Leica MC1

Machine control software
Grader

User manual (UM)

Version: 3.0

Released: 21/12/2021

- when it has to be **right**

Leica Geosystems
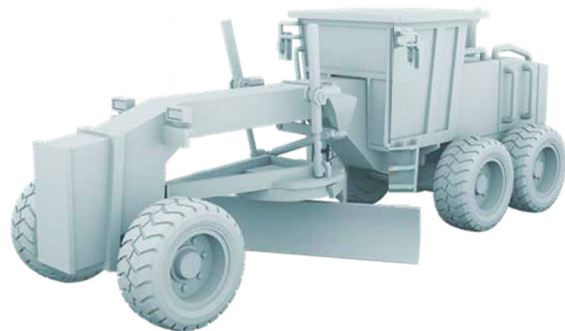
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Content:	User workflows relating to the Leica MC1 machine control software for graders.
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Software version:	6.4
Machine type:	Grader
Brand:	All
Model:	All
Limitations:	All rights reserved. No part of this manual may be reproduced in any form, or by any means, without prior written permission from LMC support.
	Refer to the Leica MC1 "quick guide" for additional legal and safety related requirements.
Support:	LMC support:

- Mail:
- Phone:

List of content

Introduction

In this user manual (UM) you will find essential workflows for you to gain success with your machine control solution.

All workflows evolve around MC1 (Software platform) for **grader**, and they cover both 2D and 3D machine control solutions.

Every workflow begins with a short explanation of the task you may be facing, followed by a step by step procedure to help you finish your task successfully.

If you need more in-depth knowledge about any of the workflows, feel free to dive into the user reference manual (URM) for grader. Alternatively, take a look at the "how to" videos available through QR coded links (See Appendix).

The first chapter in this manual helps you identify your solution. The next chapters focus on either a 2D or 3D solution.

Identify your solution and skip ahead to the chapter relevant to you.

Your machine

Workflows in this chapter focus on your machine as a whole, and are relevant for both 2D and 3D machine control solutions.

2D and 3D solution content:

- **Workflow 01:** Identify your machine control solution
- **Workflow 02:** Calibrate cross slope sensor
- **Workflow 03:** Define hydraulic performance settings (Gain)

Workflow 01:   Identify your machine control solution

Find out if you have a 2D or 3D machine control solution installed on your machine. Once you know which solution you have to work with, you can skip ahead to the relevant chapter in this manual.
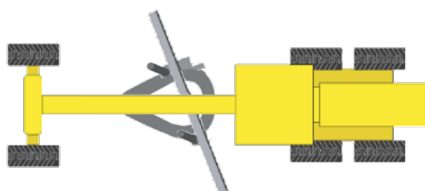
Step 1:   Identify which machine control components you have installed on your machine.

Step 2:   Identify the source of your position reference (Rotating laser, total station or satellite).

Step 3:   Compare your hardware configuration with the overview on the following two pages:
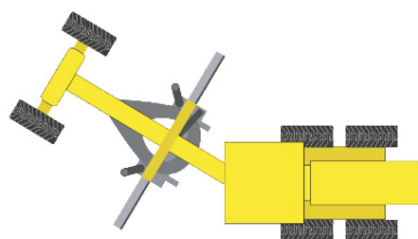
- Do you have a 2D or 3D solution?

NOTE: BLADE ROTATION

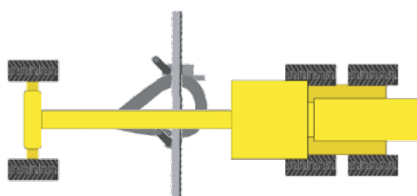**POSSIBLE** with following configurations:

- Single Laser
- Sonic Tracer
- Total Station
- Dual Laser
- Dual GNSS
- Single GNSS
- TPS

NOTE: ARTICULATION AND CIRCLE SHIFT

Grading on a slope while articulated or with the circle side shifted <u>will introduce error</u> with following configurations:

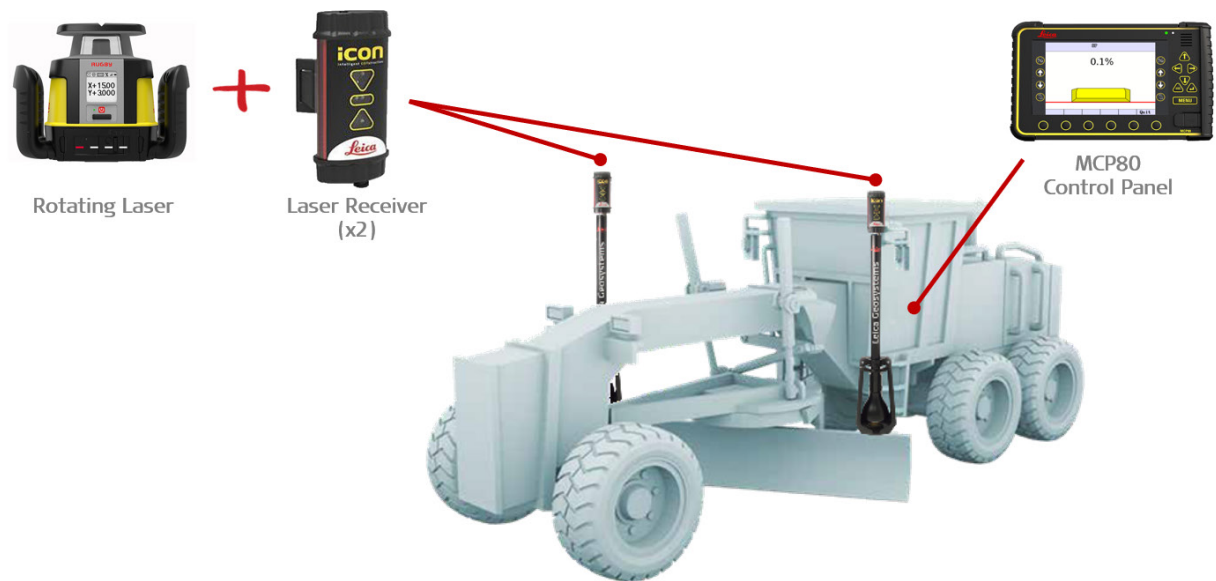- Single Laser
- Sonic Tracer
- Single GNSS
- Total Station

POSSIBLE with following configurations:

- Dual Laser
- Dual GNSS

Where can I learn more?

- User reference manual (URM) for grader.
- "How to" videos for grader (See Appendix).
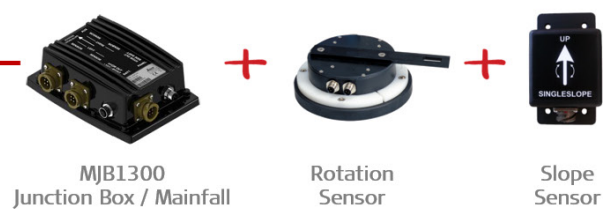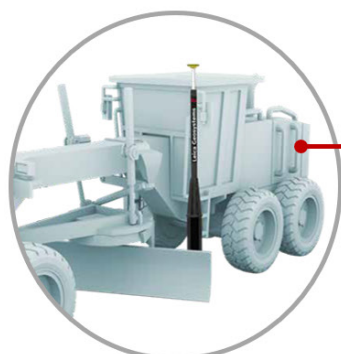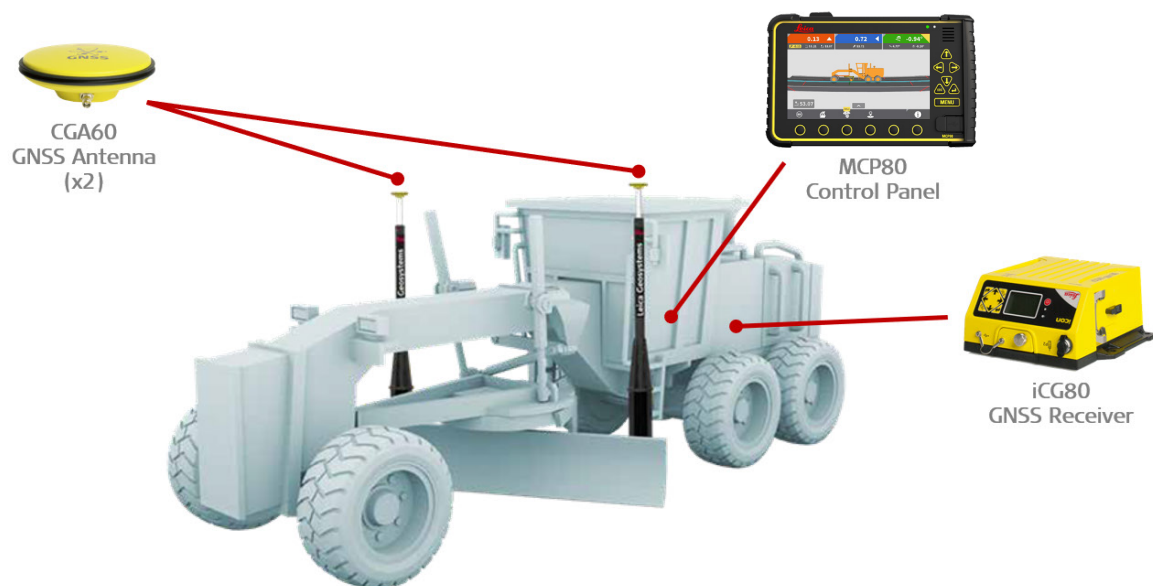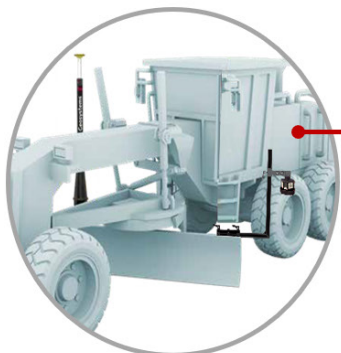
2D solution (Illustration)

Rotating Laser | Laser Receiver (x2)

MCP80
Control Panel

Option 2

Rotating Laser | Laser Receiver (x1) | MJB1300 Junction Box / Mainfall | Rotation Sensor | Slope Sensor

Option 3

Sonic Tracer | MJB1300 Junction Box / Mainfall | Rotation Sensor | Slope Sensor

Option 4

MJB1300 Junction Box / Mainfall | Rotation Sensor | Slope Sensor

3D solution (Illustration)

CGA60
GNSS Antenna
(x2)

MCP80
Control Panel

iCG80
GNSS Receiver

Option 2

CGA60
GNSS Antenna
(x1)

$+$

iCG80
GNSS Receiver

$+$

Rotation
Sensor

$+$

Slope
Sensor

Option 3

CGA60
GNSS Antenna

$+$

iCG80
GNSS Receiver

$+$

Sonic
Tracer

$+$

Rotation
Sensor

$+$

Slope
Sensor

Option 4

TPS

$+$

MPR122
Prism

$+$

CR30
Radio

$+$

Rotation
Sensor

$+$

Slope
Sensor

# Workflow 02:   Calibrate cross slope sensor

The cross slope sensor is critical for accurate positioning. It is important to calibrate, if the sensor has been repositioned or removed. Also calibrate, if your machine does not match a pass in the opposite direction. A digital level, and an assistant, is required to position the blade in "Step 4". If the machine does not match pass after calibrating the cross slope sensor, a full sensor calibration may be necessary. Note: If the blade is worn unevenly a good cross slope calibration is not possible and the cutting edge will need to be replaced for accurate grading.
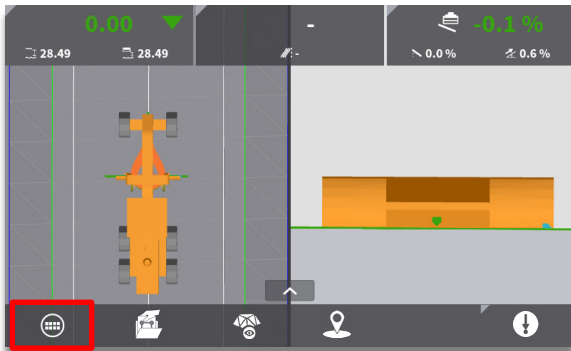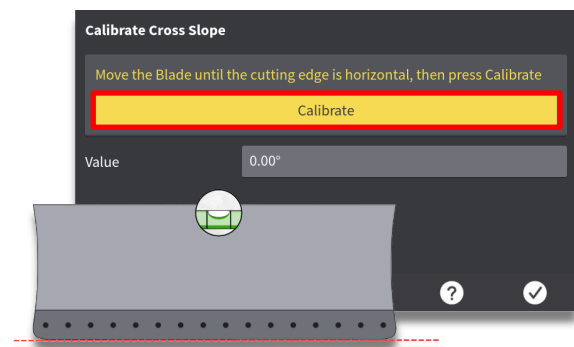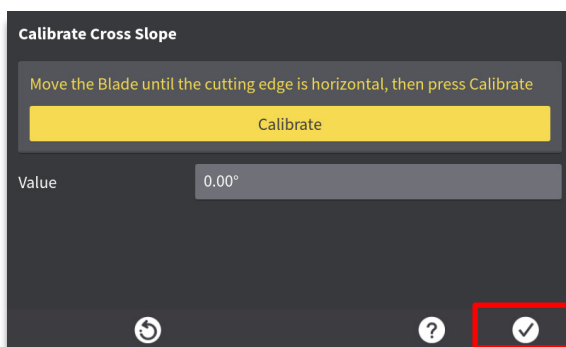

Step 1: Select "Main" menu.
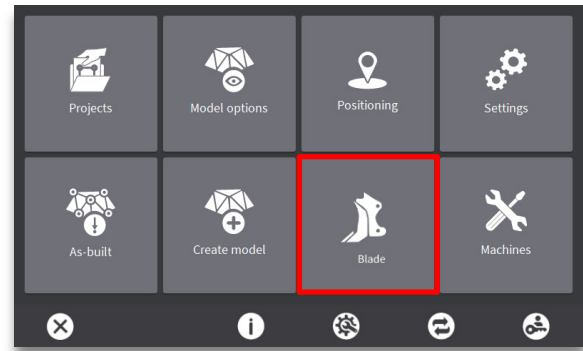
Step 2: Select "Blade" menu.
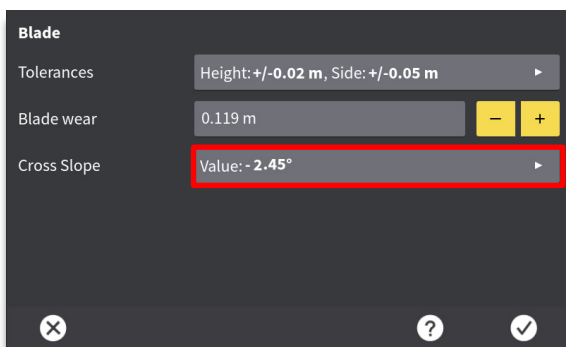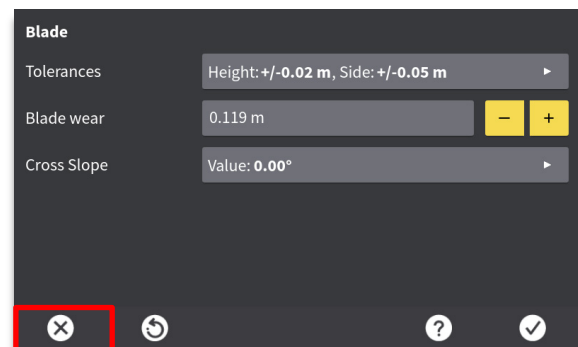

Step 3: Select "Cross Slope" menu.

Step 4: Position blade horizontal using a digital level. Then press "Calibrate".

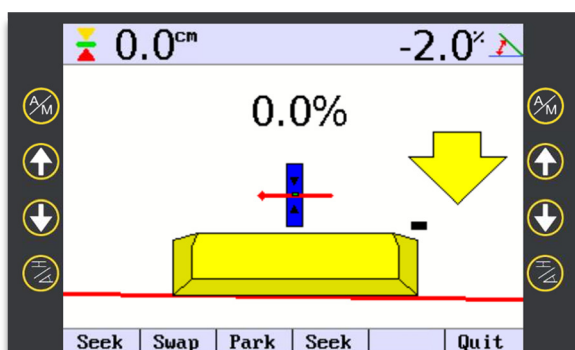**Step 5:** Select "ok" to apply calibration and return to previous menu.

Step 6: Select "X" to return to run screen.

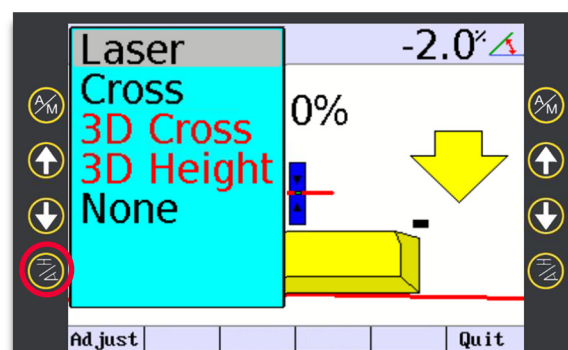## Where can I learn more?

- User reference manual (URM) for grader.
- "How to" videos for grader (See Appendix).

# Workflow 03:   Define hydraulic performance settings (Gain)

When working with different material types you may need to adjust speed of your machine hydraulics, to better accommodate how the system reacts to different weights of material (Sand compared to heavy organic soil). This is accomplished by adjusting "Gain". A different gain value can be assigned to each sensor. Only small adjustments are recommended. Please note that many other calibration parameters also affect performance.
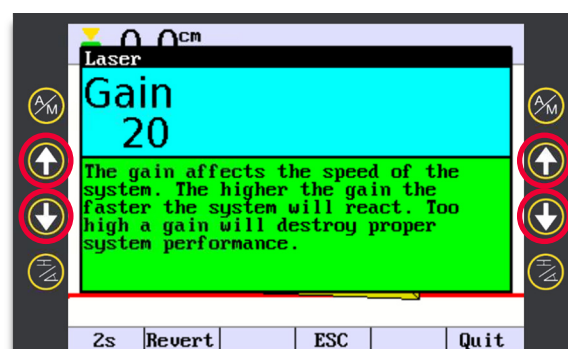

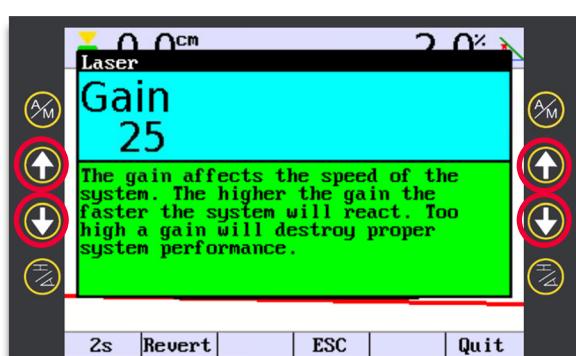**Step 1:** Access 2D user interface (See 2D Workflow 01).

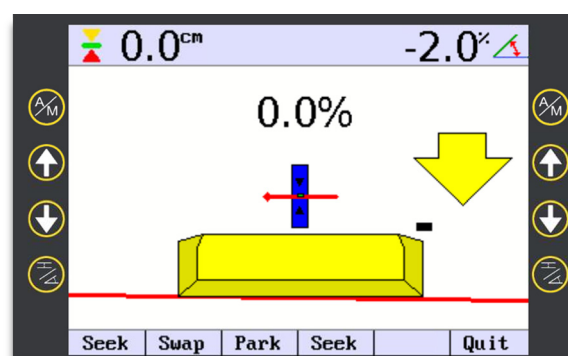**Step 2:** Select "Configure" button and highlight desired sensor to adjust.
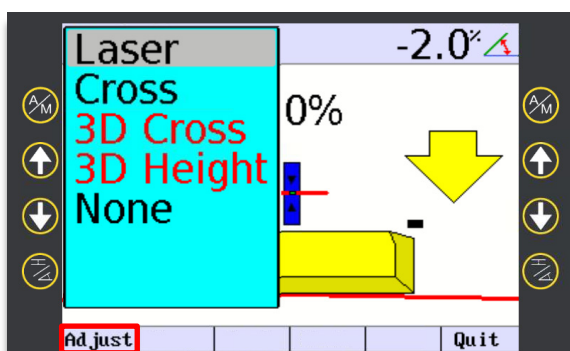
Step 3: Select "Adjust".

Step 4: Use up/down soft or hard keys to adjust gain value until hydraulics perform to satisfaction.

- Tip: Start by changing 10 steps. If too little, then do 10 more. If too much go 5 steps back. Continue this "halving" method until satisfaction.
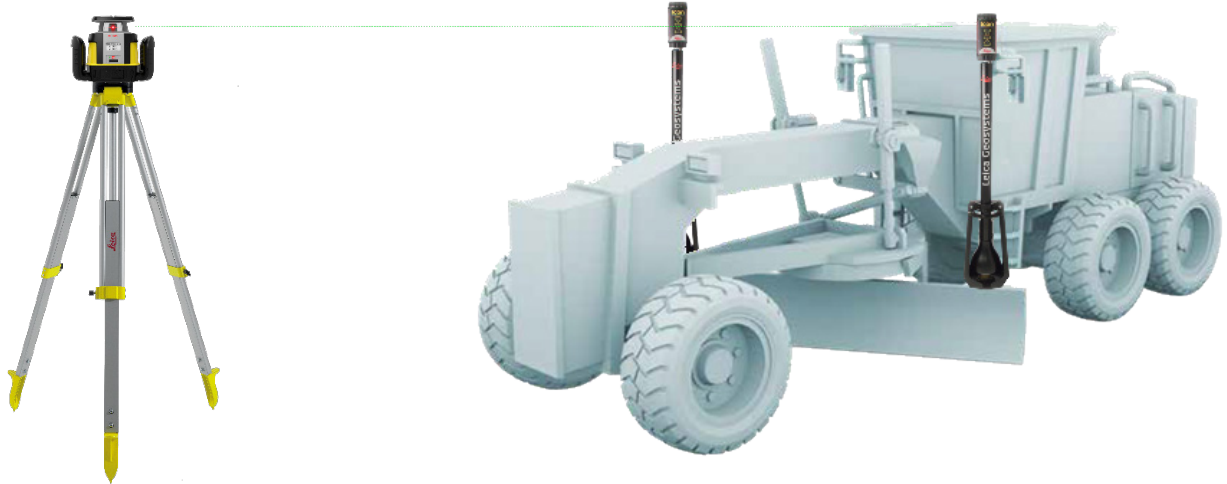

Step 5: Select "Menu" to apply changes and return to run screen.

Where can I learn more?

- User reference manual (URM) for grader.
- "How to" videos for grader (See Appendix).

Your 2D solution

Workflows in this chapter focus on your 2D machine control solution.

2D solution content:

- **Workflow 01:** Switch from 3D to 2D mode
- **Workflow 02:** Operate your machine with "cross slope" only
- **Workflow 03:** Sonic Tracer Considerations
- **Workflow 04:** Operate your machine with "Sonic tracer"
- **Workflow 05:** Laser setup considerations
- **Workflow 06:** Set up a laser to create dual sloping surfaces
- **Workflow 07:** Operate your machine with laser receiver + cross slope
- **Workflow 08:** Operate your machine with "dual" laser receivers
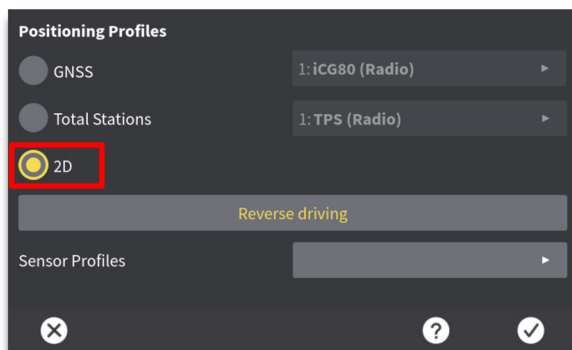
Workflow 01:   Switch from 3D to 2D mode

This workflow shows you h ow to switch from 3D to 2D work mode in MC1.
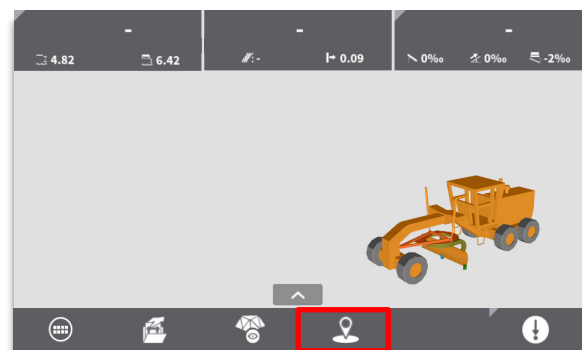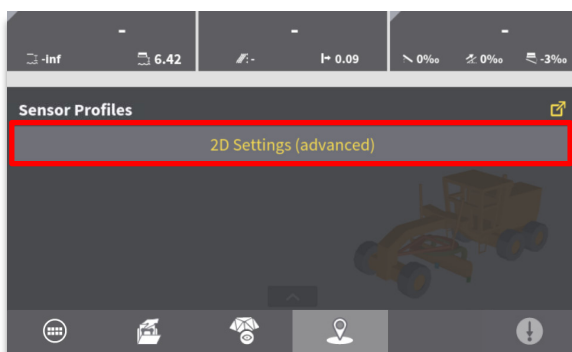

Step 1: Select "Main" menu.
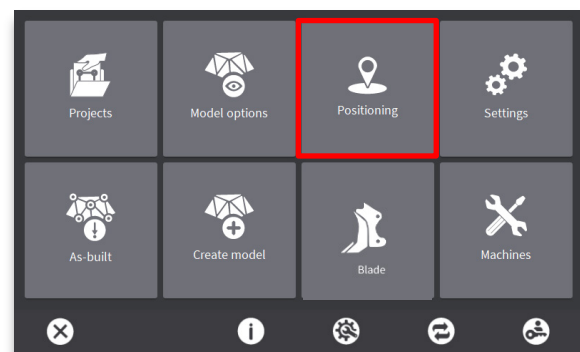
Step 2: Select "Positioning" menu.
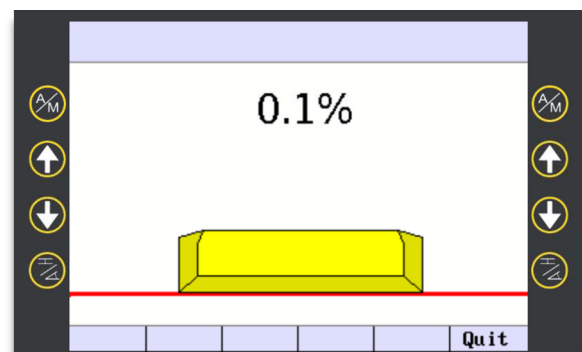

Step 3: Select "2D" positioning profile, and press "X" to return to run-screen.

Step 4: Select "Sensor profiles" menu.

Step 5: Select "2D Settings (advanced)" to enter 2D user interface.


Step 6: Select sensors to use, and start working in 2D mode.

Where can I learn more?

- User reference manual (URM) for grader.
- "How to" videos for grader (See Appendix).

# Workflow 02: Operate your machine with "cross slope" only

With only a cross slope sensor, and if hydraulics are available, cross slope automatics is used with this configuration. Manually adjusting height for elevation is required.
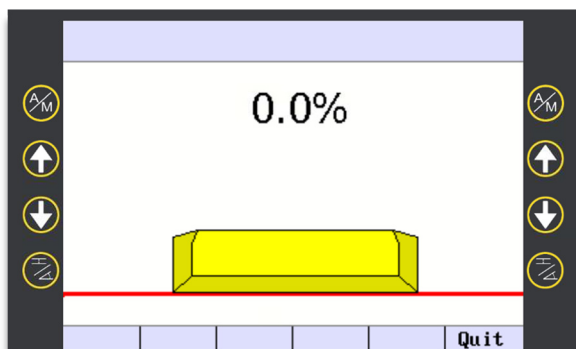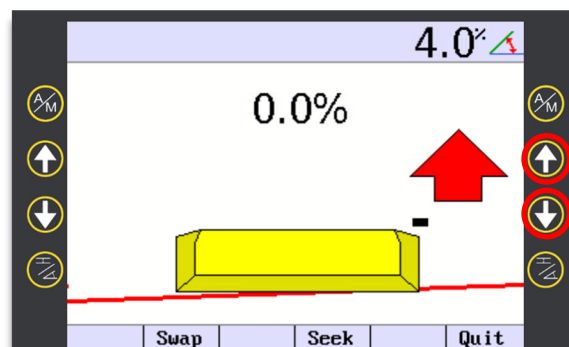
Step 1: Access 2D user interface (See Workflow 01).
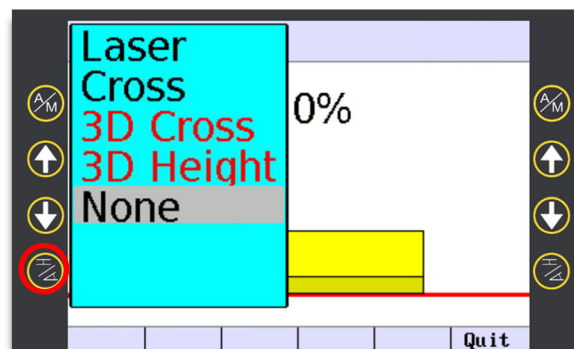
**Step 2:** Select "left side" configure softkey and use up/down arrows to select "None" for the Left tip configuration.
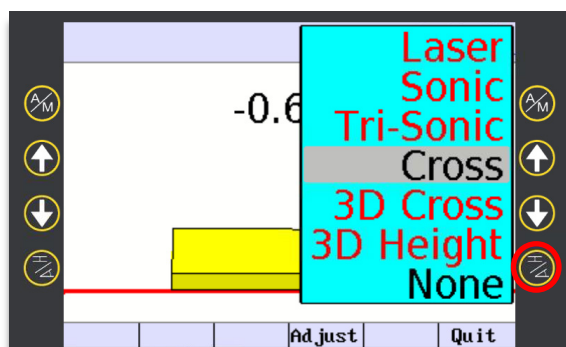
Step 3: Select "right side" configure softkey and use up/down arrows (Softkey or Keypad) to select "Cross".

Step 4: Use right side "up/down" softkeys, to dial in desired slope. "Seek" can be used to read the slope of the blade. Long Press "Seek" to bench the cross slope value from existing surface.
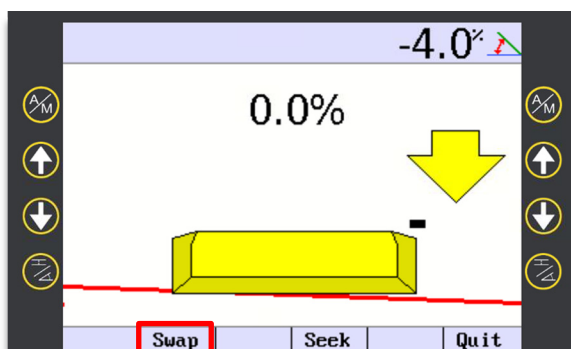
Step 5: An arrow will indicate the direction the blade needs to move to match the slope. Select the "Swap" hard key to change slope
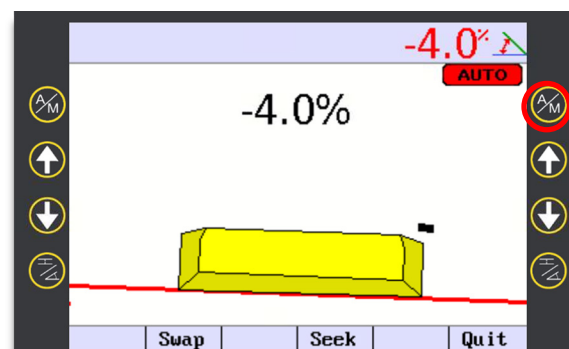
Step 6: Select A/M to engage automatic hydraulic functions (If equipped) and the blade will move to the desired slope.
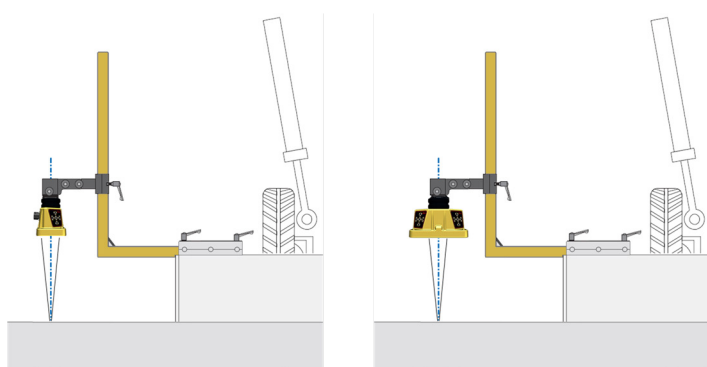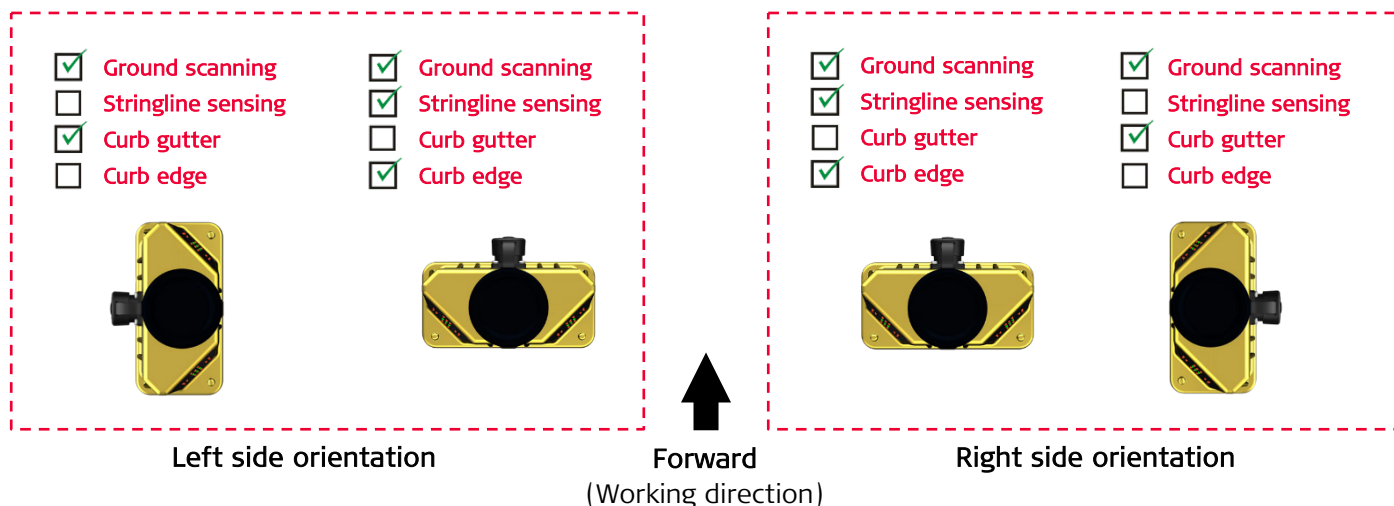
Where can I learn more?

- User reference manual (URM) for grader.
- "How to" videos for grader (See Appendix).
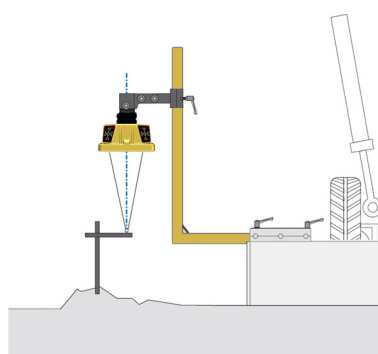
Workflow 03: Sonic tracer considerations

Step 1: Mount the Tri-Sonic at appropriate height, for maximum performance, according to selected reference surface (See illustrations below for sensing ranges).

Step 2: Orient the Tri-Sonic perpendicular or parallel to machine working direction, depending on the reference being used (The connector should always face away from operator, to the side or forward, to allow LED indicators to be visible from cab).


☑ Ground scanning
☐ Stringline sensing
☑ Curb gutter
☐ Curb edge

☑ Ground scanning
☑ Stringline sensing
☐ Curb gutter
☑ Curb edge

☑ Ground scanning
☑ Stringline sensing
☐ Curb gutter
☑ Curb edge

☑ Ground scanning
☐ Stringline sensing
☑ Curb gutter
☐ Curb edge

Left side orientation

Forward
(Working direction)

Right side orientation

Ground sensing range:
Sensing range: 20-200 cm (8-79 inch).
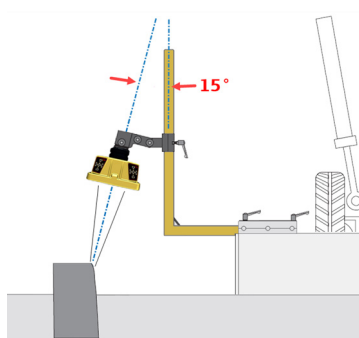Best performance: 60 cm (24 inch).

Stringline sensing range:
Sensing range: 40-70 cm (16-28 inch).
Best performance: 60 cm (24 inch).
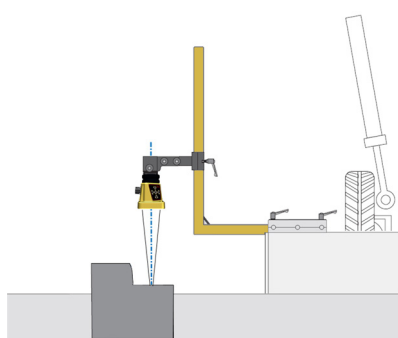
Curb gutter sensing range:
Sensing range: 40-70 cm (16-28 inch).
Best performance: 60 cm (24 inch).
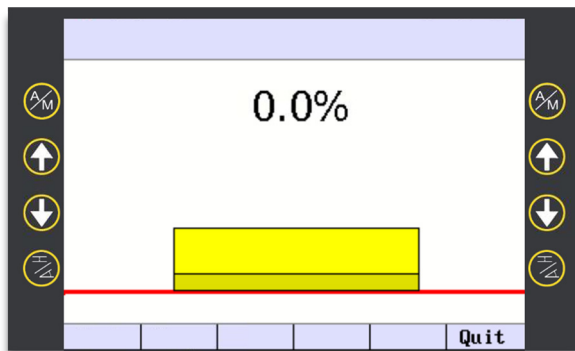
Curb edge sensing range:
Sensing range: 40-70 cm (16-28 inch).
Best performance: 60 cm (24 inch).
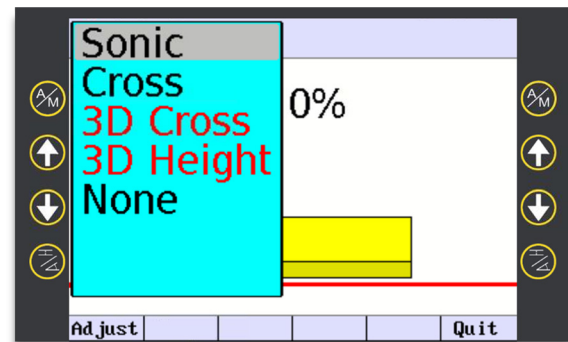
Curb edge sensor angle:
Best performance: 1' °

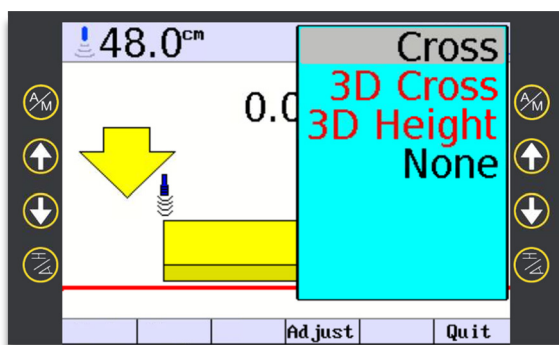# Workflow 04: Operate your machine with "Sonic tracer"

Sonic tracers are useful in grading when you need to match an existing surface, curb or have a string line for elevation control.
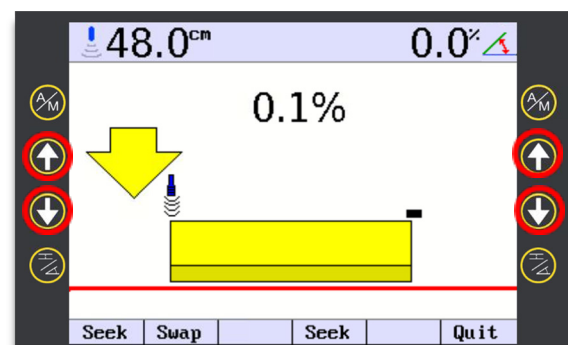

**Step 1:** Access 2D user interface (See Workflow 01)

Step 2: Select "left side" configure softkey and use up/down arrows (Softkey or Keypad) to select "Sonic". Press "Config" or "Enter".

Step 3: Select "right side" configure softkey and use up/down arrows (Softkey or Keypad) to select "Cross". Press "Config" or "Enter".

Step 4: Use softkey arrows to set desired height and cross slope. The system will guide you to the correct grade.
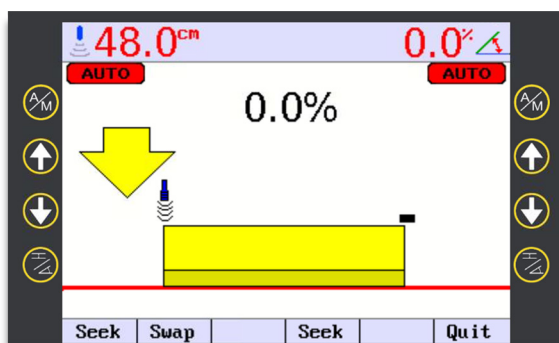

Step 5: Select A/M to engage automatic hydraulic functions (If equipped) and the blade will move to the desired height and slope.

Where can I learn more?

- User reference manual (URM) for grader.
- "How to" videos for grader (See Appendix).

Workflow 05:   Laser setup considerations

Set up a machine control laser for optimum coverage of the job site. It must be out of traffic and any obstructions. Position laser and tripod at a height equal to the laser receiver mounted on your machine, when it is on grade. Adjust alignment of your laser to the site as needed.
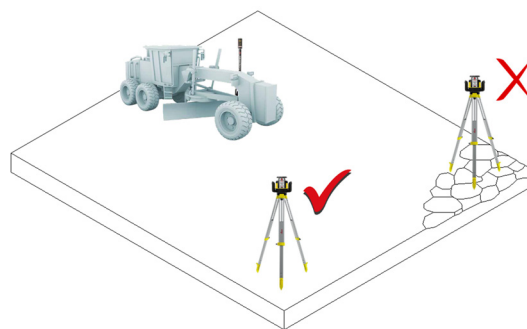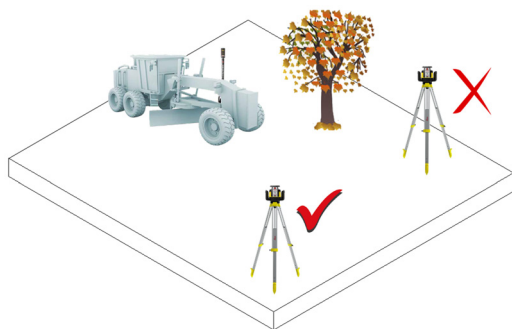
Step 1: Choose a good location for your laser.

- No obstructions that could block or reflect the laser.

- Stable ground, so the tripod won't shift or settle (Ground Vibration can affect operation of the laser).
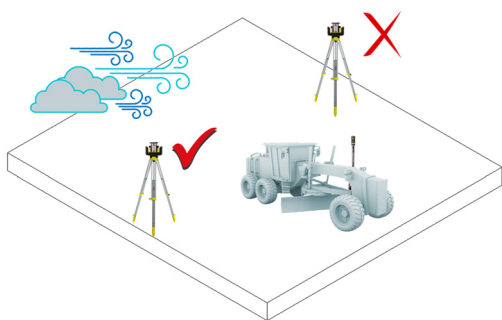
- Up-wind, in very dusty environment, so dirt is blown "away" from your laser.

Step 2: Adjust height of your laser beacon and laser sensor:

- Height should, if possible, be above cab (This prevents cab, or roll-over structure, from blocking your laser).

**Step 3:** Check tripod, then attach your laser.

- Make sure all tripod screws, bolts and nuts are tight.
- Place laser on tripod and tighten screw on underside to secure it to the laser tripod.
- If your tripod has chains, those chains should be slightly loose to allow for thermal expansion during the day.
- Secure your tripod in very windy conditions.

Where can I learn more?

- User reference manual (URM) for grader.
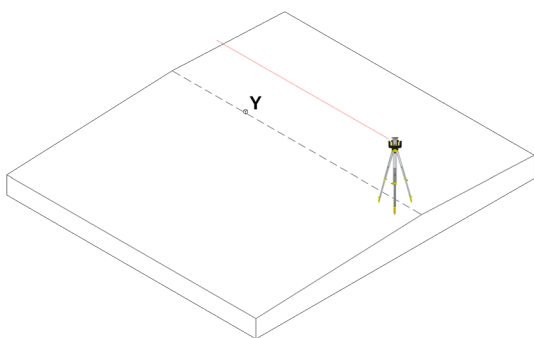- "How to" videos for grader (See Appendix).

Workflow 06: Setup a laser to create dual sloping surfaces

Dual Sloping surfaces are defined by a master alightment (Y) and a cross-slope on either side (X). Optionally an additional hub can be set for height reference (Z) along the X-axis.
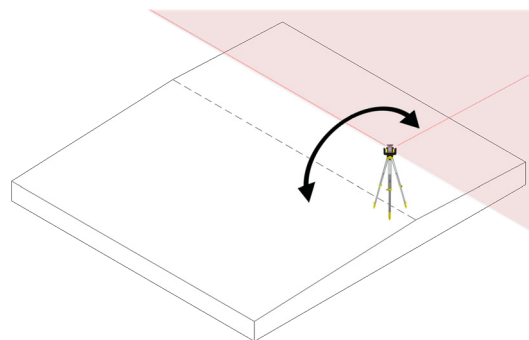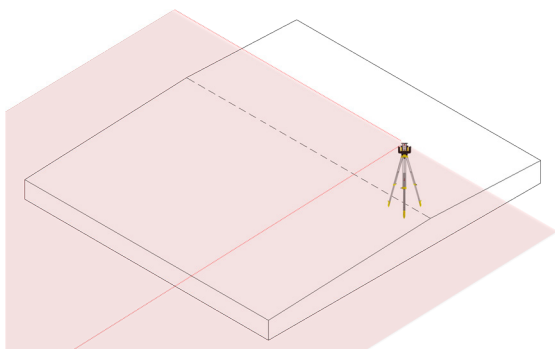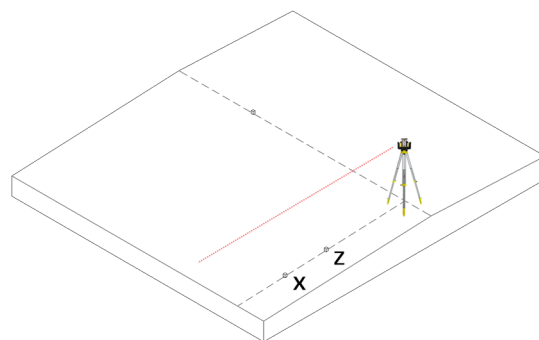
Step 1: Choose optimum laser location:

- The location should allow you greatest possible working range on your site.

Step 2: If the grade has a dual slope, have the surveyor set hubs along X and Y axis.

- Y axis defines CL and machine long slope (Align your laser precisely with this CL).

- X-axis hubs can be used to establish cross slope manually, as pictured here. If an X-slope sensor is installed, slope can also be dialed in to match the laser.

- If the slope is mirrored, and if grading will be done on both sides, it is helpful to place your laser on the crown (This way the grade can be swapped on the laser without additional setup).
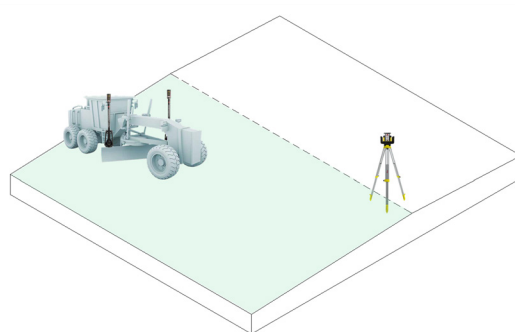
- One hub along X axis will be used for "height benchmark" the other for cross slope (Adjust laser based on this X-slope).

Step 3: Place the blade at desired working height. Adjust the laser receiver on your machine to catch the laser strike, at the center. Now, grade on the slope that matches the laser.


Where can I learn more?

- User reference manual (URM) for grader.
- "How to" videos for grader (See Appendix).

# Workflow 07: Operate your machine with laser receiver + cross slope

Single Laser is an economic option, but you must be aware of the travel direction when grading. Travel diagonally across a slope will provide incorrect guidance with single laser. Cross slope values must match entered value in laser.
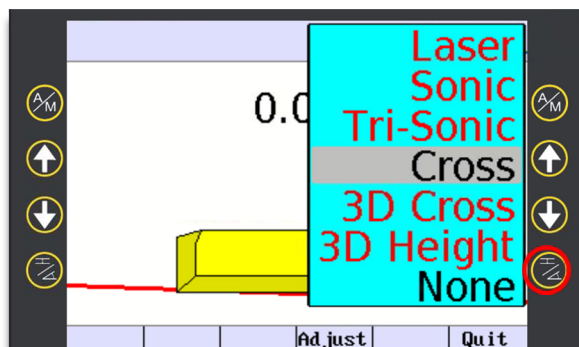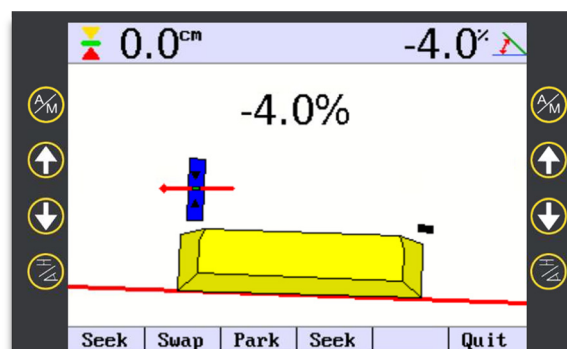

**Step 1:** Press "right side" configure softkey, and select "Cross".
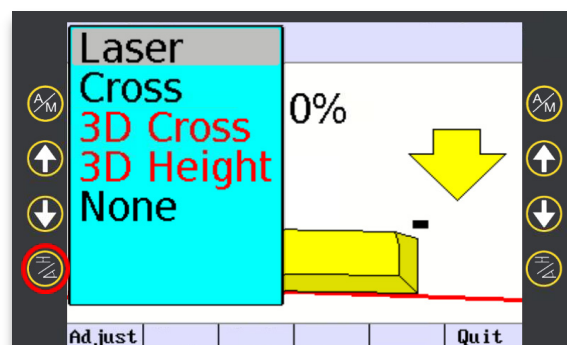
**Step 2:** Press "left side" configure softkey, and select "Laser".
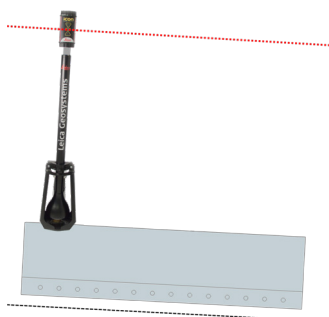
Step 3: Place blade on desired cross slope. Move laser receiver until green "on grade" indicators show. Alternatively, if using power masts, use "Seek" softkey to locate beam.

- When laser receiver is within laser strike, a red horizontal arrow appears on screen.
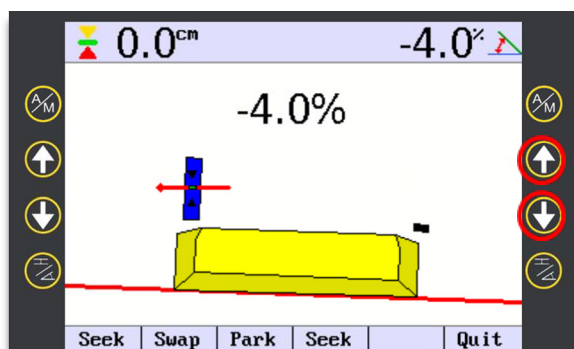
Step 4: Use "up/down" softkeys to dial in desired cross slope matching laser value. An arrow indicates the direction the cross slope-controlled tip should move to be on grade.
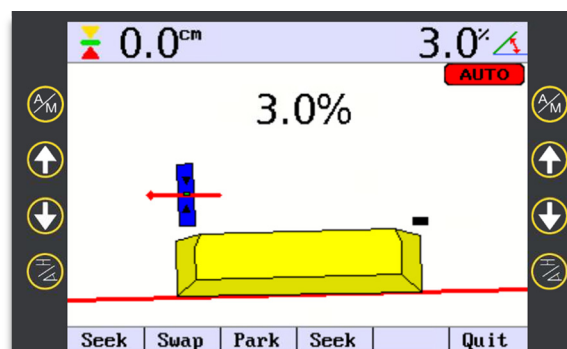

Step 5: Select A/M softkey on cross slope side to enable automatics. When "on grade", the arrows will NOT appear, and centre line of laser catcher illuminates green. Auto switch function has 4 options, selectable by tech.

Where can I learn more?

- User reference manual (URM) for grader.
- "How to" videos for grader (See Appendix).

# Workflow 08:   Operate your machine with "dual" laser receivers

When working with dual laser you can run your machine in any direction, regardless of slope. Cross slope of blade will be determined by laser cross slope. With dual laser you are free to rotate the blade if necessary. Desired cross slope must match the slope that is dialled into the laser.
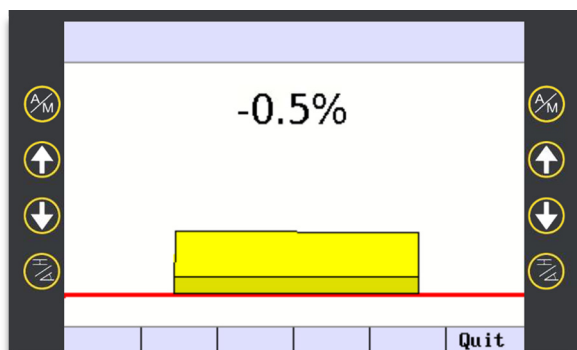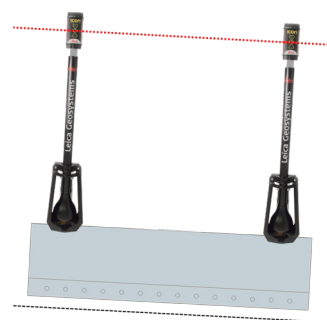

**Step 1:** Access 2D user interface (See Workflow 01).
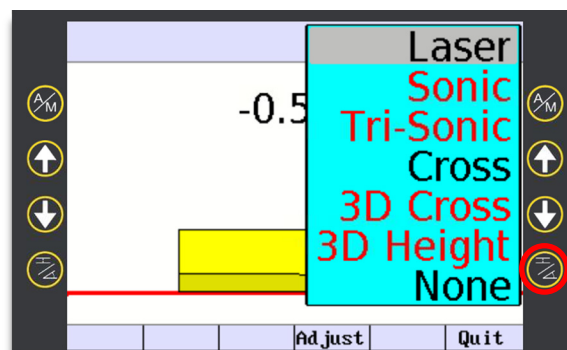
**Step 2:** Press "right side" configure softkey, and use up/down arrows (Softkey or Keypad) to select "Laser".
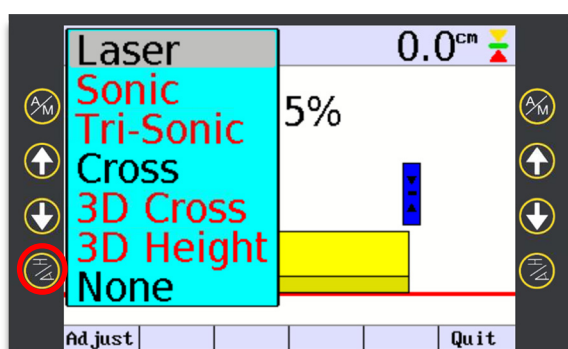
Step 3: Select "left side" configure softkey, and use up/down arrows (Softkey or Keypad) to select "Laser".

Step 4: Place blade on desired cross slope. Move laser receiver until green "on grade" indicators show. Alternatively, if using power masts, use "Seek" softkey to locate beam.
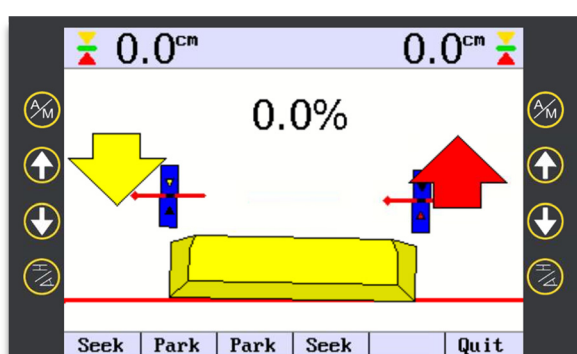
- When laser receivers are within laser strike a red horizontal arrow appears on screen. Other arrows indicate the direction each tip should move to be on grade.
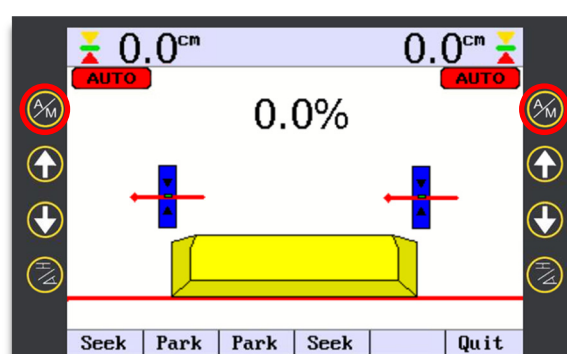
Step 5: Press A/M softkey, on either sides, to enable "Automatics". When "on grade" the arrows will not appear, and centre line of laser catcher illuminates green. Auto switch function has 4 options, selectable by tech.

Where can I learn more?

- User reference manual (URM) for grader.
- "How to" videos for grader (See Appendix).

Your 3D solution

Workflows in this chapter focus on your 3D machine control solution.

The first five pages gives you essential background information, intended to help you better understand and use the workflows described further on.

3D solution content:

- ⓘ Run screens
- ⓘ Height indicators
- ⓘ Touch navigation
- ⓘ GNSS basics

- **Workflow 01:** Select correction source

- **Workflow 02:** Find your project and active files

- **Workflow 03:** Select and use your active model, from the run screen

- **Workflow 04:** Set offset for model reference

- **Workflow 05:** Offset individual references

- **Workflow 06:** Change "height tool point"

- **Workflow 07:** Change "side tool point"

- **Workflow 08:** Select and use "height reference"

- **Workflow 09:** Select and use "side reference"

- **Workflow 10:** Daily machine check-in

- **Workflow 11:** Adjust blade wear

- **Workflow 12:** Activate auto mode

- **Workflow 13:** Create point logs

- **Workflow 14:** Synchronize files

ⓘ Run screens

You have seven screens to choose from, when using the MC1 grader solution.

Do a horizontal three-finger swipe to change screen views.

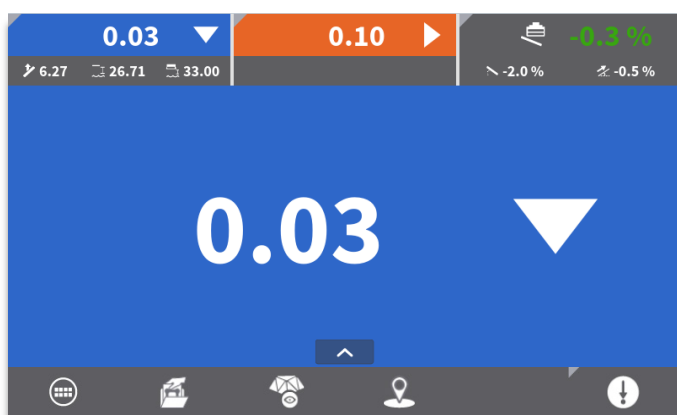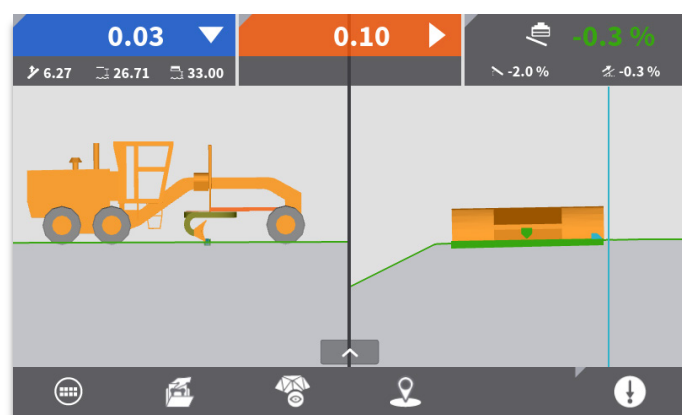- 3D or 2D grader view (Plan).

- Position info.

- Sensor info.

- Plan + cross-section.

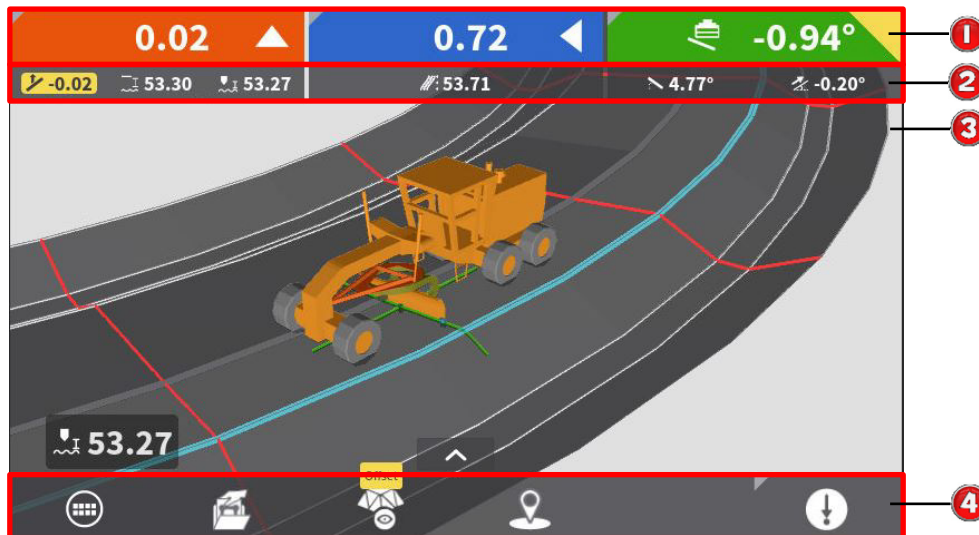- Cross-section.

- Full screen cut/fill tool point.

- Profile + cross section

ⓘ

MC1 start-up opens the run screen that was in view prior to last power off.

During operation you can scroll through seven run screens (See previous page):

• 3D or 2D grader view, • Position info, • Sensor info, • Plan + cross-section, • Cross-section, • Full screen cut/fill tool point and • Profile + cross-section.

❶   Primary Values

- Primary values are displayed across the top of each run screen.
- Cut/fill background can be configured for different colours, if desired.
- Yellow Triangle in upper right corner indicates "Installer Mode"
- Primary values options, set in "Menu › Settings › Height Indicators":
    - o   Cross slope, side distance, tool point height.
    - o   **Left height, side distance, right height (As shown).**
    - o   Tool point height, side distance, cross slope.

❷ Secondary Values (See next page)

- Detailed information on primary values.
- Display order varies on configured primary height indicator.

❸ Run Screen

- Displays Grader model and screen contents.
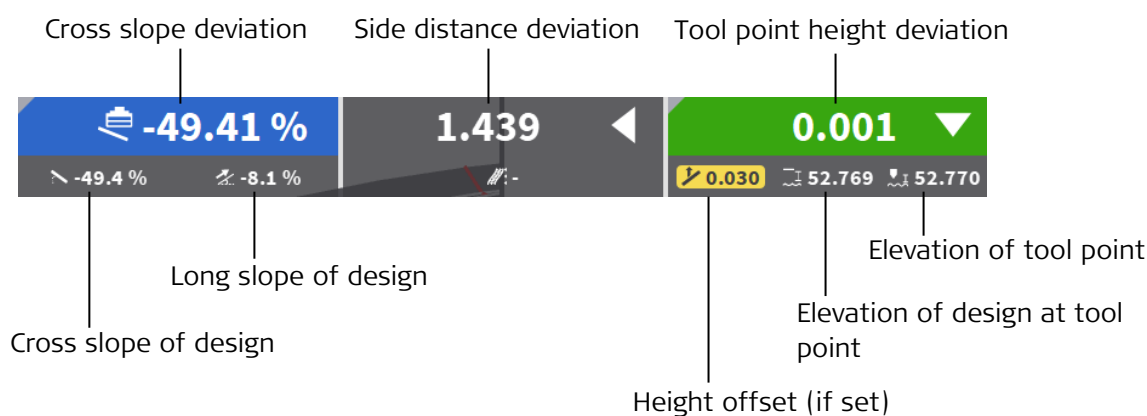- Tap the screen once to access run screen controls.

❹ Menu Bar / Action Buttons

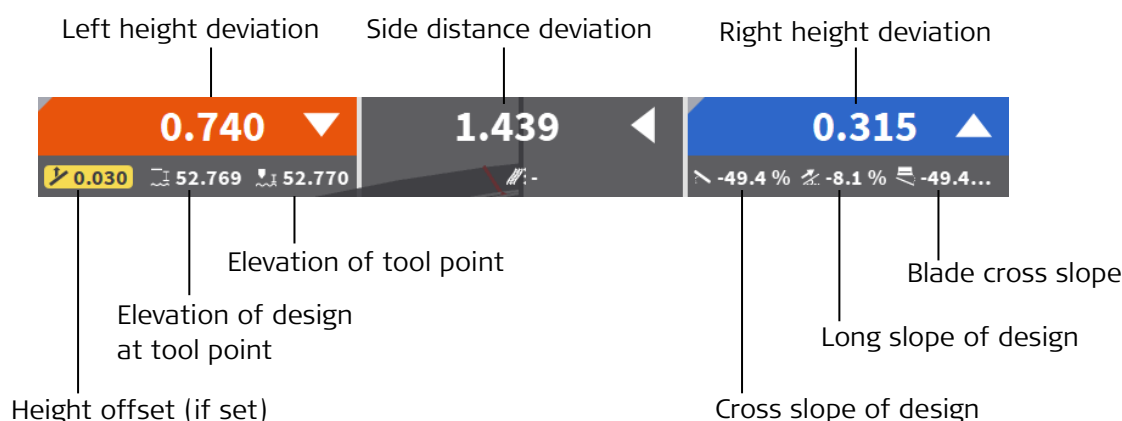- Direct access to functions and menus for other actions.

ⓘ Height indicators

Run Screen values are configured in "Main Menu › Settings › Height Indicators". Options are named by the primary run screen values. Secondary run screen values will display differently for each option.
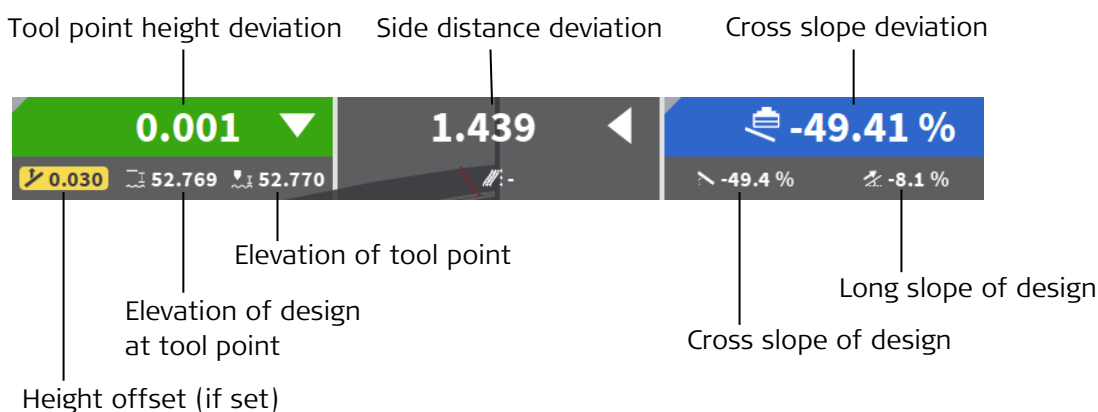
Cross slope, Side distance, Tool point height
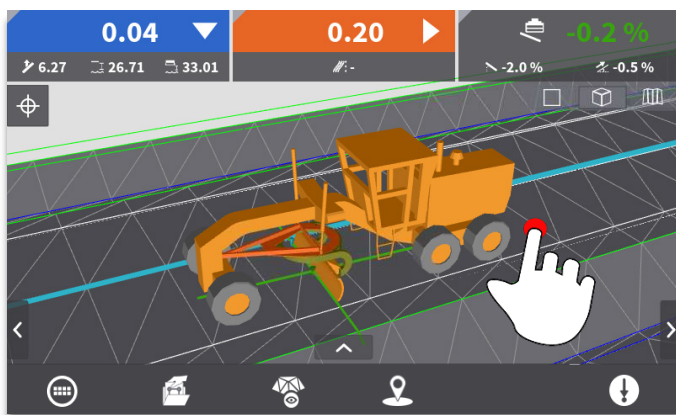
Cross slope deviation Side distance deviation Tool point height deviation

🧰 **-49.41 %**   **1.439** ◀   **0.001** ▼
-49.4 %   -8.1 %   : -   0.030   52.769   52.770

Elevation of tool point

Elevation of design at tool point

Long slope of design

Cross slope of design

Height offset (if set)

Left height, Side distance, Right height

Left height deviation Side distance deviation Right height deviation

0.740 ▼   **1.439** ◀   **0.315** ▲
0.030   52.769   52.770   : -   -49.4 %   -8.1 %   -49.4...

Elevation of tool point

Blade cross slope

Elevation of design at tool point

Long slope of design

Height offset (if set)

Cross slope of design

Tool point height, Side distance, Cross slope

Tool point height deviation Side distance deviation Cross slope deviation

0.001 ▼   **1.439** ◀   🧰 **-49.41 %**
0.030   52.769   52.770   : -   -49.4 %   -8.1 %

Elevation of tool point

Long slope of design

Elevation of design at tool point

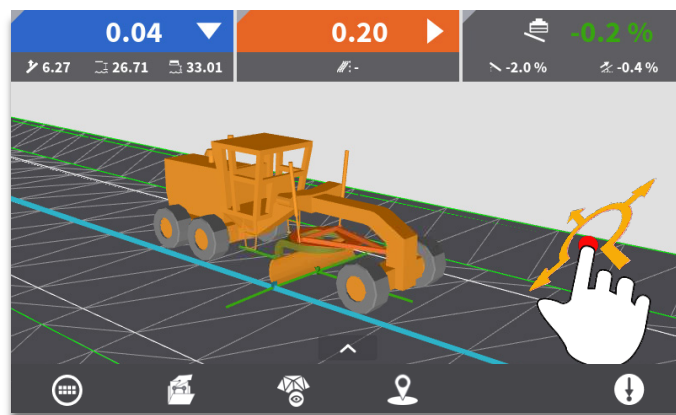Cross slope of design
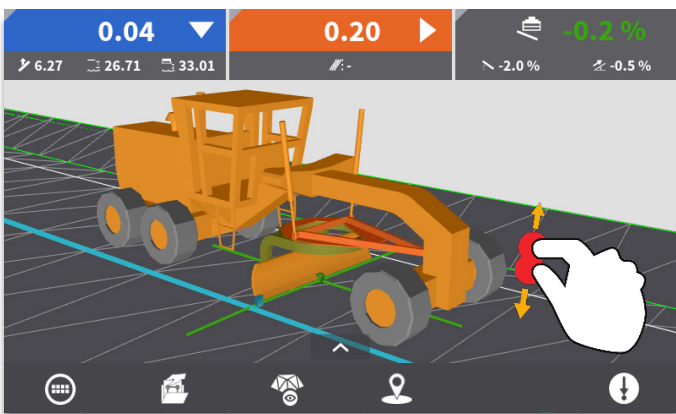
Height offset (if set)

ⓘ Touch navigation

The MCP80 panel display allows multi-touch navigation of run screens.
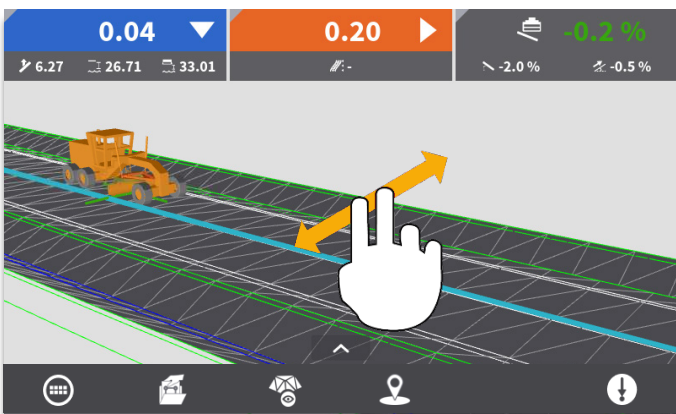

Single finger tap: Show navigation controls
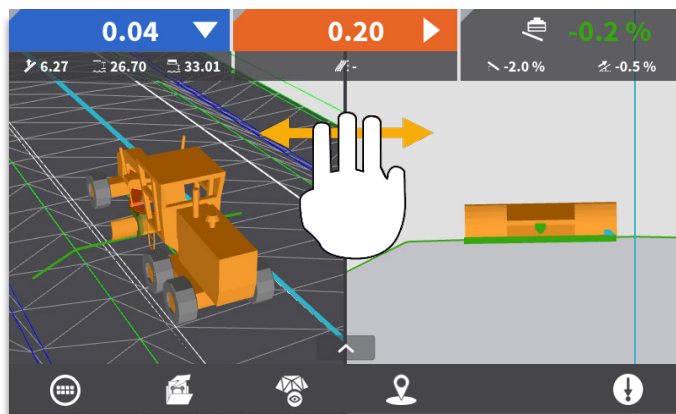

Single finger press and drag: Rotate view

Pinch close: Zoom in

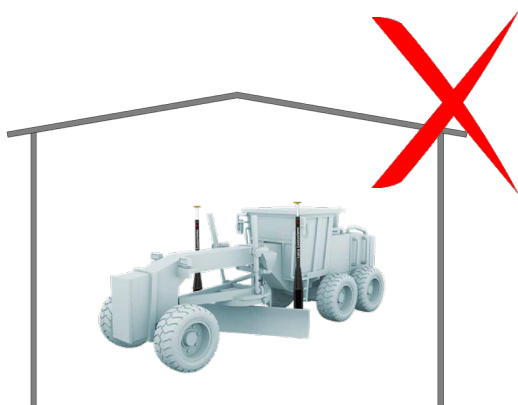**Pinch open:** Zoom out

Two-finger press and drag: Pan
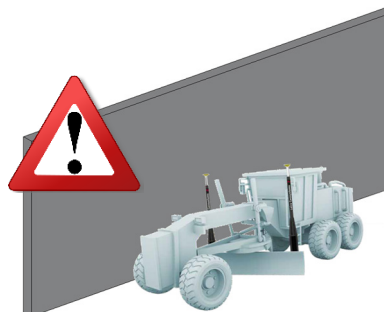

**Three-finger press and drag horizontally:** Change View

ⓘ GNSS basics

- When using GNSS, your machine must be within radio range of the local base. Alternatively, if you use an internet base, your machine must be connected via modem.

- GNSS Signal cannot be used indoors or under a canopy of trees.

- When operating close to large reflective surfaces (Such as billboards or windows) positioning quality could be affected.
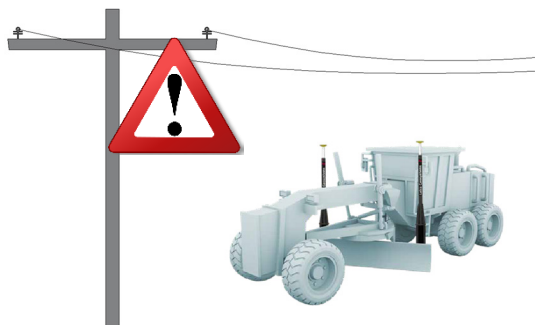
- When operating near "high power" lines, positioning quality could be affected.
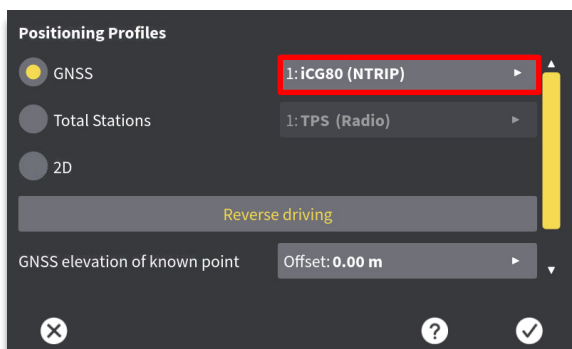
Workflow 01:   Select correction source

With the installer login multiple positioning profiles can be created and saved in MC1 to allow quick transitions between correction types. The operator login can then choose between saved positioning profiles.
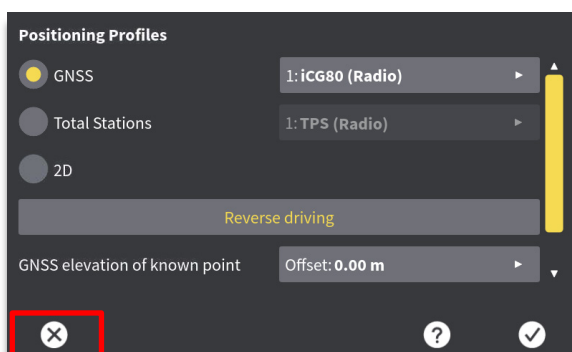
Step 1: Select "Main" menu.
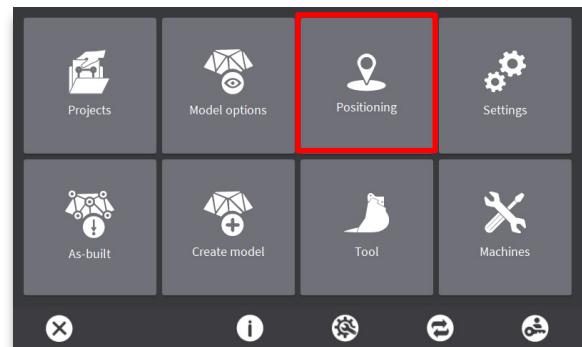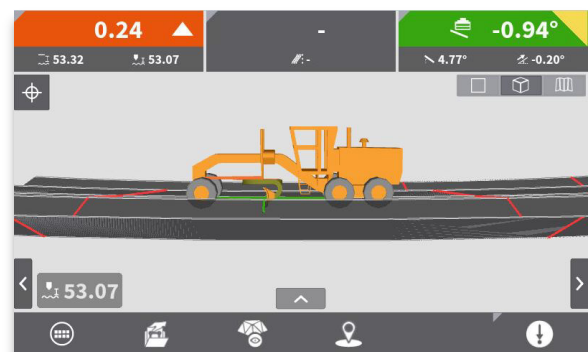
Step 2: Select "Positioning" menu.

Step 3: Select desired positioning profile. If multiple profiles exist for a position type, select this menu for more options.
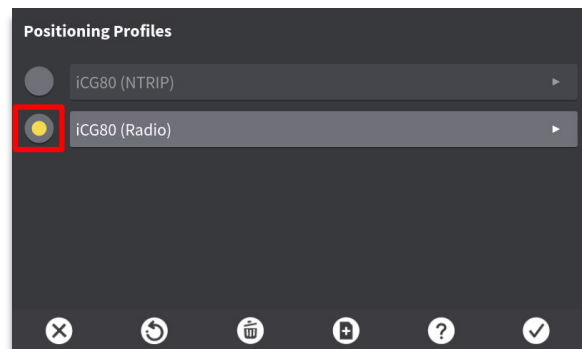
Step 4: Select desired positioning profile and press "OK" to accept.

**Step 5:** Select "X" to apply changes and return to run screen.

- Selected positioning profile applied.

### Where can I learn more?

- User reference manual (URM) for grader.
- "How to" videos for grader (See Appendix).

# Workflow 02:   Find your project and models

Multiple models can be loaded for a project, and several references can be made available for selection the in the command center. The command center can be accessed from the run screen, or in "Projects" menu. If you already have all necessary files loaded for your project, skip ahead to "Step 4".
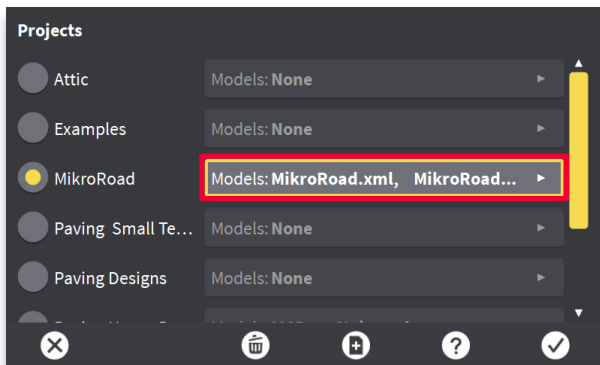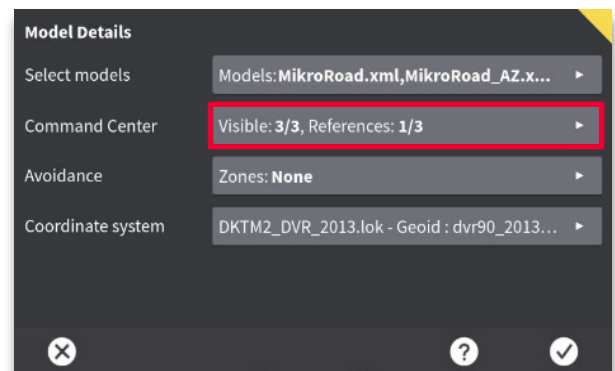

**Step 1:** Press the menu next to the project you are using, to view model details.
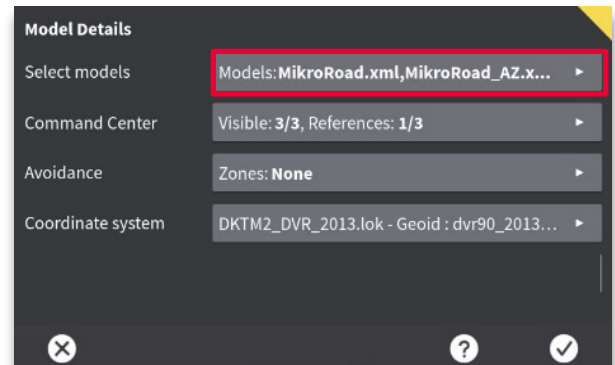
**Step 2:** Press the "Select models" menu, to access available models.
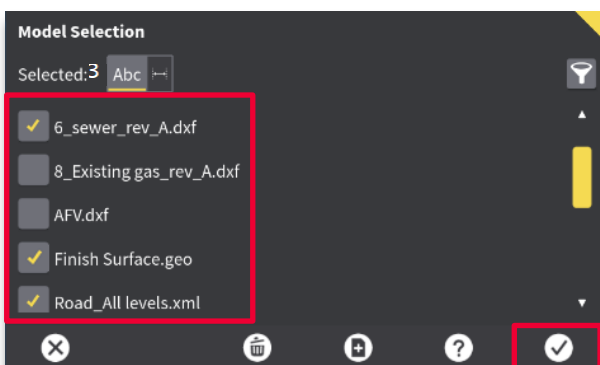
Step 3: Select models to be available in the command center. Press the tick mark icon (OK) to return to previous menu.

Step 4: Press the "Command center" menu, to access available models. You can also access the command center from the run screen (Workflow 03)
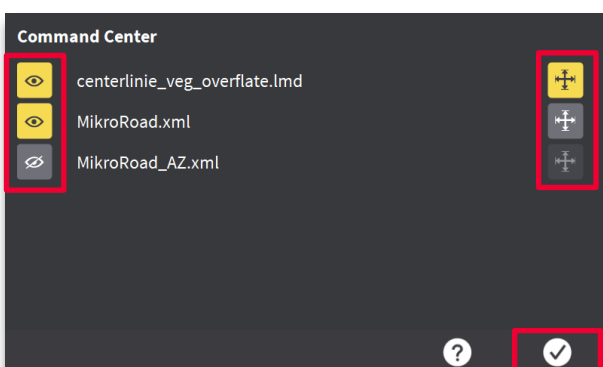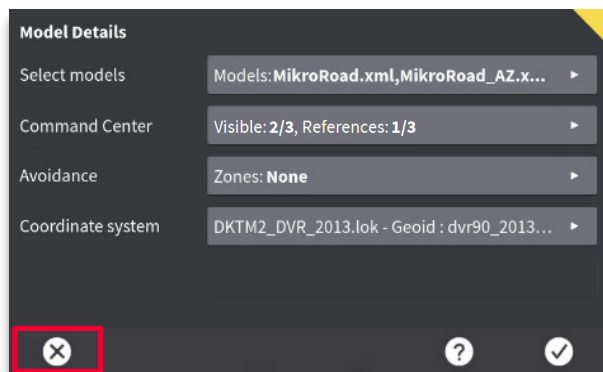

Step 5: Set which references that should be visible and available for selection in the run screen. Press the tick mark icon (OK) to return to previous menu.
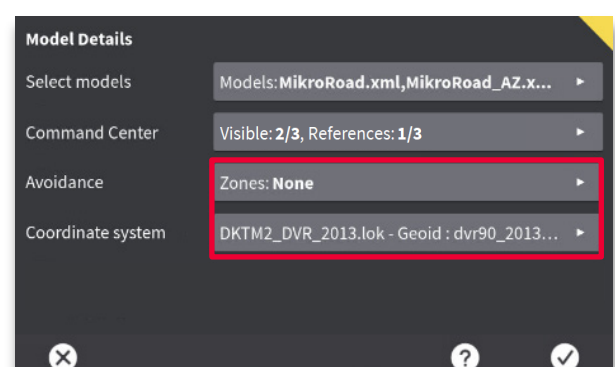
Step 6: (Optional) Select avoidance zone coordinate system files in these menus.

Workflow 02:   Find your project and models, (Continued)


Step 7: Press X to apply changes and return to run screen.

# Workflow 03:   Select and use references from run screen

Available models must be loaded in "Select models" menu (See Workflow 02). Once this is done, you can easily switch between models in the run screen. You can make multiple references from multiple models available for selection in the run screen.
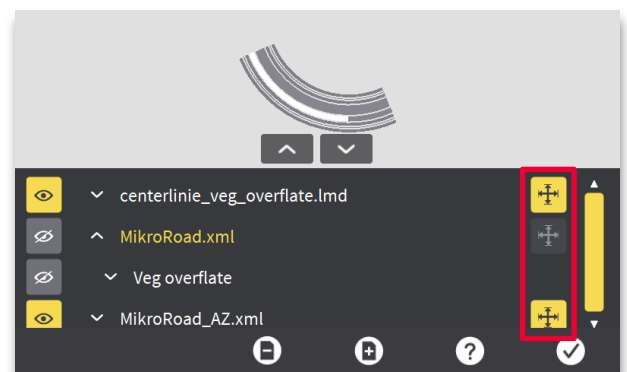

Step 1: Press the "Command centre" menu.
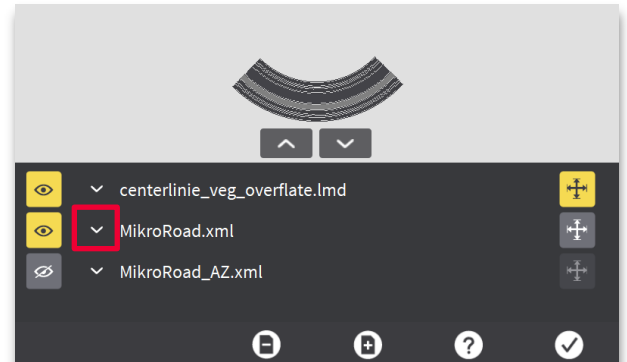
- Press the "down arrow" to view references within a model.
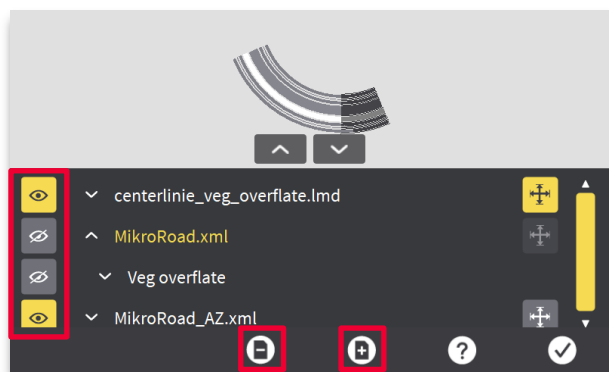
Step 2: Select the models that contain the references you want to make visible in the run screen. Press plus/minus icons to add or remove models in the command centre.

Step 3: Select which models you want to make referential in the run screen.
NOTE: models cannot be made referential in the run screen if visibility is turned OFF (Step 2).
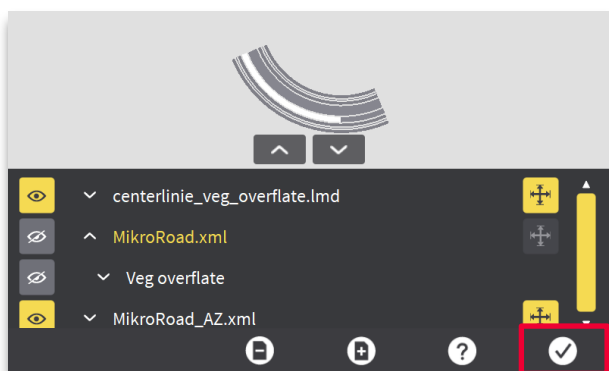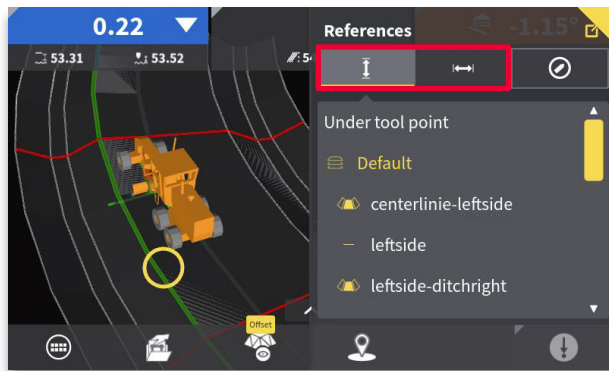

Step 4: Press the tick mark icon (OK) to return to the run screen.

Step 5: Press and hold on the model to see the "References" menu.

## Workflow 03:   Select and use references from run screen, (Continued)

Step 6: See Workflow 08 and 09 on how to use height and side references.
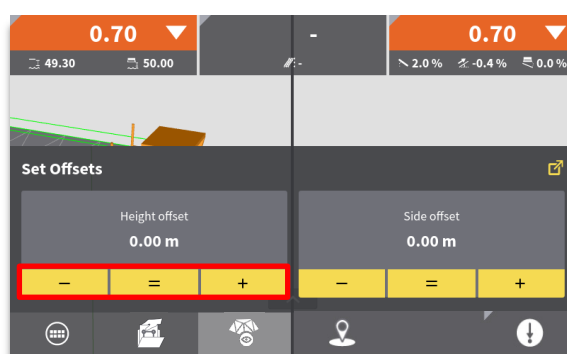

Where can I learn more?

- User reference manual (URM) for grader.
- "How to" videos for grader (See Appendix).

# Workflow 04:   Set offset for model reference

When working outside of auto range limit, offsetting the reference model allows you to utilize automatics, and thus work more efficiently. Set height offset within "auto range limit". As the surface is being worked, the cut/fill values will reduce to zero as the grade approaches design elevation. Height offsets are used in relation to the machine's height tool point.
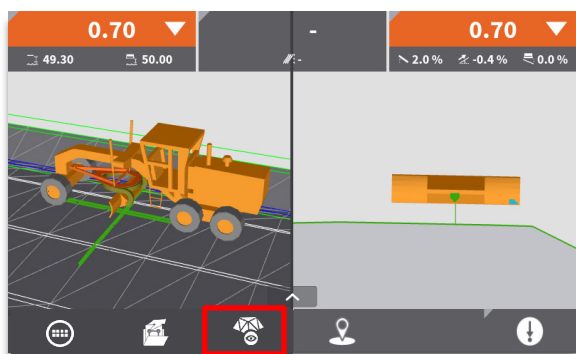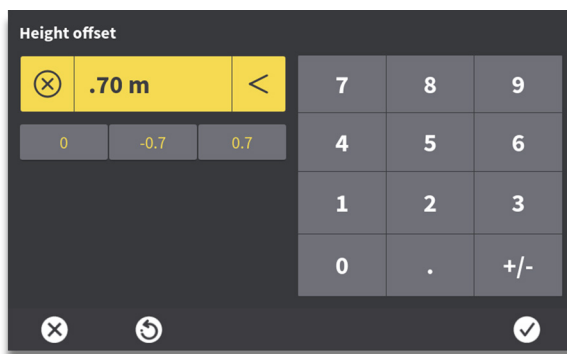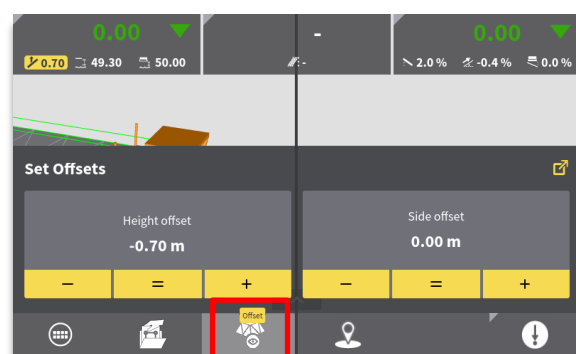

Step 1: Select "Offset" menu.

Step 2: Press - or + to offset your design by increments. Select = to set offset to current tool point height.
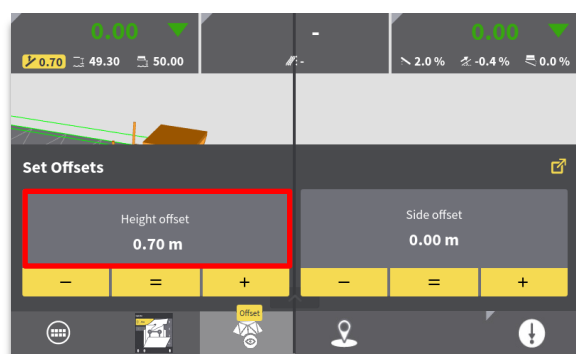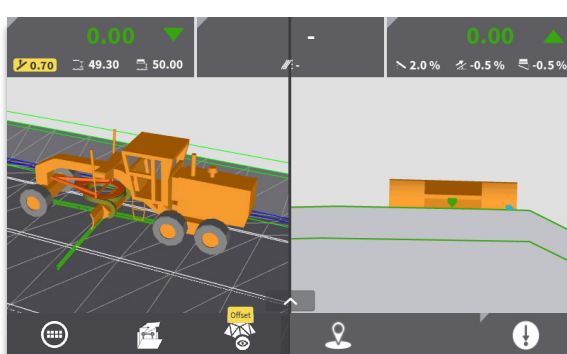

Step 3: Select grey "Height offset" box for specific offset value input.

Step 4: Use keypad to input a value, and toggle the sign. A list of the last 3 height offset values are also listed for quick selection. Select check mark icon to accept value.

**Step 5:** Select "Offset" menu icon to return to run screen.

- Cut/fill values will be shown, providing guidance to new height offset. Original grade will still be shown in x-section with applied offset.

Where can I learn more?

- User reference manual (URM) for grader.
- "How to" videos for grader (See Appendix).
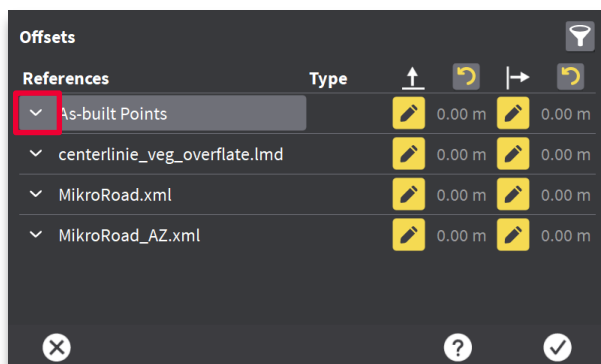
Workflow 05: Offset individual references

In the expanded "Offsets" menu, you can offset individual references within a model. Only references and models eligible for height/side reference have the option to edit an offset value. Offsets are used in relation to the machine's tool point. Described workflow reflects Individual height offset, but the same workflow applies for individual side reference.
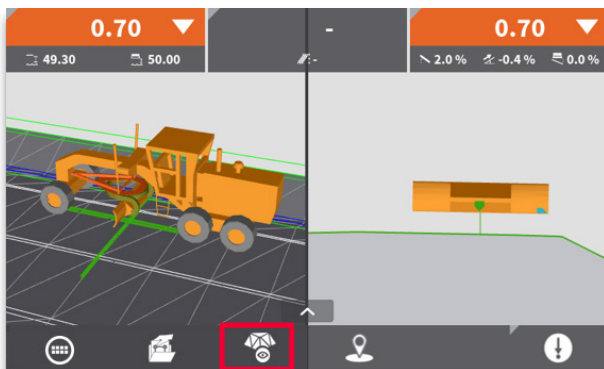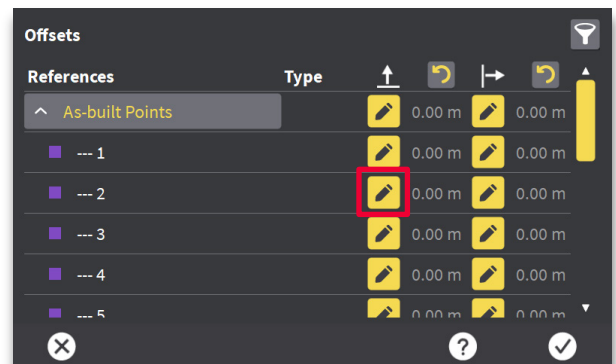

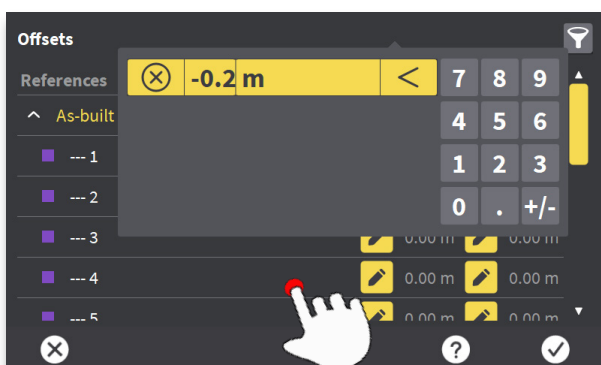**Step 1:** Press the "Offsets" menu.
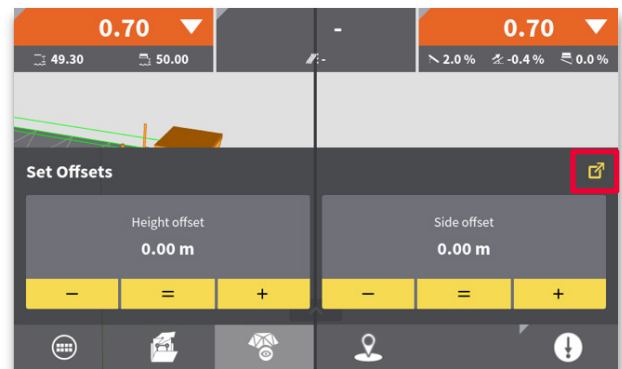

Step 2: Press the expansion button.

- Here you have a list of all the referential models. By pressing the expansion arrow, a height and/or side offset can be applied to individual references.

Step 3: Press the "Edit" button next to a reference to set an offset (height offset for point number 2 highlighted here).
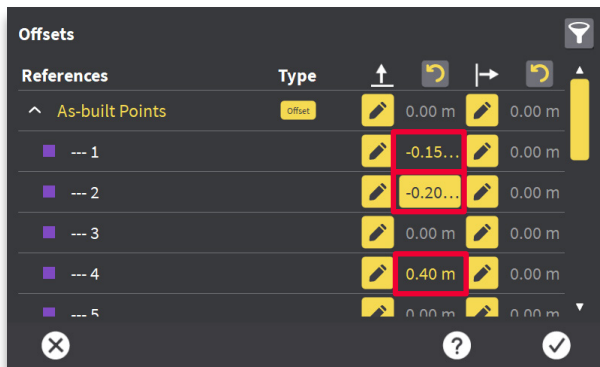

Step 4: Use the keypad to input a value and press anywhere outside the keypad to confirm.
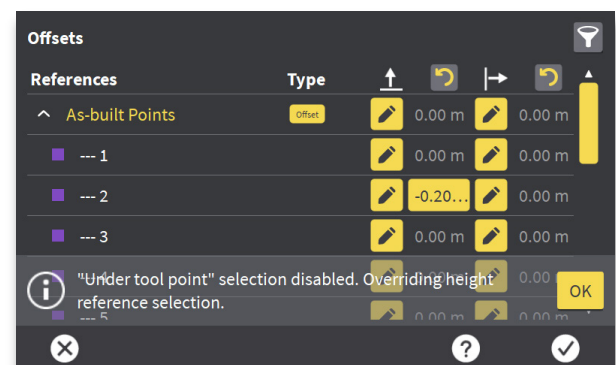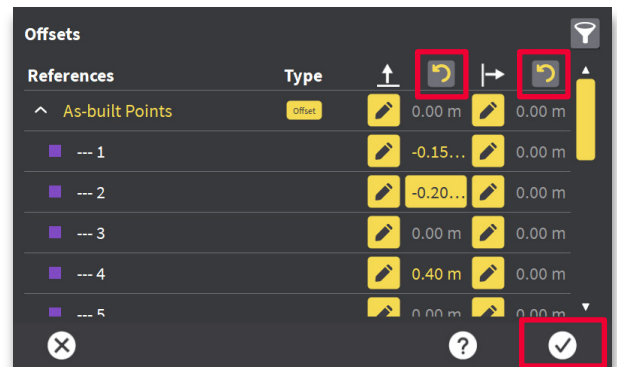

- A confirmation message is shown briefly (no need to acknowledge this message).
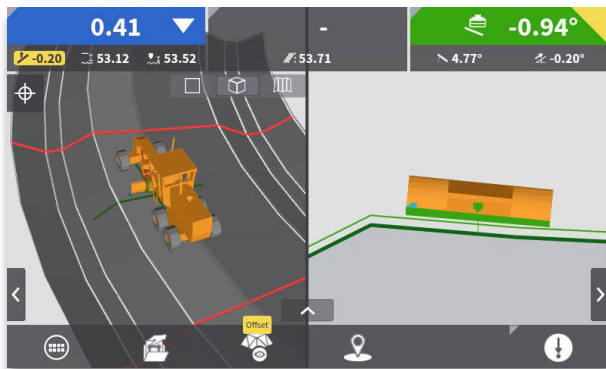
Workflow 05: Offset individual references, (Continued)

- The current active offset is highlighted in a yellow box, whereas other offsets are written in yellow text.

- The "revert" buttons at the top can be pressed to remove offset values for all references. Press check mark icon (OK).

- Cut/fill values will be shown, providing guidance to new height offset. Original grade will still be shown in cross-section with applied offset.

Workflow 06: Change "height tool point"

The height tool point defines where MC1 looks for elevation guidance, when a height "reference" is selected. Note: changing the height tool point may lead to significant hydraulic reaction on the blade, it is recommended to change while not in auto.

The "**left**" and "**right**" hard keys on the MCP80 panel toggle active **height tool point**.

- Height tool points are represented by a "green" icon on the blade (Left height tool point is shown).

Step 1: Press "right" hard key to toggle height tool point to middle position.

Step 2: Press "right" hard key to toggle height tool point to right tip position.

Step 3: Press "left" hard key to toggle height tool point in opposite direction.

Where can I learn more?

- User reference manual (URM) for grader.
- "How to" videos for grader (See Appendix).

Workflow 07: Change "side tool point"

The side tool point defines where MC1 looks for horizontal guidance, when a side "reference" is selected.

The "**up**" and "**down**" hard keys on the MCP80 panel toggle active **side tool point**.

- Side tool points are represented by a "teal" icon on the blade (Left side tool point is shown).

Step 1: Press "up" hard key to toggle side tool point to middle position.

**Step 2:** Press "up" hard key to toggle side tool point to right tip position.

Step 3: Press "down" hard key to toggle side tool point in opposite direction.


Where can I learn more?

- User reference manual (URM) for grader.
- "How to" videos for grader (See Appendix).

# Workflow 08:   Select and use a "height reference"

From the run screen, you can select and use different parts of your model as "height reference". The "height tool point" defines where MC1 looks at the model for elevation guidance. Understanding how this works is useful in different grading applications where you might need to overhang one part of your design to cut another. See Workflow 09 for how to select and use "side reference".
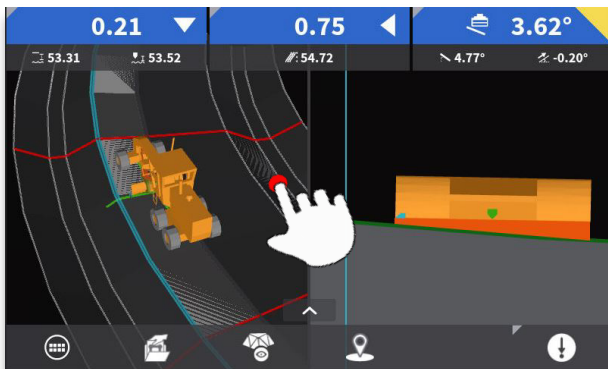
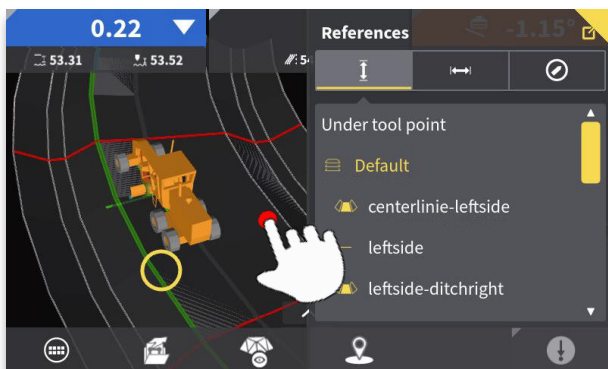**Step 1:** Press and hold on plan view to see the "References" menu.
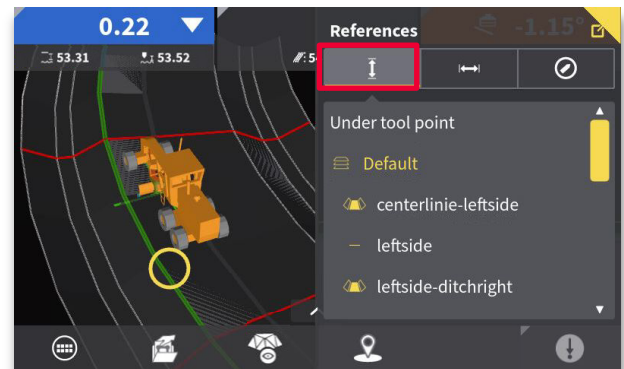
Step 2: Press ↕ icon to view height references (if not already highlighted).
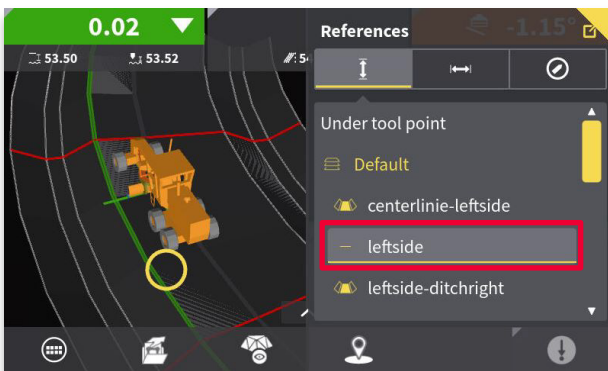
Step 3: Select the desired height reference (line "leftside" shown here).
The line closest to selected point is listed at the top.

- A confirmation message is shown briefly (no need to acknowledge this message).

Step 4: Tap anywhere in the plan view to exit the "References" menu.


- The new surface will be represented by a bold green line. Cut/fill will be provided to this reference and design cross-slope and long slope will update to reflect the height reference selected.

Workflow 08:   **Select and use a height reference,** (continued)

Example of the impact of the location of the height tool point:
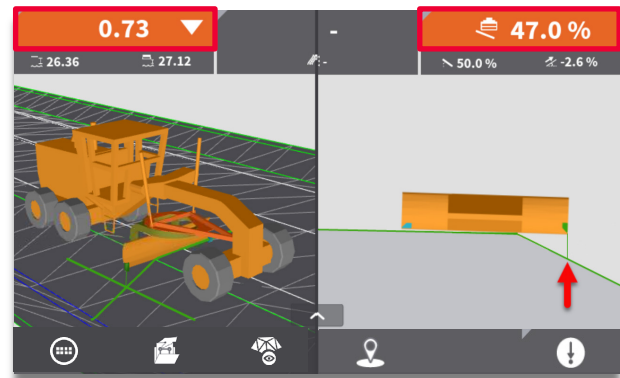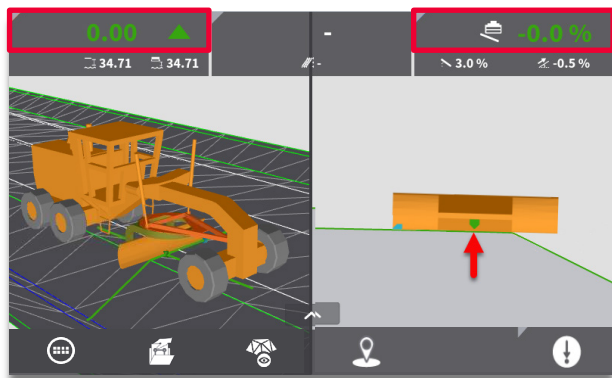
- Cut/fill and slope values are based on the surface below current height tool point (Middle height tool point shown).

- When design slope changes under current height tool point, cut/fill and slope values also change (Right height tool point shown).
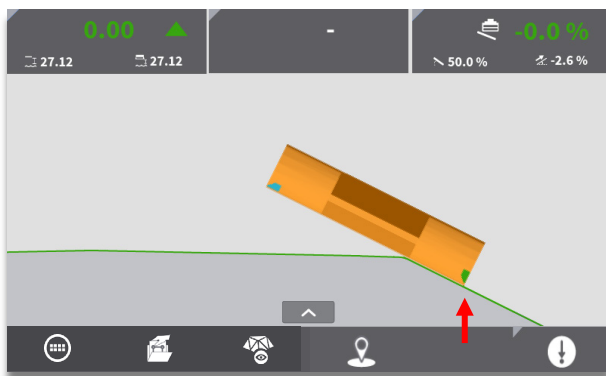

- Blade shown in correct position to grade surface under current height tool point.
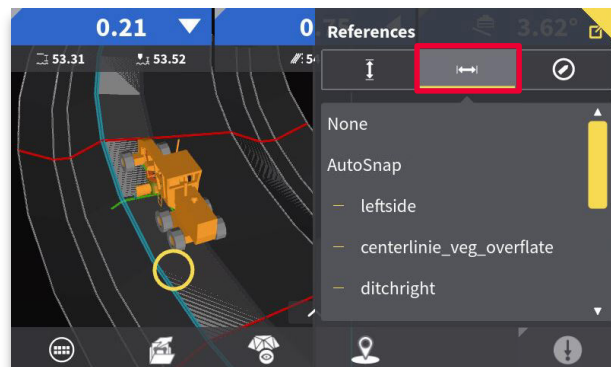
Where can I learn more?

- User reference manual (URM) for grader.
- "How to" videos for grader (See Appendix).

Workflow 09:   Select and use "side reference"

From the run screen, you can select and use different parts of your model as "side reference". The "side tool point" defines where MC1 looks at the model for horizontal guidance. Select a point or line, and you will see a navigation bar at the top of the run screen. This navigation bar will guide you to the selected reference, based on your active side tool point. See Workflow 08 for how to select and use "height reference".
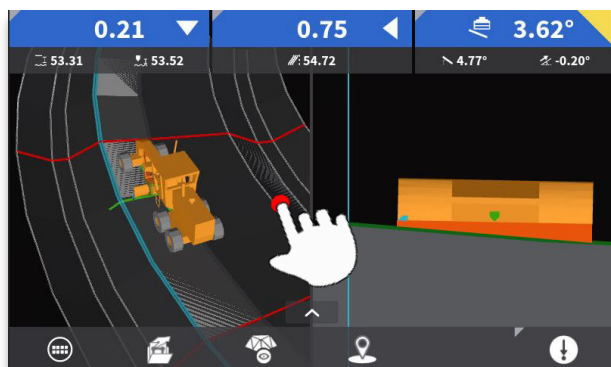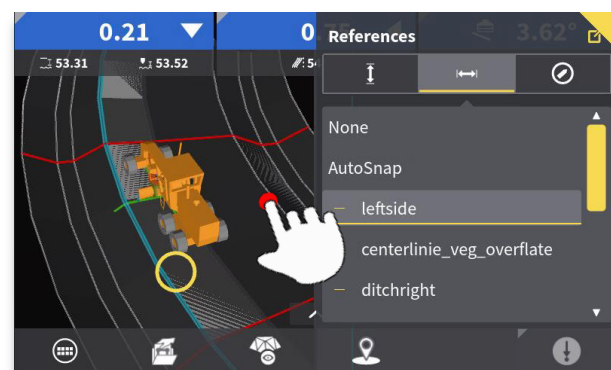

Step 1: Press and hold on plan view to see the "References" menu.

**Step 2:** Press ↔ icon to view side references.
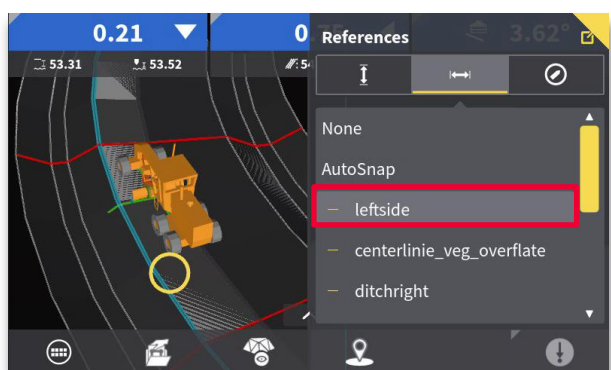
Step 3: Select desired line reference (line "leftside" shown here). The line closest to selected point is listed at the top.

Step 4: Tap anywhere in the plan view to exit the "References" menu.

- The offset distance, from current side tool point to selected line reference, is shown at top centre of the screen. A teal line represents selected line in run screen.
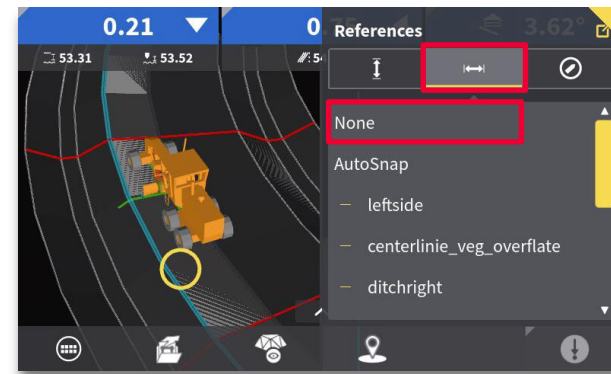

- To clear the side reference, press and hold on run screen, press ↔ icon and select "None" to clear the side reference line.
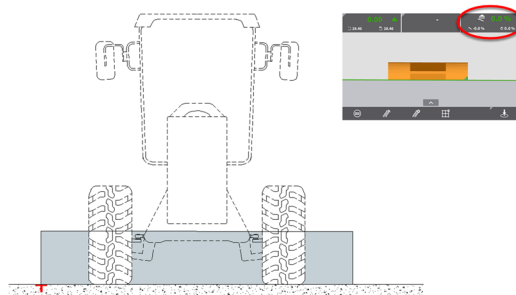

Where can I learn more?

- User reference manual (URM) for grader.
- "How to" videos for grader (See Appendix).

# Workflow 10:   Daily machine check-in

An ideal control point, used for machine check-in, is positioned in an area that will not be disturbed for the duration of the project. The location should allow for the machine to be level in cross slope, and the blade should be level. Use of a spotter on the ground is recommended to position the blade precisely.
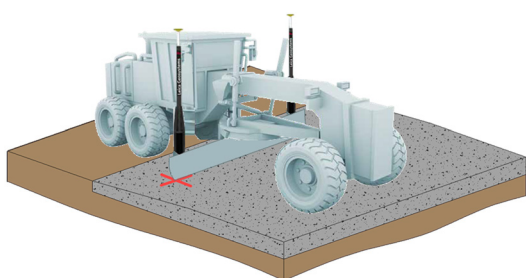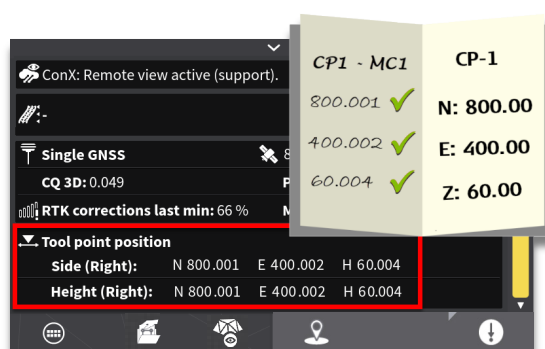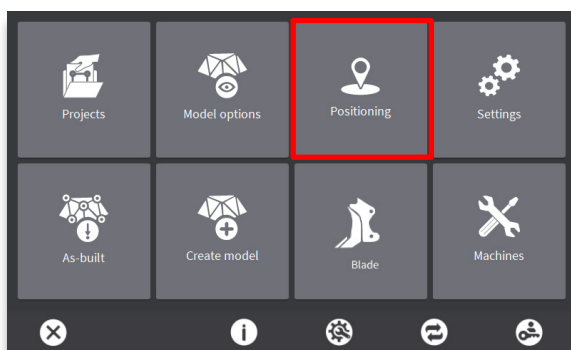
Step 1: Position centre of blade at control Point.

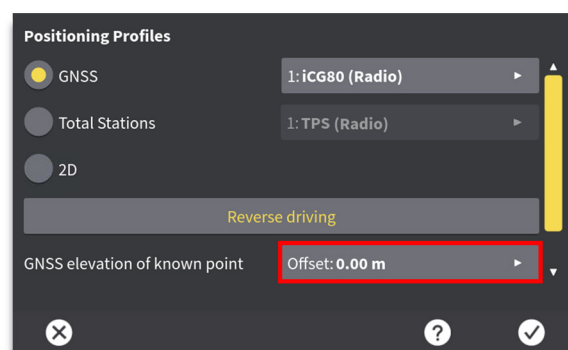**Step 2:** Ensure blade is level, and that slope values are 0%.
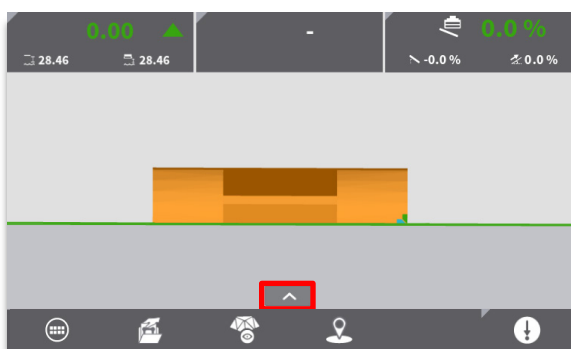
Step 3: Use "up/down" and "left, right" keys to place both "height" and "side" tool points at the desired tip of blade and select "iCON" info bar.

Step 4: Compare tool point position to CP coordinates.

Step 5: If necessary, use the feature "GNSS elevation of known point" from "Main menu > Positioning".

Step 6: If your elevation offset is more than 10cm (.328 feet), please call your machine tech for assistance.
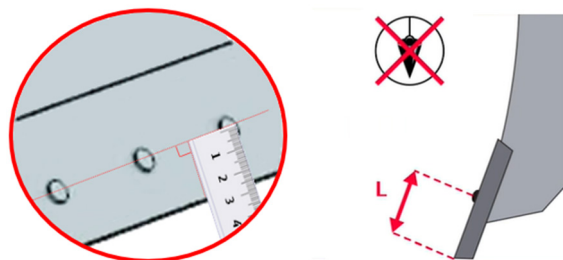
Where can I learn more?

- User reference manual (URM) for grader.
- "How to" videos for grader (See Appendix).

Workflow 11:   Adjust blade wear

Check for blade wear regularly. The cutting edge of your machine is designed to be replaceable, and the rate in which it wears depends upon the material it is working with. Incorrect measurement of blade wear can result in incorrect guidance. If the blade wear is uneven, measure a few spots along the cutting edge to find an average, or find the most representative place for a single measurement, avoiding the outer 0.5m of the blade.
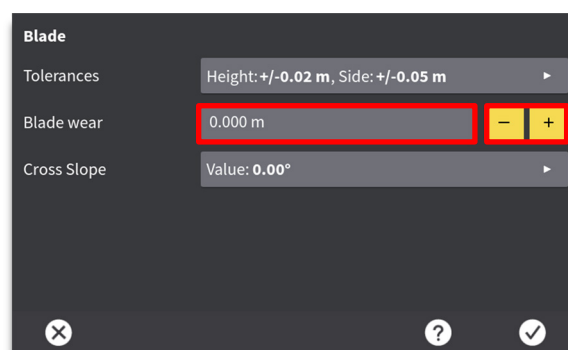

Step 1: Select a representative area of the cutting edge to measure blade wear (Avoid the outer .05m of the blade).
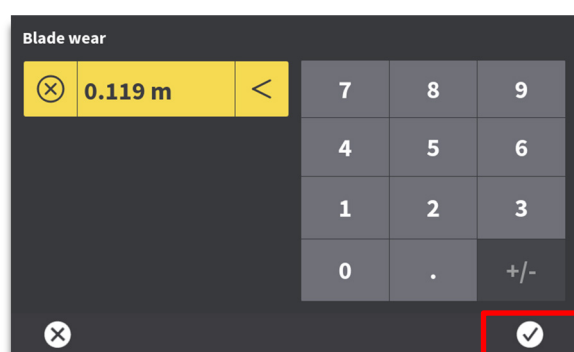

Step 2: Measure flat against surface of cutting edge to centre of bolt holes. This value represents your current blade wear.
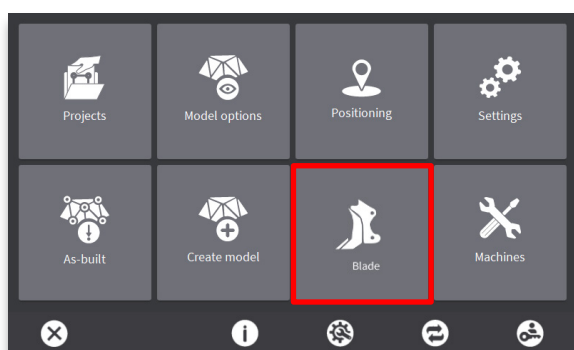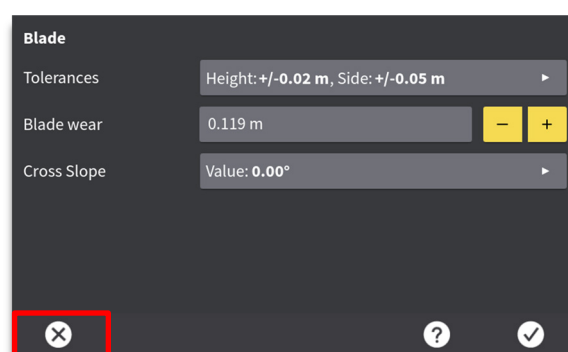

Step 3: Select "Blade" menu.

Step 4: Use + or - keys to increment blade wear value, or select the number to input manually.

**Step 5:** Use keypad to enter blade wear value manually. Press "OK" to accept.

Step 6: Press "X" to exit to return to run screen.
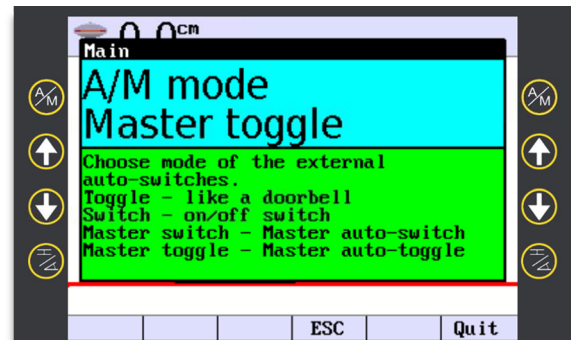
Where can I learn more?

- User reference manual (URM) for grader.
- "How to" videos for grader (See Appendix).
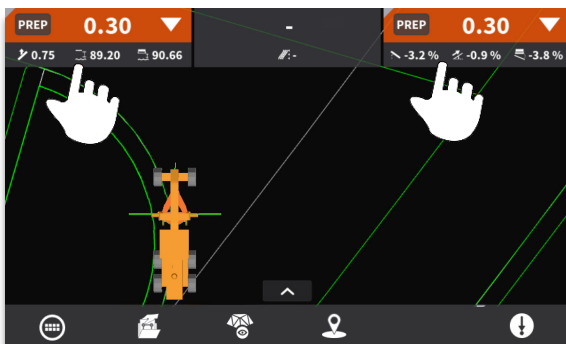
Workflow 12: Activate auto mode

If your machine is equipped with automatic functionality you can activate automatic blade control, when the blade is within a specified distance from the design. When in "auto", the blade will attempt to achieve 0.00 cut/fill. Please ensure your machine is pushing material when "auto" is engaged.
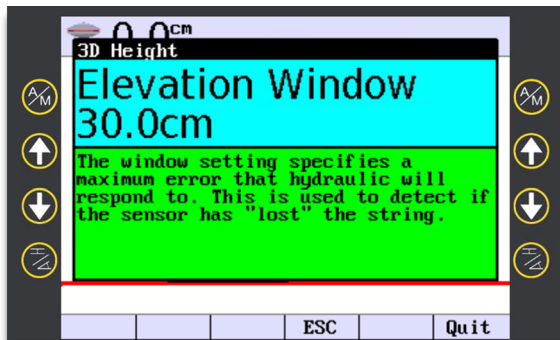
- "3D Height Elevation Window" is set in the 2D UI > Configure > Adjust > Right 3x. If outside this window Auto will not engage. Suggested value is 30cm (0.98') typically set by technician.
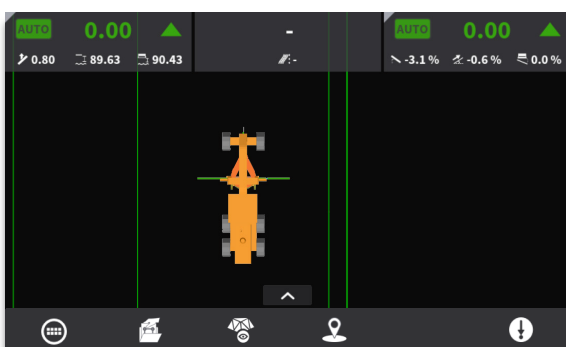

**Step 1:** Press and hold cut/fill on each side to get PREP to appear (This step is not necessary if set to A/M Mode: Toggle).

- When "auto" is engaged, top left and right guidance bars show "AUTO" in green, and blade attempts to achieve 0.00 cut/fill.

- There are multiple Auto/Manual mode Toggle functions to select from, typically set by technician.

Step 2: Press installed "auto" button, to engage automatic control of the blade.
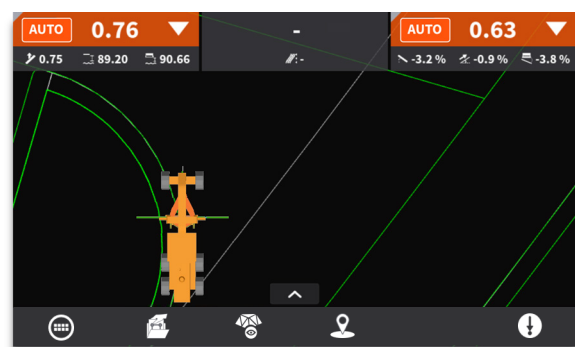

- If the blade is raised outside of the configured elevation window, the system will go into red (inactive auto)


Where can I learn more?

- User reference manual (URM) for grader.
- "How to" videos for grader (See Appendix).


Workflow 13: Create point logs

You can log points on your design, from the run screen. Apply a user defined point log, or select from a predefined point log. MC1 automatically sends stored points to ConX (If connected to ConX).
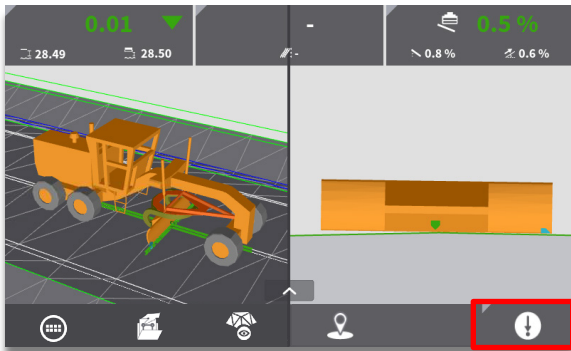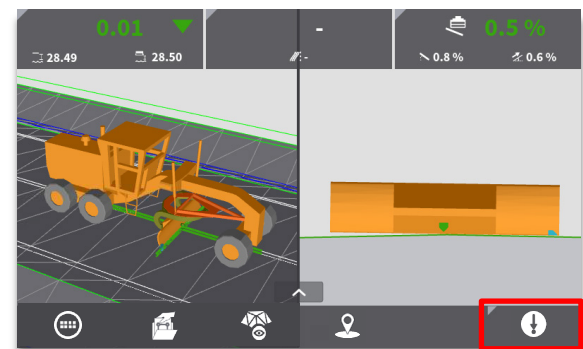

Step 1: Select "Log point" button to quickly log a point.
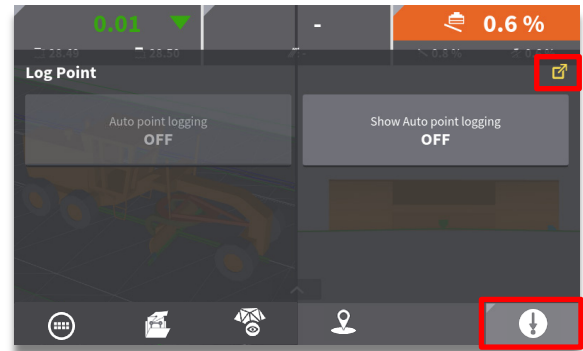
Step 2: Press and hold "Log point" button. Select a point code from available point code list and press "Log point" button to log a point with that point code. For more options select quick access button in top right corner.
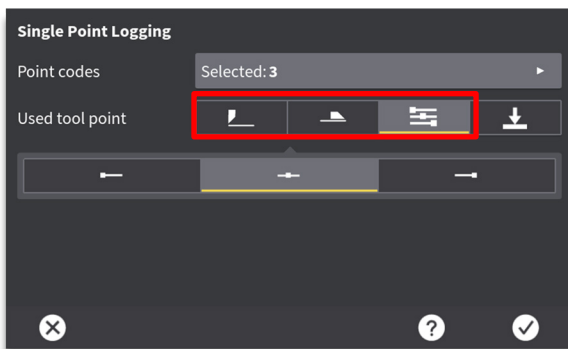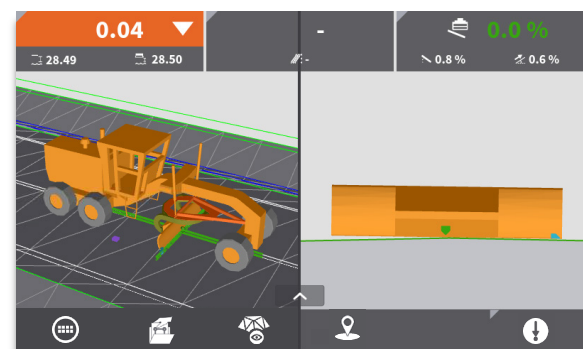

Step 3: Choose which tool point to use when logging a point (Current height tool point, current side tool point or specific tool point not used for height or side references). Select "X" to return to run screen.

Step 4: Select "Log point" button to log a point.

Step 5: If necessary, select "Revert" to remove previously logged point.
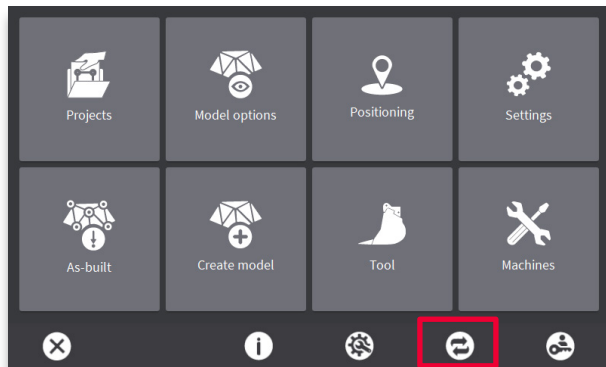

- If configured, previously stored points will appear in the plan view as purple dots.
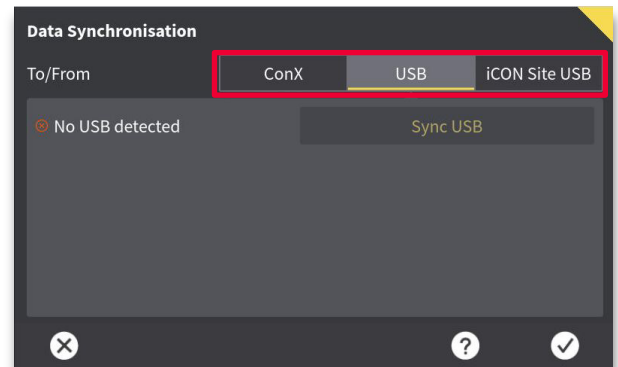

Where can I learn more?

- User reference manual (URM) for grader.
- "How to" videos for grader (See Appendix).
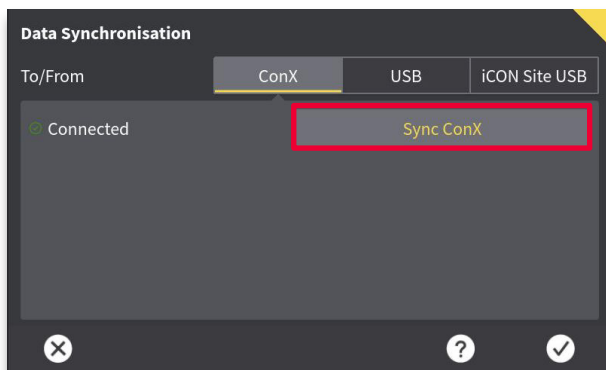

Workflow 14:   Synchronize files

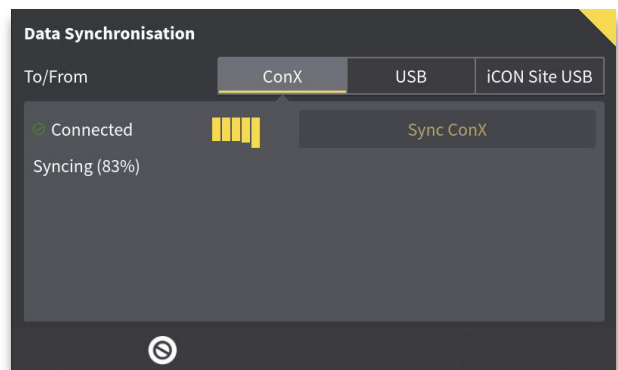Files can be synchronized to ConX or a USB key. This way you can send or receive files between machine and office.

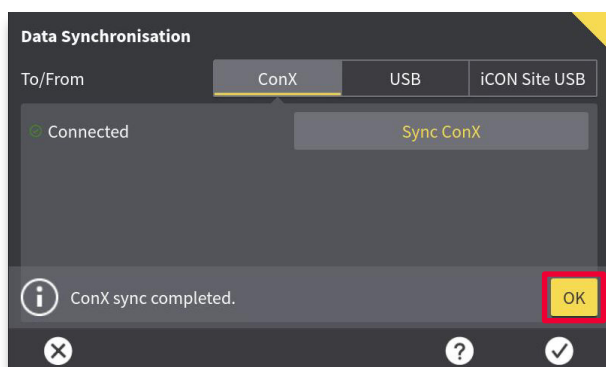**Step 1:** Press the synchronization button.

- Selection of possible synchronisation methods. USB is only selectable when inserted.
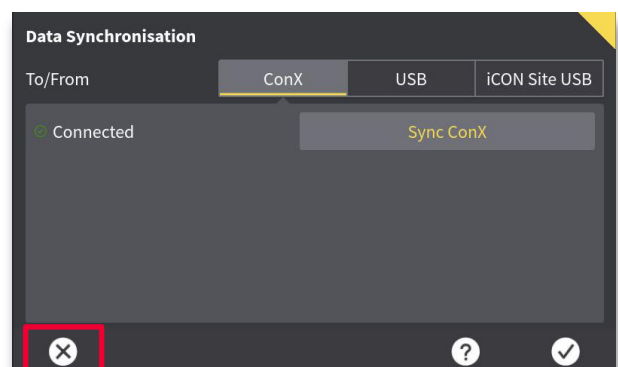

Step 2: Select desired synchronisation method. ConX is connected and therefore available for Sync.

- Files will be synchronized both directions. Progress will be indicated on screen.

Step 3: Press "OK" to acknowledge successful synchronisation.

Step 4: Press X to return to run-screen.

Appendix: List of "how to" videos

Use this link https://leicageosystems.how/usingMC1dozergrader or the QR code below to access a wide selection of "how to" videos that will help you get the most out of your work with MC1 for grader:

Learning videos

Expiry: 31-12-2023

- when it has to be **right**

The following is a selection of the currently available videos:

- Using dozer and grader run screens.
- How to set up 3D sensor profiles.
- How to select a predefined coordinate system.
- Engage a project.
- How to engage with surface models.
- How to engage with string line models.
- Multiple surfaces model.
- Select a stationing line.
- Run screen settings.
- Using hold slope – an advanced feature.
- Auto point logging.
- Calibrate your cross slope sensor.
- Adjust for blade wear.
- Setting tolerances and beep settings.
- Single Point Logging.
- Pairing TPS.
- *...many more videos will be added.*