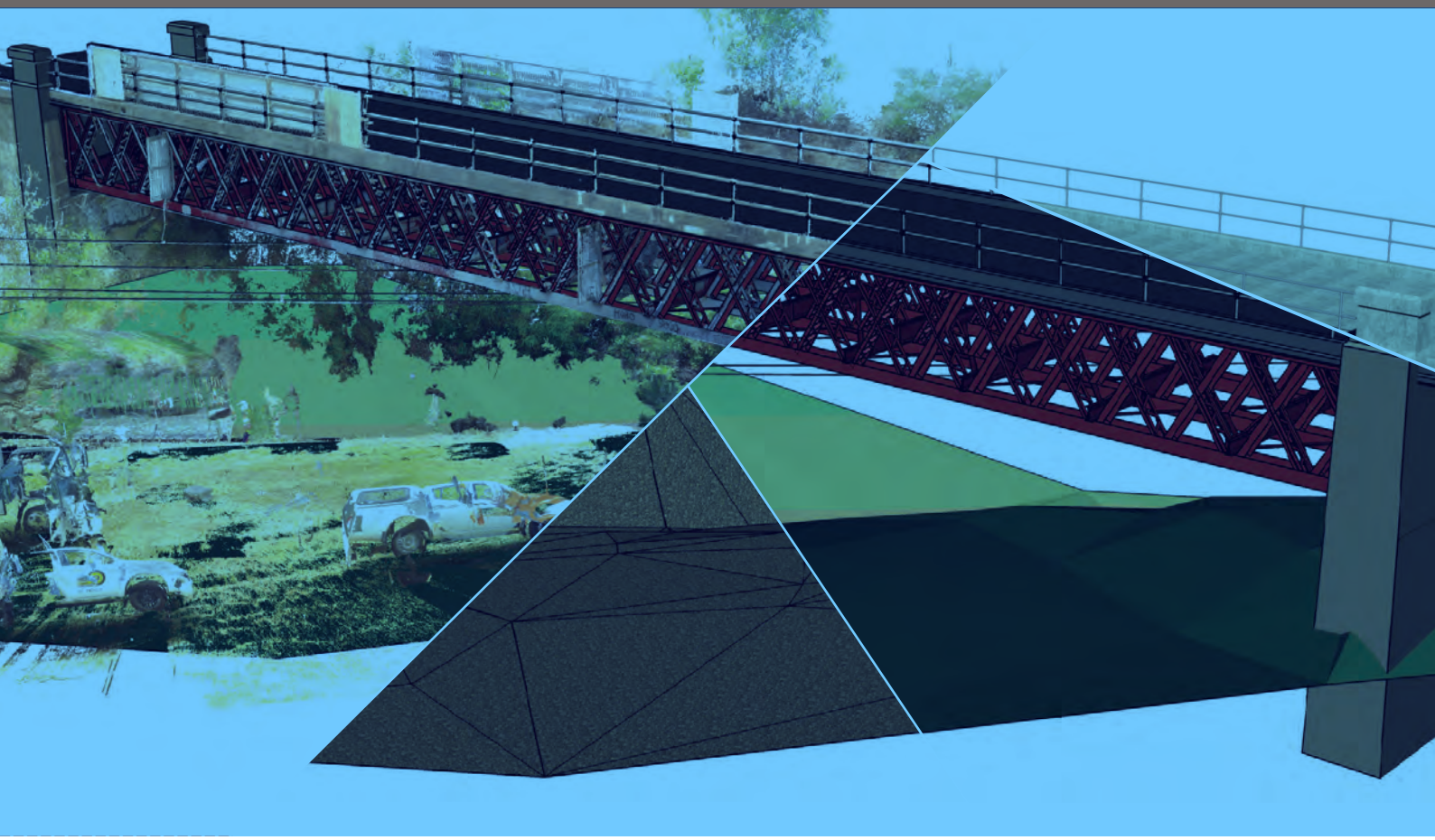
FORTISEM
consultant engineers + managers

3D LASER SCANNING CAPABILITY STATEMENT



www.fortisem.com.au

BILL HUTTON, PRINCIPAL ENGINEER
BEng Civil (Hons 1st Class),
MIEAust, CPEng, NER, RPEQ

FIRM NAME

FortisEM Consultant Engineers & Managers

ABN
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YEAR ESTABLISHED
2013

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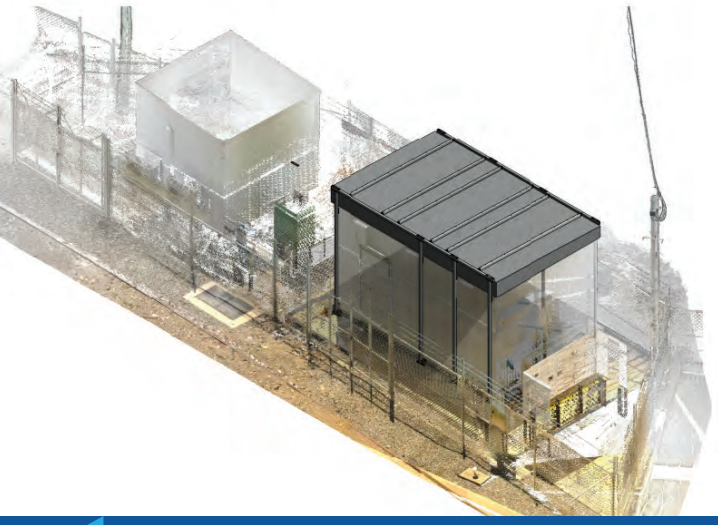
BUSINESS ACTIVITIES
Drafting, structural engineering, scaffold design, 3D modelling, animation, realistic rendering, project management, 3D laser scanning, civil engineering.

MARKETS SERVED
Marine, mining, industrial, commercial, residential, bridge maintenance, tunnelling, events and general construction and maintenance industries.



Proud Member of: CONSULT AUSTRALIA Representing Engineering Excellence

GLOBAL CERTIFICATION PTY LTD
QUALITY MANAGEMENT SYSTEM CERTIFIED
JAS-ANZ
AS/NZS ISO 9001:2008
Registration Number:
275

FortisEM is a specialist engineering company providing management, structural engineering and civil engineering services Australia-wide.

BLACKALL RANGE PROJECT

A laser scanning capability is part of our commitment to quality.

Digitise your project environment

FortisEM is an industry leader in the provision of 3D laser scanning and advanced scanning technologies allowing for better documentation of as-built and existing conditions.

This has particular application and benefits for the BIM, architecture, engineering and construction market.

We service clients across a range of industries including engineering, industrial, architectural, construction, planning and design.

The laser scanner captures everything it can see from each scan position in a digital point cloud.

Think of a TV screen defined in resolution of thousands of pixels, or single points of light. We'll give you a three-dimensional image built by billions of points of light.

From multiple scanning positions we can capture all angles of a site/project/job/object.

These are melded together to create a complete representation of the scanned area.

Key benefits of incorporating laser scanning into your project include:

- Very dense data collected in a very short timeframe, saving time and money
- Produces realistic virtual tours (animations) and still images
- Captures all site characteristics and details, eliminating the need to re-measure sites if design features change
- Effective clash-analysis of existing site against proposed design
- Eliminates safety and cost issues as scanner is operated at safe distances from dangerous or inaccessible areas
- High-integrity data (individual pts +/- 2mm)
- High-intensity data (average 30mm grid)
- Long-term advantage as data can be used for future projects
- Eliminates re-works and reduces the cost of retrospective engineering
- Great for visualisation purposes for end client.

> "We apply our engineering knowledge and resources on every project in order to supply you with the most comprehensive and reliable 3D information safely, on time, every time."

FortisEM owner Bill Hutton, (RPEQ and NER)
- Managing Director

What is laser scanning?

Laser scanning is a modern surveying technique used to gather as accurate as possible data about an object or an environment.

It is non-contact, non-destructive technology that digitally captures shape using lasers.

The scanner maps everything it can see and, using multiple scan positions, can capture all sides of an object.

How it works

Essentially, three-dimensional (3D) laser scanners create 'point clouds' of data from the surface of an object which are then used to map a digital, 3D representation.

Accuracy achieved is in the order of +/- 2mm with a range of up to 130m.

3D laser scanning allows a structure to be accurately modelled in AutoCAD, Revit or any other drafting package.

In particular, the scans capture and measure fine detail, as well as free-form shapes, quickly and accurately.

Surveying to this tolerance is only possible with laser scanning.

Modern laser scanners also take high definition photographs that can colour the scan.

This gives a realistic representation of the structure in your drafting software.

3D laser scanners also stitch the photographs together to create a 3D photo (similar to Google Street View) which can be manipulated and viewed in the office.

This adds significant value to the 3D laser scanning process.

Key advantages of laser scanning

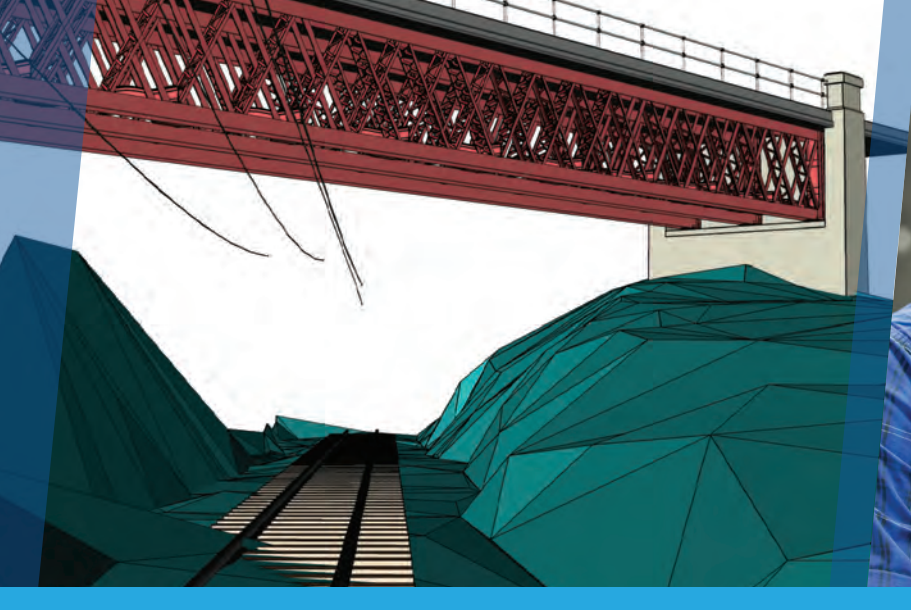
3D laser scanning is fast becoming the go-to measurement tool for any professional working on a brownfield project. 3D laser scanning provides significant advantages including:

- Very dense and accurate data collected in a very short timeframe, saving time and money
- An average scan takes approximately 8 minutes with photos, 4 minutes without, and can have upwards of 50 million points captured
- Eliminates safety and cost issues by operating at safe distances from dangerous or inaccessible areas
- Measurement of structures in difficult to reach areas or at height is undertaken cost-effectively and accurately
- Produces realistic still images and virtual tours
- Colouring scans adds significant value to documentation and allows for a photo realistic visualisation of the existing structure in your drafting and modelling software
- Clash analysis of new design vs existing structures is easily achieved
- Due to the extensive information captured, the need to revisit site to obtain additional information is minimised
- The point cloud can be geo-rectified if required so that it can be modelled at real world coordinates and levels

Traditional measuring techniques are limited to a few fixed points on a structure.

The number of points on a typical laser-scanned project can exceed one billion. This produces an extremely accurate 'point cloud'

This gives engineers, architects and fabricators an 'as-real' accurate digital model of the structure.



Latest technology

FortisEM has invested in a top-of-the-line Faros X130.

With a range of 130m, the laser scanner is ideal for mid-range applications such as architecture, BIM, structural engineering, fabrication, facility management and industrial manufacturing.

The X130 is a 'phase-based' laser scanner that typically provides more accurate measurement than pulse-based laser scanners.

The Faros X130 has a distance accuracy of up to +/- 2mm and a range of 0.6m to 130m.

FortisEM also employs the latest software, including Scene and Autodesk ReCap to register, process and model the point cloud data.

Purpose-built data interpretation software is also used to minimise point cloud processing times, ensuring a quicker turnaround for the final models.

INDUSTRIES SERVICED

- Mining
- Industrial
- Commercial
- Universities and educational establishments
- Infrastructure and local government
- Residential
- Ports and marine infrastructure
- Scaffolding
- Processing plants
- Bridges
- And many more

OUR SERVICES

- Laser scanning
- Point cloud processing
- 3D modelling into AutoCAD and Revit formats
- Terrain modelling
- Volume calculation
- Laser scanning hire
- Floor flatness assessments
- As-constructed surveys
- Animations
- Virtual reality

BURDEKIN BRIDGE REFURBISHMENT

EQUIPMENT

- Faros XD130 laser scanner
- Faros Scene
- ReCap
- AutoCAD
- 3ds Max
- Revit
- Navisworks
- A360

SPECIALISED CAPABILITIES

- 3D laser scanning
- High-quality 3D modelling
- Reverse engineering
- Accurate site measurements
- Fly-throughs and animations
- Terrain modelling
- Laser scan hire

POINT OF DIFFERENCE

Our people, our process and use of technology results in cost-effective laser scan and modelling solutions.

We laser-scan for accuracy and produce high-quality, three-dimensional models.

From this we can also build fly-throughs and virtual reality models of existing and new structures.

The process we employ reduces variations and the chance of dispute by promoting communication between designers and builders and builders and asset owners.

We operate under a third party-accredited ISO9001 quality system.

CERTIFICATIONS HELD

- Bachelors Degrees in Civil and Structural Engineering, including first-class honours.
- Chartered Professional Engineer
- Registered Practising Engineer Queensland
- National Engineering Register

TRAINING AND CAPACITY LEVELS

FortisEM has a third party-accredited ISO9001 quality assurance system which is audited annually.

Our laser scan technicians undertake regular training on the latest updates to software, scanners and industry standards.

Management Systems & Risk Management

Safety, Environment and Quality - FortisEM has an internal quality system including a Quality Policy Statement and documented Quality Management System.

Their development is overseen by a senior manager responsible for quality management.

These systems and procedures are ISO9001 compliant.

Our workflow is charted and processes standardised allowing for continual improvement.

We encourage client feedback as part of our standard operating procedures and have responses to address all comments.

This is collated into a monthly report, which charts the company's progress and helps plan its development.

Our safety and environmental procedures are consistent with office environments functioning at optimum levels.

Insurances - We are fully insured.

- $20m public liability
- $10m professional indemnity
- WorkCover

Risk management approach

Our risk management approach is consistent with the ISO9001 series.

It includes built-in redundancies where drawings are reviewed by third-party senior draftsmen and designs certified by an RPEQ-recognised engineer.

Our activities are governed under various regulations and we are compliant with each including:

- Workplace Health and Safety Act
- Australian Standards
- Building Code of Australia
- Scaffolding Code of Practice

Our engineers complete technical requirements to maintain certified status in their specialties. That includes more than 250 hours a year professional development in civil and structural engineering for the business principal.

Our professional staff are undertaking post-graduate studies and our technical staff who continually undertake allied TAFE and other courses are required to share the knowledge.

This is to maintain currency with industry-specific requirements and regulatory obligations.

As leaders in the field, we are educating the industry not only on the capabilities of laser scanning, but also the significant benefits accurate 3D data provides.

WE WALK THE WALK

By having engineers, designers and draftsmen in the same office we can address the technical as well as the practical aspects of each project. Better design means better communications, means quicker decisions, means on time, on budget, means more profit.

WE ARE SOLUTIONS BASED

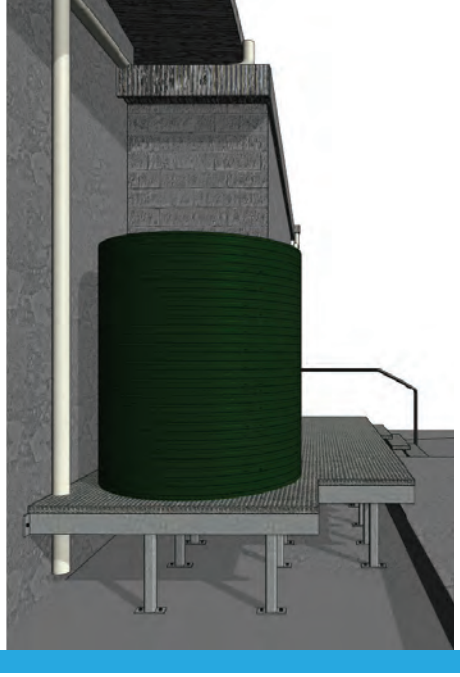
We are passionate about our ability to ensure an optimal outcome is achieved efficiently in any project through the use of laser scanning.

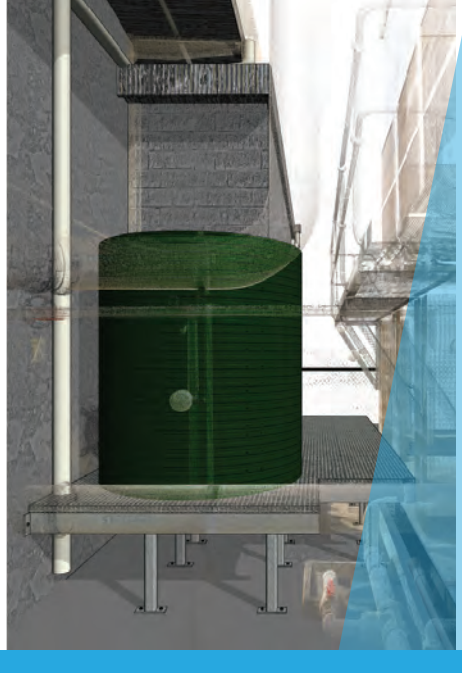
WE BACK OUR CLAIMS

Our services are audited to the point where we foster a company culture of continuous improvement, with a focus on project delivery and client relations.

WE BACK OUR PEOPLE

Our succession planning is allowing for staff to come through the system and take more responsibility. This means we follow through on our commitment to maintain standards and be responsive. Designs are all signed off by an RPEQ.





JCU SIDE STREAM PROJECT

Case study

Extensive pipework and cable tray networks in processing plants can be difficult to measure and hard to access.

That was the case at James Cook University where FortisEM was engaged to undertake structural engineering and design management of the side stream filtration system.

It is part of the Townsville campus district cooling system which provides chilled water (4 degrees) to most of JCU's buildings through a network of underground pipes.

In this case, the construction was designed around the guttering and downpipes of an existing building, which presented a challenge.

FortisEM employed 3D laser scanning using the Faros XD 130.

With this data we designed and modelled the new side stream filtration building extension around existing pipework.

The laser scanner accurately picked up all downpipes. This allowed the building location and height to be accurately determined to ensure the flow of stormwater through existing paths.

New pipework and the connections to existing pipework were also accurately detailed and modelled.

This also reduced fabrication costs and construction risk.

Working with industry and others

Our professional staff members are members of one or all of the following peak industry groups:

- Consult Australia
- Engineers Australia
- Steel Association Australia
- Concrete Institute of Australia

LONG-TERM RELATIONSHIPS

The FortisEM team takes pride in cementing long-term relationships and repeat business.

We are the default provider for established businesses, servicing Tier 1 providers in mining, construction and infrastructure and event management.

We have a proven service model and can cite numerous clients that have tried us, gone back to old sources, only to return to FortisEM as repeat clients.

References are available on request.

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