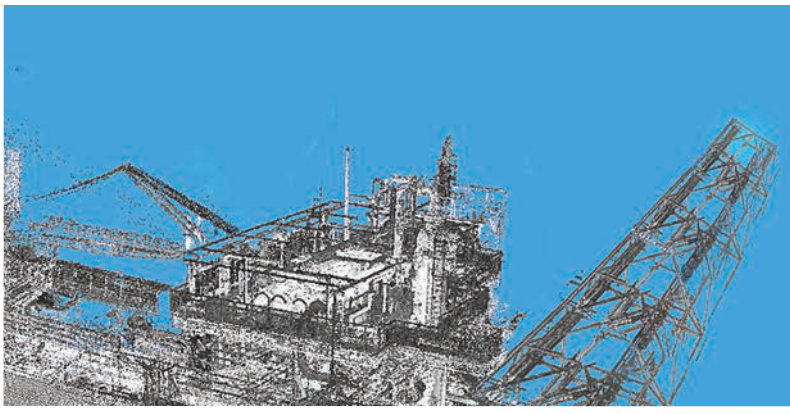
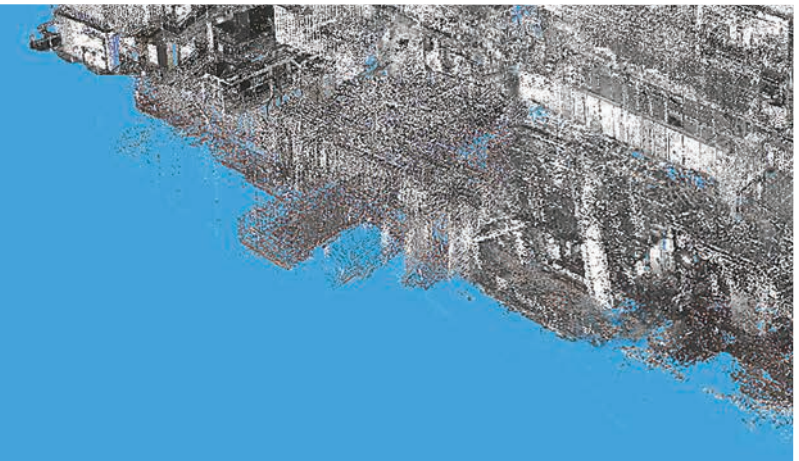
How we build reality

Zoller+Fröhlich

Case Study

Decommissioning of Existing Off-shore Installations





Company Overview

Z+F is one of the world's leading manufacturers in the field of non-contact laser measurement technology. Due to years of research, development and numerous successful engineering projects, Z+F is the forerunner in this field with a wealth of knowledge, experience and success.

When it comes to implementing future developments Z+F has always encouraged innovative thinking and open-minds. Our loyal and long-standing customers appreciate our continual innovations, support and the services we provide.

In cooperation with Scopus Engineering

Background

The decommissioning of existing offshore installations has now become a major part in the oil and gas industry with many mature assets worldwide earmarked for removal.

However, decommissioning of offshore structures is one of the most complex and highly technical exercises for engineers nowadays.

The majority of these assets have been in operation for many years, as a matter of fact long before 3D design models were introduced. Consequently, there are no models available to assist engineers with the decommissioning planning.

Of course, by nature the location of these offshore installations means that they are not easily accessible for any engineering team wanting to start a revamp or asset management project.

Throughout the life cycle of each asset there have been countless modifications to the structures and processes without any updates being carried out to the general arrangements or detail drawings. What this means for engineers is that there is no accurate record of what the actual structures or processes look like today.

Moreover, these exact structures may now be approaching the end of the lifespan for which they were designed initially, and corrosion or ageing may occur.

All these combined factors make the "reverse engineering" process of these assets very difficult, as engineers operate in hazardous environments.

Nevertheless, this case study aims to demonstrate how the use of 3D laser scanning for decommissioning projects may assist in identifying problems, mitigating risks and prove to be a much more cost effective solution.

scopus

Company overview Scopus

Z+F and Scopus Engineering Ltd are long term partners and have been working on many projects together.

Scopus Engineering Ltd is the leading provider of dimensional control and laser scanning services to the global Oil & Gas industry.

With over 200 survey personnel located in the UK, Brazil, Azerbaijan and Malaysia, Scopus are placed to support the industry worlwide.

Scopus' dimensional control and laser scanning centres are the first of their kind in the world. This ensures that local employes are trained to a high standard in Scopus' methods and procedures, providing high quality deliverables regardless of the location.

Objectives

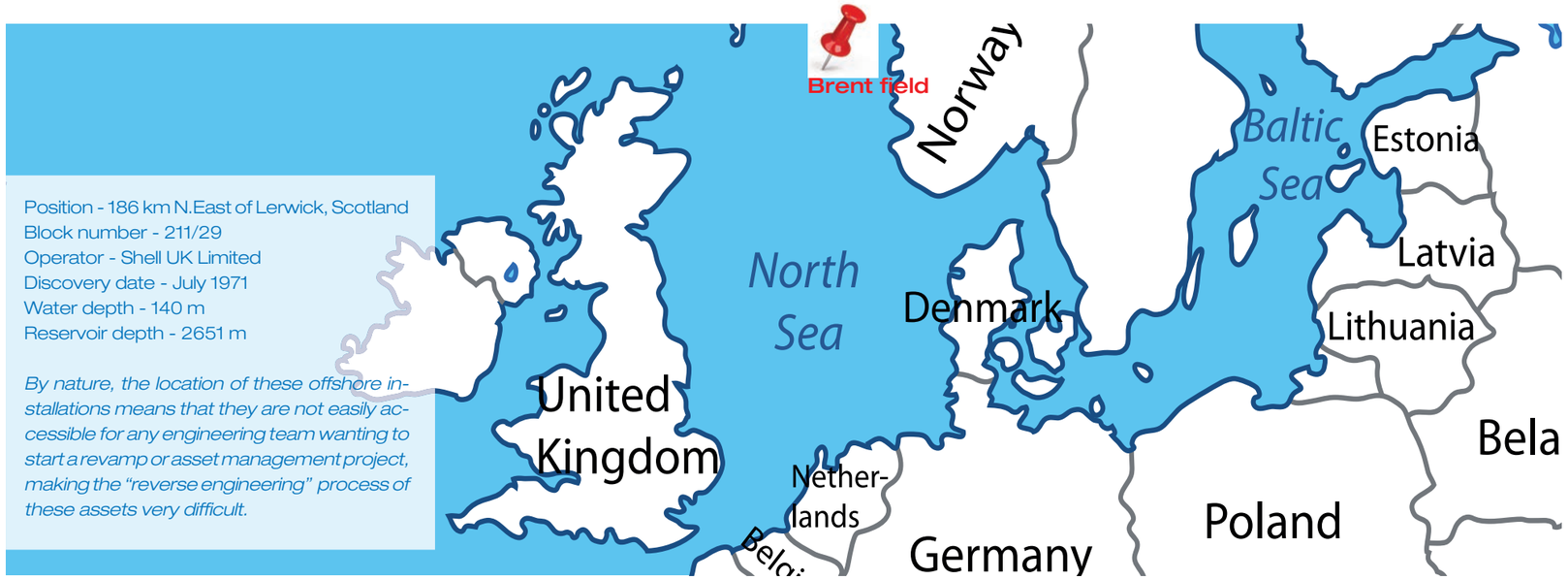
To provide an accurate 3D point cloud of each platform

The Brent field is an oil field located in the East Shetland Basin, 186 kilometres North-East of Lerwick, Shetland Islands, Scotland at the water depth of 140 metres.

The Brent field is exploited by four platforms and operated by Shell UK Ltd., and it is one of the largest oil fields in the British North Sea. Despite being approaching the end of its life, it once was one of the most dynamic parts of the UK's offshore ressources.

Position - 186 km N.East of Lerwick, Scotland
Block number - 211/29
Operator - Shell UK Limited
Discovery date - July 1971
Water depth - 140 m
Reservoir depth - 2651 m

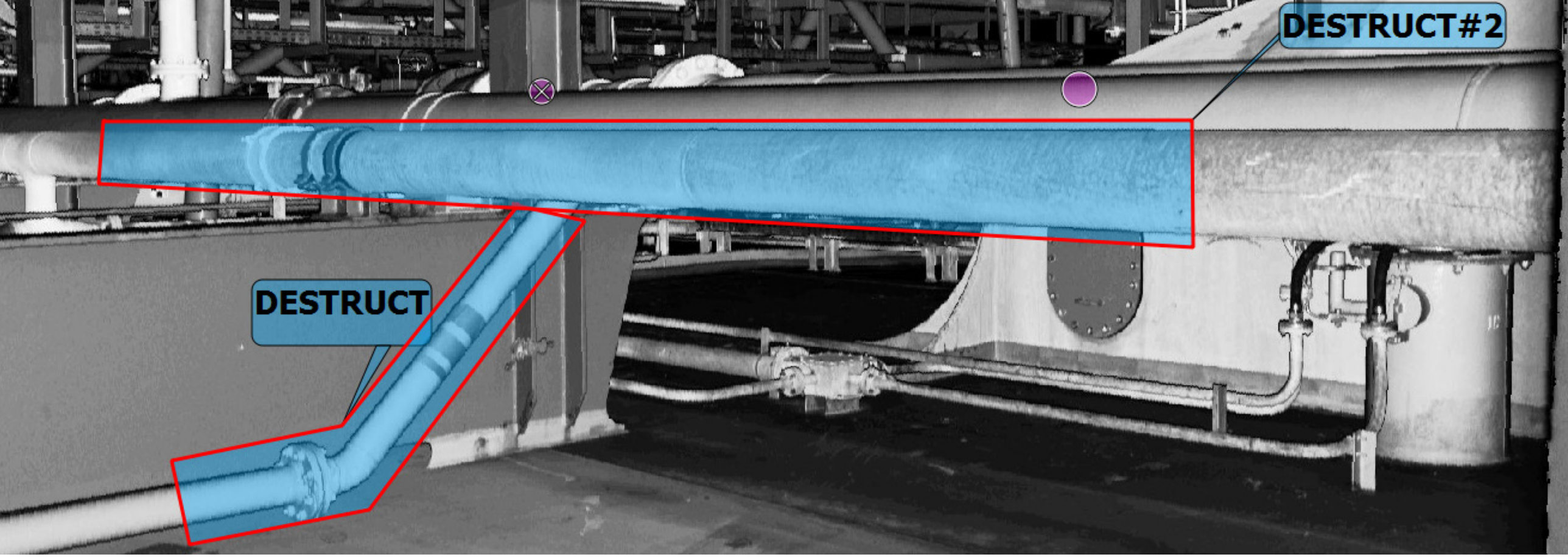
By nature, the location of these offshore installations means that they are not easily accessible for any engineering team wanting to start a revamp or asset management project, making the "reverse engineering" process of these assets very difficult.



Location of the Brent field in the East Shetland Basin

The Brent field in the North Sea is earmarked for removal. Shell, a global Oil and Gas multinational, was in search for an accurate method of planning this process to minimise risks to budget and schedule. Scopus Engineering offered a proposal to completely laser scan each platform to provide a precise 3D point cloud, accurate to +/- 5mm, providing exact as-built information to allow the decommissioning team to plan the removal process of each component of each platform.

The go ahead was given by Shell and Scopus mobilised multiple teams equipped with the Z+F IMAGER® Series Laser Scanners to Brent Alpha, the first of the platforms required to be scanned.



LFM NetView offers extensive collaborative tools. This image shows the mark-up facility whereby users can annotate certain areas within the BubbleView®.

Methodology

Step by Step
The first task was to set out a master control system throughout the whole platform. This allowed all scans to be referenced together into one complete point cloud and also meant, that we could demob and remobilise our scanning teams in line with platform bedding restraints.

In total over 2.400 individual scans were acquired over a few months on Brent Alpha alone and Scopus have subsequently scanned both, Brent Bravo and Brent Charlie since. The response from Shell has been very encouraging, they immediately realised that the scan data provided meaningful information and has allowed accurate planning and accurate budgets to be established early in the project. The true definition of scopes of work has also meant that HAZOP (Hazard & Operatibility) studies are carried out with real information available. Scopus have fine tuned their processes throughout the project and can now offer this facility to other decommissioning projects.

Having gained valuable experience on the Brent field, the laser scan of the CNR Murchison platform already has been given approval and Scopus see the decommissioning side of the industry as a future business stream which can only grow.

Collaboration
Working on such a big project, it was crucial that the data was shared across people involved in this huge project. Once the data is collected and a database is generated, LFM NetView can be utilised to allow the client to view the scan data remotely over the internet, away from its place of origin.

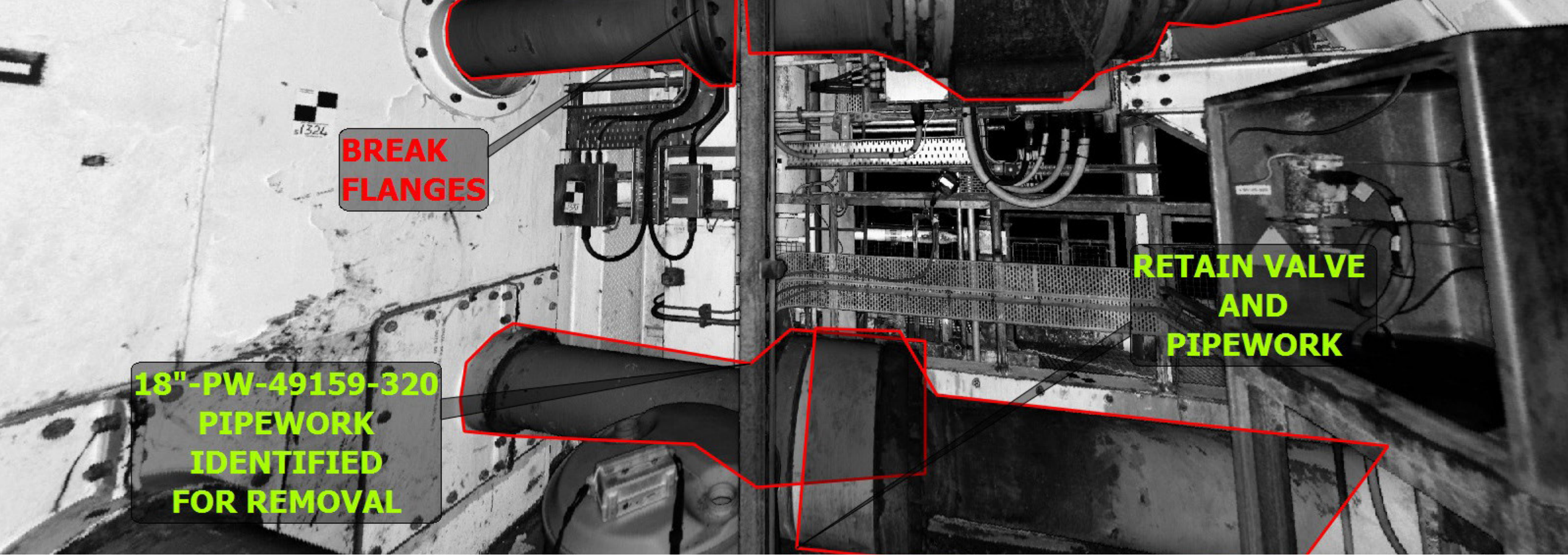
LFM NetView also provides users with invaluable collaborative tools. This allows clients to annotate, measure, and interact with designers, to offer invaluable unambiguous information and feedback on the project without having to visit the site.

Instruments and Software
The Z+F IMAGER® 5006h phase based laser scanner was used due to its accuracy, resolution and data capture rate of over 1 million points per second.

Vast amounts of data were quickly generated and stored on the IMAGER® 5006h internal hard drive. The benefit of the Z+F IMAGER® scanners is, that they are totally encapsulated units where no peripherals are required to operate. It was important that the scanner was portable and light due to the diverse of environments, in which it was used by the Scopus Team. Many scans were produced and registered via a controlled survey process, with preview scans in real-time providing onsite verification of the data capture.

Why was laser scanning chosen
Z+F is one of the leading manufactures of phase based scanners. The IMAGER® 5006h offers a robust casing with an environmental rating, suitable for harsh environments. It collects clean and accurate point cloud data, making the IMAGER® range of scanners the choice on high profile engineering projects such as leading EPC expect.

The data collection and ease of processing the data in LFM software allows accurate as-built recording of hazardous areas such as found on offshore platforms. Z+F's experience in this sector make it the choice of Scopus Engineering professionals for 3D data collection. Z+F offers a range of IMAGER® scanners suitable for all areas of the scanning for the offshore Oil & Gas sectors.



The pipework which has to be removed, can be easily identified and labeled within the BubbleView®.

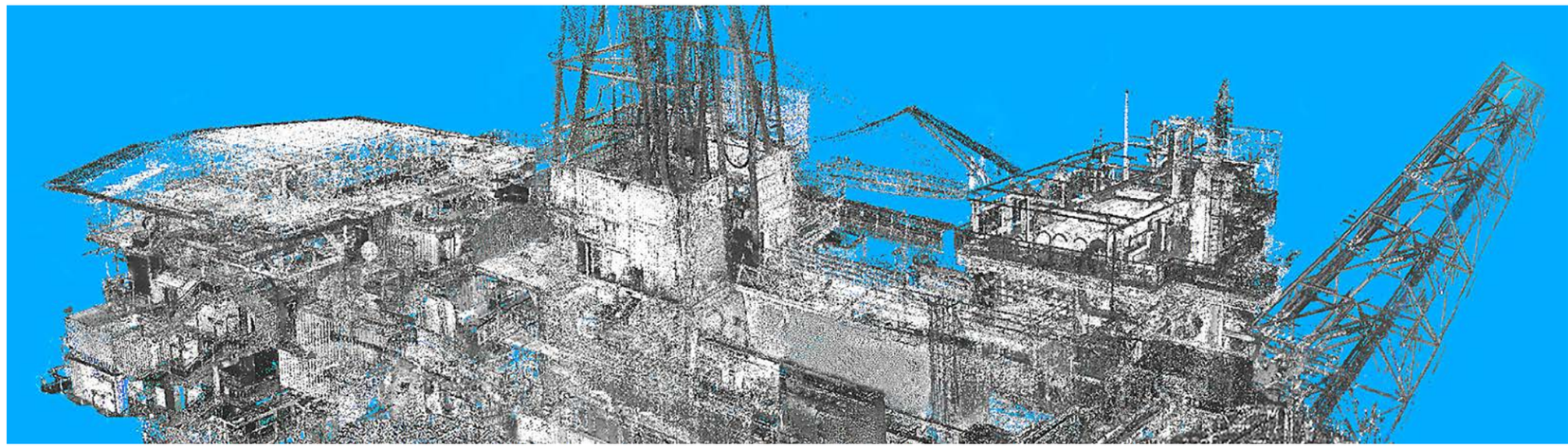
Deliverables

It is fair to say, that Shell are delighted with the final deliverables: not only that they can realise how meaningful the information is, but they can also appreciate how vital laser scanning will be with their future commissioning projects.

Scopus Engineering has been working months to provide Shell with the point clouds, so that the decommissioning teams could start planning the actual removal of the various components.

Although the decommissioning of the Brent platforms is in the early stages, it will still be a few years before the actual removal process starts.

Moreover, the outcome is going to have a major impact on how this project will proceed: having now obtained accurate 3D data of each component on each platform so early in the process, the engineering teams will be able to take advantage of invaluable information, and are estimated to save a couple of years and millions of pounds.

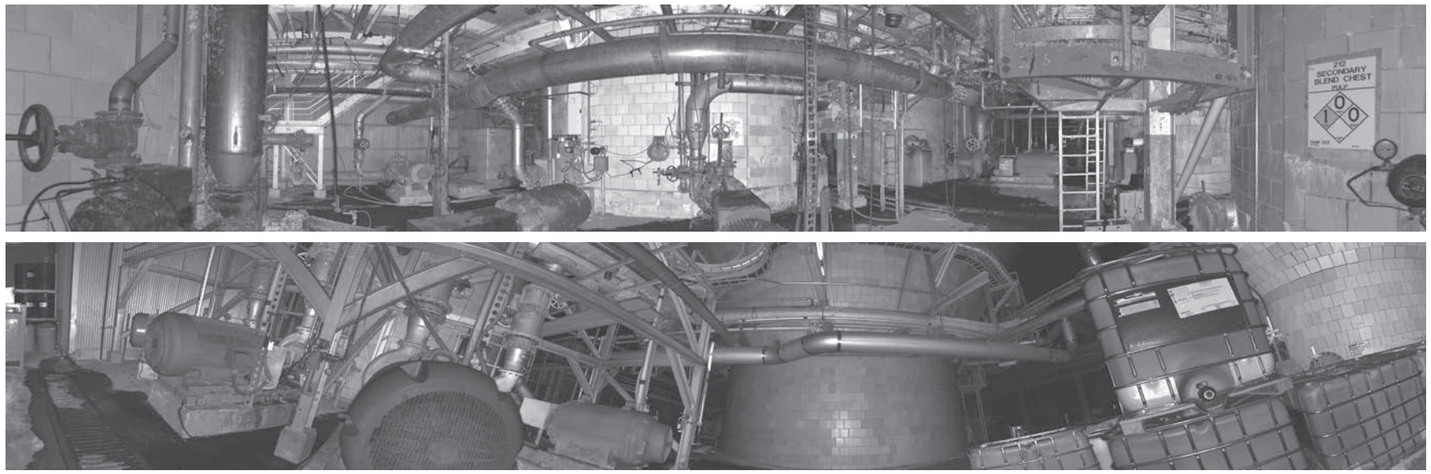


3D Point cloud of the platform

Pictures

The Z+F IMAGER® 5006h and a detailed view of its display.

Real pointcloud (grey) super-imposed with new designed pipes (green, yellow) in an industrial plant, displayed in MicroStation.



360° views of an industrial plant. The plant was scanned with the Z+F IMAGER® 5006h.

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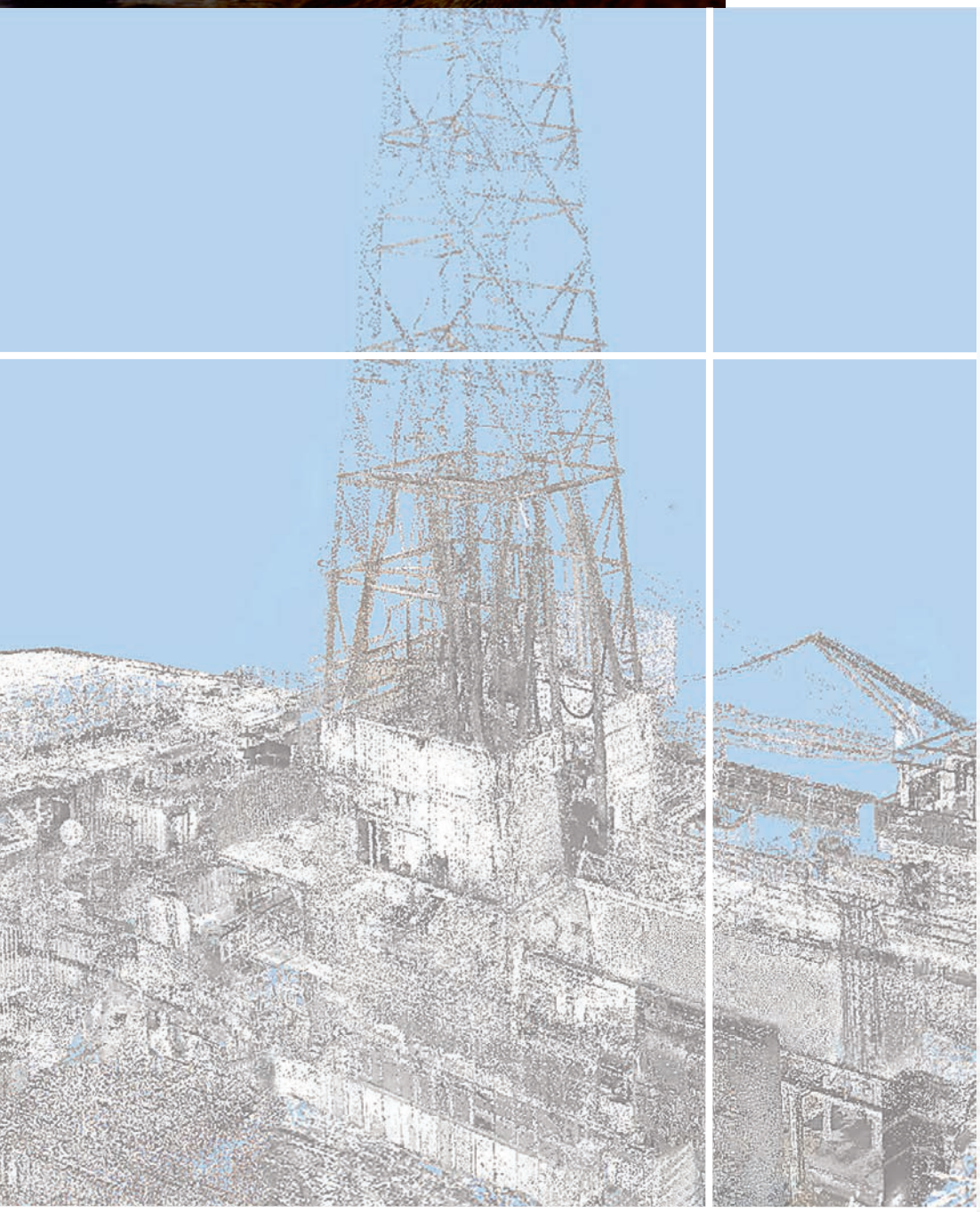

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