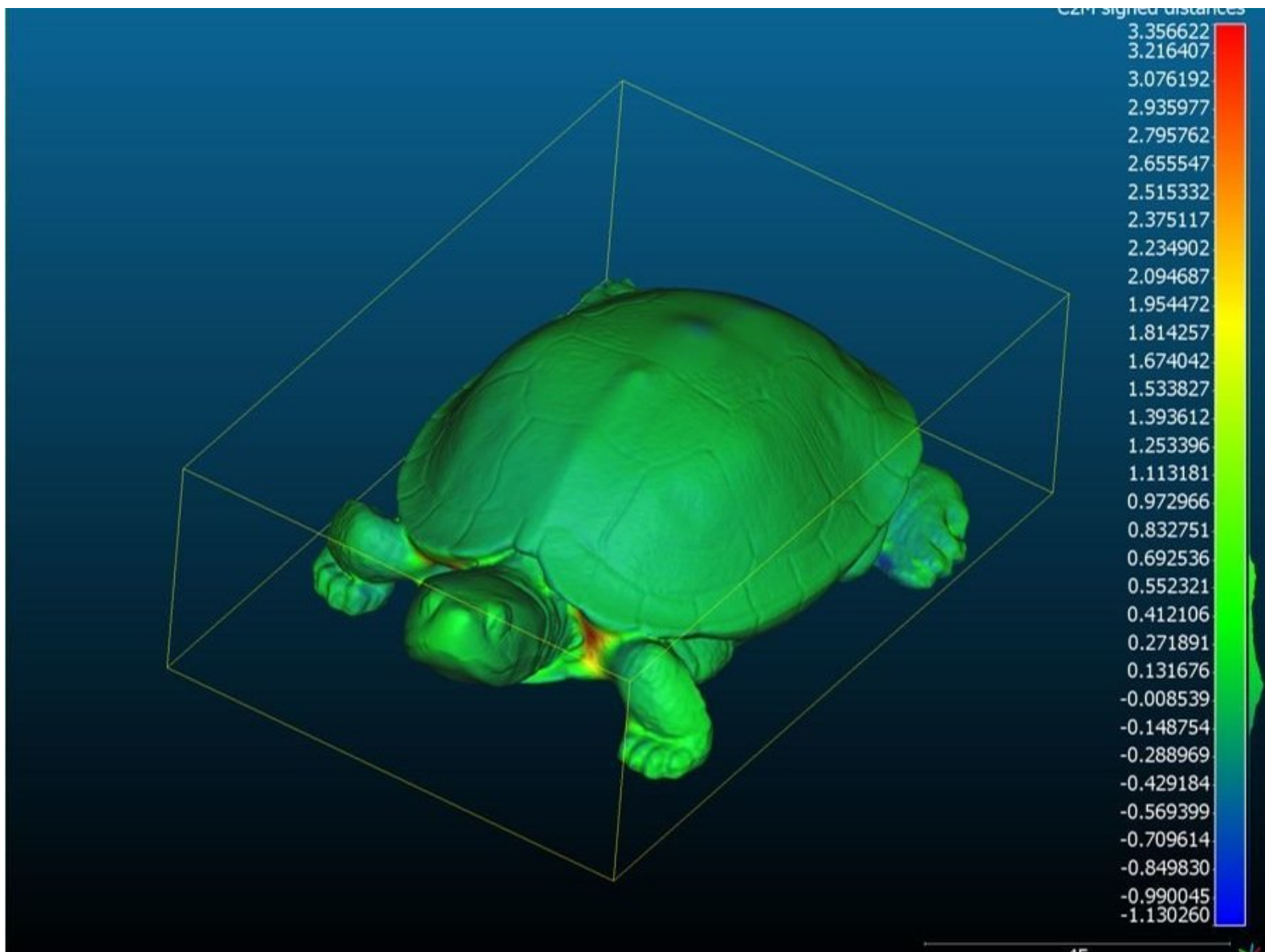




# Parts Comparison

The tutorial explains how to perform a comparison between 2 scan results or between the scan result and a CAD model.

**Written By: Martinus Arie**

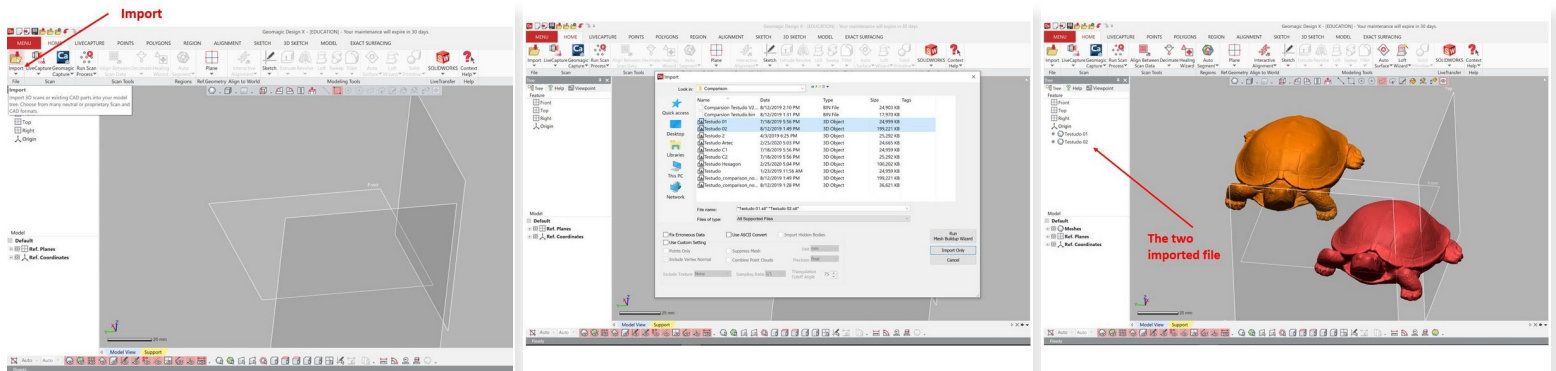


## Step 1 — Introduction



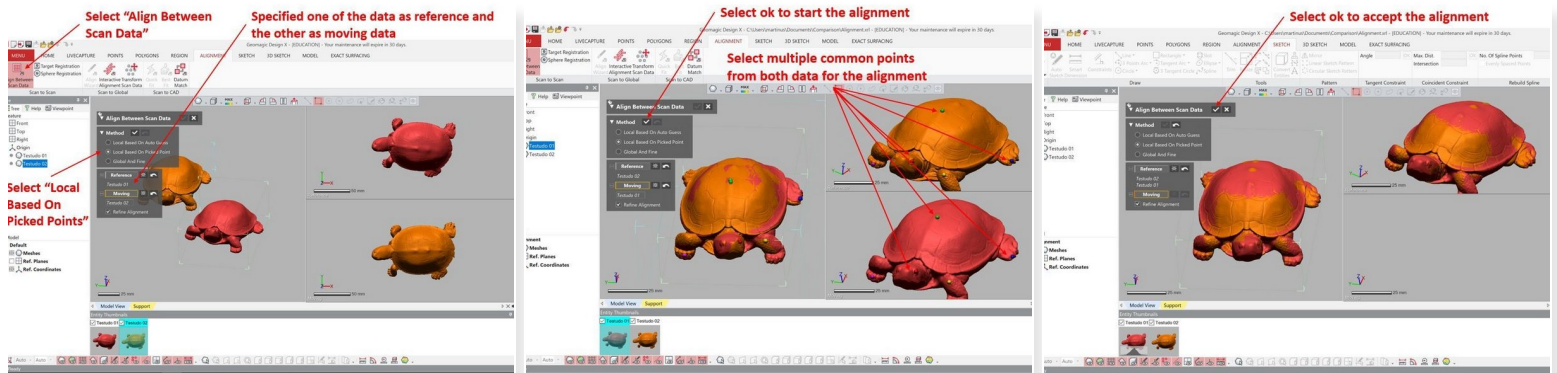
- This tutorial explains how to perform a comparison between two scan results or between a scan results and a CAD model
- To perform the comparison, the scan results need to be exported as **an .stl file** (Please refer to the beginning tutorial for each scanner for instruction on how to export the scan results)
- For the case of comparison with the CAD model, the CAD model also needs to be exported as **an .stl file**
- For the comparison, two software are used:
  - **Geomagic Design X** is used for aligning the two .stl files
  - **CloudCompare** is used for comparison between the two align files
- Geomagic Design X software is available in the scanner desktop and laptop
- CloudCompare software can be download for free from the internet

## Step 2 — Geomagic Design X – Importing the file



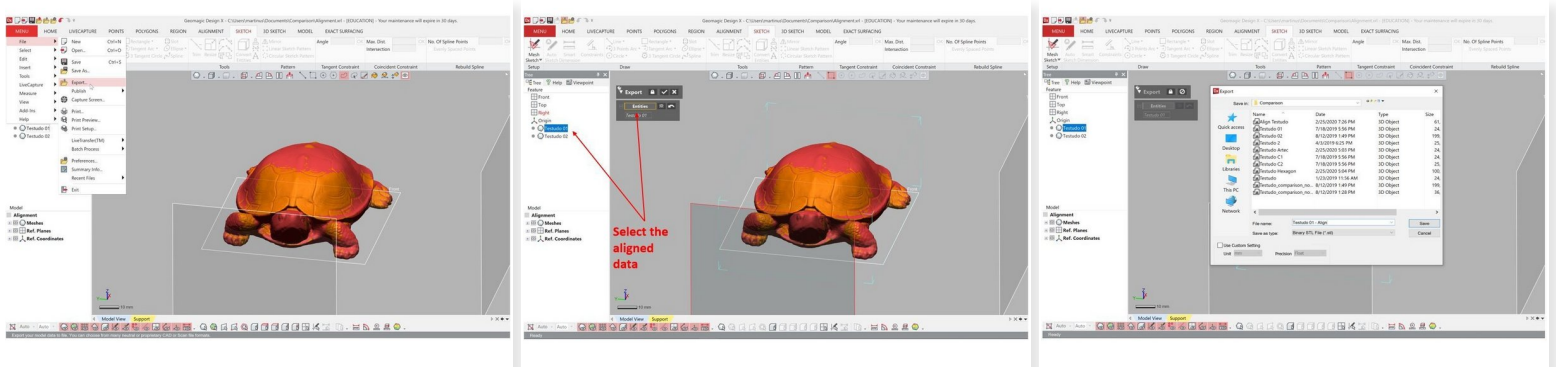
- The first step is to use **Geomagic Design X** software for aligning the two .stl files
- You can import the .stl files by using the **Import** feature under **Home** as shown in [the first figure](#)
- Select both .stl files and select **Import Only** as shown in [the second figure](#)
- The two imported data files are shown in the top left window as shown in [the third figure](#)

## Step 3 — Geomagic Design X – Data Alignment



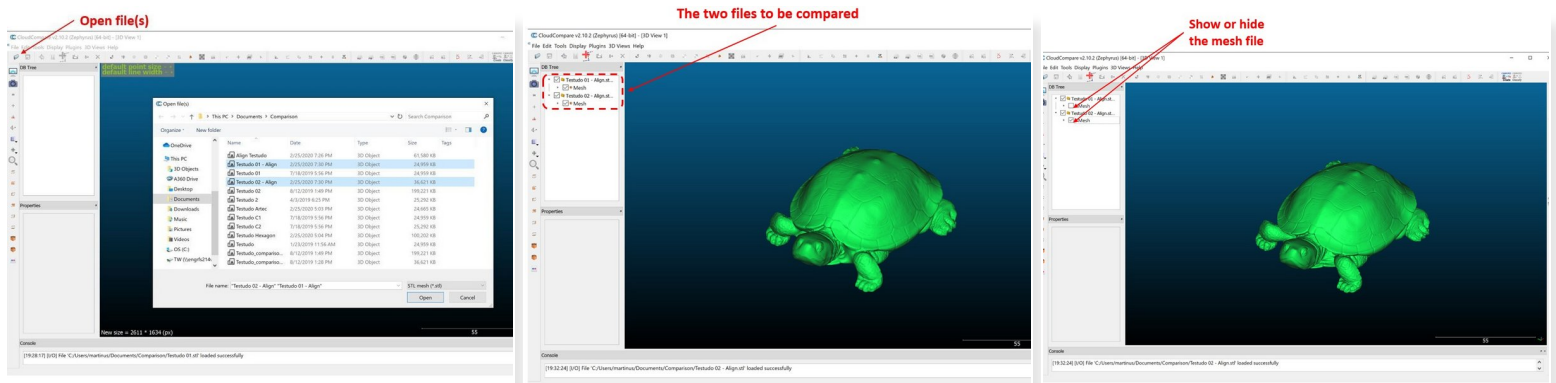
- Select **Align Between Scan Data** under **Alignment** to start the alignment process (See [the first figure](#))
- For the alignment method, select **Local Based on Picked Points**
- Specify one of the data as reference and the other as moving data
- Select multiple common points from both data for the alignment as shown in [the second figure](#)
- Select **Ok** (Under method) to start the alignment (See [the second figure](#))
- Checked the alignment result to make sure that they are well aligned. Otherwise, repeat the process by adding more reference points
- Select **Ok** (Under Align Between Scan Data) to accept the alignment (See [the third figure](#))

## Step 4 — Geomagic Design X – Exporting the Align File



- The aligned data need to be imported back into .stl file by using the **Export** feature under **Menu > File > Export** (See [the first figure](#))
- Select the aligned data. You need to export the data one by one, so only select one of the data (See [the second figure](#))
- Select .stl as the output file type (See [the third figure](#))
- Repeat the process for the second file

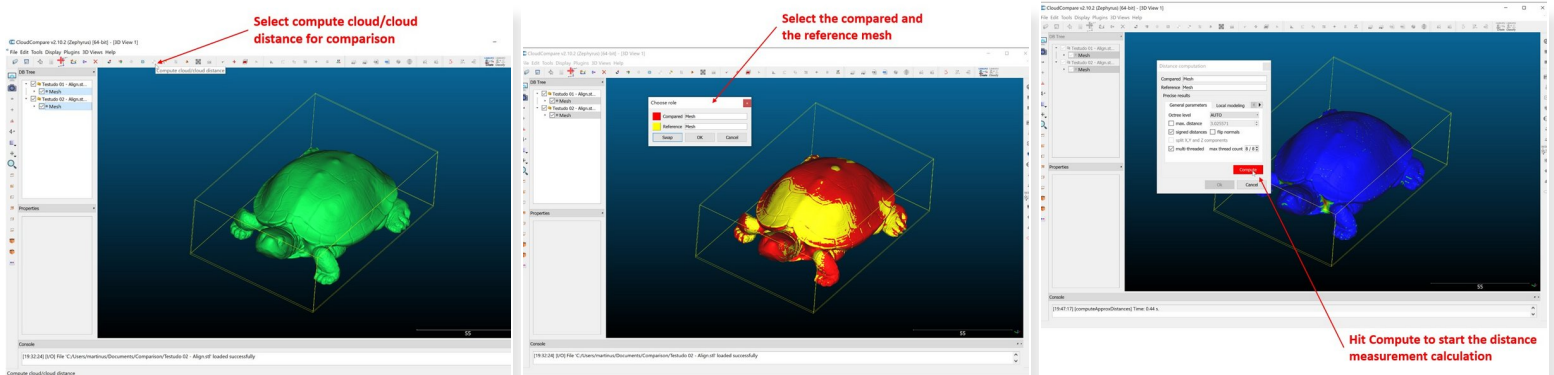
## Step 5 — CloudCompare – Importing the file



- Run the CloudCompare software to start the part comparison
- Run **Open File(s)** to import the aligned .stl files (See [the first figure](#))
- The two files you want to compare are shown in the top left window (See [the second figure](#))
- You can show or hide one or both files by checking or unchecking the mesh as shown in [the third figure](#)

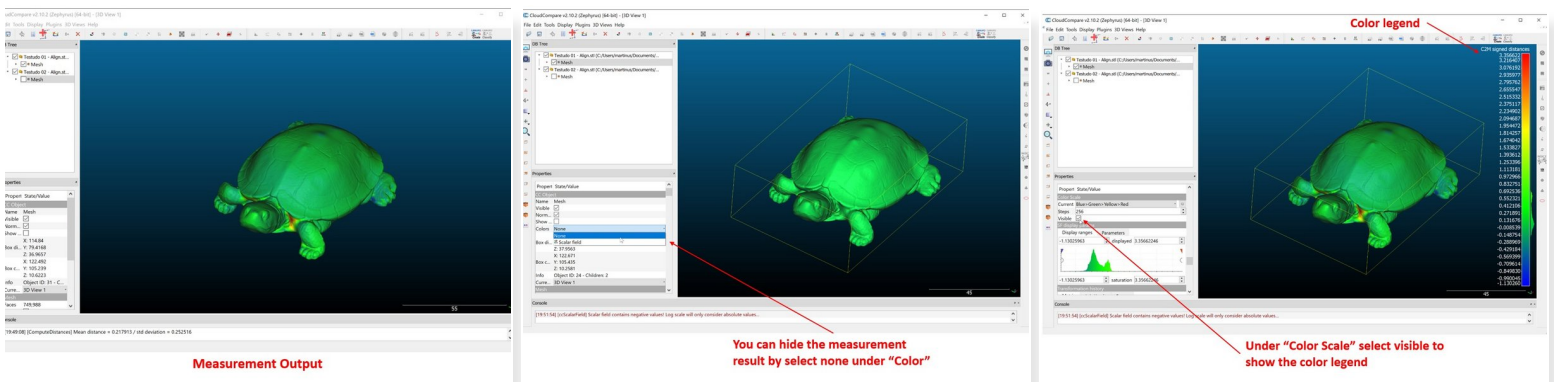


## Step 6 — CloudCompare – Parts Comparison



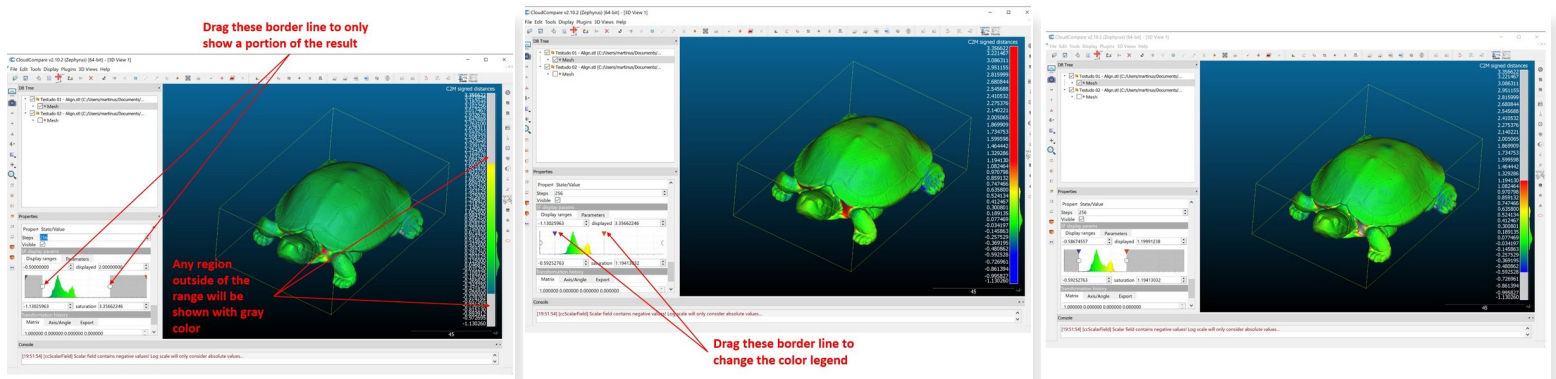
- Select **compute cloud/cloud distance** to start the comparison process as shown in the first figure
- Select one of the mesh files as the compared mesh and the other as the reference mesh as shown in the second figure
- Hit **Compute** to start the distance measurement calculation as shown in the third figure

## Step 7 — CloudCompare – Analyzing the Comparison Results (Part 1)



- The measurement result is shown in the first figure as the distance difference between the two mesh
- You can hide the measurement result by select none under **Color** (Under the compare mesh file) as shown in the second figure
- To show the color legend select visible under **Color Scale** as shown in the third figure

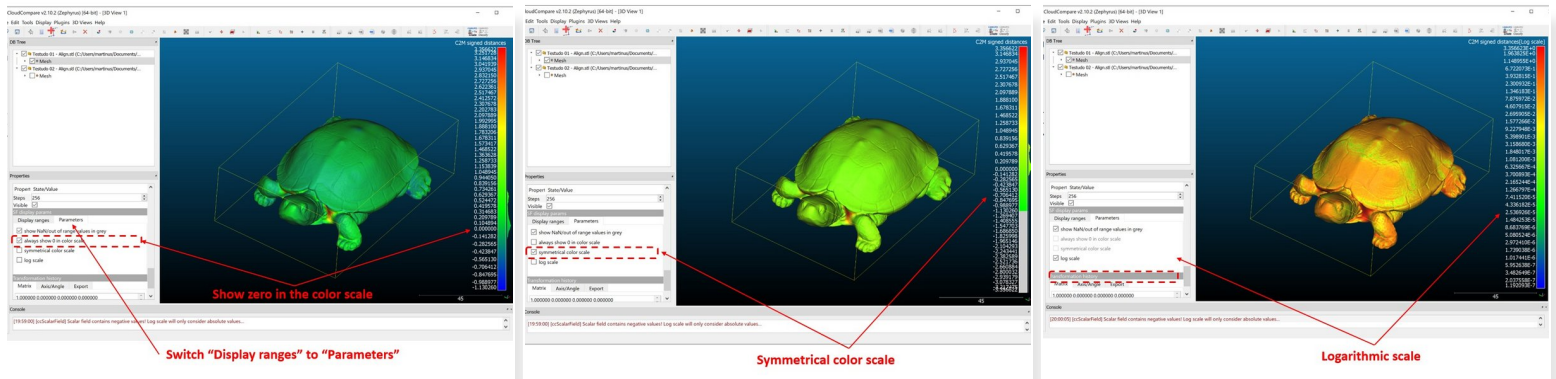
## Step 8 — CloudCompare – Analyzing the Comparison Results (Part 2)



- You can drag the borderline (*The one with circular symbol*) to only show a portion of the result as shown in the first figure
  - The region outside of the range will be shown with gray color
- You can drag the borderline (*The one with red and blue triangle symbol*) to change the color legend as shown in the second figure
  - The region outside of the range will be shown with either red or blue color
- You can also drag both borderlines at the same time as shown in the third figure

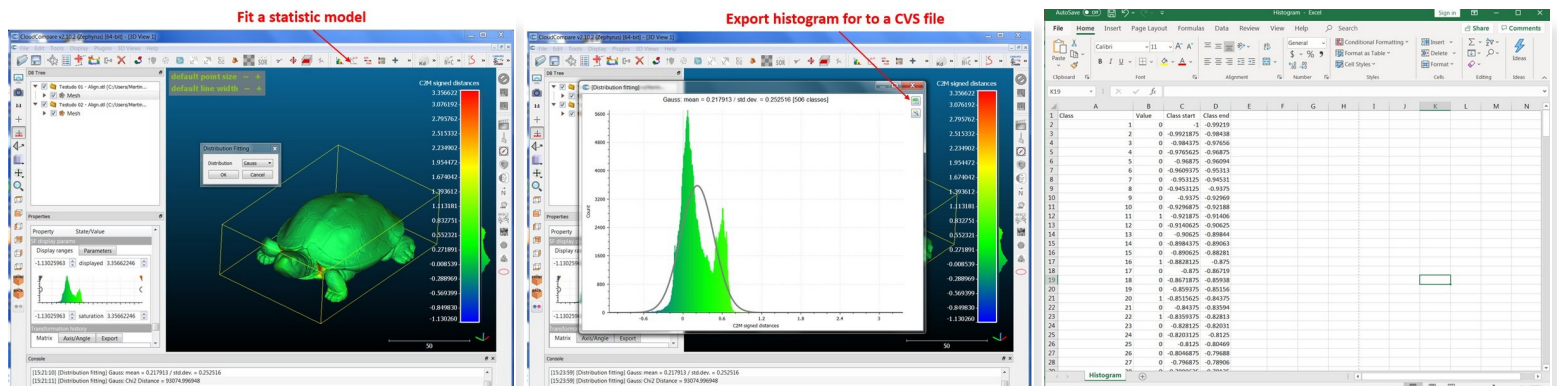


## Step 9 — CloudCompare – Analyzing the Comparison Results (Part 3)



- Under SF display params, switch **Display ranges** to **Parameters** (See [the first figure](#))
  - Select always show 0 in color scale to show zero in the color scale as shown in [the first figure](#)
  - Select symmetrical color scale to have a symmetrical color scale in both positive and negative distance as shown in [the second figure](#)
  - Select logarithmic scale to have a symmetrical color scale in both positive and negative distance as shown in [the second figure](#)

## Step 10 — CloudCompare – Quantify the Difference



- In CloudCompare, you can quantify the difference between the two scans
- On the top window, select **Fit a statistic model** (See *the first figure*)
- A plot showing the distribution of the difference between the two scans will pop up as shown in *the second figure*
- In addition to the distribution, the plot also showed the **Mean** and **Standard Deviation**
- You can also export the histogram for to a CVS file (Excel file) as shown in *the third figure*

Congratulation you have learned the skill to perform a comparison between two scan results or between scan result and the CAD model