

SUMMARY:

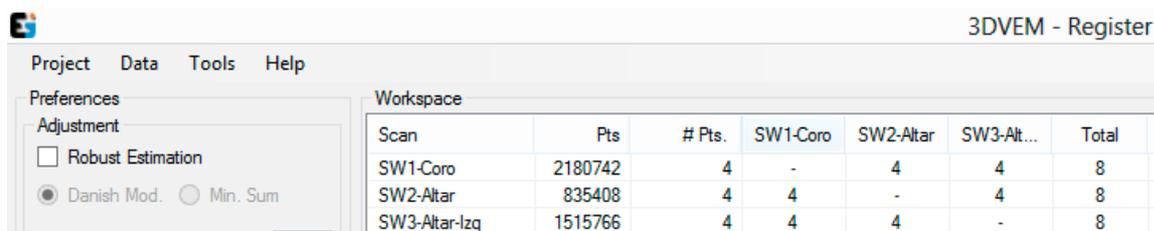
- 1.- **Import** laser scanning files and check the number of targets/spheres/points.
- 2.- Check the settings.
- 3.- Run registration (**Register**).
- 4.- Print out the registration report.
- 5.- **Export** files¹.

Steps:

1. Import laser scanning files and check the number of targets/spheres/points

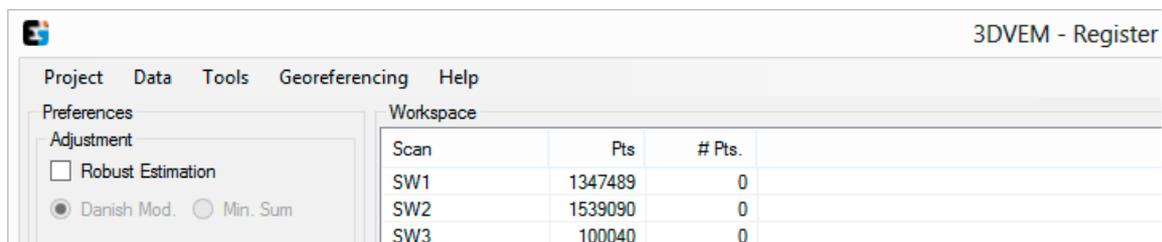
Click **Data/Import Files**. This command allows you to import point cloud data (PTS, PTX, FWS, FLS², ASC, TXT, LAS, LAZ) and also 3D models in OBJ.

After importing the files, you should be able to identify the number of points (**Pts**) and the number of targets/spheres or natural points for registration (**#Pts**). If there are targets/spheres/points as illustrated in Fig. 1, you can go directly to Step 2, otherwise the field **#Pts** will be presented as 0 values (Fig. 2). In this case, act as follows: (1) select the Scan at the Workspace panel, and (2) from the Targets/Spheres/Points panel import target coordinates from a text file using the relevant icon . Alternatively, you can insert manually the coordinates of the targets/spheres/points by clicking Edit Table . The ASCII file of point coordinates can be either numbered (No X Y Z) or unnumbered (X Y Z). Different file formats are accepted (PTS, TXT, ASC, CSV, XLS and DXF).



Scan	Pts	# Pts.	SW1-Coro	SW2-Altar	SW3-Alt...	Total
SW1-Coro	2180742	4	-	4	4	8
SW2-Altar	835408	4	4	-	4	8
SW3-Altar-lzq	1515766	4	4	4	-	8

Figure 1. Detail of three imported files with available point clouds and targets.



Scan	Pts	# Pts.
SW1	1347489	0
SW2	1539090	0
SW3	100040	0

Figure 2. Detail of three imported files that do not contain targets, spheres or 3D points. Target coordinates have to be imported before registration.

¹ This is the only step that you are not allowed to do with the Demo version.

² For FLS files only: run **Pre-process** on all scans in FARO Scene to mark targets/spheres, because without this, the targets/spheres in the *.fls files will not be read. Afterwards, *.fls files can be imported.

2. Check the settings

Least-squares adjustment is performed by default if you click **Register** button. Check the **Robust Estimation** in case you are dealing with a large number of redundancies. If your laser scanner is levelled, click the corresponding box for each scan at the Leveled panel, but be careful of the weight assigned to the **Dual-axis compensator** ("). We advise you to always run with unleveled scans. Feel free to adjust the value of Dual-axis compensator by running different registrations.

Important note: the software is developed to run in **Automatic** mode (Matching panel) without requiring any targets/spheres/point numbering. If you want to keep the original numbers of the targets/spheres/points from the input files, choose **Manual** and click (**Tools/Recovery Original ID**) to retrieve the numbers of the targets/spheres/points.

3. Run registration (Register)

Once coordinates of spheres/targets/points are available, 3DVEM – Register is ready to align, register or orient point clouds and/or 3D models. Click **Register** to start registration. The **Summary of the Adjustment** panel summarizes the results (number of iterations, root mean square (R.M.S.) error and number of oriented scans).

By clicking on the **External Orientation Parameters** panel box after registration, the reference system of the adjustment is transformed to the reference system of that particular scan. At the same time all point coordinates are transformed into that reference system.

Check the residuals of the adjustment and if necessary, **deactivate** any point and re-**Register** again to check if the adjustment can be improved.

4. Print out the registration report

The full report of the registration can be printed out either in TXT or in PDF (**Project/Generate Report**). Special attention should be paid to the standard deviations of the external orientation parameters because this is an indicator of the precision of the adjustment.

The result can also be visualized in 3D, resampled and exported into VRML and DXF (**Project/Generate 3D**)¹. This command can be used to confirm the registration outputs, for visualization and, last but not least, for inclusion in the final report of the project (e.g. as annex or printout of the survey with the distribution of scan stations and targets/spheres/3D points).

5. Export files

The registered point clouds and/or 3D models can be exported into various related file formats (**Data/Export Files**), file by file (**Single**), or altogether (**All in one**). In addition, if FARO files are used, the raw scan folders taken from the memory card of the laser scanner should be selected (**To folders .fls**).

More information can be found in the User's manual, YouTube tutorials/showrooms http://www.youtube.com/channel/UCGo2H2iRP9FDBYSlh_hiv2A, <http://gifle.webs.upv.es> or write an email to gifle@upv.es.

