Next Engine 3D scanner: Instructions for use

1. Set up your object on the scanner.
2. Start the ScanStudio HD software.
3. If using the dual turntable (a.k.a. the MultiDrive) Go to Align>Calibrate MultiDrive. Allow the unit to calibrate. If just using the single turntable, skip and go to step 4.
4. Click the "Start a scan" button.
5. Go to Scan>Settings… If you don't need textures, select "Turn off texture capture" (this will save time). Also, select "Disable scan-time auto alignment" as you have already done this manually in step 3 (again to save time). As long as you don't reorient the model, you are fine (if you do realign, you will need to re-calibrate as in step 3).
6. Confirm that your object fits within the view of the camera throughout its 360 rotation and that it is within the focal range outlined in the preview. Use the rotation buttons at the top to manually rotate the axis throughout its full range of movement. Get the object as centered as possible. If it doesn't completely fit during all stages of rotation, you may need to switch from macro to wide view.
7. Under the Scan Family heading, select family "A". Set the required settings i.e.
   a. Positioning: 360
   b. Divisions: 6
   c. Start: 0
   d. Tilt: 0
8. Adjust additional families as necessary. Make sure the radio button is on for all the families you want to capture
9. Set your points/in2. Note that the highest quality setting doesn't provide that much more detail, but takes considerably longer and requires more memory. I would keep the setting in the middle of the highest quality unless your subject is very small and will really benefit from the additional points captured at highest quality.
10. Target can be left at Neutral in most cases
11. If your subject doesn't require the full screen, consider cropping the capture area by left-clicking and dragging in the preview window. Make sure this doesn't crop your object throughout the extents of its movements!
12. Click on "Start" when ready to start scanning.

After scanning…

1. **Align**: (ensures that scans taken from different perspectives are aligned properly).
   a. Expand the scan family. Pull out all scans but one. Click on "Align".

b. Pick 3 points for aligning on both your reference scan (on the left and one of the rest of the scans shown on the right. Click "attach scans". Take a look at the tolerance value at the top of the screen. It should read no more than 0.005" if its greater than that, try running the "Refine" option at the top. If that doesn't help, then consider using other scans for reference.

c. If you are using the MultiDrive and plan on reorienting your object to scan from all sides, you won't be able to align scans from separate scan families if your object has been reoriented on the turntable. It's easiest to break this down into discrete scanning files. You can still register within each family, but registration of different orientations is best done in Geomagic.

2. **Polish**: (removes any small fragments due to scanning artifacts).
    a. Go to the "Polish" menu and select Auto Trim. Choose "Selected scan family". This will trim away any really small faces that clearly aren't part of the subject. Click "Apply" to run this command.

3. **Fill Holes**: (fills holes)
    a. This command will allow you to fill holes. I really prefer doing this in Geomagic.

4. **Trim**: (manually deletes unwanted/unnecessary data)
    a. Click on Trim. Select the appropriate brush at the top and trim away any unwanted areas. Don't get overzealous here as this is one area where ScanStudio often crashes. I actually prefer doing this cleanup downstream in Geomagic.

5. **Fuse**: (stitches all scans together into one mesh)
    a. If you don't want ScanStudio to close off areas, go to Fuse>Volume Merge Scans instead. This is what I recommend in most cases, especially if you plan on registration of multiple families within ScanStudio or later on in Geomagic.
    b. If you are looking for an enclosed result, you can choose "Fuse". This will close off areas that were not visible during scanning. For a simple subject with a flat surface occluded from the scanner (i.e. a toy soldier sitting on its flat base), the base will be sealed if you use "Fuse".
    c. If you are using the MultiDrive and do not plan on re-orienting you object, then Fuse will be fine. If you do anticipate needing to reorient your object for a more 360 degree scan, use Volume Merge

6. **Output**: (exports your mesh)
    a. Click on Output and select a format. There is no geometric difference between STL, PLY and OBJ formats. They all export triangulated meshes. The main differences between the three are listed as follows:

      i. STL: The most universal format. Requires the least amount of drive space. No color information is included in an STL; on Geometry. Unless I need color information, this is the format I use.

     ii. OBJ: Includes color information by associating the mesh with a series of image files which are created when you export. These image files must accompany the OBJ downstream if you want the images to be preserved later on

   iii. PLY: (you will see this option if you click on "More"). Includes color information within the file itself, meaning there are no additional external image files. Color is mapped onto the mesh vertices using a red, green and blue value for each vertex.

b. Regardless of the format, always choose "Binary" when exporting (ASCII takes up more space with no added benefit). Also, at the "Save as…" dialogue, make sure "Save finished scans only (Green)" and "Save as a Single File" is checked.