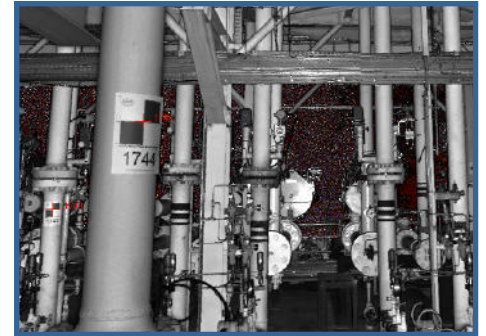


Z+F UK specialises in 3D laser scanning. Our LFM development team uses its experience to solve complex problems, yet making intuitive and powerful tools. User feedback is constantly sought and integrated into new versions of LFM. By actively listening to our customers the LFM product range is now one of the most comprehensive available. LFM is rapidly becoming an industry standard.



Registration is the process by which separate 3D laser scans are correctly orientated to a defined co-ordinate system. LFM Register is equipped with tools and techniques that allow this registration process to take place and also be confident as to its quality. In the field productivity that can be achieved with 3D laser scanners is constantly improving. LFM Register has moved the registration process off the critical project path so that clients can quickly receive the full benefit from laser scan data. With LFM Register there is no accuracy vs time trade off, its features give accurate registration for a large dataset within minutes.

## Key Features

- Several quality assurance tools ensure accurate registration
- Inter-Cloud Registration ensures registration even when some targets are not visible
- A unique 'traffic light system' indicates quality of registration
- No accuracy vs time trade off. Data can be registered accurately and quickly
- Tools to ensure accurate registration

## Features and Benefits of LFM Register

### Registration Against a Control Survey

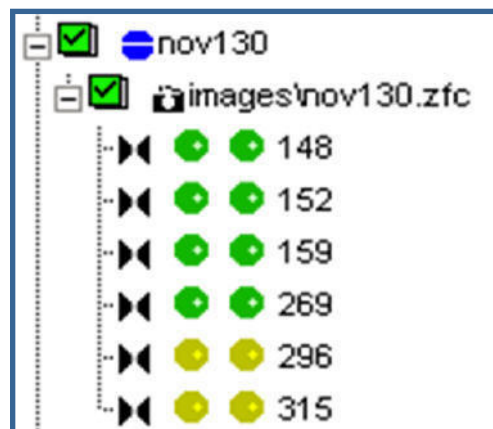
Registration can be carried out against a survey from a traditional survey instrument. Different input survey formats are supported.

### Quality Assurance in Registration

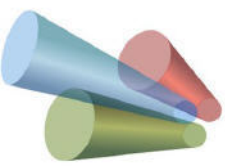
Visible metrics show the quality of registration against the survey for every single target.

Each of these metrics are shown in the form of a simple three-coloured 'traffic light' set: green, amber and red.

The coloured lights give a rapid visual indication of the quality of fit against a user defined threshold. Detailed registration reports can be saved for future inspection.



Registration Process in Progress



## Benchmarks

Benchmarks are the core reference points for a project. Being able to visualise these client defined benchmarks against the laser scan data ensures that everything is correctly aligned to the client reference points. The benchmark points can be presented in the form of a list of objects. Double clicking on each benchmark point in the list takes the user to that point in the laser scan data.

LFM Register is capable of taking an initial approximate registration, for example using one target provided by the user and then iteratively refining the registration between the image data until a perfect fit is achieved. The “rogue scans” can then be brought into the overall project deliverable.

## Target Prediction & Automatic Registration

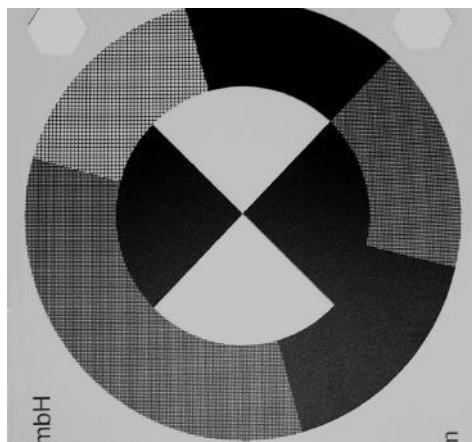
With target prediction the user need only identify the approximate location of two targets manually, LFM Register is then capable of locating the additional targets. By combining the technology in the new Z+F AutoTargets and LFM Register, target identification becomes a fully automatic process. This removes the need for an operator and the requirement of manual target selection.



*A Surveyed Target*

## Inter-Cloud Registration (ICR)

ICR overcomes some of the problems inherent in registering scans. Complete registration relies on being able to see at least three good targets in each scan. Inevitably, on some projects there will be scans with potentially only a single target visible.



*A Z+F AutoTarget*

## Data Filtering and Data Clipping

LFM customers like the flexibility to manipulate their 3D laser scan data. Data can be filtered and edited using different parameters. The near and far range can also be clipped and rogue points removed from the data. Points are never deleted, it is always possible to revert back to the original laser scan data. This is invaluable where a client seeks proof of an automatic and complete dataset.

## Bundle Adjustment

Bundle Adjustment is now included in LFM Register. With bundle adjustment the location of a target is considered from every scan position. A mean average of its location is then taken before a scan is re-registered. This process is continually repeated resulting in increased accuracy in the registration process. The increased accuracy achieved with bundle adjustment is particularly useful where a control survey is not possible.