



Title: Gocator 4.x Dual-Sensor Setup Guide

Revision: 1.1

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1 Overview

This application note describes how to set up and use the Gocator’s built-in support for dual-sensor operation. The document is divided into two main parts. The first part is based on the user manual for all the basic setup steps, whereas the second part describes in detail how to align the system into a common coordinate frame and briefly explains how measurement tools can be used on the combined data. The aim of this document is to provide you with all the required setup steps to get a dual-sensor system operating.

The guide requires two Gocator sensors of the same model, *running the same firmware version*.

2 Software and Hardware Requirements

Requirements	Details
Gocator Firmware	Gocator 4.0.9.136 or later
Gocator Series	Gocator 2300 family

3 Dual-Sensor Setup Steps

In a dual-sensor system, two Gocator sensors work together to measure an object, typically in order to cover a wider field of view (FOV) or to measure thickness. The sensor system can deliver combined 3D data in a common coordinate frame, provided by the Gocator’s built-in alignment support. The controlling sensor is referred to as the Main sensor, and the helper is referred to as the Buddy sensor. Gocator’s software recognizes three dual-sensor installation layouts, which are summarized in the following table:

Layout	Description and usage scenario
Wide	Sensors are mounted side by side to scan a wide target.
Reverse	Sensors are mounted side by side as in the Wide layout, but the Buddy sensor is rotated 180 degrees around the z-axis to prevent occlusion along the y-axis.
Opposite	Sensors are mounted facing each other, typically to measure the thickness of material.

These layouts are illustrated in System Layouts.

3.1 Connecting the Components

Master 400 must be used to connect two sensors in a dual sensor system. Gocator 23x0 Master cordsets are used to connect the sensors to the Master.



GOCATOR 2300 SERIES

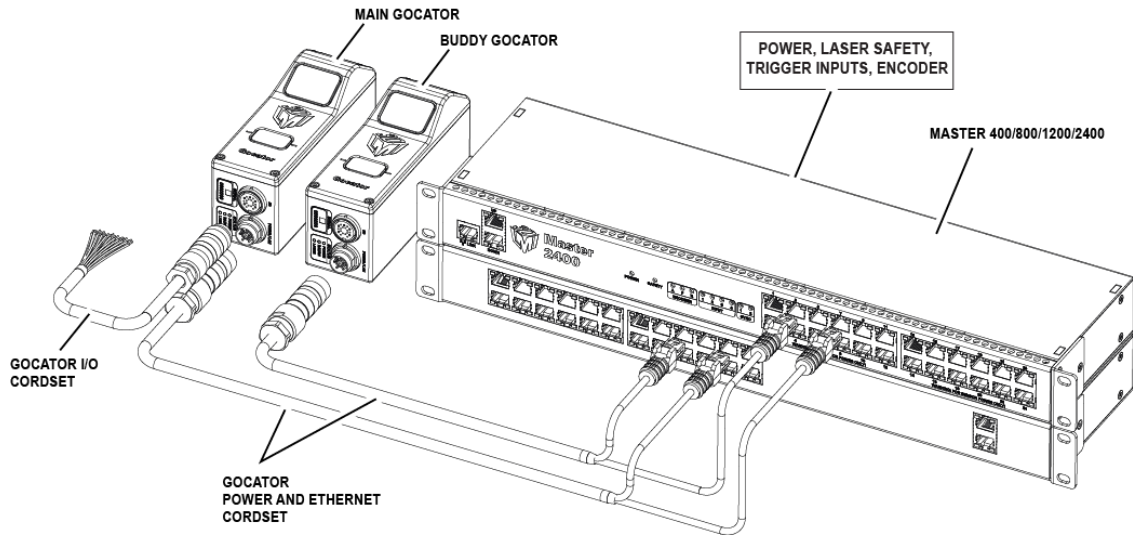


Figure 1: Gocator 2300 Family Connection (Master 2400 pictured)

3.2 System Layouts

The examples below illustrate the possible mounting layouts for dual-sensor systems. The mounting relationships between the Main and the Buddy sensor must be as shown in the following diagrams. When viewed from the rear, in Wide and Reverse layout, the Main sensor is always on the left. In Opposite layout, the Main sensor is always on the top.

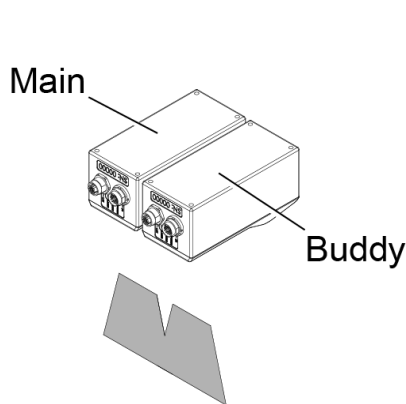


Figure 2: Wide layout (with overlapping FOV)

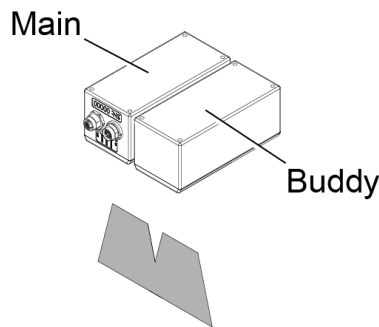


Figure 3: Reverse layout

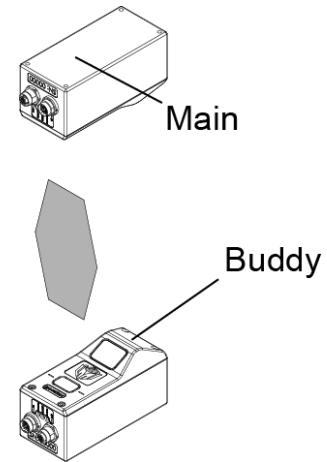


Figure 4: Opposite layout

For more information, see Dual-Sensor Mounting Layouts and Orientations.

3.3 Running a Dual-Sensor System

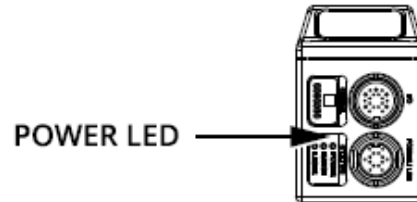
All Gocator sensors are configured to use 192.168.1.10 as the default IP address. For a dual-sensor system, the Main and Buddy sensors must run the same firmware version and must be assigned unique



addresses before they can be used on the same network. Before proceeding with these instructions, connect the Main and Buddy sensors one at a time (to avoid an address conflict) and follow the steps below.

- 1. **Turn off the sensors and unplug the Ethernet network connection of the Main sensor.**

Skip steps 1 to 3 if the Buddy sensor's IP address is already setup with a unique address.



- 2. **Power up the Buddy sensor.**

The power LED (blue) of the Buddy sensor should turn on immediately.

- 3. **Enter the sensor's IP address (192.168.1.10) in a web browser.**

This will log into the Buddy sensor.

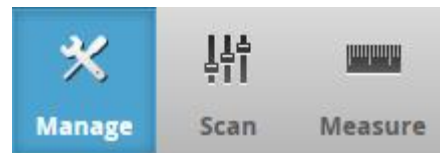


- 4. **Log in as Administrator with no password.**

The interface display language can be changed using the language option. After selecting the language, the browser will refresh and the web interface will display in the selected language.



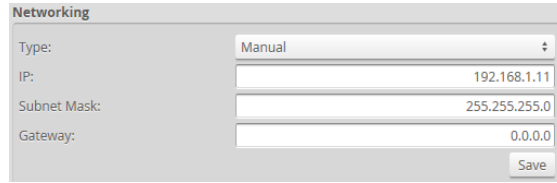
- 5. **Go to the Manage page.**





- 6. **Change the IP address to 192.168.1.11 in the Network settings and click the Save button.**

When you click the **Save** button, you will be prompted to confirm your selection.



The screenshot shows a 'Networking' configuration window. It has a 'Type' dropdown menu set to 'Manual'. Below it are four input fields: 'IP' with the value '192.168.1.11', 'Subnet Mask' with '255.255.255.0', and 'Gateway' with '0.0.0.0'. A 'Save' button is located at the bottom right of the form.

- 7. **Turn off the sensors, re-connect the Main sensor's Ethernet connection and power-cycle the sensors.**

The sensors must be reset or power-cycled before the change will take effect.



- 8. **Enter the sensor's IP address (192.168.1.10) in a web browser.**

This will log into the Main sensor.

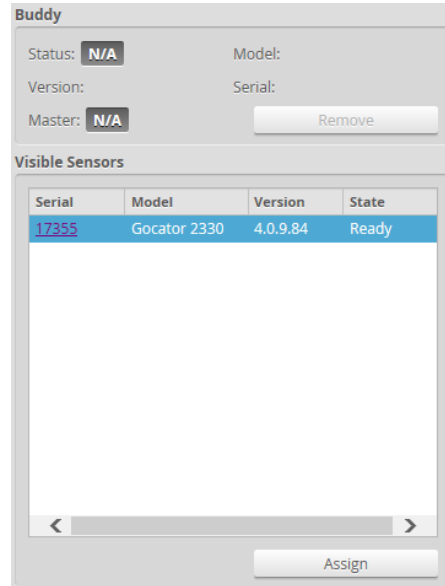
- 9. **Log in as Administrator with no password.**





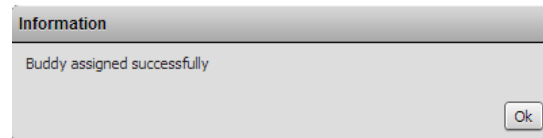
10. Go to the Sensor System category on the Manage page.

The serial number of the Buddy sensor is listed in the Visible Sensors area.

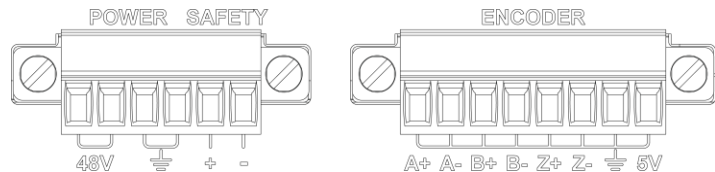


11. Select a sensor to assign as the Buddy and click the Assign button.

The Buddy sensor will be assigned to the Main sensor, and its status will be updated in the System panel. Note that the firmware version on the Main and the Buddy must be the same for Buddy assignment to be successful.

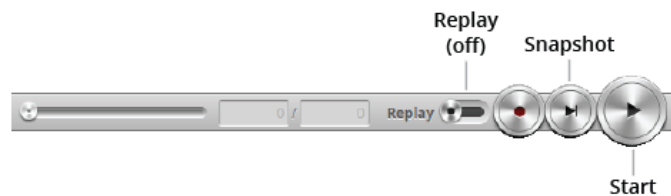


12. Ensure that the Laser Safety input is high.



13. Go to the Scan page and ensure that Replay mode is off.

When Replay mode is off, the slider is to the left.



14. Click on the Start button to start the sensors.

The Start button is used to run sensors continuously, whereas the Snapshot button is used to trigger a



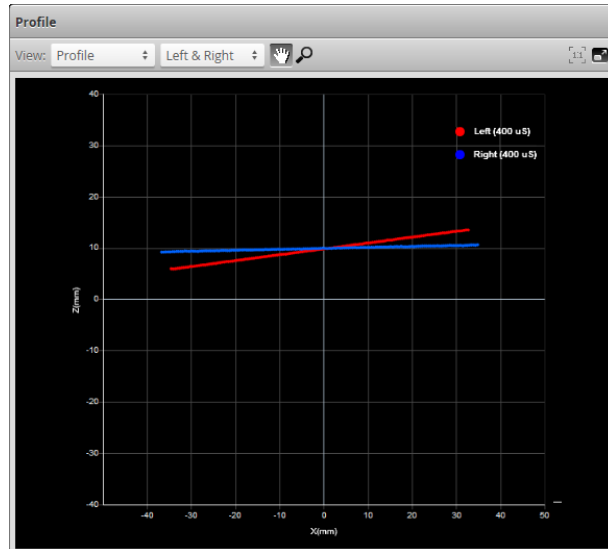
single profile.

15. **Move a target into the laser plane.**

If a target object is within the sensor's measurement range, the data viewer will display the profile of the target and the sensor's Range indicator LED will illuminate.

In the data viewer's drop-down box, select **Left & Right** to view data from both sensors at the same time.

Note that sensors are referred to as Top, Bottom, Left, or Right in the **Scan, Measure, and Output** pages, The exact names used depend on the layout chosen.



4 Alignment and Measurement Example

In order to use the dual-sensor setup to actually measure targets in a single combined field of view, the sensors have to be made aware of each other's mounting location. In Gocator 4.0, this is done through the built-in Alignment function, which supports the alignment of the dual-sensor system into world coordinates.

The example presented here is for the Wide layout scenario, that is, when the sensors are mounted side by side to cover a wider field of view. For wide multi-sensor systems, alignment bars are required to perform the system alignment according to the specification in Figure 5. The bar should not be made of a reflective or shiny material, but a brushed or matte metallic surface may still work. As a rule-of-thumb, the diameter of the reference holes should be at least 10 times the sensor's X resolution.

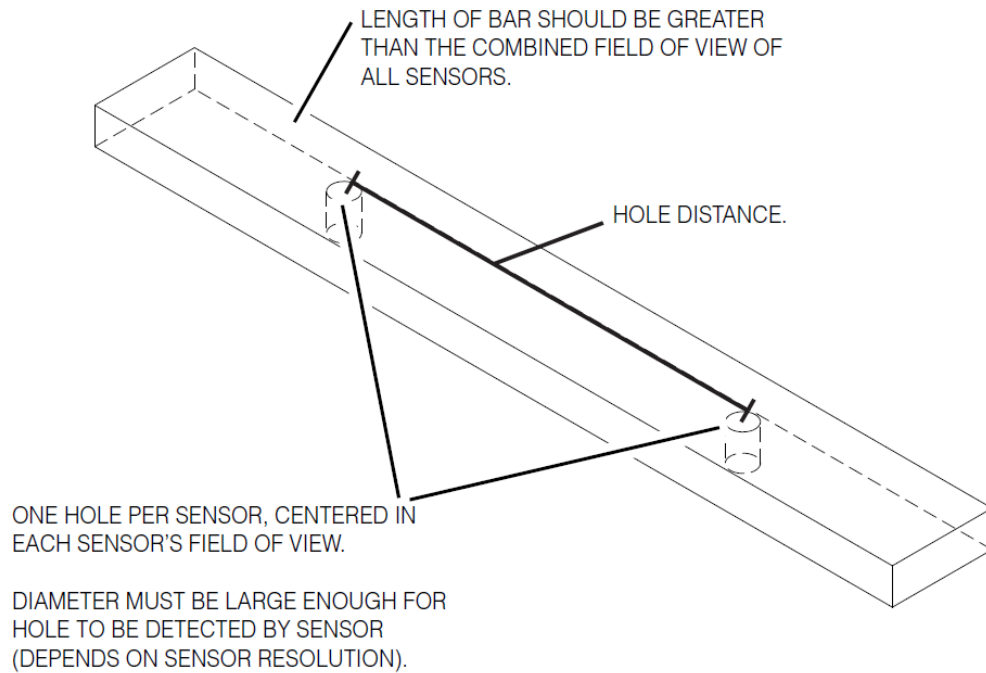


Figure 5: Alignment bar specifications

Figure 6 shows two Gocator 2330 sensors mounted side by side in a Wide layout, with an alignment bar in their field of view (FOV). In this case the sensors are close together and their individual FOV's are physically overlapping, which is suitable in applications where high resolution is required to scan a target that is larger than the FOV of a single sensor. **Exposure Multiplexing** was enabled in **Sensor System** on the **Manage** page.

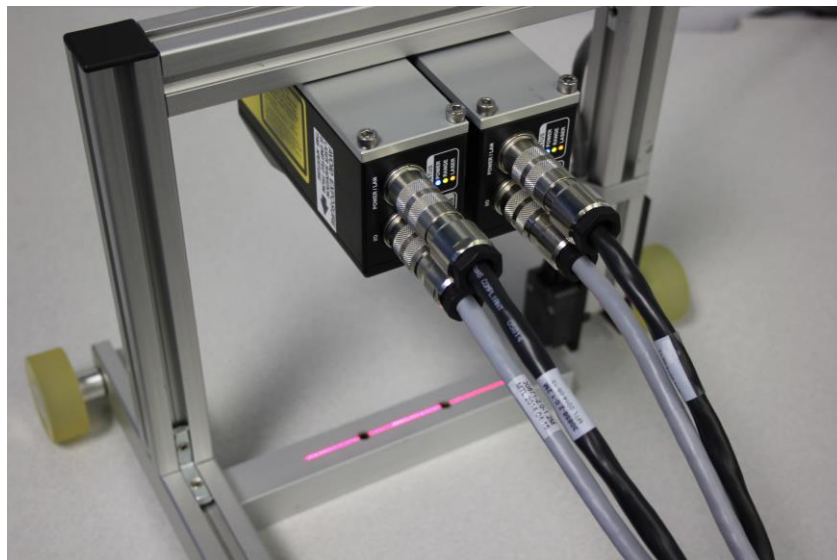


Figure 6: Dual-sensor setup with custom alignment bar



Figure 7 shows what the unaligned profile data looks like in the data viewer. Note again that **Left & Right** must be selected in the data viewer's drop-down selection box.

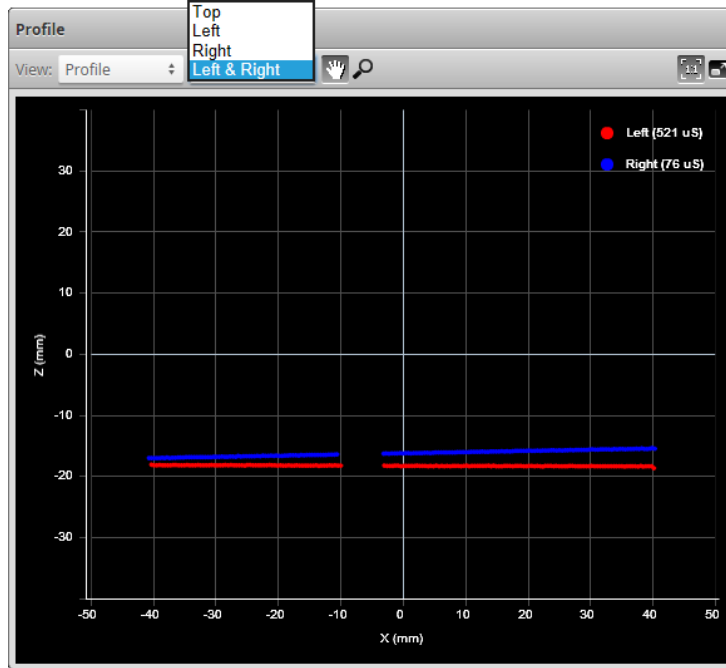


Figure 7: Unaligned profiles from both the Main and the Buddy

Alignment of the Gocator is done in the **Alignment** panel on the **Scan** page. Figure 8 shows the **Alignment** panel with the correct settings entered corresponding to the setup pictured above in Figure 6.

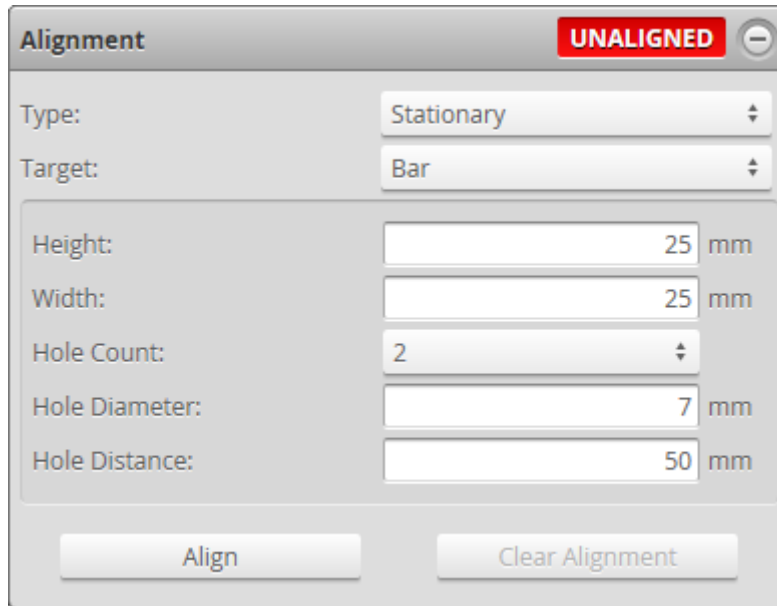


Figure 8: Alignment panel with settings

Note the following:



- The correct layout must be selected in the **Layout** section in the **Sensor System** category on the **Manage** page before alignment for a successful operation. See Figure 9.
- If the Main and Buddy sensors are mounted so that the camera from one sensor can detect the laser from the other sensor, the **Exposure Multiplexing** feature can be used to eliminate laser interference. Exposure multiplexing creates a time offset for laser exposures and ensures that interfering lasers are not strobed at the same time. Note that the use of exposure multiplexing may reduce the maximum frame rate. See Figure 9.
- Select **Bar** in the **Target** drop-down and enter the dimensions of the alignment bar. The distance between the holes is from center to center.
- Select **Stationary** in the **Type** drop-down for an alignment where the bar does not move in the sensor's FOV during alignment. This type of alignment does not calibrate the encoder resolution and is the recommended method if the encoder resolution has already been established or has not changed.
- If an encoder is connected to the system, it is possible to also calibrate the encoder resolution in a single operation by scanning the bar in the direction of travel. In this case, select **Moving** in the **Type** drop-down. The **Width** setting represents the width of the bar and is used by the alignment routine to establish the encoder resolution. The encoder resolution can also be manually entered in the **Motion and Alignment** category on the **Manage** page.

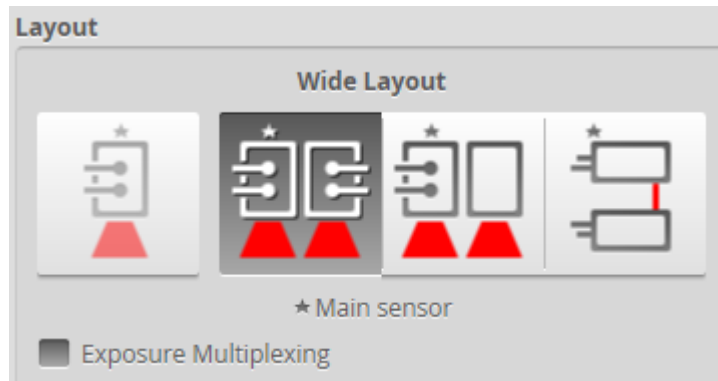


Figure 9: Layout under Sensor System on Manage page
(Wide layout selected)



After successful alignment, the profile data from the two sensors should resemble Figure 10.

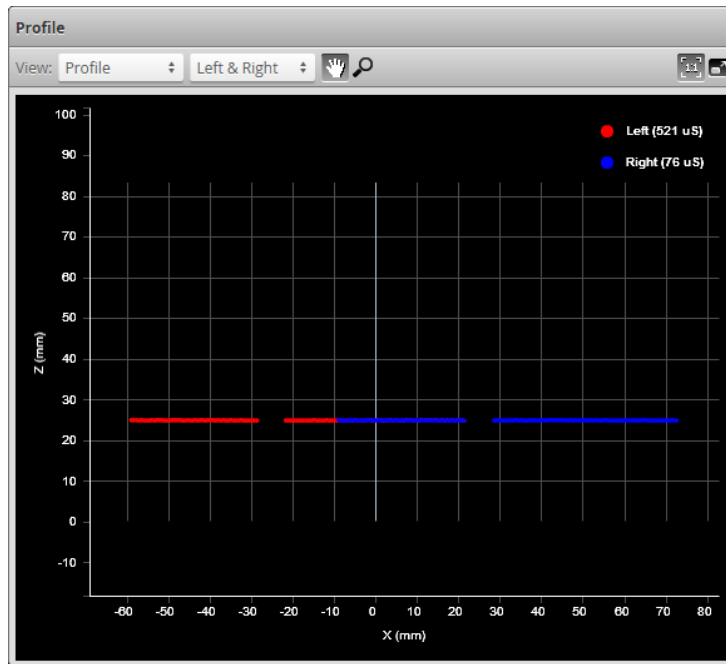


Figure 10: Successful alignment

Measurement tools can now be applied to the system-aligned data for dimensionally correct results across the combined field of view, as shown in Figure 11.

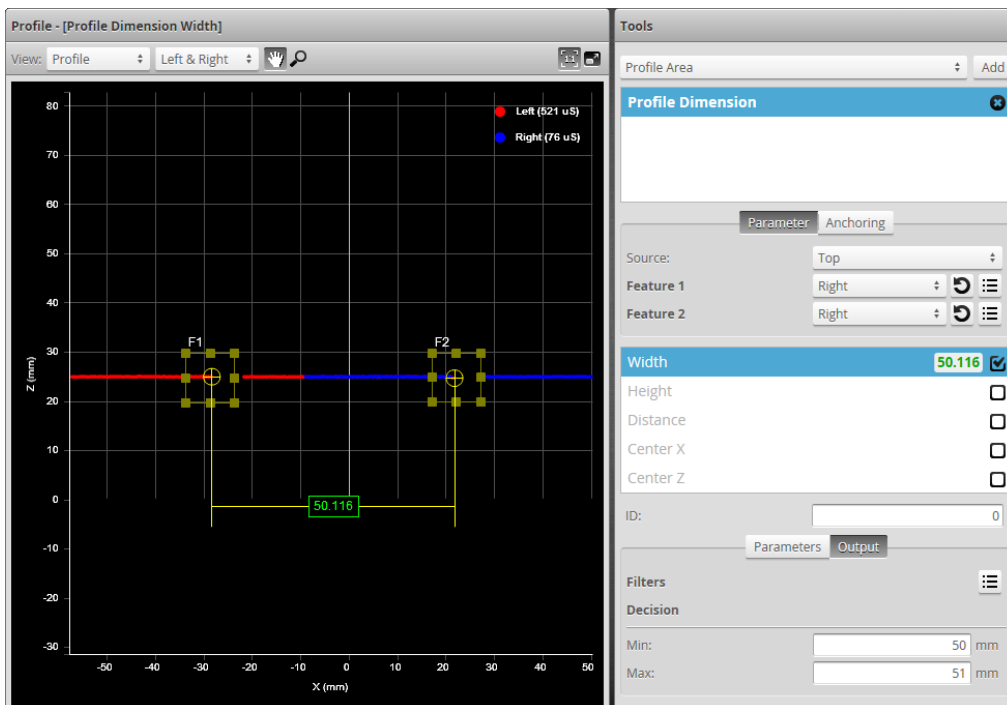


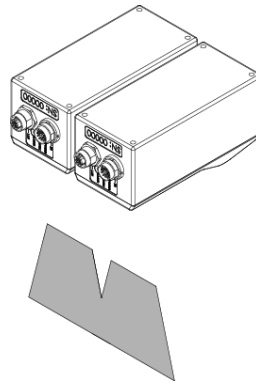
Figure 11: Example of Width measurement on combined dual-sensor data



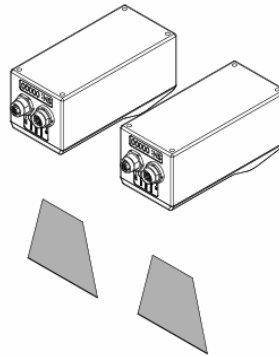
5 Dual-Sensor Mounting Layouts and Orientations

There are a number of possible dual-sensor layouts and orientations. These configurations are set up and aligned in the same way as the example, with the exception that sometimes only a single reference hole is needed for alignment.

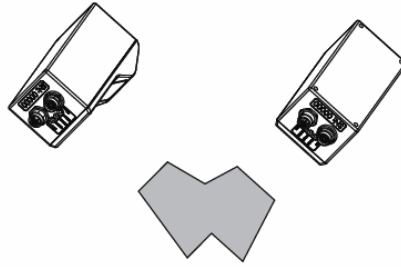
- **Wide layout with overlapping FOV** – used to measure a wider target than is possible with a single sensor, providing complete coverage of the target surface. Alignment is performed with a bar with two holes, exactly the same way as described in the example above. The **Exposure Multiplexing** setting should be disabled so that the two sensors capture data at the same time. (Example used in this document.)



- **Wide layout with non-overlapping FOV** – used to measure the width of a large web of material such as metal or rubber. The **Exposure Multiplexing** setting should be disabled so that the two sensors capture data at the same time.



- **Angled Wide or Reverse layout with overlapping FOV** – used to avoid occlusions on targets with complicated shape and sharp corners. The sensors are angled in toward each other. Alignment is performed using a bar with a single hole.



- **Opposite layout** – used to measure true thickness of a target. The **Exposure Multiplexing** setting should be disabled so that the two sensors capture data at the same time. The two sensor’s lasers should be aligned to form a single plane. Alignment is performed using a bar with a single hole, as illustrated below.

