

3D Laser Survey and Point Clouds Define new Standards for Timber Construction

Timber construction is currently experiencing a renaissance in the form of modern mass timber construction. Thanks to innovative 3D laser scan technology, this development will continue.

Modern timber construction contributes significantly to sustainable construction. The digital laser survey technology in connection with 3D point clouds offers completely new possibilities in the field of timber construction in general and also for CLT construction. New ideas in architectural implementation can be realised holistically leading to a significant increase in efficiency.

The entire process from the idea to planning, design, manufacture, assembly and documentation is greatly enhanced. This approach does not only generate higher precision and efficiency, but also allows for reliable project planning and a consistent workflow.

From 3D laser scanning to CAD model

A point cloud is generated from the individual scans using the proprietary SCENE registration software by means of a precise laser survey, for example supported by a FARO Focus laser scanner. Another benefit is the customized adaption and the definition of the zero point in the coordinate system. This virtual reproduction of reality serves as a design basis for architects, timber construction companies and other trades involved in construction when working on existing and new buildings.



Scans created with a FARO Focus laser scanner are registered in the SCENE software to process the point cloud.

The unique possibility of importing and employing point clouds directly ensures efficient and smooth working with the SEMA software.

In addition to the vendor-independent file format e57, a common interface between SEMA and FARO enables that the 3D point cloud from the FARO SCENE software is output as an spw file. The exchange of SEMA's own point cloud format allows the direct import of the point cloud without further conversion required. Any loss of data or quality is thus excluded. Users can proceed according to both the 'Closed-BIM' concept and the data exchange strategy of 'Open- BIM'.

The file size of the point cloud is irrelevant. Whether the digital twin contains 3 billion or twice as many points is irrelevant for the performance in the SEMA program. This is a unique selling point that distinguishes SEMA from all other CAD software manufacturer.



Any sections of the stored point cloud provide the perfect basis for planning and design in the SEMA program.

The point cloud offers convincing benefits: minimum measurement deviations, quantity survey true-to-deformation, area calculation and distance measurements. All of this takes place on the PC, without further construction site visits required. Using the CAD program, any sections can be created at the push of a button and relevant tolerance points can be easily determined.

High range of functions for an optimized workflow throughout the entire building project

The SEMA program offers the user countless possibilities:

Creation of as-built plans, simultaneous CAD planning and design in 2D/3D, photorealistic visualization for sales promotion and virtual control, creation of architectural, production and work plans as well as parts lists and data export for machine production. Users can make changes at any time, the adjustment is calculated in the program background.

Continuous further development of the software

SEMA covers the entire spectrum of timber construction, stair design and sheet metal work by means of its software solutions. The SEMA company strives for consistent optimization and standardization of processes while helping to shape trends or introducing innovations. New features in the planning and production of solid wood construction are, for example, the visual upgrading and adjustment of the grain direction arrow as well as the individual adjustment of the surface quality on the wooden sides.

Even though SEMA is already an innovator in point cloud technology in the CAD sector, the range of functions for processing 3D point clouds is constantly being enhanced. Point clouds stored in the project can now be individually reduced. The outer sides can be limited by means of a clipping box. In addition, one or several individual areas can be punched out of the point cloud and hidden. The automatic alignment of related point clouds and the colour highlighting of individual point clouds within a project create enormous added value. The point cloud display has also been improved in the 2D view: In projects with several storeys it is now possible to select only the part of the point cloud of the active storey. Consequently, the user gets a better overview of the project and always sees only one cutting plane of the point cloud. It is therefore possible to work specifically within individual storeys using the point cloud as basis for measuring.



Conclusion

Thanks to all these increases in efficiency, users no longer have to visit the construction site several times to carry out further measurements. The point cloud provides comprehensive documentation from the first scan. Subsequent changes on site can be quickly reviewed and tracked. Consequently, personnel and transportation costs are reduced, the risk of injury for employees is minimized and there is less rework.

The partnership between FARO and SEMA with the workflow between laser scanner, SCENE and SEMA provides a huge potential for an effective work process.



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SEMA provides software solutions and additional services in the fields of timber and stair design, as well as for the sheet metal work. As the world-leader in these sectors, the SEMA program is available in 11 languages and has been used successfully by more than 11,000 customers in 61 languages for over 35 years. Each year, an average of 15 % of the company's turnover is re-invested into the further development of the software solutions so that SEMA customers can always benefit from new and innovative solutions.