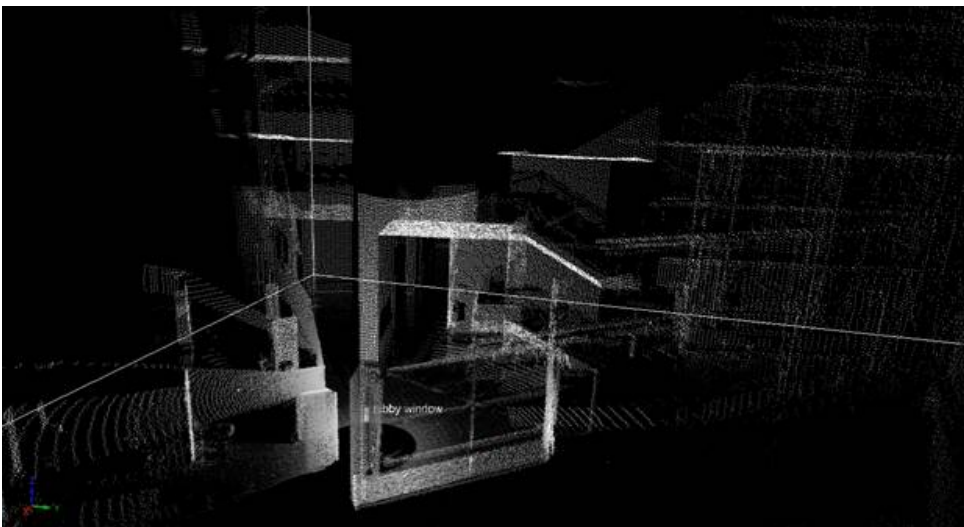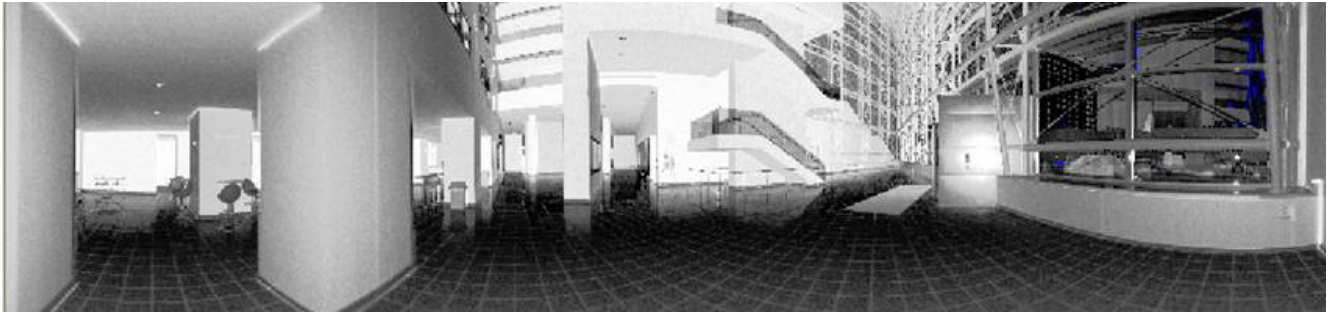Process data in RiSCAN and Geomagic

Now you have all of your scans completed and the project open in RiSCAN PRO. You can now view each scan. You have a choice to either view a 2D panorama or a 3D point cloud views. Both default to showing laser reflected intensity in grayscale; this allows you to get a black and white image which can help when identifying objects.


These two images are of the same scan data to show the variety of information available from each view.

We are now going to combine two scans into a single coordinate system so we can later combine them into a single point cloud that contains information from both points of view. To accomplish this we must identify each of the reflectors on both scans so the software can calculate the relation between the coordinate systems. We can then import the scans with the global coordinate system in Geomagic where they can be combined into a single point cloud. In Geomagic we then clean up any undesired points and create the surface model of the area scanned.

View your first scan in 2D and locate the first reflector. It will be an extra bright spot. Depending on the area you are scanning there may be many unintended reflectors (i.e. cars) that will also be visible, so you will need to select only the ones that you placed for this purpose. Zoom in on the reflector and create a tie point by Left clicking on it, this will place a small plus on the pixel, then Right clicking on the plus and selecting "Add point to TPL".
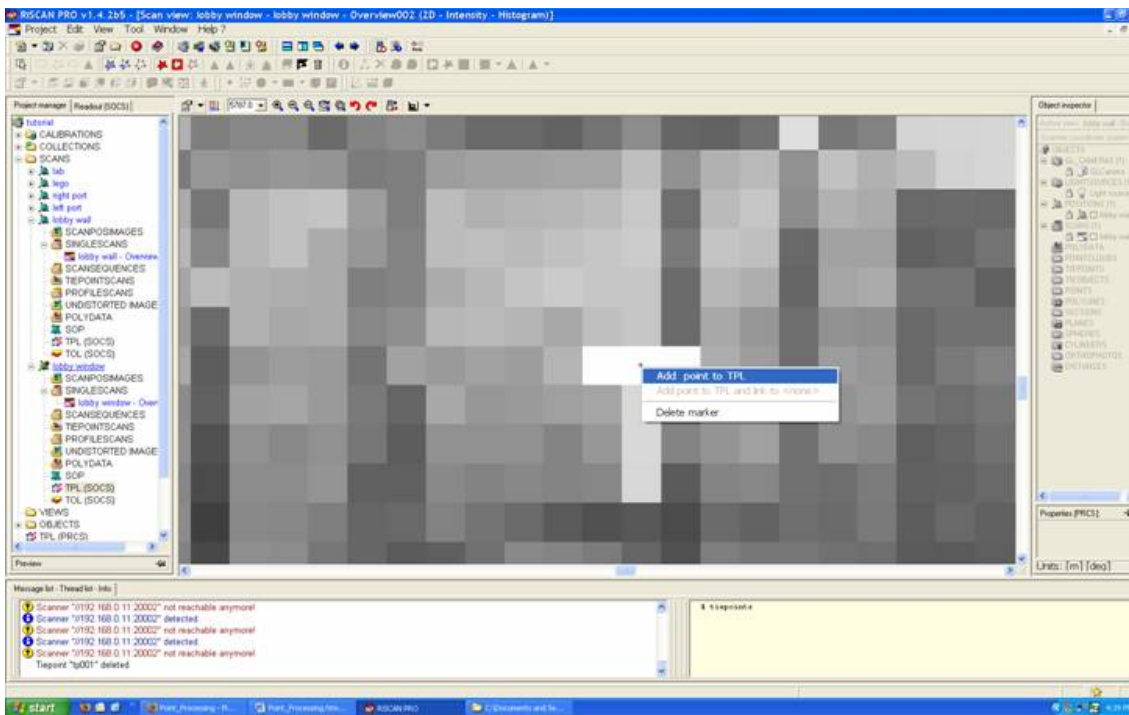
You can now select "TPL (SOCS)" for this scan from the tree at the left to see the tie point you created. Now add the remaining reflectors
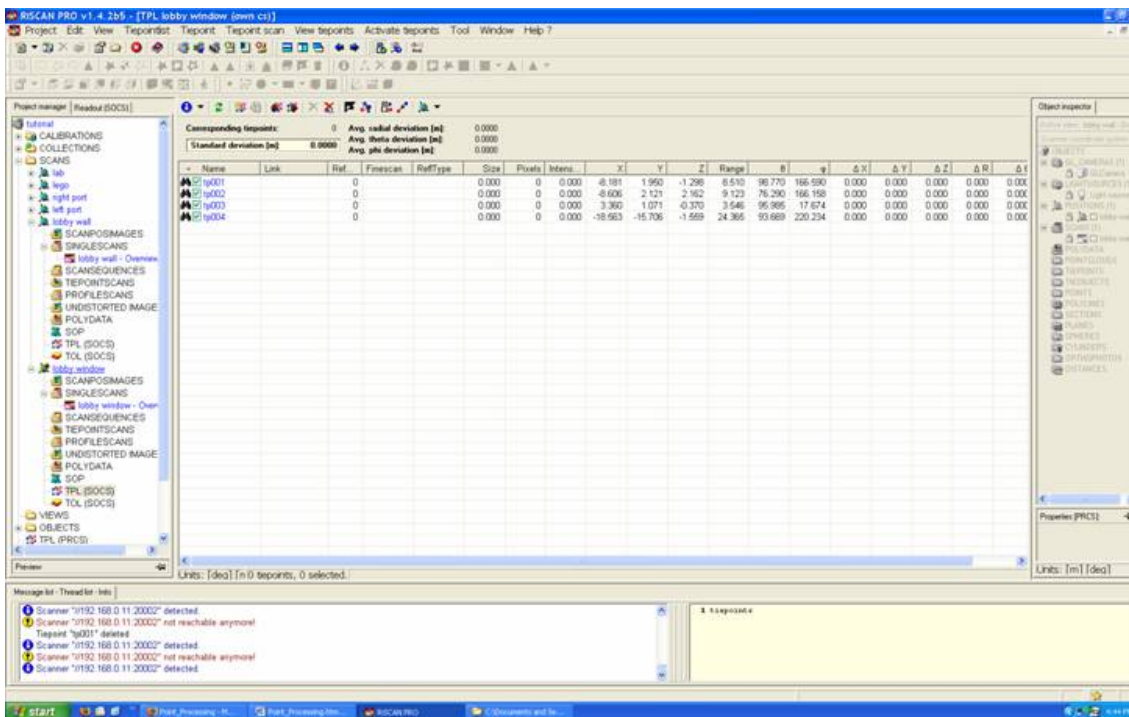

Now go to the second scan and select the same reflectors. You must give each reflector the same name on each scan or they will not be correlated correctly. One of the scans must now be selected to be the starting position, its coordinate system will be used as the world coordinate system; this is done by right clicking on it and selecting "Registered".
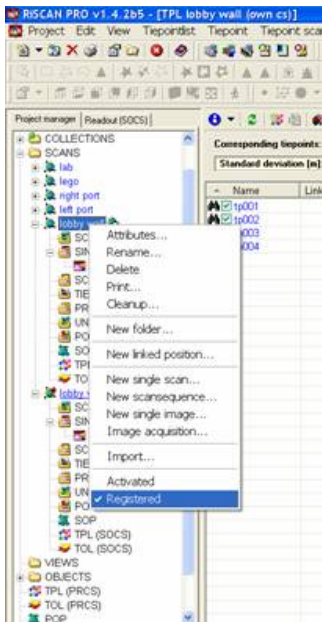
Now open the tie point list "TPL (SOCS)" of the scan that is not registered and click the icon for "Find corresponding points…"
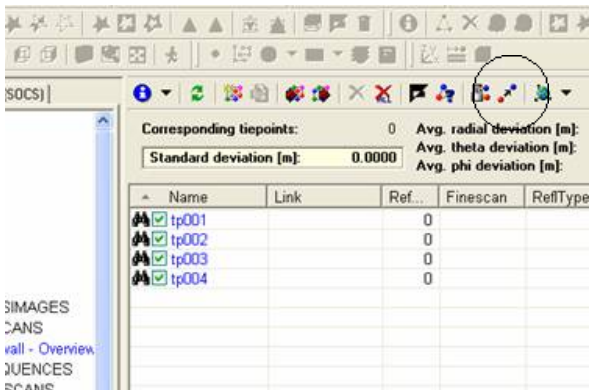
Move the check mark from "Project coordinate system" to the scan you just Registered and press start.
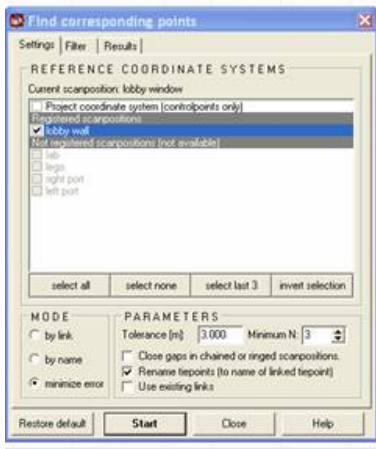
Depending on the quality of the solution that it finds you may have several possible solutions or not any. It will present the best solution first so it is ok to have more than one. If it does not find any solutions try increasing the tolerance value and recalculating.

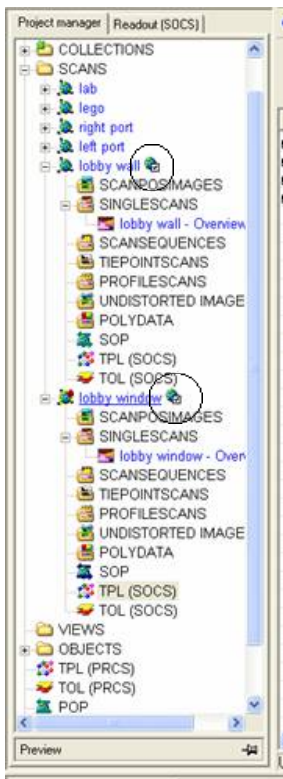**Find corresponding points**

Settings | Filter | Results

STATUS

State of calculation: Solution #1.

Number of corresponding points: 4

Standard deviation of residues: 0.3431

MATRIX

Calculated matrix:

-0.837226931	-0.546713778	-0.012454354	-23.607250860
0.546854548	-0.837053183	-0.017090115	3.344703150
-0.001081555	-0.021119024	0.999776384	-0.049363089
0.000000000	0.000000000	0.000000000	1.000000000

INFO

If you are satisfied with this solution, click on the button [Ok]. To calculate an other solution, click on the button [Next solution]. To cancel the computation, click on the button [Cancel].

Next solution | Ok | Cancel | Help

When you are satisfied with a solution, press ok. You will notice that there is now an icon in the tree next to the scan that indicates that it is registered.

Project manager | Readout (SOCS)

- COLLECTIONS
- SCANS
  - lab
  - lego
  - right port
  - left port
  - lobby wall
    - SCANPOSIMAGES
    - SINGLESCANS
      - lobby wall - Overview
    - SCANSEQUENCES
    - TIEPOINTSCANS
    - PROFILESCANS
    - UNDISTORTED IMAGE
    - POLYDATA
    - SOP
    - TPL (SOCS)
    - TOL (SOCS)
  - lobby window
    - SCANPOSIMAGES
    - SINGLESCANS
      - lobby window - Over
    - SCANSEQUENCES
    - TIEPOINTSCANS
    - PROFILESCANS
    - UNDISTORTED IMAGE
    - POLYDATA
    - SOP
    - TPL (SOCS)
    - TOL (SOCS)
- VIEWS
- OBJECTS
- TPL (PRCS)
- TOL (PRCS)
- POP

Preview

Now we are ready to export the data for later use in Geomagic. Right click on the scan and click export. Select Save as type "ASCII (*.*)" and name the file.
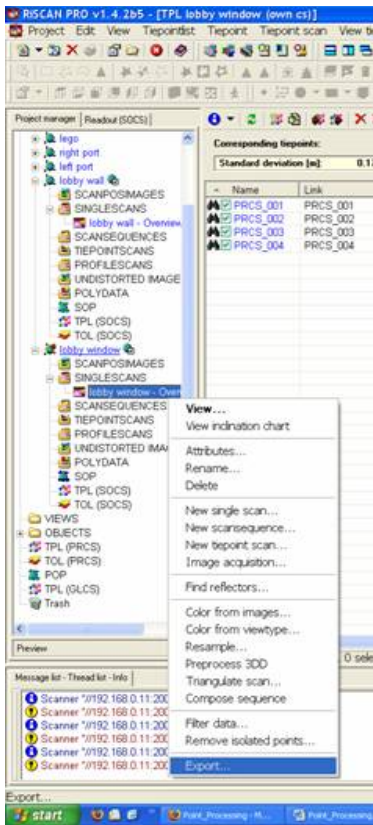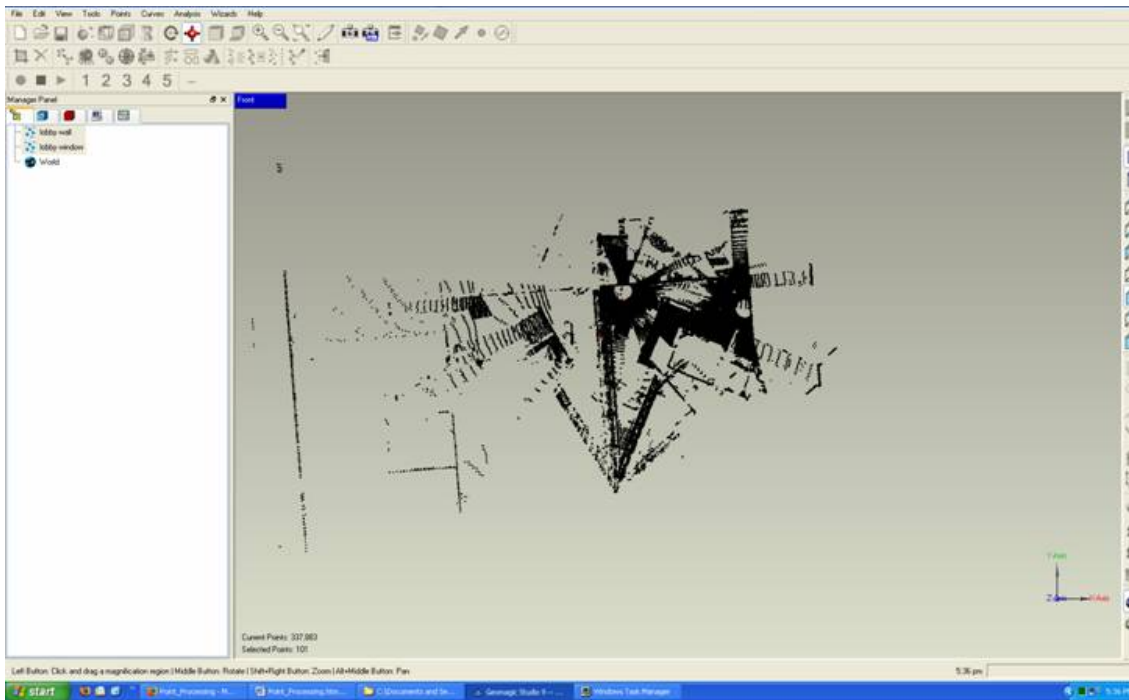
The default export settings are correct.

Repeat this for the second scan.

Now open Geomagic and import the scan data we just created. This is you first opportunity to view the combination of the scans, now is a good time to verify that RiSCAN found the correct alignment.

We can see here that the alignment looks good, as the shape are the space scanned is clear and the scanner locations, as indicated by the open circles, are correct. We also note that due to the large glass walls on the left and lower right sides of this image we have a significant reflection problem which we will confront later.

The features of Geomagic that I will use for this tutorial are largely wizard driven so I will not give you click by click instructions, but guide you on your way. First we will merge the two point clouds into a single point cloud for later operations.
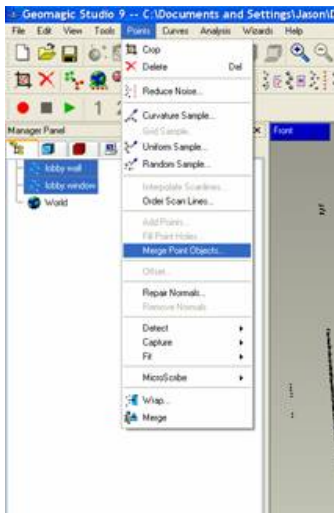

Now is a good time to clean up the points that are outside the area of interest or are known to be invalid. In this case I removed all the points outside the building. This is done by drawing a box round the points to select them, they will turn red, then press delete. If you select points you don't want to remove, hold down control and draw a box around the points you no longer want highlighted. Be wary of any reflective objects such as windows or polished floors, they can cause duplicates of objects. It is important at this stage to look closely at the data and compare it with the site to determine if there are any reflected objects and remove them.
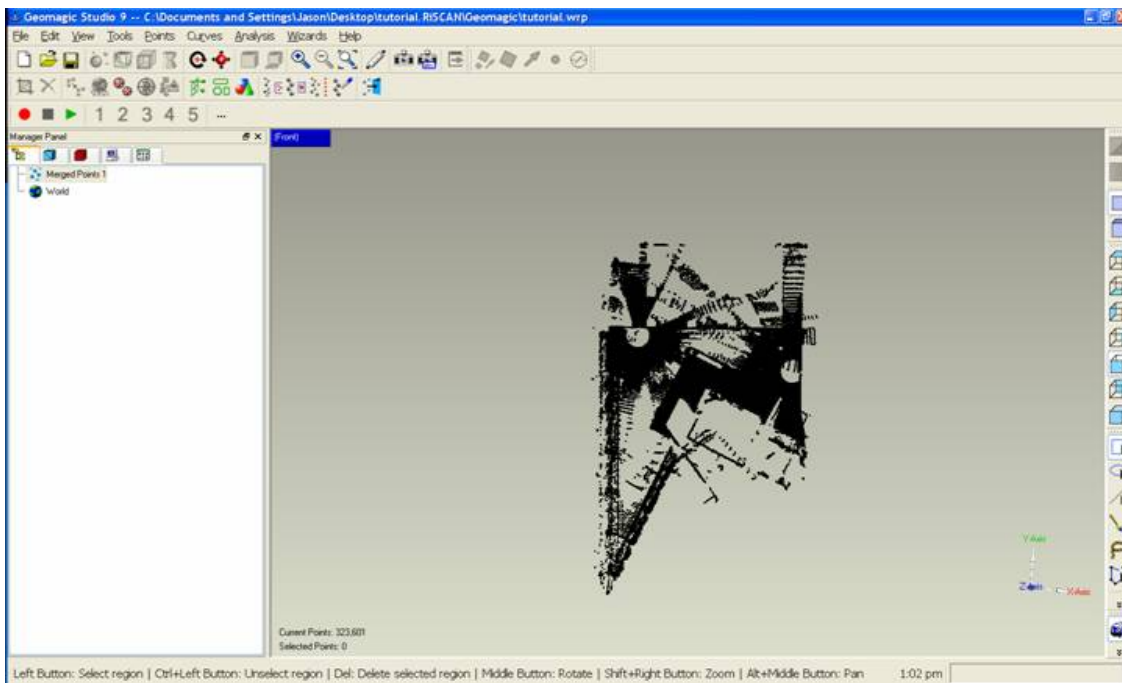
Now go into "Wizards" and select "Points to Polygons". Follow the wizard through the steps, just keep in mind that this software is designed for very high density point clouds, several million points on a 6 inch part, and we are working with ~300,000 pts over 10s of meters so use you judgment as to how to prune the point cloud. This is where you will need to decide what to do based on how you plan to use the result.
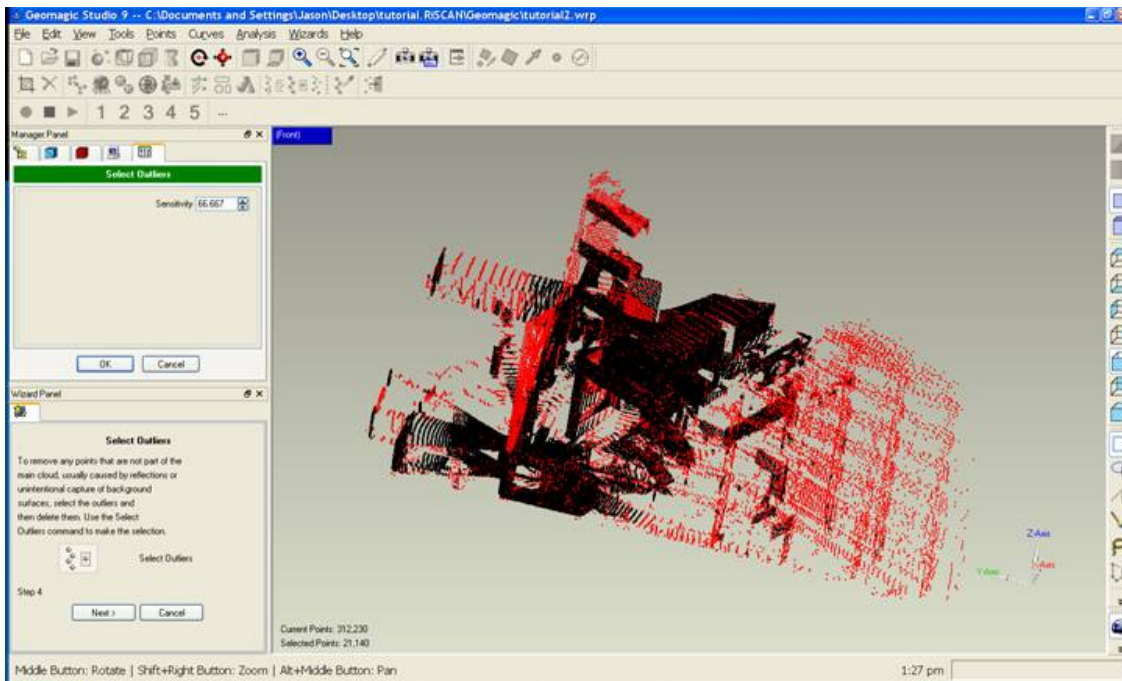

If you decide to remove the selected points you will be left with the surfaces that have a high concentration of points which in this case gives you the walls closest to the scanner locations.
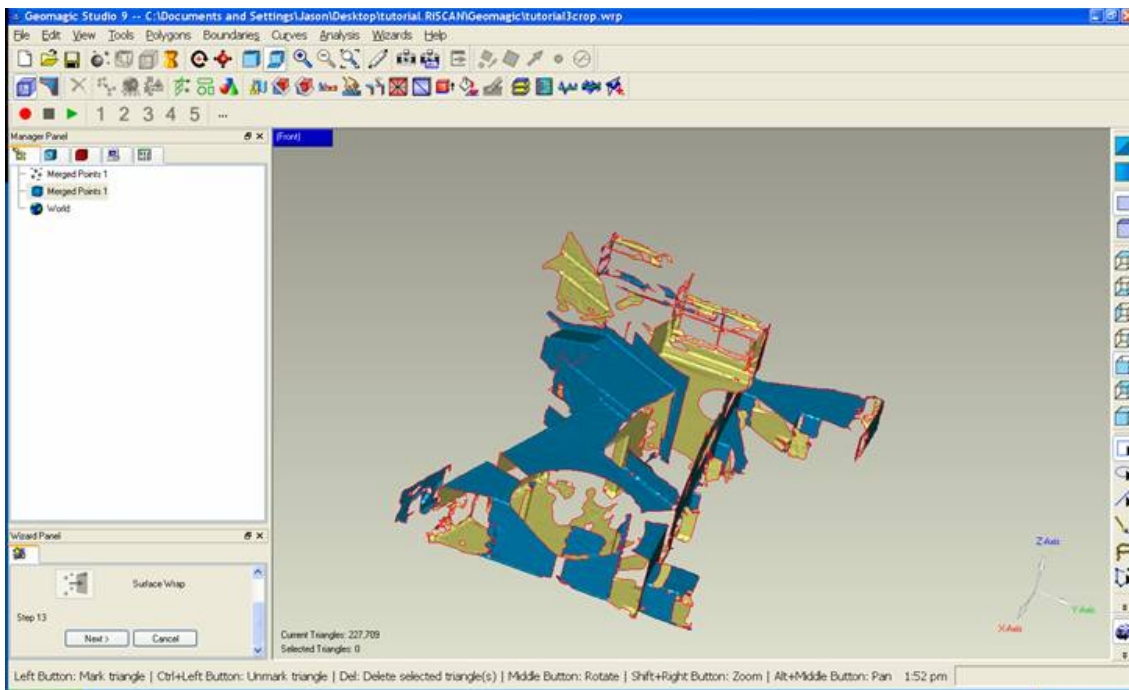
If in stead we decide to keep the selected points we keep the lower point density areas which are much more noisy. This will keep more of the shape of the entire building, but it is not as clean looking.
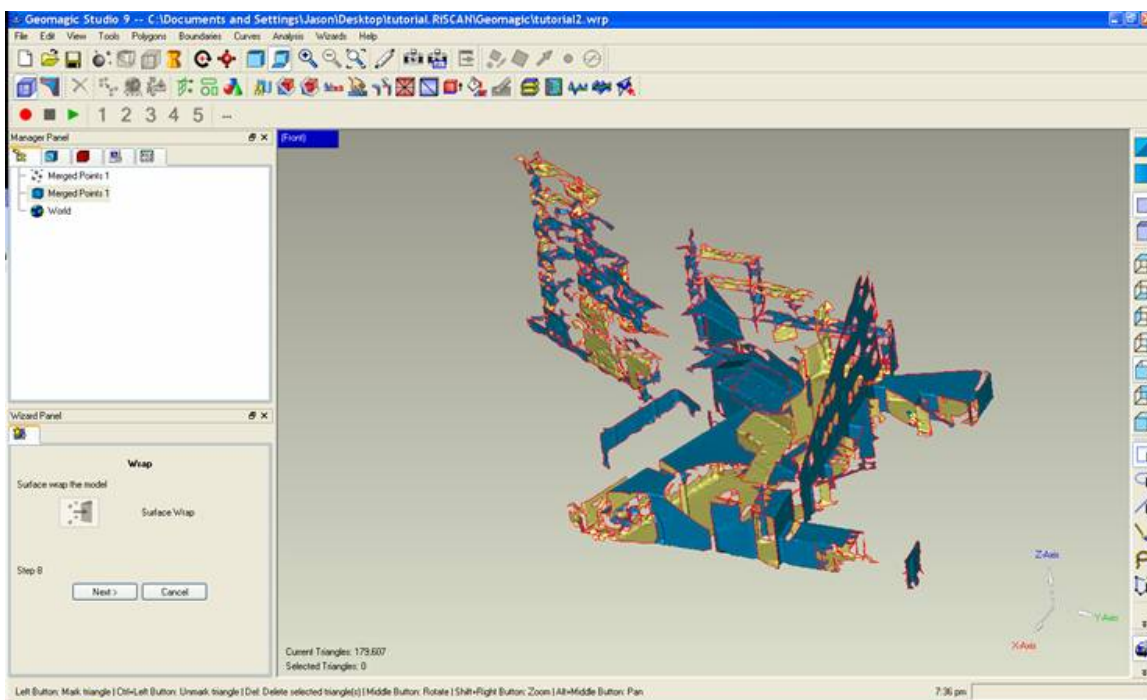
I will use the cut down version in later steps. Now it is time to do some touch up work on the model. There are a number of holes in the model that can be repaired. Go to "Polygons" and select "Fill Holes…"
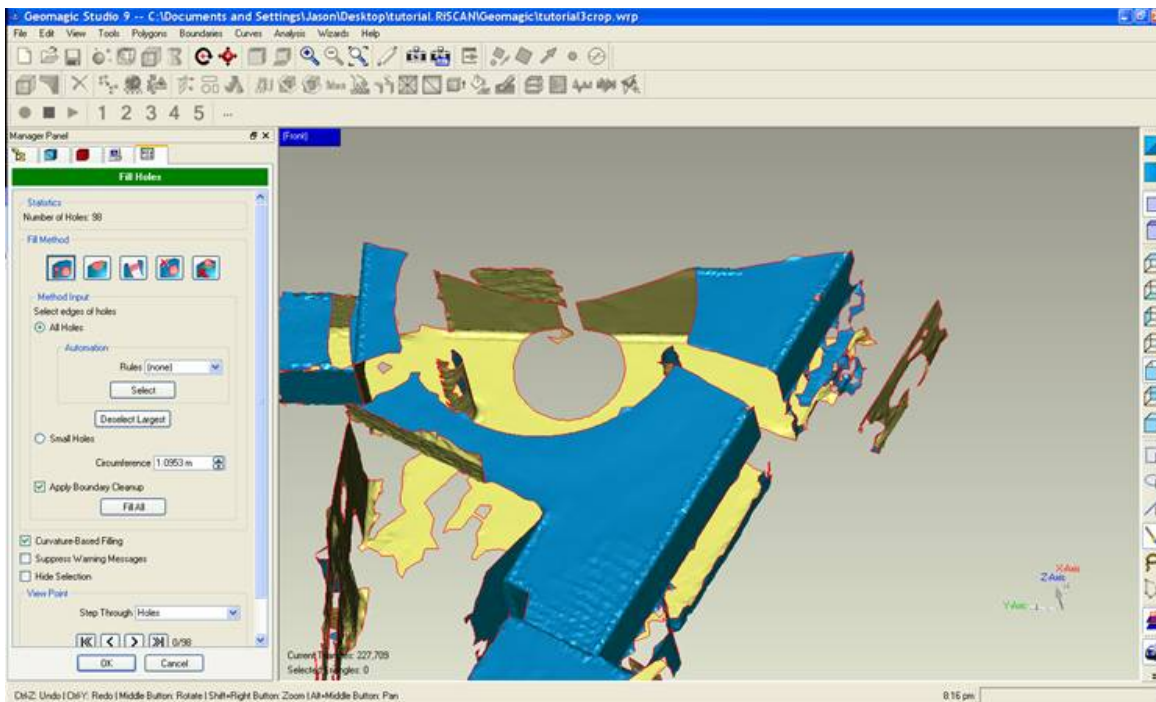
Select the Bridge command and select two points on a large or open sided hole to make a connection.
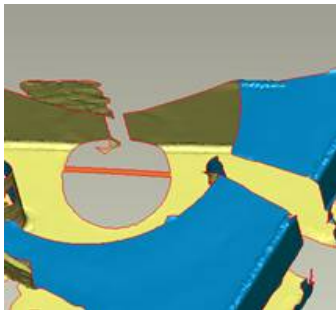
Then select fill and click the edge of the now enclosed hole.

Continue to fill holes until you are satisfied with the resulting model. There are a number of other features that you may find useful, but you can now explore them yourself. When you have finished working on the model you can export it as a VRML model.
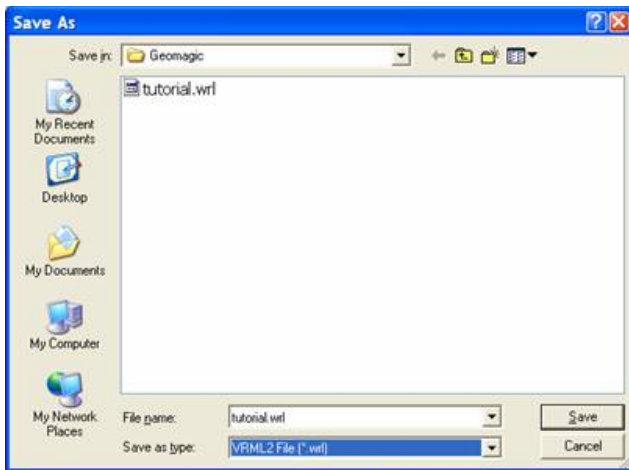
Congratulations you have created your first 3D surface model from laser scan data.