
LFM™
OPEN. INTELLIGENT.
Laser Scanning Software Solutions
www.lfm-software.com

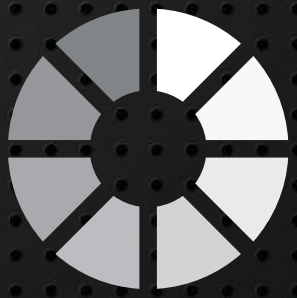
The Future of Laser Scanning

Safe and efficient operation of complex engineering assets, and the efficient management of their continual modifications and upgrades, requires accurate knowledge of their true current condition. Proven on thousands of projects around the world, 3D laser scanning has solved the challenge of capturing the physical condition of such assets by automating the surveying process. Laser scanning is more efficient, producing better quality deliverables in less time, at less cost and more safely, than any other method.

So the data capture problem has been solved. The challenge now is to exploit the resulting 'big data' and maintain trust in the information it provides.

Paradoxically, the solution is to scan more, not less. And LFM is leading the way in providing this solution. The ever-increasing productivity and capabilities offered by 3D laser scanning are rapidly broadening its application to increase efficiency throughout the entire asset life cycle. More value can and must be extracted from captured data, so discarding it after use is no longer acceptable.

LFM is applying its unique technologies to the delivery of next-generation methods of laser scan data exploitation to create a continually evolving source of reliable, value-rich information. This can form a core 3D component in a perpetually changing Digital Asset.



Trusted Living Pointcloud™

The Trusted Living Pointcloud concept is LFMs pioneering approach to enabling industry to execute leaner, more efficient projects and operations. It embodies six key principles.

1. Scalable
2. Maintainable
3. Verifable
4. Accessible
5. Visual
6. Intelligent

The laser scan data life cycle

LFM provides laser scanning software solutions that span the entire life cycle of both the laser scan data and, with the supporting vision of the Trusted Living Pointcloud, the physical asset itself.

Asset operation requires identifying, understanding and adapting to the continual changes that are made to the asset throughout its working life.

The ever-widening range and reducing costs of static, mobile, airborne and hand-held scanners make it easier to capture the as-is condition of an asset, but the right software technology is needed to exploit them.

Remote visualisation of an asset provides immediate, low-cost and risk-free access to site information for work planning.

Registration locates individual scans into a common coordinate system, creating an overall project from the data.

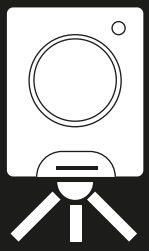
Modelling is the process of tracing elements of the as-built scan to create deliverables for use in design packages.

LFM provides a number of validation tools to ensure data quality on laser scan projects.

Whether creating tie-in points or clashing new design against the point cloud data, designing against the accurate existing condition of an asset greatly reduces project cost, risk and delivery time.

Managing laser data requires structure, accessibility and the extraction of intelligence.

The laser scan data life cycle



CAPTURE

LFM's open approach takes data from any laser scanning devices, offering the freedom to use the most appropriate sensors for the job and enabling their datasets to be fused together.

LFM's Infinite Core technology stores an unlimited number of scans in a single dataset, enabling projects of any size to be easily manipulated.

REGISTER

LFM software imports both registered and unregistered scans. It offers a registration process that supports survey workflows using either full, partial or no dimensional control. Options include automatic target prediction, bundle adjustment and inter-cloud registration.

Intelligent registration, supported by multi-threaded technology, delivers unrivalled efficiency in both creating and accessing laser scan projects.

Quality analysis tools include target prediction, a target network and bundle adjustments. An accuracy identification system provides both visual and numerical feedback on scan positioning accuracy.

VALIDATE

Increased use of 'on the fly' registration techniques creates large quantities of preregistered data. Here, LFM provides a 'gatekeeper', verifying data quality before its acceptance into an overall dataset.

Scan projects can also be validated and compared against existing models in leading 3D CAD systems.

MANAGE

LFM's unique enterprise solution supports the creation of a single dataset that is shared collaboratively across multiple applications and teams.

Volumes, measurements, CAD intelligence, mark-ups and metadata are stored against a project and organised to make them available to all asset stakeholders.

Managing the data to keep it up to date with the physical asset is made possible by data demolition and the registration of rescanned areas.

DESIGN

LFM's open approach delivers the laser data to all of the leading engineering design packages, enabling concurrent use of different design applications on a single master dataset.

Data accuracy gives the designer confidence when creating asset modifications.

LFM's unique data demolition capabilities, driven by area selection or by importing CAD models, facilitates the compilation of accurate and detailed demolition packages and ensures the designer is confident the data is a true reflection of the site.

MODEL

LFM technology enables 'on-demand modelling', the rapid capture of priority design elements rather than the unnecessary creation of costly, full as-built models.

LFM software's modelling functionality is driven from the BubbleView and point cloud, providing total control to the end-user and delivering standard specifications that can be exported with the model into any CAD package.

VISUALISE

Advanced laser data visualisation techniques enable users to switch seamlessly between the point cloud, the BubbleView and the HyperBubble.

Interoperability with design solutions enables CAD and review models to be viewed directly inside the BubbleView and, if applicable, HyperBubble environments, immersing designers in the real world.

OPERATE

An accurate 3D model is ideal for asset management but is costly to create and maintain. LFM allows the laser data to be the model used in operations at a total cost-of-ownership not previously possible. Mark-up functionality adds intelligence to the laser data by enabling objects in the data to be tagged to associate them with related information held in asset management and design platforms.

Tablet computing capabilities enable the laser data to be accessed remotely or taken offline for on-site visualisation with the ability to synchronise information back to a master dataset.

LFM solutions

LFM has led the way in providing the most powerful and open technology for exploiting the rapid advances in laser scanning devices to create new capabilities. New ways of working have evolved, with service providers becoming more involved in design, contractors both scanning more and also hosting data for their customers, and even asset owners establishing in-house scanning divisions.

To support this more complex business landscape, LFM has standardised its product suite onto a single platform, increasing efficiency and enabling users to more easily expand and develop their operations.

LFM Server™ forms the core of the product suite, delivering laser data to LFM Modeller™ and working seamlessly with LFM NetView™.

A variety of licensing options provide flexibility in choosing and operating the most appropriate software modules. There is a global, growing network of Value Added Resellers, selected for their specialist expertise in laser scanning; the current list can be found on **www.lfm-software.com**.

For surveyors

Experts in data capture can use LFM's unrivalled registration capabilities to efficiently provide the highest quality deliverables. LFM's open technology and rapid inter-cloud registration enable the use of any sensors to compile accurate deliverables without the need for numerous software packages, while the ability to combine data allows surveyors to use the right capture device for the task in hand. By adopting the Trusted Living Pointcloud approach surveyors can provide increased value to their clients.

For engineers and constructors

The Trusted Living Pointcloud approach increases design efficiency through rapid, low-cost data capture, better decision making, more flexible workflows and easier collaboration with clients. Unnecessary rework costs can be eliminated, compliance can be more easily verified and construction made quicker and safer.

For asset owners

The Trusted Living Pointcloud provides an affordable data model that will collaborate with, and increase, the value of existing data as a foundation of asset operations and life cycle management. It can be efficiently maintained to reflect the many changes to the physical asset, and can have intelligence applied to it to make it a core element in the comprehensive Digital Asset. It will support, not only efficient day-to-day inspection and maintenance tasks, but also the detailed planning and efficient execution of major revamps.

Learn more at www.lfm-software.com

LFM product portfolio

LFM Server

Create, access and manage the Trusted Living Pointcloud. Compile point cloud datasets of every scan on a project with Infinite Core technology. Clash detect proposed design against as-built data; add new scans; demolish and replace scans. Work with point cloud, BubbleView or HyperBubble views as required. Interface with CAD and Review packages from Autodesk, AVEVA, Bentley or Intergraph.

Gateway mode

Scan conversion	Registration	Creation
Convert supported scan formats to LFM input files or export to industry standard formats (PTX and ASTME57). Perform data filtering, subsampling, range and intensity clipping, and mixed pixel masking. View and verify results, including 3D and BubbleView measurements.	Quickly align unregistered scans into the correct coordinate system (reference, plant or world) and register against control surveys. Use multiple target types (checkerboard, spherical and free pick targets), and named and unnamed target placement prediction. View and verify registration results with intuitive real-time result feedback, including 3D and BubbleView measurements, and registration network views. Full bundle adjustment and true multi-modal interscan registration. Export comprehensive QA reports.	Take registered scans and produce LFM Server, Trusted Living Pointcloud, Infinite Core datasets. Create HyperBubbles; view and verify results, including 3D and BubbleView measurements. Translate and rotate final dataset locations. Perspective and orthographic modes.

Server mode

Connect to CAD	Connect to Review	Clash
Bring laser scan data into your CAD environment and CAD objects into the LFM environment. Measure, draw and design against the laser scan data. Launch BubbleViews and, where applicable, HyperBubbles and select volumes. Create and export tie-in points.	Bring laser scan data into your review package. Launch BubbleViews and, where applicable, HyperBubbles and select volumes. Create and export tie-in points.	When connected to a CAD link, perform automatic clash detection between the laser dataset and design model. Comprehensive analysis and QA reporting tools.

LFM Modeller

Produce 3D CAD models on demand from as-built laser scan data. Model pipes and structural standards from the standards library using BubbleView modelling. Export intelligent 3D models to leading CAD systems.

Modelling	Export to CAD
Use powerful BubbleView and 3D-view modelling capabilities. Semi-automatically produce an accurate as-built 3D model. Save and export standard 3D solid models via .sat files. Model against separate images.	MicroStation live export module. Export geometric AVEVA PDMS™ and AutoCAD models. Produce .pxf, .pcf, and .stp files to enable generation of intelligent piping and structural components in packages including AutoPlant, Plant 3D and CADWorx.

LFM NetView

Secure, on-demand access to the Trusted Living Pointcloud for project collaboration and asset management. Deliver the 'as-is' asset condition to all stakeholders where and when needed, providing 3D scans, risk-free visualisation, tagging, review and planning. The LFM NetView 4 series introduces unique 3D mark-up functionality, tablet enablement and an offline mode supporting on-site operation with the ability to synchronise back to the master project. LFM NetView has the option of deploying on client site or as hosted projects using Cloud technology.

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