



Worldwide Zoller+Fröhlich GmbH (Z+F) is one of the leading companies in the field of contact-free laser scanning. Z+F produces the 3D laser scanning system Z+F IMAGER® 5006i.

The Z+F IMAGER® 5006i rapidly delivers high-resolution measurement results within very short time and within a field of view of max. 360° horizontal and 310° vertical. With a maximum sampling rate of 500,000 pixels per second, the amount of generated data can be up to 800 million points per panoramic scan. If necessary, the amount of data can be reduced and worked with, afterwards.

With Z+F LaserControl, Zoller+Fröhlich offers a software tool, which provides multiple functions of 2D and 3D visualization of laser scans and extensive measurement functions for immediately post-processing as well. Z+F LaserControl is also generated for the scanner control of the Z+F IMAGER® 5003 and Z+F IMAGER® 5006(i).

Z+F LaserControl supports the entire control of the hardware Z+F IMAGER® 5006(i). The different ways of control allow a high degree on flexibility. For example:

- Scan – starts the scan with different settings, like resolution, use of a camera, naming of viewpoints, use of projects...
- Scan Preview – quick overview scan (less than half a minute).
- Scan Selection – selection of an area out of a previous done scan, which will be scanned in a higher resolution.
- Scan from Position – scan will be started from current position.
- Scan Targets – previously defined targets will be scanned again in the highest available resolution and connected to the "parent-scan".
- Download – scan data can be downloaded from the Z+F IMAGER® 5006(i).

After a scan is completed the quality of the data can be checked with the intensity view (2D) or the 3D View immediately in the field.

Possibilities of the visualization of scan data in 2D and 3D

2D View

After opening a scan, the data will be displayed in a high-resolution 2D grey view (intensity image). In this intensity image strongly reflective pixels show up in bright, strongly absorbing pixel will be displayed in dark. This information allows for a quick and easy interpretation of the captured object. The 2D views also allow showing additional information; by displaying in respect to the distance or the heights. The range views show the geometric relation to the environment objects, the intensity views are used for the identification and extraction of objects, for visual inspection but also for classification of object surfaces and documentation.



grey view-intensity image



range view



As the false-color intensity image shows, other color-codings are possible as well. For each collected pixel it is possible to display the reflections-, range- and angle-values as well as the 3D coordinate.

All view-possibilities are also available in the equalized BubbleView. Through photo-real view, the user gets a very good overview of the scanned environment from the scanner position.



false-color-intensity image

3D View

In 3D it is possible to show the scan as a point cloud. The operator can get a view on the point cloud from different positions by a very easy navigation. Point size and the subsample can be defined by the user.



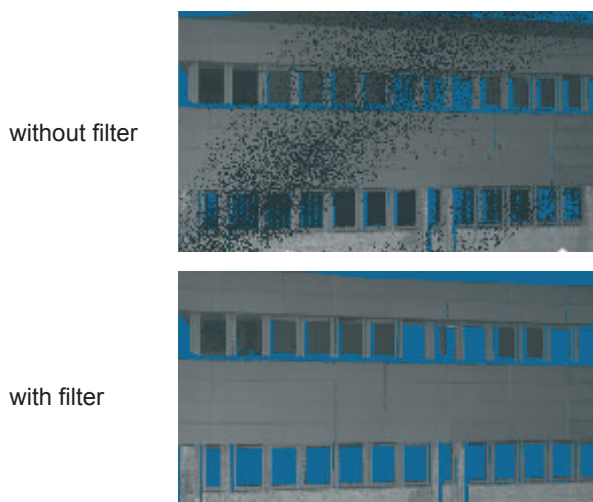
BubbleView

Functions in Z+F LaserControl



3D View

Filter



A very important part of this software is the extensive filter functions. Through different characteristics it is possible that wrong measurements might be done, which can not be detected to an object or decrease the quality of the point cloud (low intensity, range). The filter functions will not delete any point.

Z+F LaserControl generates a mask for each filter, which just marks the filtered points in a certain color. All masked points will not be used for the further processing, they are not active.

Import and Export

Import formats:

zfc, ptx, asc, pt, pts, ptc, vrml, wrl, iv, bmp, jpg, gif, png, txt, k, idx

Export formats:

zfs, xyz.asc, pt, pts, ptx, ptc, vrml, dxf, tiff, bmp, jpg, png

In Z+F LaserControl there are certain import- and export functions for single scans, selections in a scan but also as a patch process.

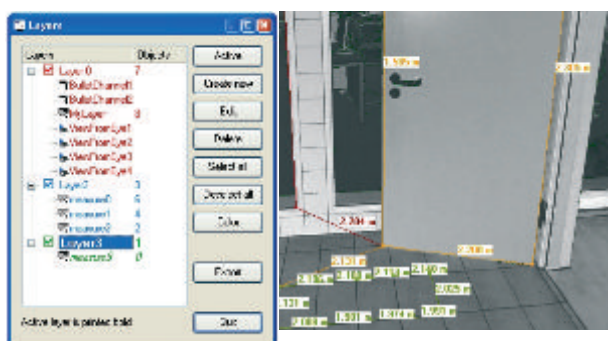
Video

With the AVI-generator, it is possible to create and save a video (*.avi) of a flight through the point cloud (3D).



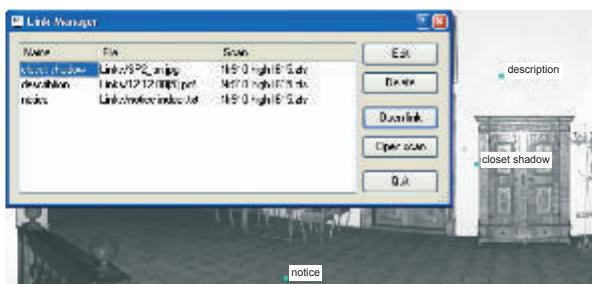
Functions in Z+F LaserControl

Measurement tools



There are different measurement functions integrated in the software Z+F LaserControl, to measure distances in 2D and 3D very quick. With only two mouse-clicks it is also possible to calculate the height of a room. All measurements can be stored in layers and can be displayed any time.

Link-tool



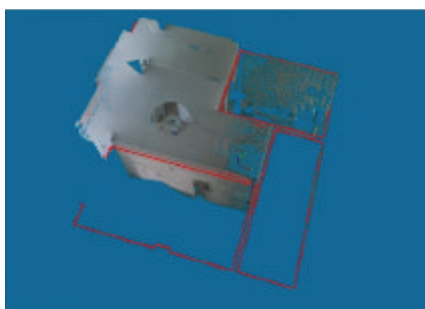
With the link-tool it is possible to link external files, like pictures, documents, etc. into any position of the scan, which will also be added to the project-structure. Thus all information of a scan-project can be digitally added to the scan. So the entire project-structure forms one unit. In addition to that it is possible to add notes into the scan.

OrthoPhoto



The generation of orthophotos leads to an equalized view of the point cloud. The user can define a plane which can be placed into the room in any order. All measurement points of a certain area will be projected onto this plane afterwards. Thus it is possible, for example, to generate floor plans or have an orthogonal view on a wall or something like that. The generated files will be displayed in Z+F LaserControl and can be printed to scale or be stored as a JPG.

Slices



With the software Z+F LaserControl it is possible to calculate pre-defined slices out of a point cloud, these can also be displayed in the 3D View or exported into dxf- or txt-format. The slices can be placed in a direction, not related to the coordinate-axis, to place the slices on the optimum position to the object-geometries.



Functions in Z+F LaserControl

Registration



All necessary functions for the registration of scans can be found in Z+F LaserControl. To that belongs the definition and naming of identical points, the calculation process and the generation of a registration report.

Based on the proved highly accurate Z+F PaperTargets, it is now possible to identify and name special Targets ("Z+F AutoTargets") automatically in the scan. Thus the registration in Z+F LaserControl leads to a completely automatic process which will be faster to the previous process by the factor of 4-5.

Totalstation-data for georeferencing and bundleadjustment are still supported, to increase the accuracy with these methods.

Color



An ideal base for object visualization forms the combination of laser scanning and digital photogrammetry. The mapping of the point cloud with color information leads to a better and easier interpretation possibility. Objects can be recognized and analyzed much easier because of their visual illustration rather than by their geometric characteristics. In addition color information includes a documental value, which is interesting for certain applications. A connection of both measurements methods can be realized when the laser scanner is equipped with an additional digital camera, which detects pictures in addition to the scan process. With the system Z+F IMAGER® 5006(i) there are three different camera models for the detection of color-information available:

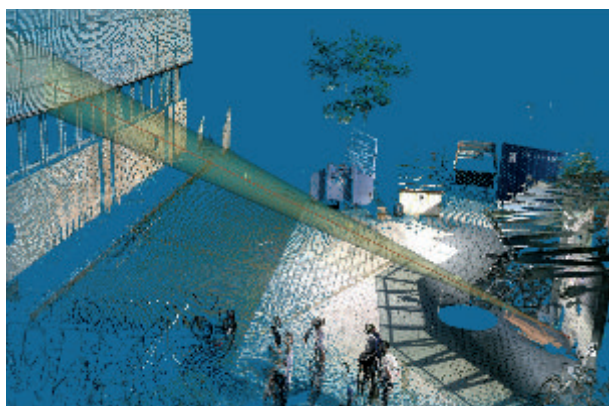
- M-Cam – digital industrial camera with oscillating motor
- Digi-Cam – digital SLR Nikon D40
- Pano-Cam – Spheron Fisheye Camera (panoramic camera)

The software Z+F LaserControl supports all three camera models as a PlugIn for the point cloud color mapping.



Functions in Z+F LaserControl

Forensic



After extensive development, Z+F LaserControl now offers special features for forensic applications. Combined with the existing functions for the 2D and 3D visualization of laser scans and the extensive measurement functions the software offers the new forensic features for help with the work in the scene documentation and -postprocessing.

- Shot trajectory
- View from eye, for example to verify witness evidences.
- Generation of rectificated images, for the documentation and review of marks, for example.
- Possibility of importing 3D models into the point cloud, for example: the car of a suspect.