D3D-s Hardware/Software Guide

This software guide includes additional explanations and extends information provided inside video tutorials.

Contents

Software Installation

Scanning Software Installation

This software is used for 3D Scanning of objects.

Install the latest 3D Scanning Software from:

https://www.d3d-s.com/setup.html

In addition to this document, see the video tutorials on the setup website.

NOTE:

To install the CAMERA/SOURCE hardware module, the vertical stage will need to be raised up. This can be done without the CAMERA/SOURCE module plugged in. When the software runs for the first time and instrument is detected, but the CAMERA/SOURCE module is "not" detected, the software will provide the option to raise vertical stage, which proides easier access to the screws for mounting.

MeshLab Software Installation

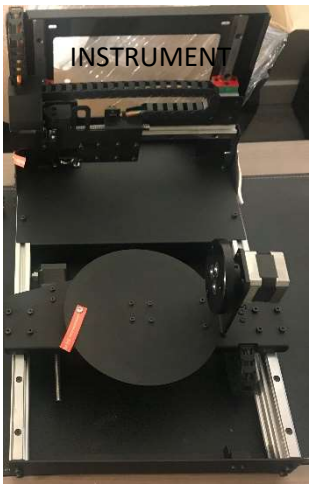
This software is used for all data post processing and analysis.

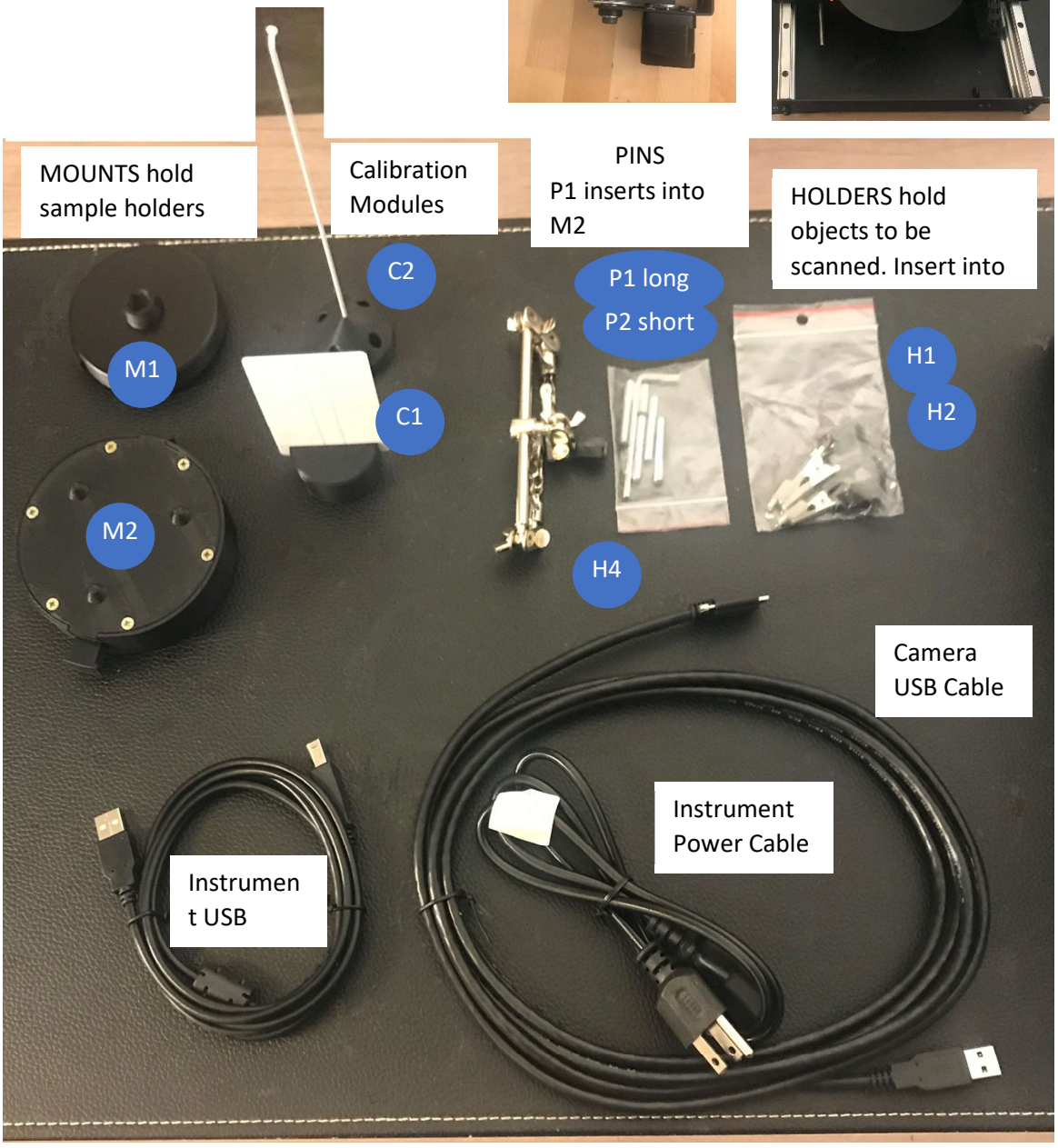
Install the latest 3D Scanning Software from:

https://www.d3d-s.com/setup.html

Hardware Components

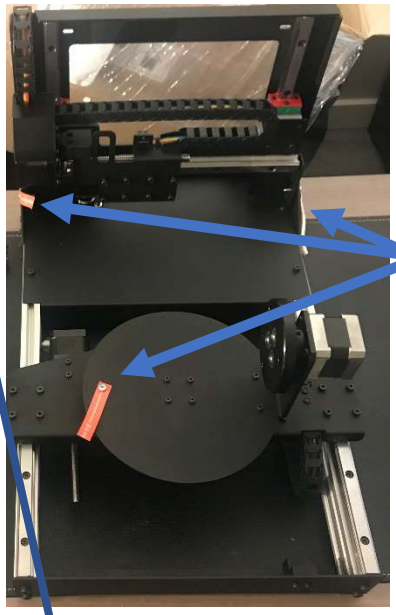
CAMERA/SOURCE MODULE





Hardware Assembly

Be sure to perform the following after unpacking or using the instrument.



1 Remove all four (4) motion contrainst **!!!**

Reuse these constraints for shipping at a later time.

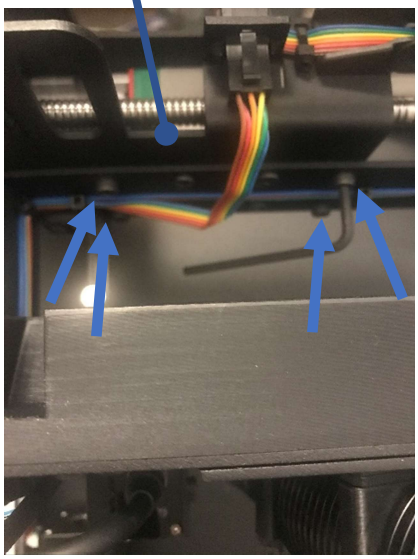
Camera/Source Module

Instrument

Plug in camera/source cable 4

2

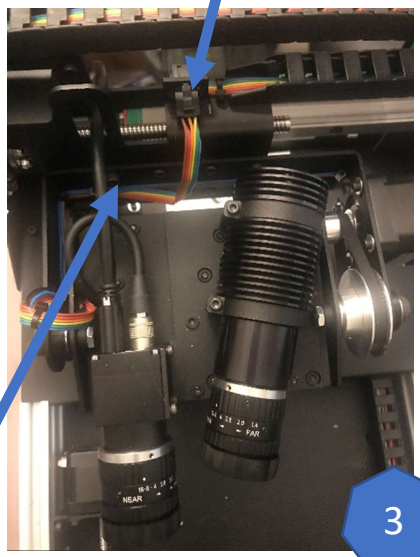
Install The Camera/source Module



1. The instrument vertical stage needs to be raised up to allow easier access to the mount screws. See Software Installation Section, or the vertical lead screw can be turned by hand to raise the vertical stage.
2. Loosen (but do not remove) the four outer perimeter camera/source module screws.
3. Insert the camera/source module as shown below and on right. Then tighten screws.

Camera/Source Mount Plate

Insert from larger holes, then slide down



3

Remove Camera Lens Covers

Remove lens covers. Replace when not in use !!

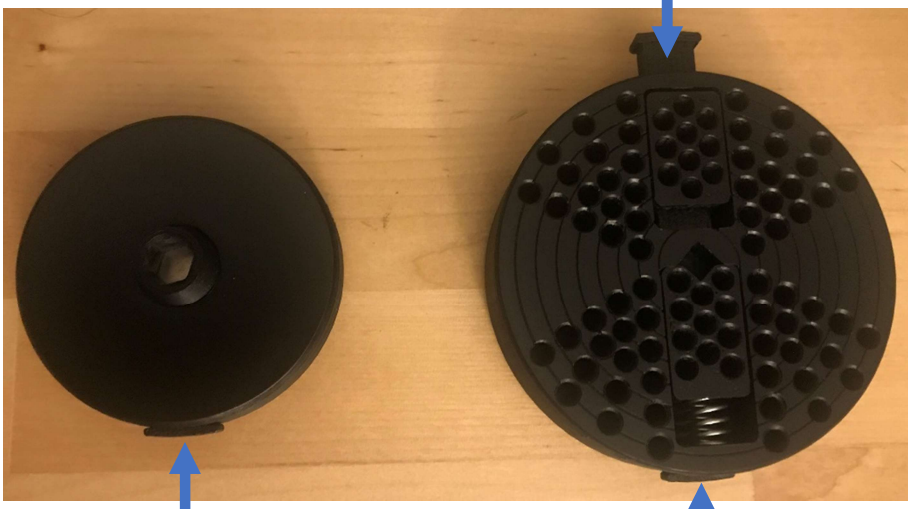
Sample Mounting

Test parts are held by *holders*, holders are interted in *mounts*, and mounts are interted in *sockets*. There is one socket integrated into the instrument. There are multiple holders and mounts for various size and shaped test parts. Custom holders and mounts can be fabricated for odd shaped custom test parts.

Mounts (M1 and M2)

M1 FRONT M2

Gripper



M1 MAGNETIC M2

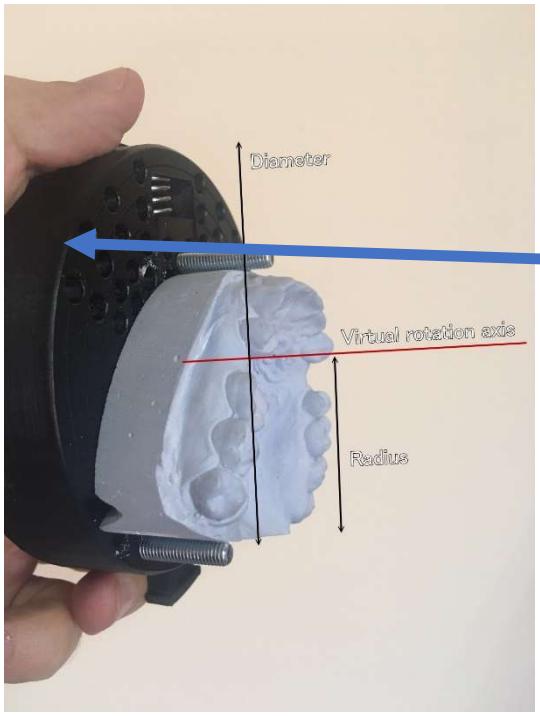
Pops outward when interted in Socket S

Press to release magnetic hold from socket

M1 BACK M2

M2 Mount

PINS



P1 pins insert into

Mount M2

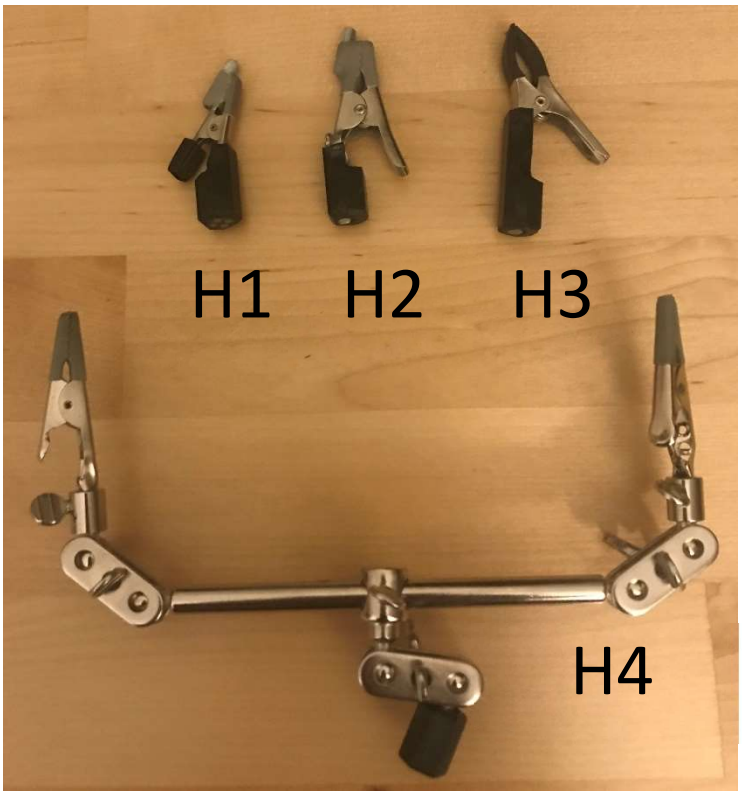
Insert a P1 pin into the spring loaded gripper section for adjustable pressure on test part

P2 pins insert into the calibration module C1.

HOLDERS

Holders insert into

Mounts M1 and M2



SOCKET S (Magnetic)

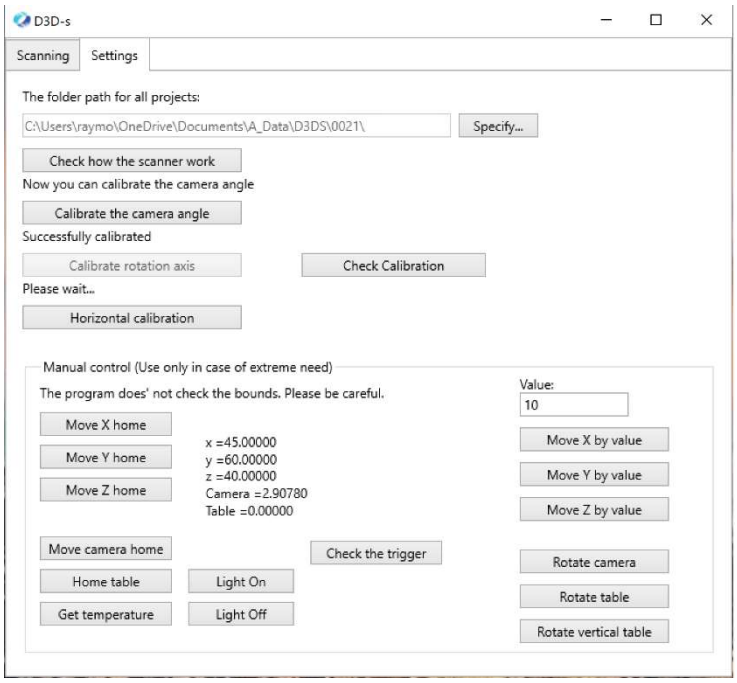
Holder H2 inserted into Mount 1

Mount M1 inserted into Socket S

Press button on left to release M1

Software Calibration and Manual Control

Calibration



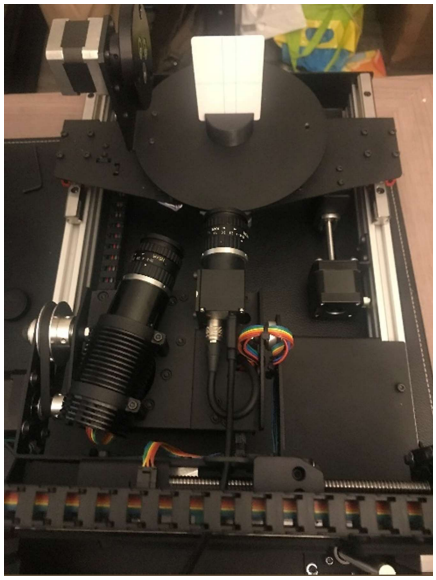
1
2
3
4

Calibration is performed in four (4) steps and MUST be performed when the instrument first installed and whenever the instrument is moved.

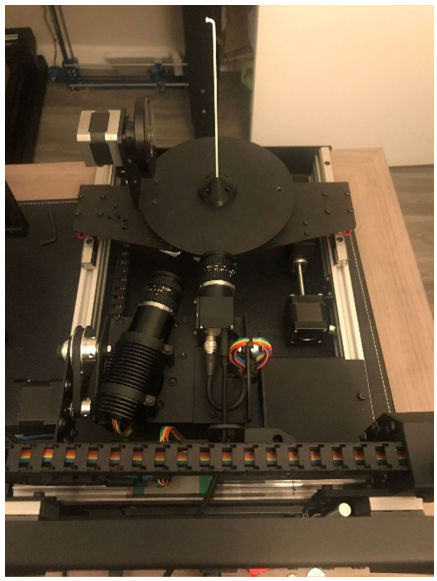
1. **Check how the scanner works**. Perform this procedure first. This procedure checks all motorized stages to enure proper operation. Be sure all constraints and obstacles are revmoved before performing any calibration and measurement procedures.

For the following calibration procedures be sure to insert the proper calibration module as shown in the images below.

2. **Caibrate the camera angle**.
3. **Calibrate the rotation axis**.
4. **Horizontal calibration**.



Calibrate Camera Angle



Calibrate Rotation Axis

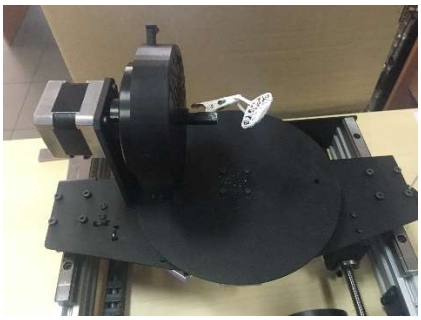
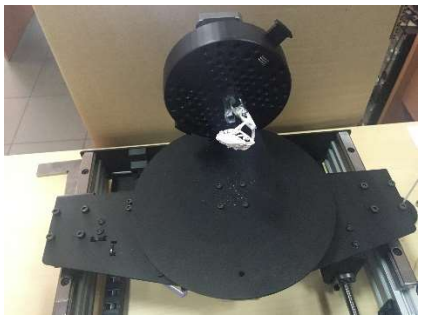
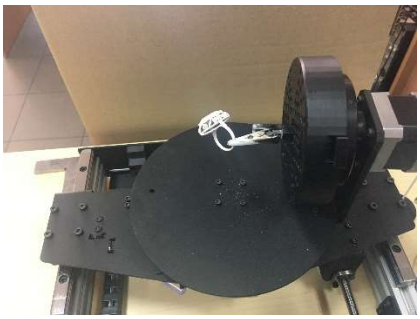
Horizontal Calibration

Manual Control

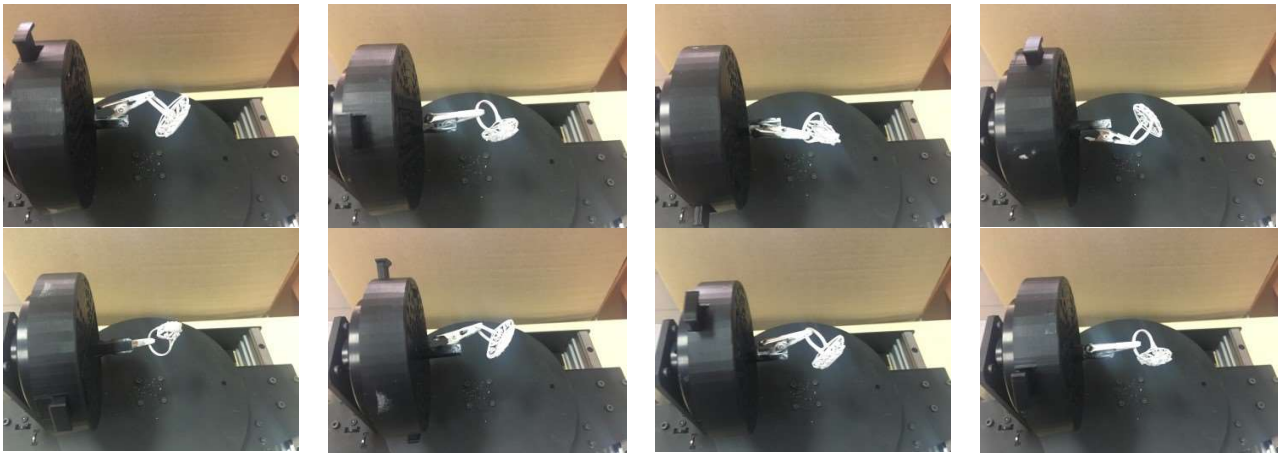
Manual controls can be used for testing or other purposs as needed.

Basic terminology and principles of work

The D3D-s scanner rotary table with two rotation axes. The horizontal rotation is limited from 0 to 180 degrees. The vertical rotation is unlimited.
When you specify the number of horizontal turns in software, you specify how many times the scanner will rotate the horizontal table during measurement. For example, the images below show three horizontal rotations.

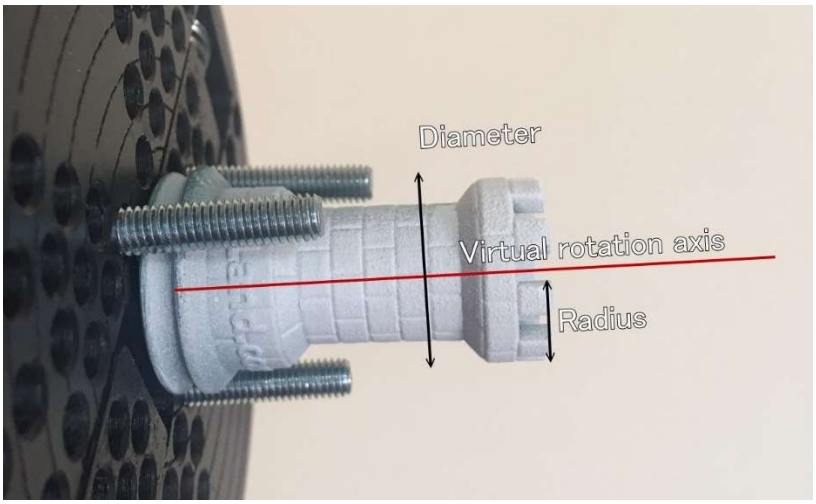
The vertical rotations in software corresponds to the table positioned vertically. If you specify “N” vertical rotations then the program take measurements every 360/N degrees. For example, if you specify 8 vertical rotations then the scanner will make 8 scans and rotate the vertical table 45 degrees (360/8=45) for each scan as shown below.



Software Scanning Operation

Diameter

This software parameter specifies the object extension relative to the mount's rotation axis, or mount center (not the center of the part). To measure this value take the imaginary rotation axis of the mount and find the point on the object furtherest away from this rotation axis. In this way, you can get the radius of the object relative to the rotation axis. Then multiply this value by 2 to get the *diameter*.



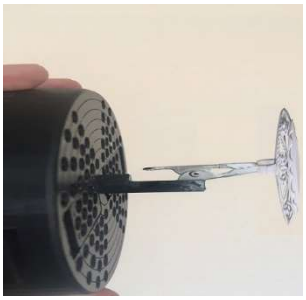
Suppose you have an object that doesn't have symmetry according to the rotation axis. In this case, you do the same, find the farthest point, and measure the distance to the rotation axis as shown below.

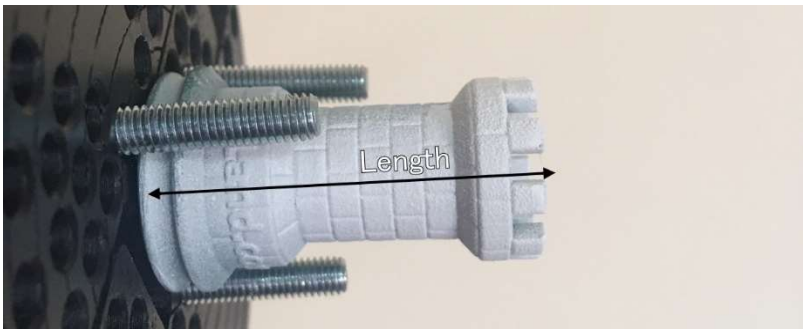
Put the object as close as possible to the rotation axis. This will significantly reduce the scanning time. For example –

Worst

Better

Best





The length software parameter specifies the length of the object along the rotation axis. You can specify only part of the object that you want to scan by selecting a shorter length value.

Automatic search for an object location

By default, the D3D software automatically searches for the object's extension after the start of measurement. The scanner moves from right to left by 1 mm and when the brightness in the camera exceeds a certain threshold the program assumes that to be the most right point of the object. If you have bright or shiny objects in front of the camera it can cause incorrect results.

Focus depth(Scanning depth)

To understand this setting, imagine a robot peeling oranges. You may use a tiny knife to remove only a small layer of the skin or you can use a bigger knife to slice through the orange. A small knife can achieve the same results as a big knife, but you need to repeat the operation many times.

In the same way, the optical head has the working depth that depends on a resolution that you specify. By selecting resolution you select the size of the knife. By specifying **Focus depth** you select how many times the scanner should slice through the same area but deeper each time. For example, if you select 12 mm Focus depth and you have an object size less than 12 mm you get results in one scan. But if you have a 20 mm object, the scanner will make two scans of the same area but with different depths. Suppose you don't need to dig so deep into the object and you need to scan the only surface - how to speed up the process and tell the scanner to scan only a surface? If you specify the Focus depth about 10mm for the 20mm object size then the scanner will scan the surface only once.

If you don't understand this explanation then use this rule – use the minimum value for the focus depth, like 10mm. If you see missing parts, then try to increase it. You should not specify this value more than the diameter. If you aren't sure and have a lot of time, you can specify the focus depth equal to the diameter. In this case, the scanner will get all the data possible.

Resolution

This value represents what resolution you get with the final results. Higher resolutions requires more processing time, storage space, and storage saving time. If you have a slow hard drive, large resolution files can slow down the process. Also, high-resolution files require more processing time for alignment in MeshLab and post-processing for a final mesh. We recommend using **High** resolution for everyday use and small objects. The **Maximum** resolution is useful for objects that have high detail. **Normal** resolution can be useful if you have a very large object and don't want to wait and don't need a lot of details. The normal mode corresponds to most other scanners that on the market. The **Low** mode is useful if you need to check your settings.

Project name

To save the scanning results the program use the following information to build the path –

C:\Users\name\Documents\3Dscans\Project Nmae

C:\Users\name\Documents\3Dscans\ - path that you specify in settings

Project Name – that you specify

The program will create files inside this folder by adding a counter to duplicate project names –

Ring1.mlp – MeshLab file that includes information about all scanned slices located in .stl files
Points1.stl
Points2.stl
…
PointsN.stl - the .stl files that you can open in any program

If you run the scanning process once again and don't change the project name, the program will increase the counter digit for the project and STL files.

Warming up

To get best possible results, the scanner warms up the light projector before calibration and measurements. This ensures scanning is done at the same temperature conditions. This can take time. This don't worry about small delays at the beginning of calibration and measurements.
If the delay takes longer than 10 minutes, it can be related to problems with hardware or software. If this happens, please turn off the scanner and close the program. Then restart after about 15 minutes. Press the "Get temperature" button on the settings tab and report this information to support. Over heating is dangerous for the optics so be careful.

How properly restart the scanner

The scanner includes sensitive components after you turn off the scanner please wait 7 seconds before turning on again.