TOTAL STATION</b>	Asphalt Pavers Milling Machines Trimmers	Total station based systems for high accuracy paving, milling and trimming without stringlines	Single on-machine active target Control box Rugged on-machine radio Universal Total Station



**Trimble GNSS Smart Antennas**



The Trimble MS992 is "smart" because it contains an integrated GPS+GNSS receiver, antenna, and isolation system all in a single, durable housing. It uses the advanced Trimble RTK engine for faster initialization times when satellite lock is lost and enhanced performance near obstructions.



The MS972 offers a cost-effective alternative for contractors who need a highly accurate GNSS receiver at a lower price point. It is optimized for cab or machine body mount only.



## Productivity is...

### Planning

software that optimizes transportation routes to minimize project time and costs.

### Design

data preparation and management for the construction jobsite life cycle.

### Grade

control that is faster, more accurate and minimizes rework.

### Check

measurement, stakeout, quality control and progress monitoring on the job site.

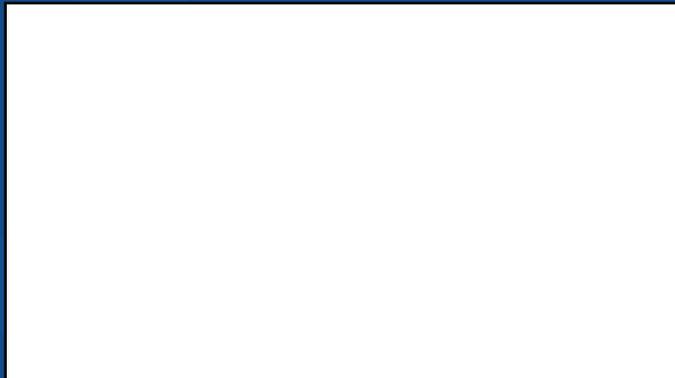
### Construct

with precise positioning for faster completion with less re-work.

Only one company can optimize your productivity with the broadest, deepest and most advanced set of tools for integrating measurement, data management, machine operations and asset management throughout the construction life cycle. Productivity is... Trimble.

# Trimble Productivity

Go to [www.trimble-productivity.com](http://www.trimble-productivity.com) to learn how contractors are using these Trimble Systems for significant time and money savings.



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