



Title: HDI – Multi-sensor Systems with FlexScan3D
Revision: 1.1

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1 Overview

This document will explain how to setup a multi-sensor system to minimize acquisition time, how to setup simultaneous acquisition, and some key points that you need to pay attention to. This document also covers the hardware requirement as well as the changes and improvements that are related to multi-scanning.

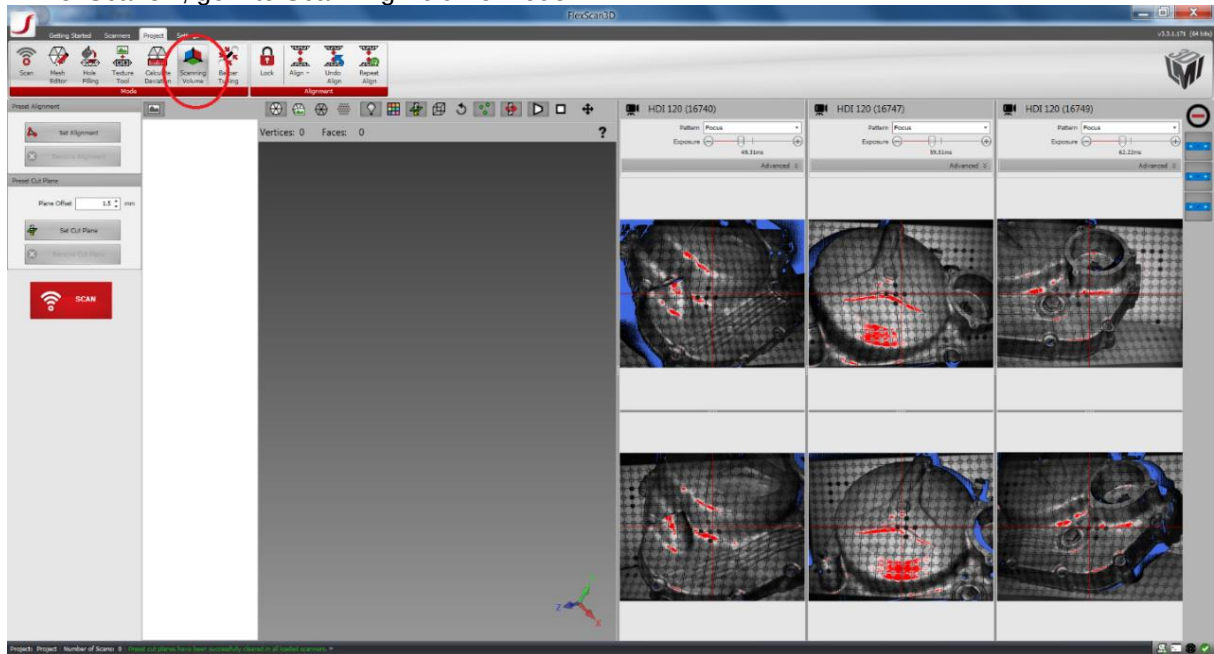
Simultaneous acquisition is only available on FlexScan3D 3.3.2.212 or above.



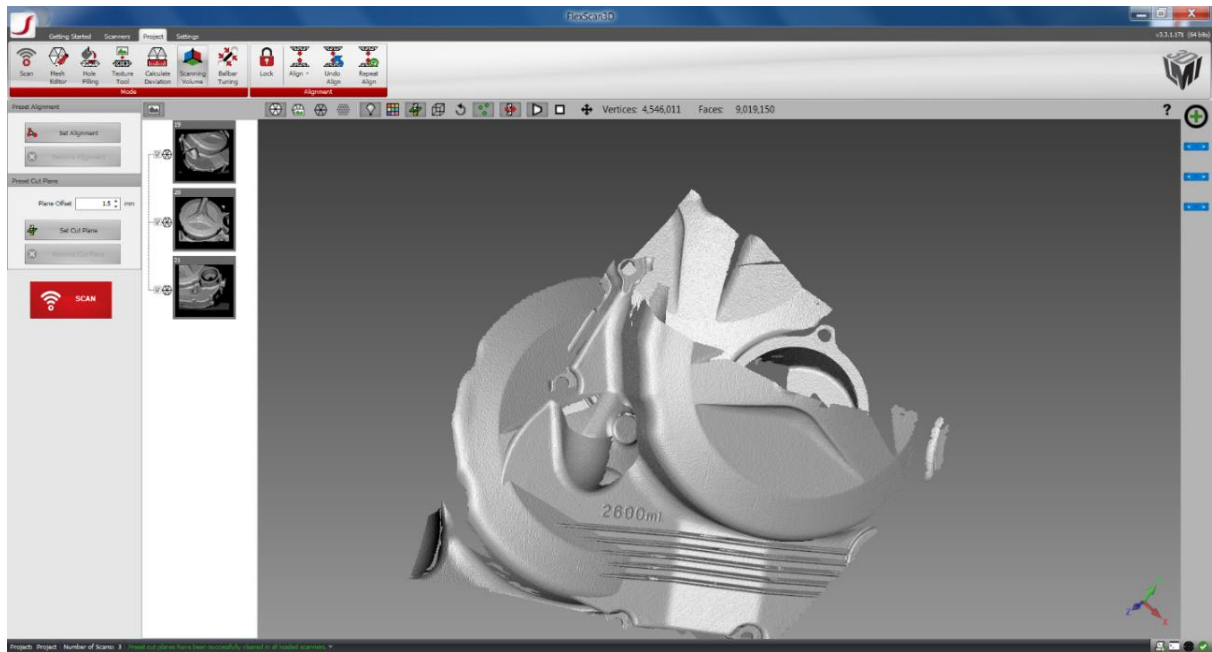
2 Setup a Multi-scanner System

To set up multiple HDI scanners:

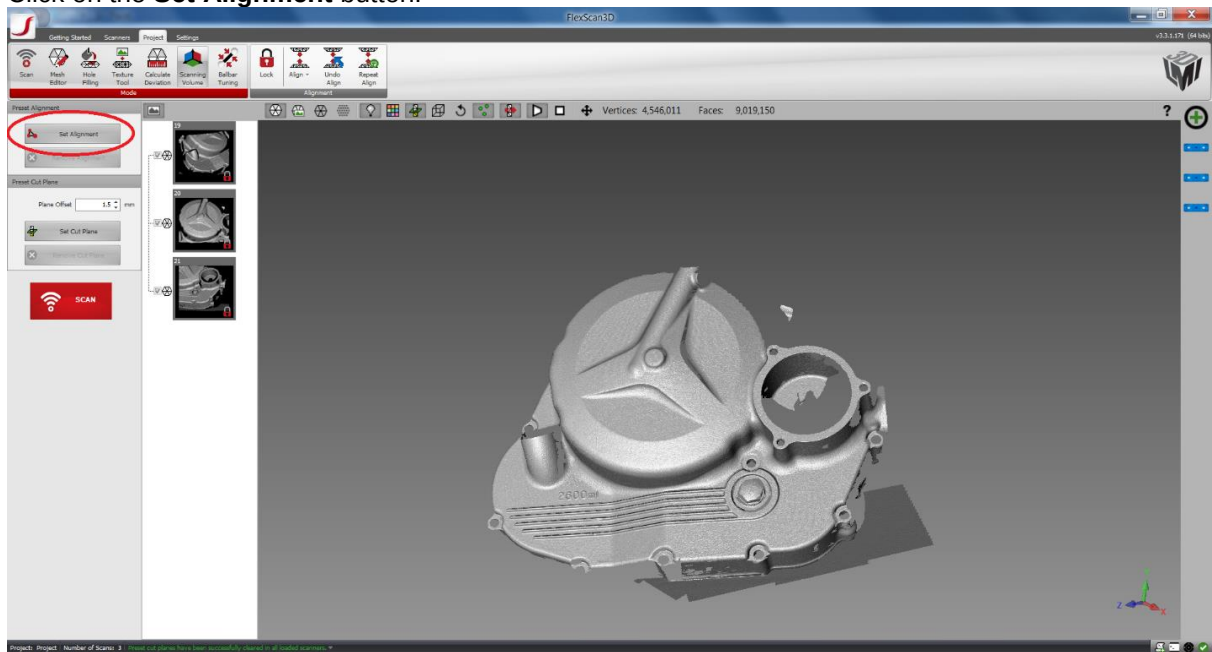
- 1) In FlexScan3D, add all of the scanners in your connected system.
- 2) Find a part that will have enough geometry to align your scans with.
An ideal part is one that does not have too many flat surfaces.
- 3) Adjust the scanners individually so that they have a 30% geometry overlap to ensure that the scans can be aligned.
- 4) In FlexScan3D, go into Scanning Volume mode.



- 5) Make sure that the rotary table is disabled, and then click on the **Scan** button.
- 6) Manually align all the scans.
If the scans fail to align, readjust the scanners and start again from step 6.



- 7) Click on the **Set Alignment** button.



- 8) Once alignment is complete, go back into the Scan mode.
All subsequent scans will be aligned automatically.
- 9) **Optional:** If simultaneous acquisition is needed, simply open the script editor and manually set the groups of each scanner. Please refer to the next session on setup.

NOTE: If you move any of the scanners, you will need to reset the alignment. This is why it is important to adjust everything first before moving on to the actual scanning.

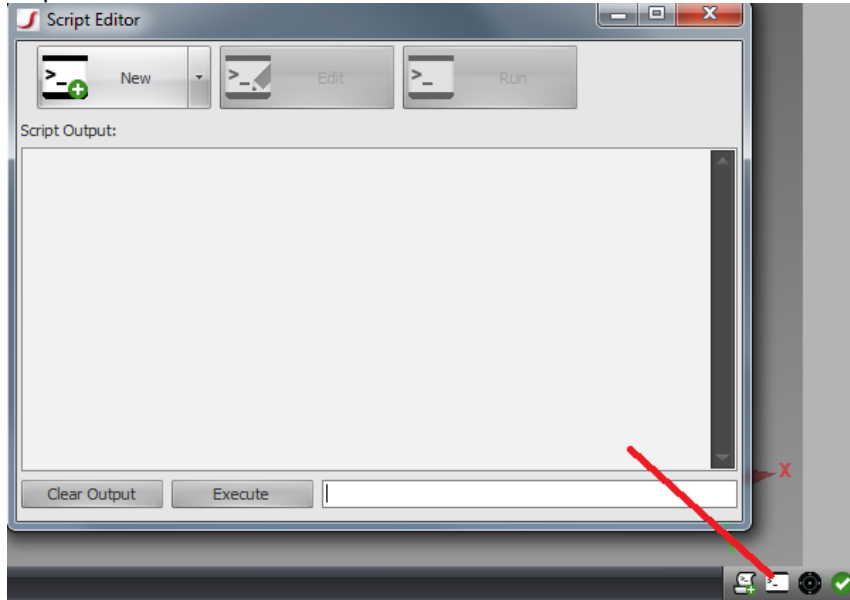


NOTE: If FlexScan3D is starting to slow down during setup, it is best to turn off the live video of the scanners and only enable the ones you are currently adjusting.

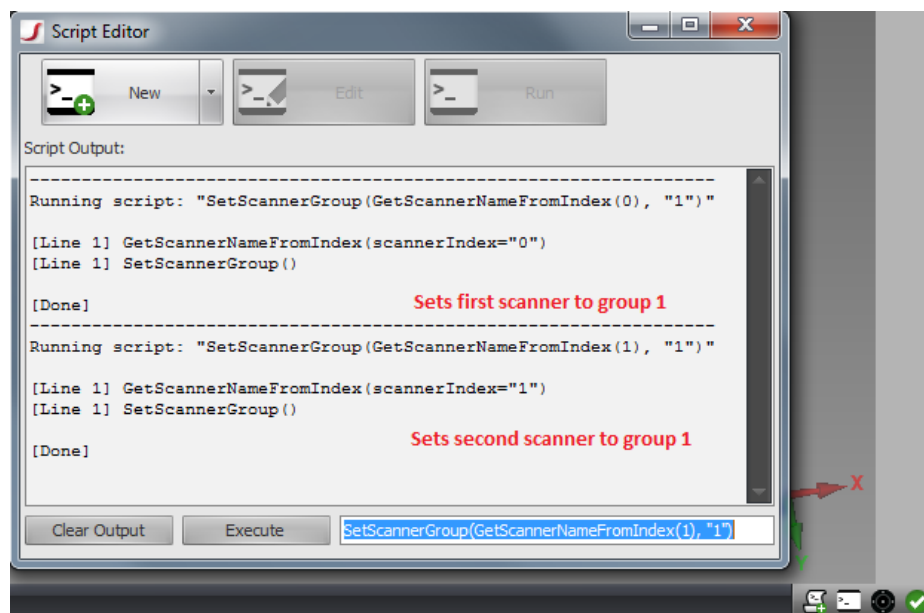
3 Setup for Simultaneous Acquisition

Setting up for simultaneous acquisition requires the user to run several scripting functions through the script editor. This section will provide step by step instructions on how to do this.

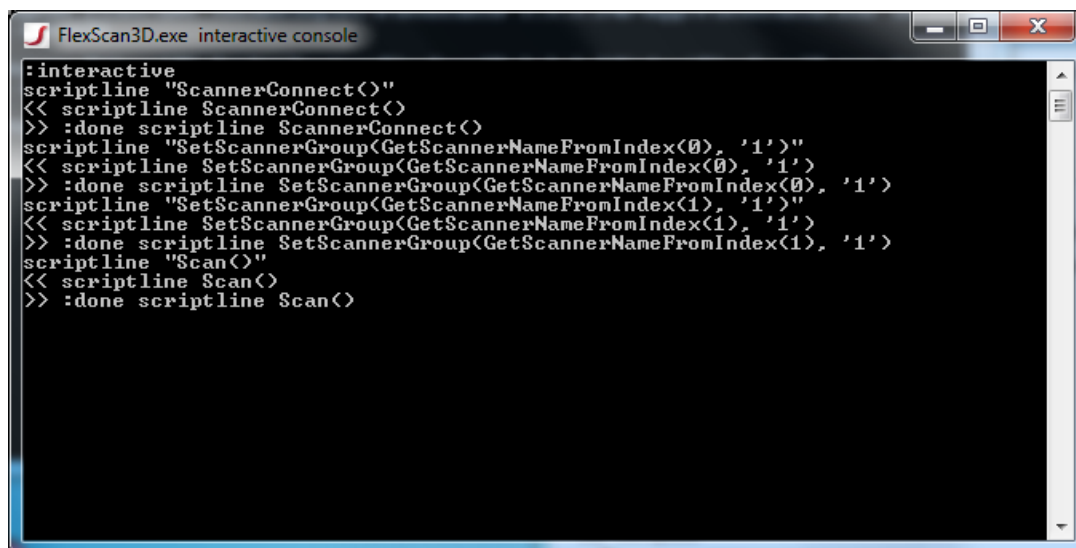
- 1) Add all the scanners that will be used for this and make sure they are ready for scanning
- 2) Launch the Script Editor



- 3) The following function will be used: `SetScannerGroup(scannerName, groupName)`
 - If you are not familiar with FlexScan3D scripting, please review it [here](#).
 - Tip: An easy way to obtain the scanner name is to use `GetScannerNameFromIndex(scannerIndex)`. The scannerIndex starts from 0 for the first scanner, 1 for the second scanner and so on.
 - Example: `SetScannerGroup(GetScannerNameFromIndex(0), "1")`
- 4) Set all of your scanners to the same groupName and the system will be ready for simultaneous acquisition.



The setup is the same with console scripting.



***Important Note** – Using simultaneous acquisition may cause the scanning pattern to overlap and should not be used if this is the case.

4 Maximum Number of Scanners and Hardware Requirements

There are no limits with FlexScan3D on how many HDI Series scanner can be connected at one time. However, please be aware of the hardware limitations such as PC processing power, scanner power requirement, and connection/bandwidth requirement. We have successfully tested up to 10 HDI Series scanners at once without running into issues.



Requirements	Details
Scanners	Multiple HDI 100 Series scanners.
Cordsets	Standard cordset for each scanner (1x barrel jack and 1x RJ45 plug); power connects directly to a power outlet.
Network	1 Gbps network switch.
Cables	Ethernet cable.
Computer	Laptop or PC.

Optional	Details
Master	Master 400, 800, 1200, or 2400 (for power only).
Power supply	Must provide enough power for all the scanners (25 watts per scanner).
Cordsets	Ethernet to Master cordset with two RJ45 plugs (one for each scanner).

5 Changes and Improvements

- Simultaneous acquisition was made available on FlexScan version 3.3.2.212 and above.
- New scripting functions added (that's related to multi-scanner)
 - o *SetScannerGroup(String scannerName, String groupName)*
 - o *GetScannerGroup(String scannerName)*
 - o *SetScannerEnabled(String scannerName, Boolean enabled)*
 - o *IsScannerEnabled(String scannerName)*
- Right clicking on the exposure slider or dropdown menu allows user to apply the same exposure to all scanners
- Software optimization was done on FlexScan version 3.3.3.246. Scan speed with multi-scanner has improved.
 - o Two tests were conducted to get the average speed between the two versions. First method is to do a single scan with a dual scanner setup and to check the time within the log files. This method is just an approximate time that users will see without using scripting. Second method uses a script to do a single scan with a dual scanner setup and to display the exact time needed to complete the process. All scans were measured from the Scan() function until the data was displayed.

	Without Script	Without Script	With Script	With Script
Scan Number	Version 3.3.2.212	Version 3.3.3.246	Version 3.3.2.212	Version 3.3.3.246
1	10 s	9 s	10.982 s	9.581 s
2	11 s	8 s	12.76 s	10.904 s
3	12 s	11 s	12.418 s	11.373 s
4	11 s	9 s	11.388 s	11.515 s
5	11 s	11 s	11.965 s	9.391 s
Average Time (s)	11 s	9.6 s	11.903 s	10.553 s

- o Based on the measured time, there is a decrease in average of 1.35 seconds in dual scanner mode with the latest version of FlexScan3D.

6 Note

Multi-scanner and simultaneous acquisition is a great way to improve the overall scan speed; however, it is important to understand there are limitations on using this setup. A minimum of three scanners are recommended for simultaneous acquisition because the need of ensuring scan patterns do not overlap (see screenshot below). Having three scanners can effectively scan both the left and right side of an object simultaneously, and then triggering the center scanner to eliminate any overlapping scan patterns.



This setup relies the center scan as a reference to align the left and right scans as well as ensuring no scan patterns are overlapped.

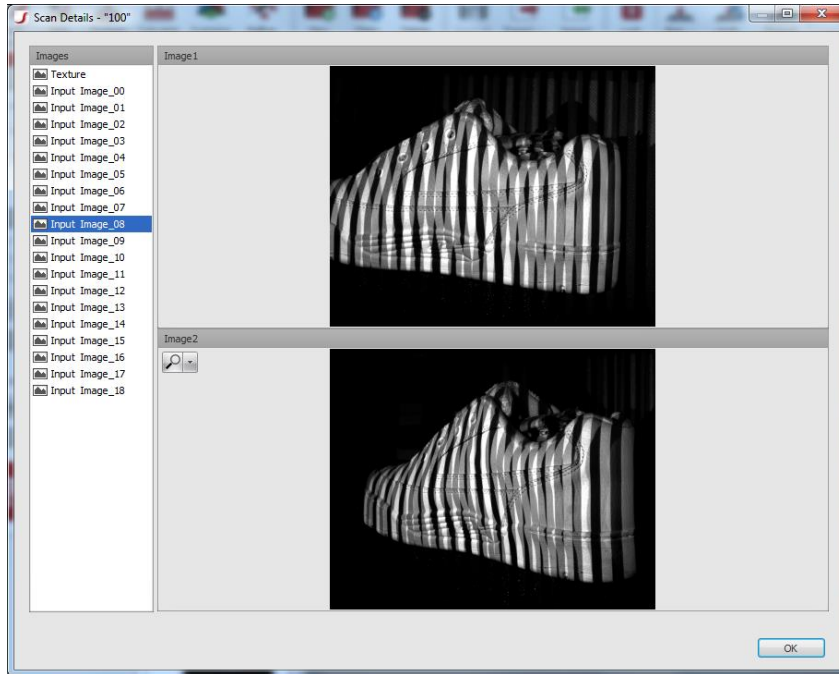


Figure 1 - overlapping patterns from two separate scanners leads to bad scans; hence the recommendation of using three scanners to ensure scan patterns do not overlap.

Even though simultaneous scanning might not be suitable in all situations, having a multi-scanner setup can still speed up the overall scanning process. This is because having a dual scanner (or more) setup can effectively capture the data from different angles without having to manually reposition the scan target or scanner. This works particularly well with a rotary table. Without using a multi-scanner setup, it is likely that the rotary table needs to be recalibrated each time a different angle needs to be scanned. This may lengthen the overall process when scanning a target.