PointCab TUTORIALS

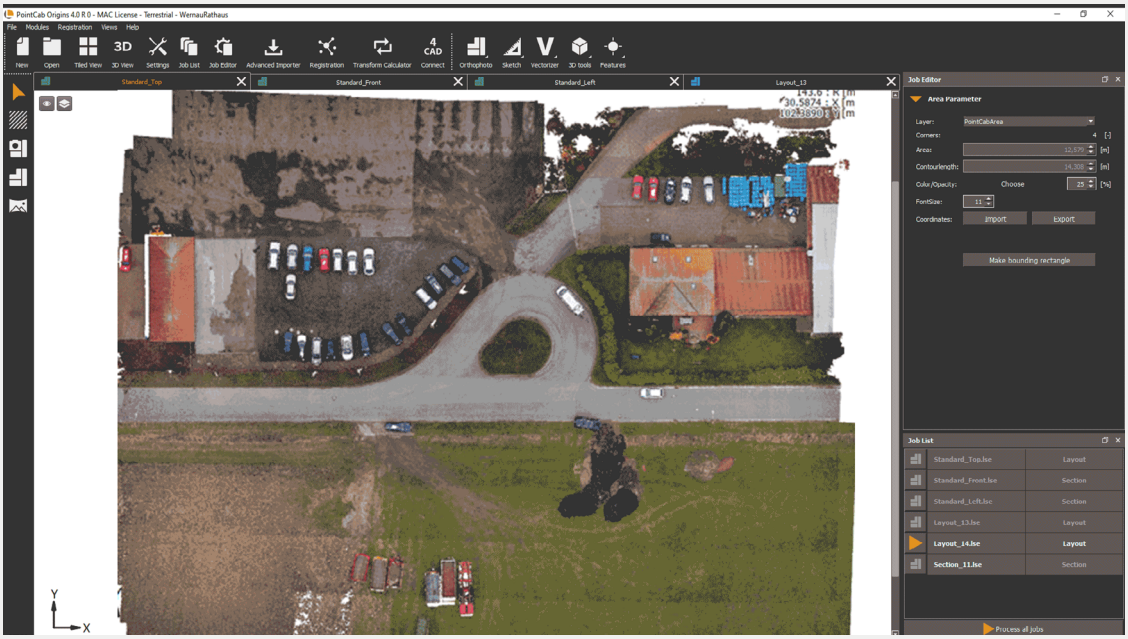
TRANSFORMATION CALCULATOR

Georeferencing - Using a drone project as example

Our task in this tutorial is to transfer our point cloud from a local coordinate system of the scanner into an external coordinate system - in this example ETRS89. Of course, you can also use other UTM variants. Our coordinate file contains points that were measured on the manhole covers with a GPS device before the scanning process. Then we scanned with a drone.

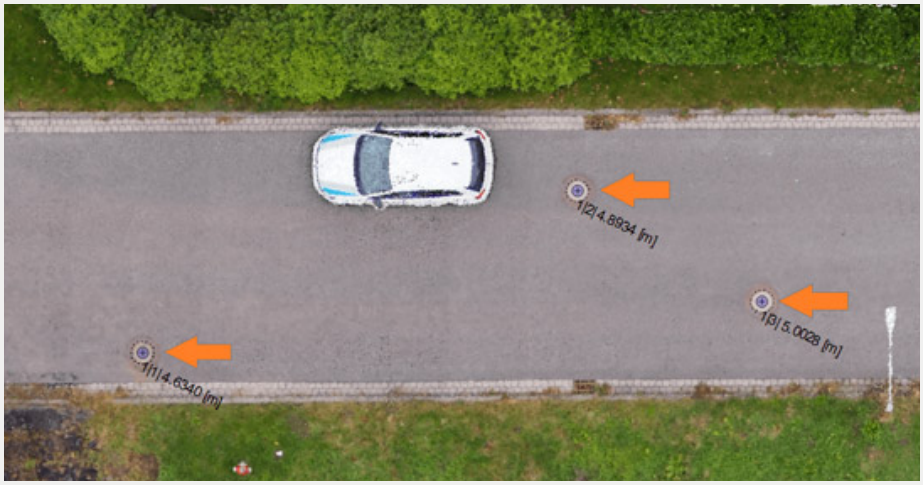
After we have processed the drone images in a specialised software and obtained a point cloud, we import the point cloud into PointCab for further processing. As always, PointCab calculates the three standard views automatically. We use a coloured point cloud in this project and set the standard views to process with colour information. This way we can better estimate where our GPS points are placed in the project.

This is our project after the import:



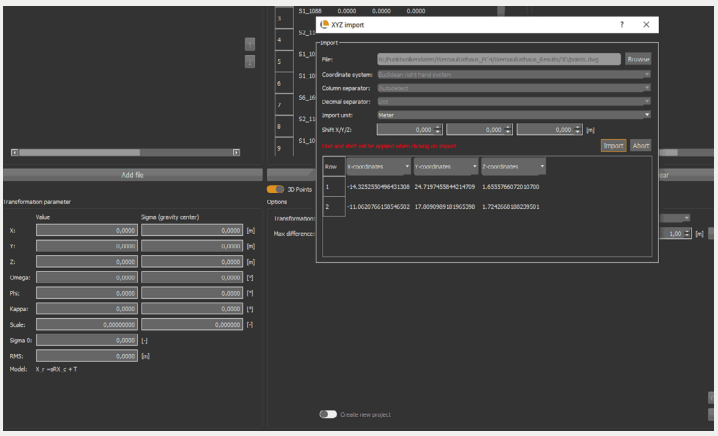
To transform the project into our external coordinate system, we will use the transformation calculator.

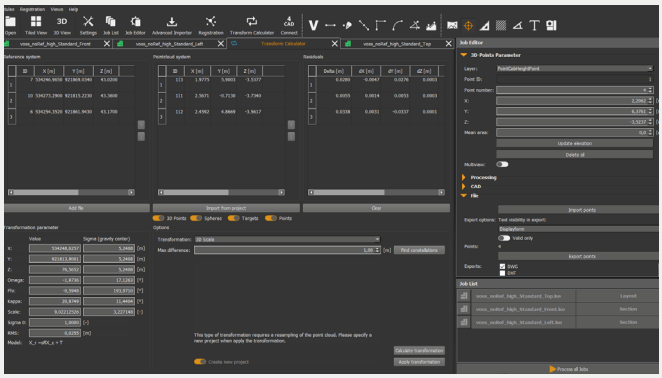
Further we determine the reference points (here: the gullies) with the 3D-Points tool. We use five points in this project, but actually only need three points for the transformation to be successful. However, four or even five points will result in a more accurate transformation:



Now we open the transformation calculator. On the left side you find the reference system into which we have to import the points measured with the GPS instrument. In the second column we find the coordinate system of the point cloud, which is defined by the 3D points we have selected in our point cloud. First we import the external coordinates by clicking on the button **Add file** below the column Reference system.

A new window opens where we can navigate to the location of our coordinate file. The supported formats for the coordinate file are ***.xyz, *.cor, *.txt, *.dwg and *.dxf.** We can adjust the parameters depending on our coordinate file and then import the coordinate file.





We need to find the correspondences between our two coordinate systems: the local coordinate system of our scanner and the external coordinate system. For this we press the button **Search Constellations**. The residuals are automatically calculated in the third column of the transformation calculator.

Deviations between the individual points we clicked on manually and the points we imported from the coordinate file are always present. The smaller the calculated deviations are, the better. As a rule of thumb, the delta value should not be greater than 0.100m. If the deviations are too large, you can delete the points that cause this deviation by right-clicking on the point to open the context menu - either in the reference or point cloud system.

The transformation parameters are also calculated automatically. The **translation parameters** represent the distance from the local coordinate system to the global, external coordinate system in all directions: X, Y, Z. The **rotation parameters** represent the angle by which our point cloud is rotated after the transformation, also in all three directions: Omega, Phi and Kappa.

In our example, the scale factor will be 1, which means that our point cloud will have the same dimensions after the transformation. In other coordinate systems a scale is calculated. In this case you have to change the transformation method from 3D to 3D with scale or 2D with scale. The scale factor is calculated automatically and also displayed in the transformation parameters.

After we have checked the residuals, we can click on the **Align** button. Our point cloud is transformed into the new coordinate system and the standard views are recalculated.