

THE ESSENTIAL GUIDE

TO UNDERSTANDING 2D MACHINE CONTROL



A SMART STEP INTO MACHINE CONTROL.

Excavator machine control systems have become standard for contractors who want measurable improvements in accuracy, efficiency and jobsite productivity. Many operators report significantly reduced need for constant grade checks, resulting in both labor savings and enhanced performance.

Despite these advantages, concerns about cost often delay adoption—manual grade checking consumes resources and requires a dedicated crew member, leading to delays when the operator repeatedly exits the cab. The outcome is predictable: increased labor costs, lost efficiency and diminished profitability.

The New Holland Construction SiteControl 2D guidance by Hemisphere® is an accessible and cost-effective entry point into machine control technology. Once implemented, these 2D systems quickly deliver a return on investment and significant operational improvements.

THE FUNDAMENTALS OF 2D MACHINE CONTROL.

2D machine control has proven to be a reliable solution over several decades. It integrates an external elevation reference point provided by a laser, stakes or physical benchmark to continuously display depth and slope during excavation to the operator. The system provides real-time guidance through an in-cab display, allowing operators to monitor grade directly from the cab. This eliminates the need to get out of the cab multiple times a day or wait for another crew member to deliver a reading. In turn, it increases efficiency while improving jobsite safety by reducing foot traffic in active work zones.

For many operations, 2D systems deliver a substantial step forward in productivity and accuracy without the complexity or cost of 3D technology. These can include:

- Placing building pads
- Digging foundations and footers
- Digging ditches and basements
- Creating slopes
- Placing utilities

BEYOND MANUAL GRADE CHECKING.

Comparisons between 2D and 3D machine control systems often push contractors toward higher-priced 3D systems, creating the misconception that 2D solutions are suited only for smaller operations. But 2D systems are a great choice for any operation, no matter the size. Plus, it can be more impactful for operators to compare 2D against manual methods.

Manual grade checking can introduce inefficiencies and inaccuracies to the jobsite. Each time an operator exits the cab or waits on a grade checker, valuable time is lost, slowing progress and disrupting workflow. Human error in measurements can also compound lost time, leading to rework, material waste and higher costs.

A 2D machine control system streamlines the excavation process, allowing operators to work continuously with accurate, in-cab information. It transforms the excavator into its own grade rod, eliminating the need for a dedicated grade checker at the excavation site. This allows every crew member to be assigned to schedule-critical tasks, increasing overall jobsite productivity.

2D builds on the grade control basics users already know: setting up a benchmark, checking where the machine is in reference to that benchmark and working with lasers. With 2D, operators have this information available in the cab, delivering information about when you're at grade and when you're not.

Plus, it works in areas where the satellite feed required by 3D systems is not available, including inside buildings, beneath tree canopies, against high walls and within pits.

2D MAKES A DIFFERENCE ON THE JOBSITE.



BASEMENT EXCAVATION: Dig to a specific depth, creating a level floor in a lower elevation.	
MANUAL	2D
Requires a laser setup to provide a reference elevation and an additional crew member to perform grade checks during excavation. The operator must exit the cab every 15 to 30 minutes to check grade. The job might also require the extra expense of a surveyor.	Depth and slope are continuously displayed in the cab. The operator excavates to grade without interruptions or additional personnel, and the chances of over or under digging are significantly decreased.
DITCH EXCAVATION: Dig a ditch with a level floor for utility placement.	
MANUAL	2D
Requires two people, one in the machine and one holding the grade rod in the trench, increasing labor costs and safety risks.	The system benchmarks against ground level, survey stake or laser. The operator then sets cut depth on the in-cab monitor and excavates until the system notifies that depth has been reached. The operator then backs up, benchmarks against the new surface and repeats the process for the entire length of the trench. This allows other personnel to focus on setting pipe while increasing excavation accuracy.
BLIND CUTS: Dig and grade from a position where the bucket cannot be seen from the cab.	
MANUAL	2D
Requires two people communicating by radio or hand signals, increasing safety risks because the operator can't see the bucket.	Working from a laser reference or a benchmark, the operator continuously checks grade without requiring a second person.

LIMITATIONS OF 2D SYSTEMS.

While highly effective, 2D systems have inherent limitations. They provide information relative to a fixed reference point, but do not account for machine movement. When the tracks are moved, a new benchmark must be established. By contrast, 3D systems provide full positional awareness, adjusting guidance in real-time as the machine moves.

Visit your local dealer to learn why excavator 3D machine control is right for you.

KEY CONSIDERATIONS FOR 2D IMPLEMENTATION.

COST

A high-quality 2D system might not cost as much as you anticipate. A typical investment ranges between \$13,000 and \$15,000, depending on system options.

CORE COMPONENTS

ROTARY LASER: Mounted outside the machine, this projects a 360-degree light beam to establish a precise elevation reference point. A 2D benchmark can also be set with the machine's bucket teeth touching the desired elevation.

SENSORS: Located on the excavator, inertial measurement units (IMU) measure and report findings via cable to the machine's in-cab tablet. These include:

- **CHASSIS (PITCH AND ROLL) SENSOR:** Placed in the upper body of the excavator.
- **BOOM SENSOR:** Measures angle movement of the boom.
- **STICK SENSOR:** Measures angle movement of the stick.
- **LASER RECEIVER:** Provides elevation reference when benching to a laser beam, may also be mounted to the stick parallel to the stick sensor.
- **BUCKET SENSOR:** Placed either on the excavator's dogbone or the quick coupler to measure the bucket's open/close movement.
- **TILT SENSOR (OPTIONAL):** Measures the sideways movement of a tilt bucket.

IN-CAB TOUCHSCREEN TABLET: This allows operators to monitor and control the 2D system right in the cab. Operators can quickly toggle between features, including project set up and type of bucket used. It also allows users to create in-field designs for common jobs such as pads, ramps and slopes.

LASER RECEIVER/CATCHER (USED WITH LASER-ASSISTED 2D): Positioned on the excavator stick parallel to the stick sensor, this provides elevation reference when benching to a laser beam.

INSTALLATION

Installation takes approximately one day for a full system.

TRAINING

Operators usually adapt quickly to 2D systems because they are already familiar with grade control fundamentals. As such, training takes approximately one to two hours of direct instruction, including time for questions and answers. Make sure to ask the system provider for a complete overview of what is required to get the crew comfortable using the technology.

SCALABILITY

Consider selecting a system that can expand from 2D to 3D without replacing existing hardware, allowing for future technology adoption without additional costs.



MOVE BEYOND MANUAL GRADE CHECKS WITH 2D MACHINE CONTROL.

Continuing to rely on manual grade checks is both inefficient and costly on today's demanding construction jobsites. A 2D machine control delivers clear advantages over manual grade checks in both accuracy and efficiency.

HIGHER PRODUCTIVITY

Maximizes project uptime by reducing interruptions and enabling faster, more accurate daily progress.

CONSISTENT ACCURACY

Maintains precise grade and slope in real time, ensuring the work is completed correctly the first time.

IMPROVED SAFETY

The operator remains in the cab, reducing risks associated with manual grade checking in or around the excavation.

BLIND CUT CAPABILITY

Provides grade information even when line of sight to the bucket is restricted.

OPERATOR CUSTOMIZATION

User profiles allow each operator to store individual settings, making it easy to switch between operators without compromising performance.

OPTIMIZED TEAM

Frees other crew members to tackle higher priority, schedule-critical tasks to improve efficiency.

GET EXPERT GUIDANCE FOR A SMOOTH 2D IMPLEMENTATION.

Consulting with an expert is essential before installing a 2D system. Our specialists are ready to assess your operation, workforce and project requirements to guide you in choosing the right New Holland Construction 2D guidance system.



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