

## From Photo to 3D Point Cloud

**The ELCOVISION 10 software creates 3D point clouds from real photos using photogrammetry.**

3D point clouds have conquered the digital world in the past two years. There are many different ways to create a 3D view of an object. The ELCOVISION 10 software from PMS AG generates 3D models and point clouds fully automatically from photos taken by a normal camera or with a drone. The high-precision and highly detailed 3D models have an almost laser scan quality.

The development of photogrammetry is advancing. An innovation of the ELCOVISION 10 is the fully automated generation of high-density point clouds from photos taken freely. The smallest differences in texture on the object, even with areas that are barely distinguishable by colour, are sufficient to create almost noise-free and detailed 3D point clouds.

But how do you create 3D point clouds from simple two-dimensional images? Photos of different views of a building are read into the ELCOVISION program. The software now fully automatically calculates the view-points of the images when taken, calibrates the camera and, finally, calculates a 3D point cloud of the building in almost laser scan quality.

In the next step, a co-ordinate system is defined based on the natural points, such as the corners of a house wall, and at least one known distance, such as the wall length.

If the images have GPS information, such as photos from drones, the definition of the co-ordinate system can be done completely automatically by means of georeferencing.

Then there is also the possibility of defining the point cloud in its border limits. Thus, no unnecessary elements, which could be seen, for example, in the background of the photos, affect the further use of the point cloud. These borders are comparable to a clipping box.

The following can generally be said about the creation of a point cloud using photogrammetry: The better the quality of the photos in relation to the resolution and the views of the object – the better and more detailed the point cloud generated will be. The same applies to the point cloud as a whole – if only the exterior views of a building are photographed, the result will be the point cloud of a building envelope. The software requires additional images from the premises and a connection between inside and outside for a point cloud with external and internal views. Such a connection is, for example, a photographed threshold – the reference can, thus, be recognised by ELCOVISION 10 via so-called linking points. The result is a building that is represented in its entirety with external views and internal rooms in the point cloud.



If a point cloud has now been created from the object, it can be exported into the SEMA point cloud format (.spw) and read into the SEMA software. Further processing, such as designing on the existing object or taking measurements, is carried out in SEMA as usual.

ELCOVISION 10 has presented many ground-breaking innovations in the field of automatic 3D evaluation

of images since its market launch in 1986 as the world's first 3D photogrammetry system for PCs, such as the first 3D photogrammetry system with fully automatic image orientation for freehand images in 2005. The current version of ELCOVISION 10 uses a new algorithm that tries to calculate a 3D point from every pixel of an image. For the first time, very clean and simultaneously very detailed point clouds from images are now possible.

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