seatronics

Improved Operational Efficiency with Laser Scanning

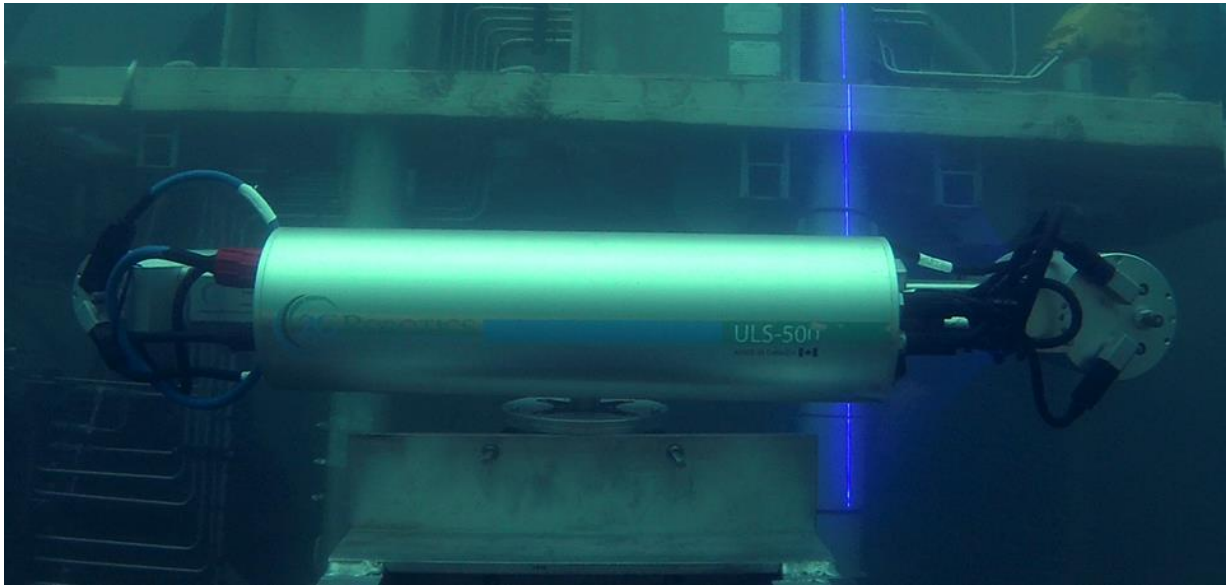
Scott Gray, Operations Manager, Seatronics Ltd.

2G Robotics

an ACTEON company

Overview

- ULS Underwater Laser Systems
- Tradeoffs with Sonar and laser
- Dynamic and Static Scanning
- Deployment Methods
- Results



2G Robotics

- Founded in 2007 in Waterloo, Ontario, Canada.
- Aim to continually improve subsea imaging and measurement technology.
- Dedicated to advanced research, development, and engineering for the production of innovative and cutting-edge solutions.

Seatronics

- The Marine Technology Specialists
- Global partners and distributors of 2G ULS range of systems

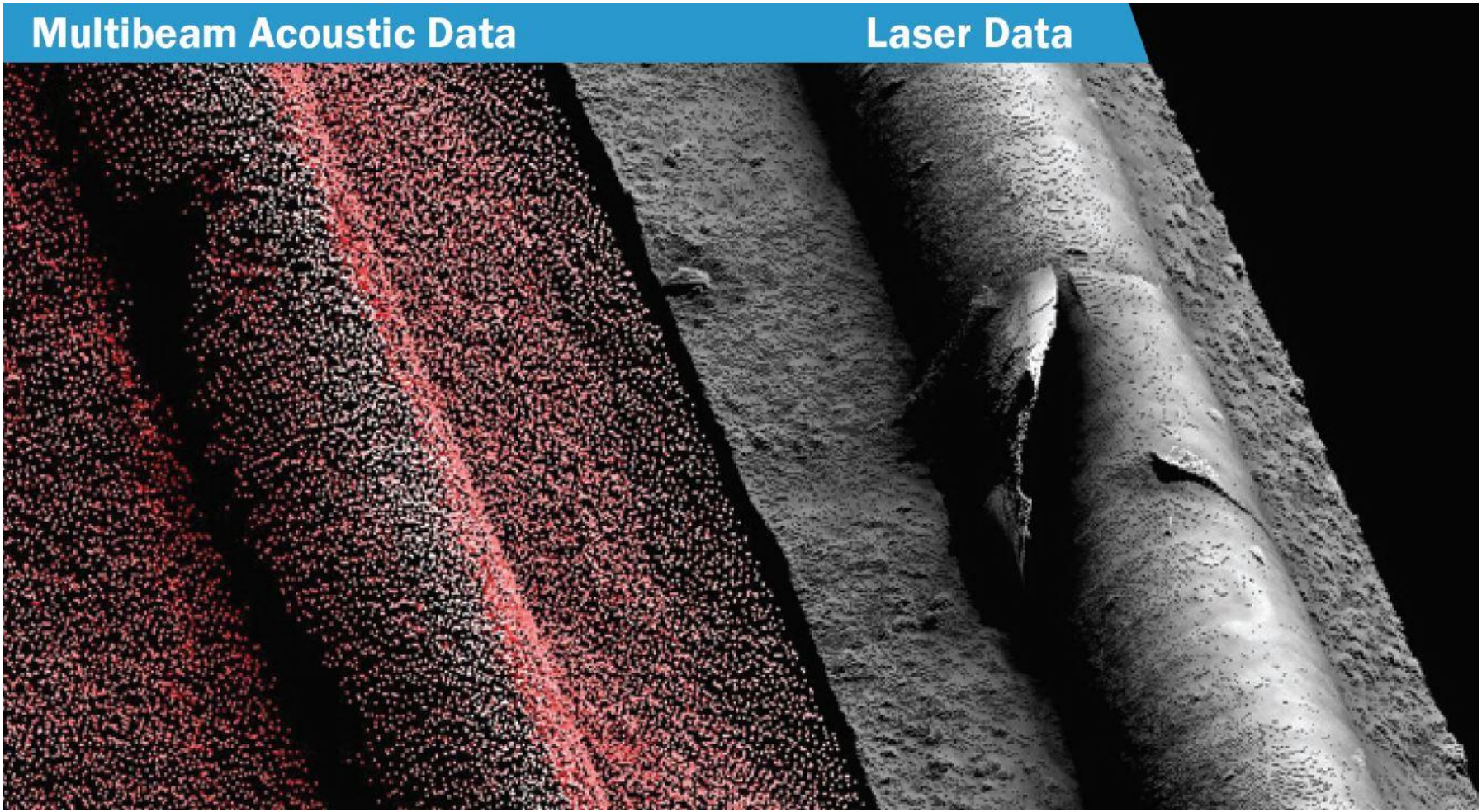
ULS Laser Systems

ULS-100

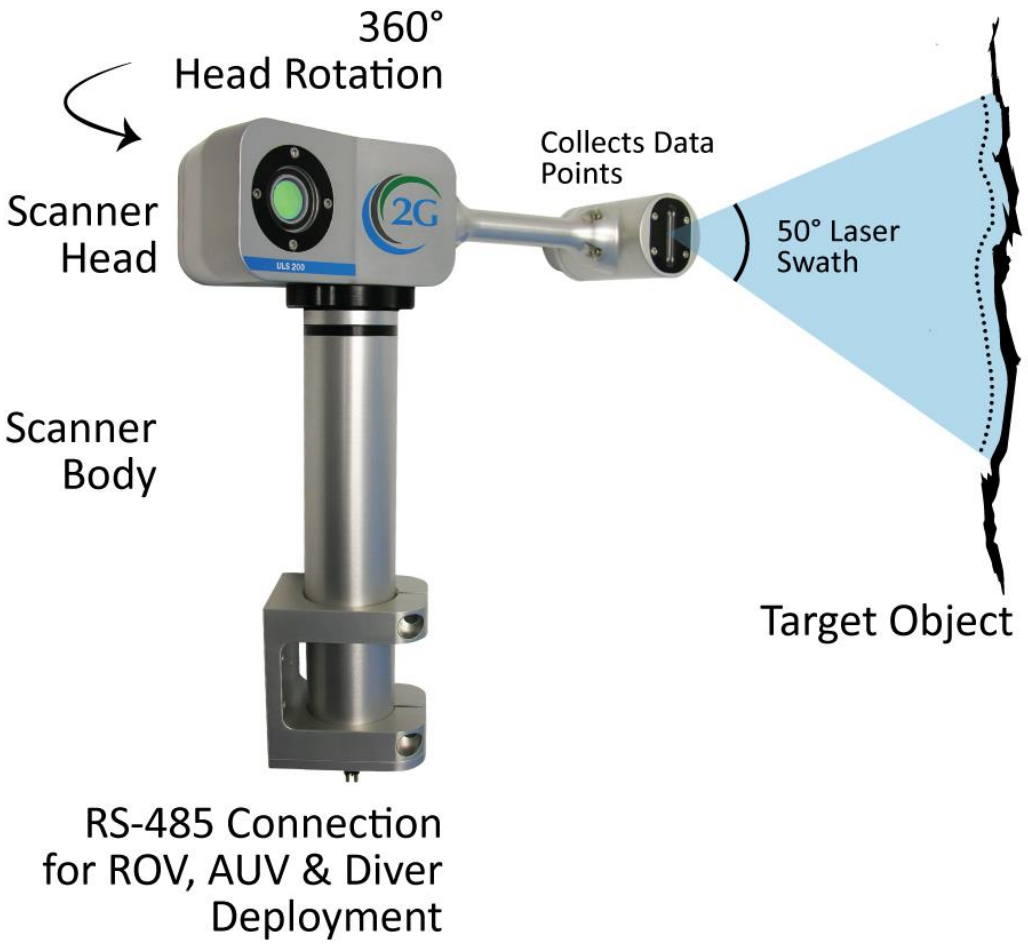
ULS-200

ULS-500

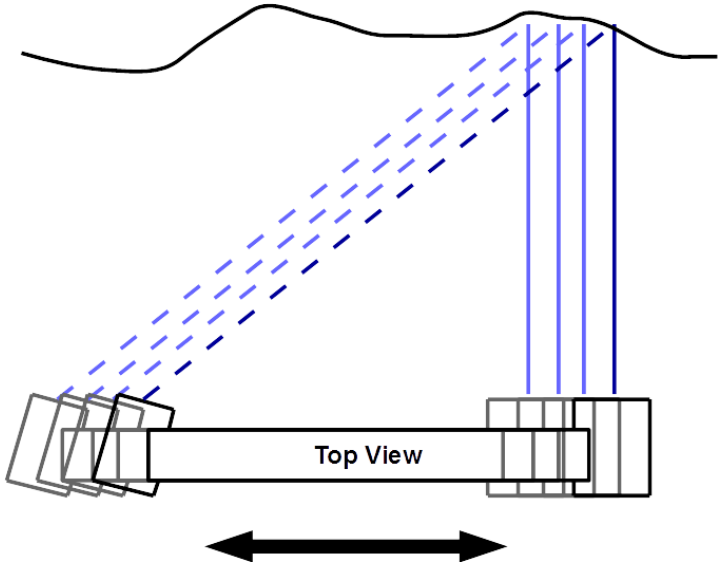
Trade-offs between Sonar and Laser

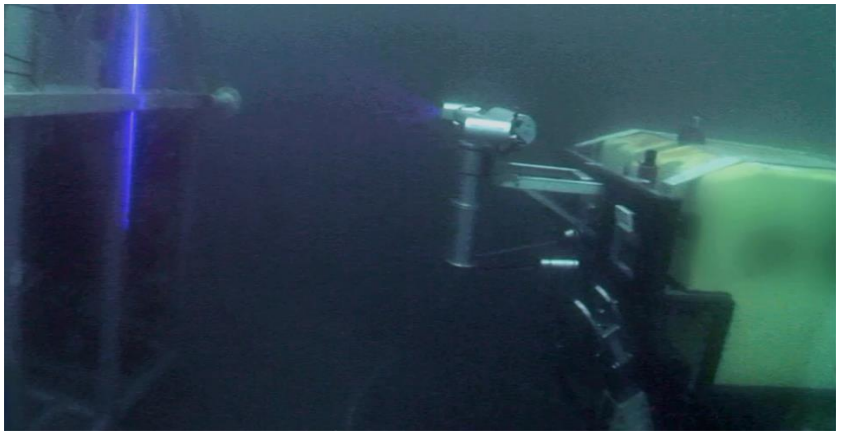


How the ULS Systems Work

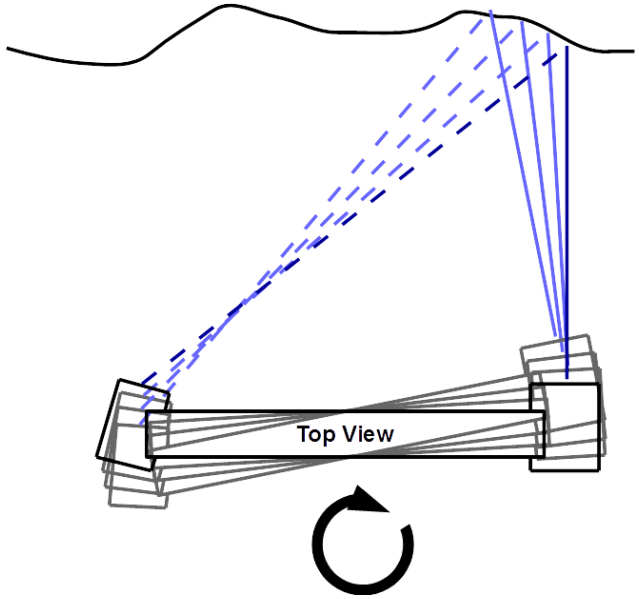


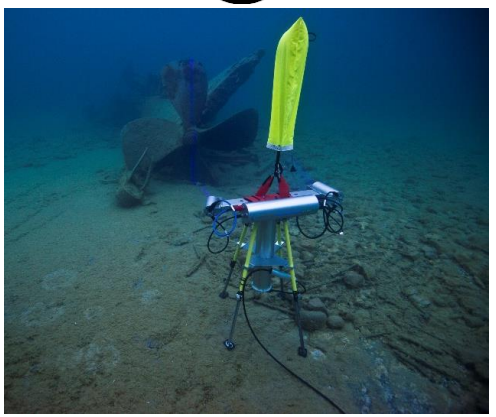
Dynamic



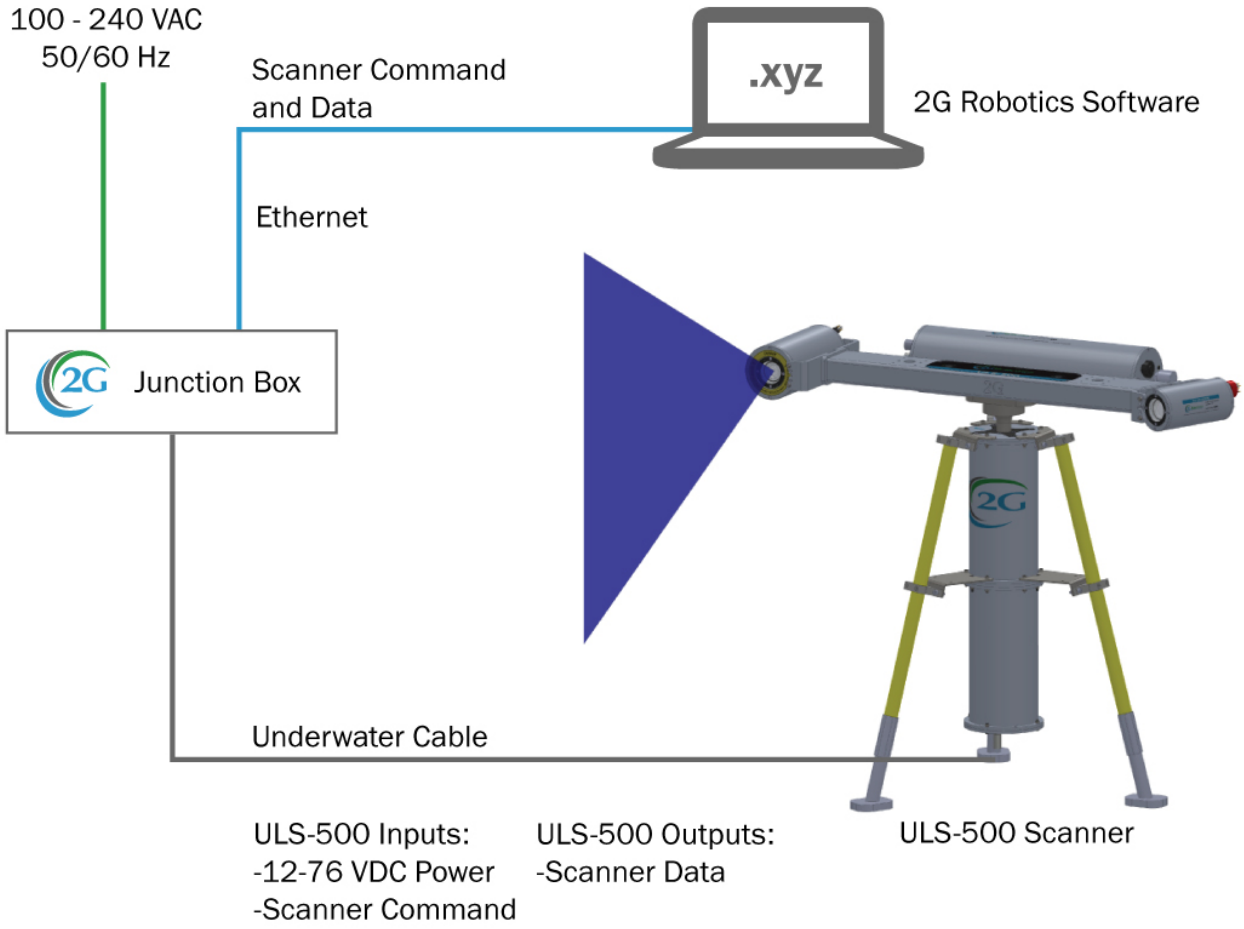


Static

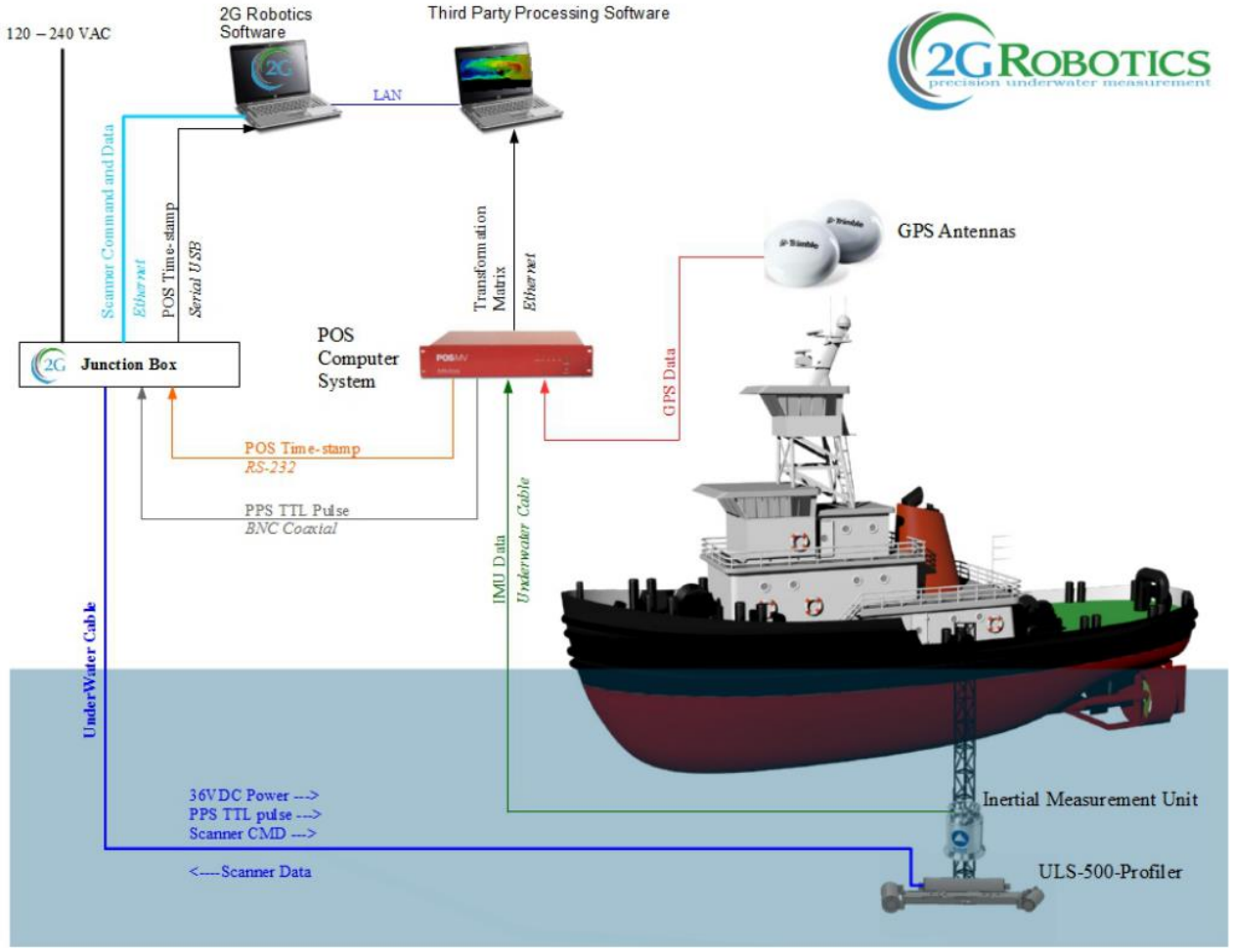




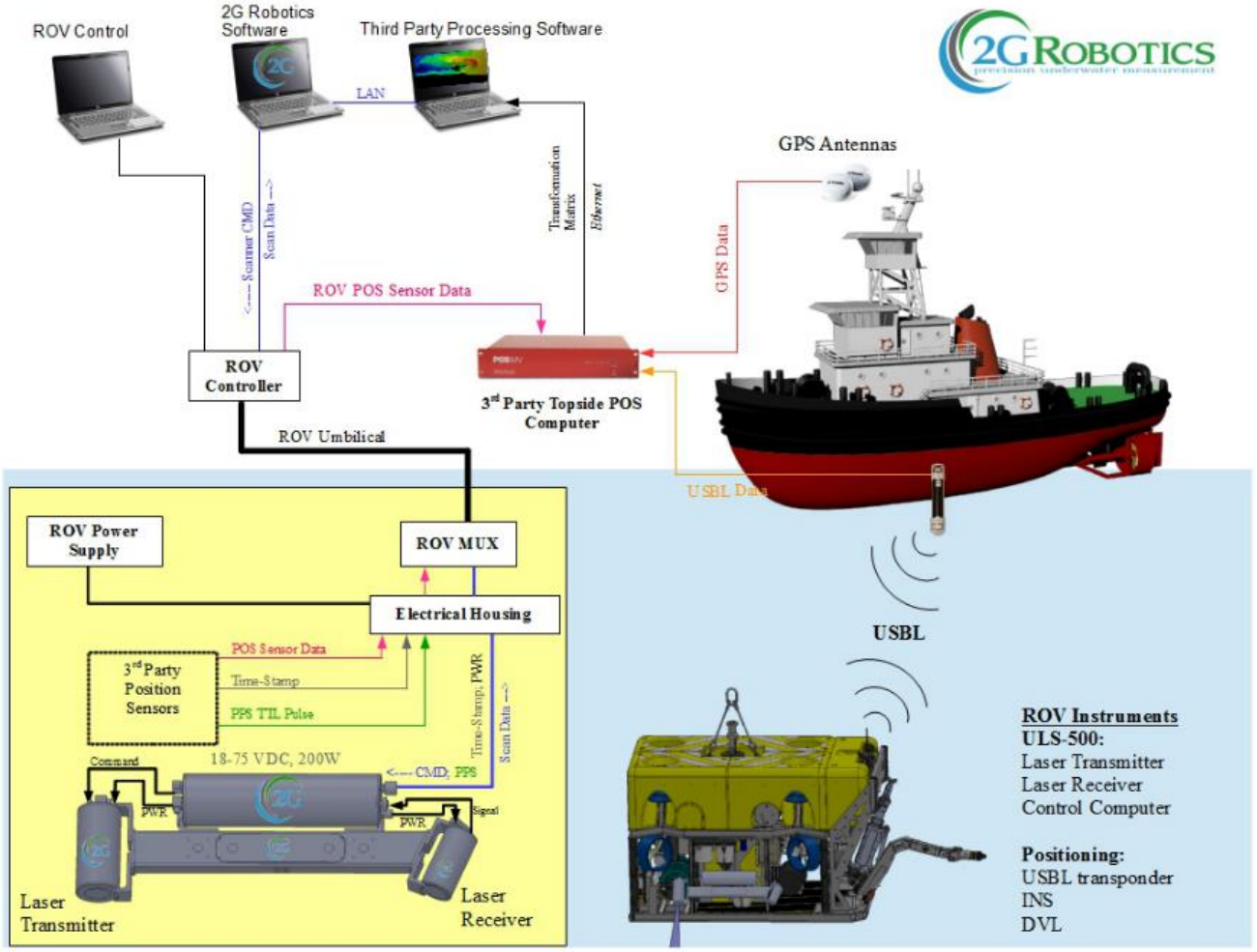
Static Deployment



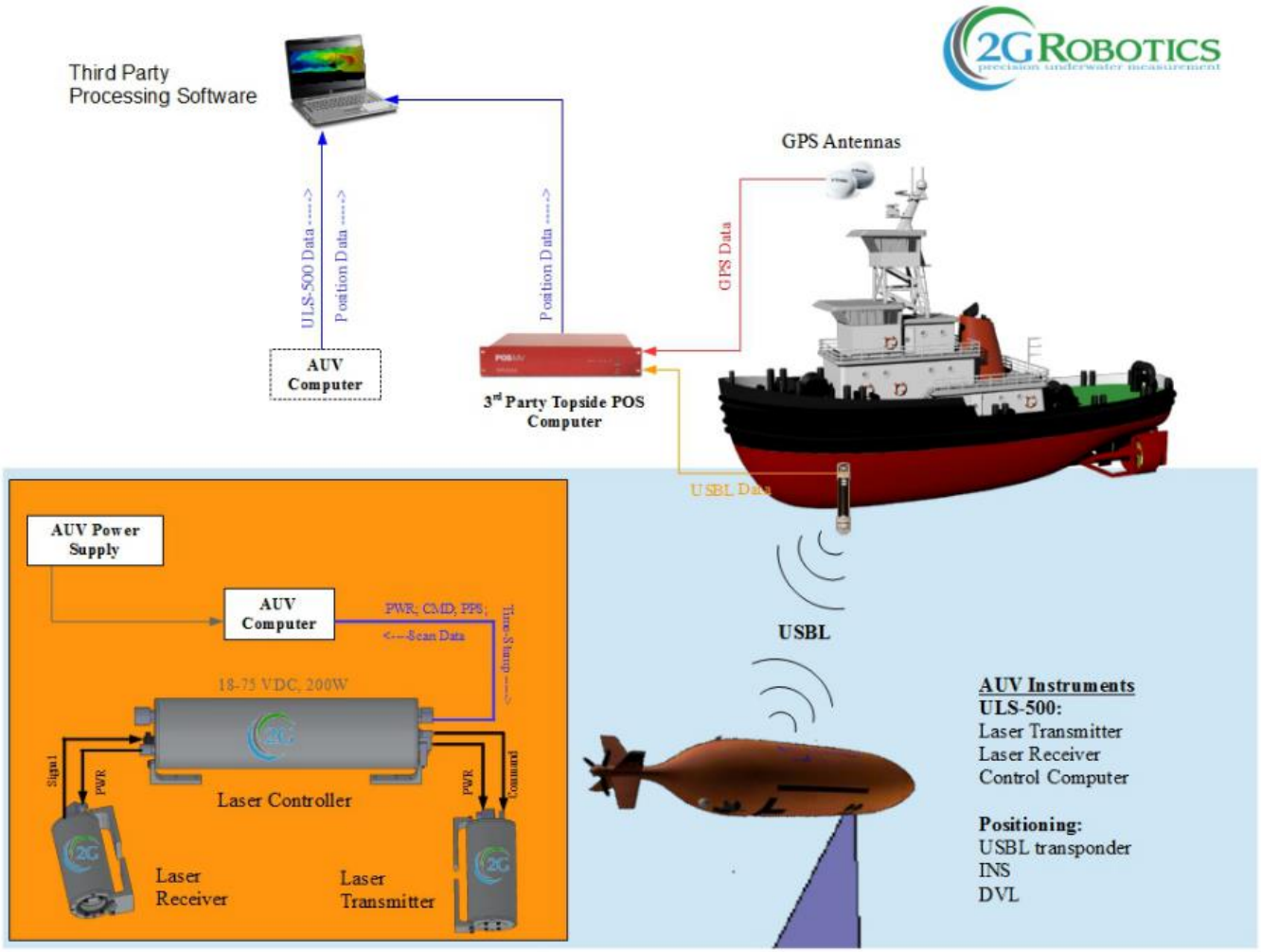
Vessel Deployment



ROV Deployment



AUV Deployment



Data Processing

- Data is captured in real-time and can be easily processed while still offshore.
- .xyz conforming to LAS data output.
- Dedicated drivers in EIVA, HYPACK, and QPS software.

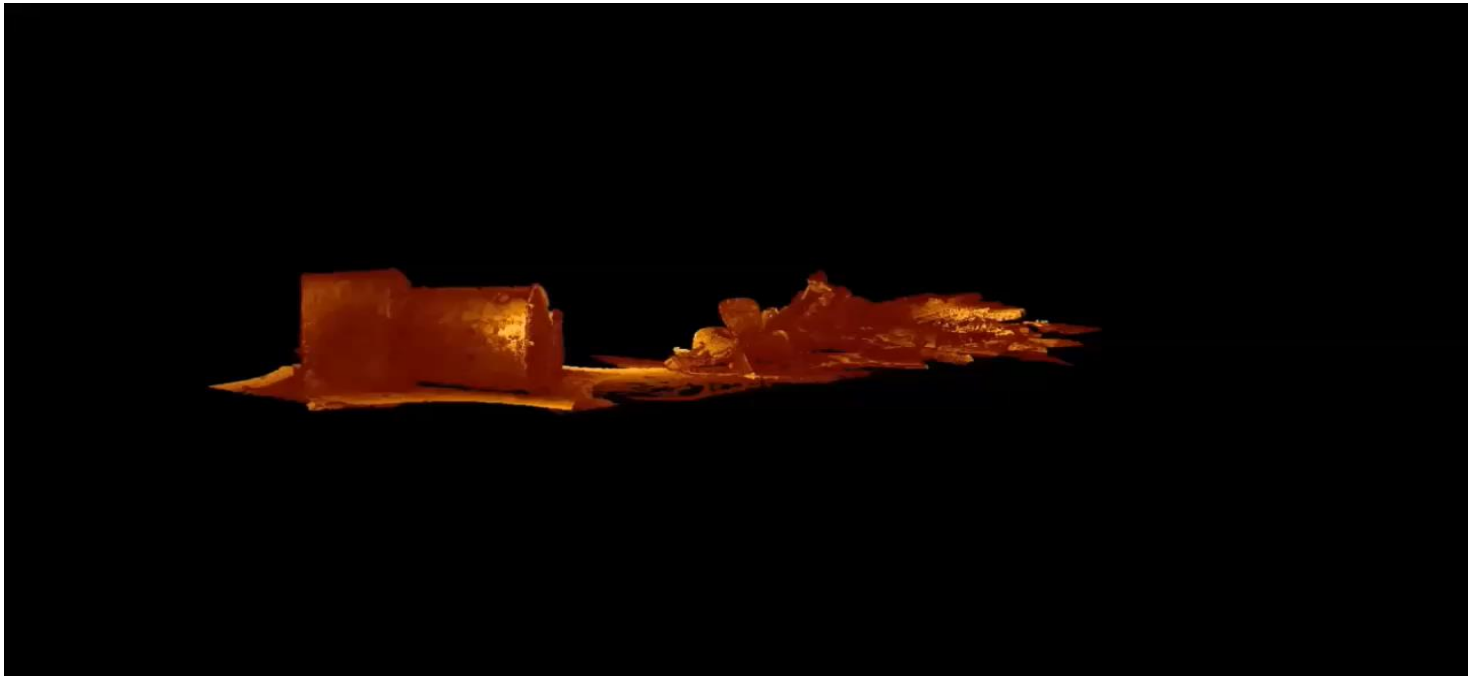
Monohansett Shipwreck

Objective

- Obtain detailed dimensional information of the archaeological site for historical records

Solution

- ULS-500 with rotary actuator diver deployed to perform multiple stationary scans



Costa Concordia Parbuckling

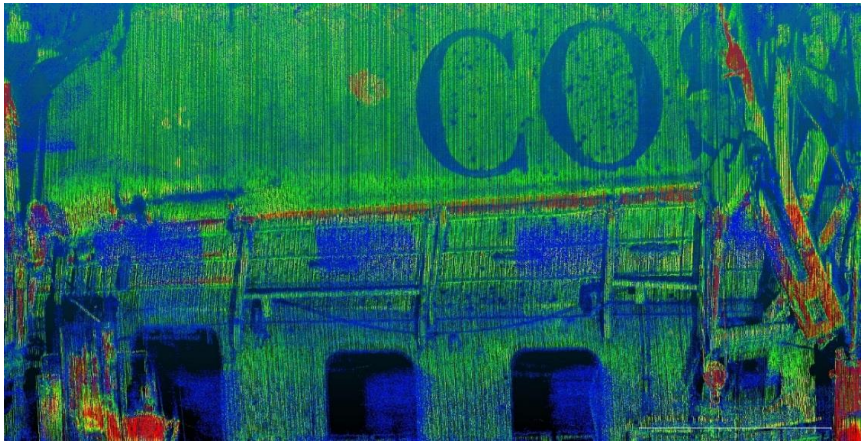
Objective

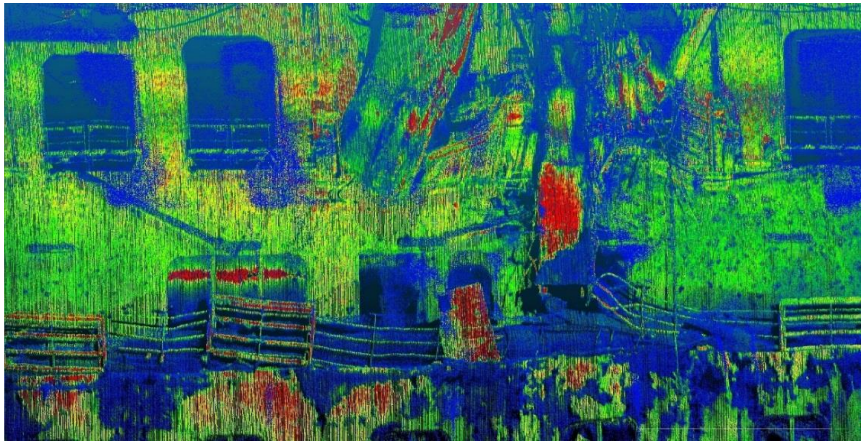
- Assess damage to underwater portion of the Costa Concordia during the salvage operation. Produce point cloud model of the entire underwater portion of starboard hull.

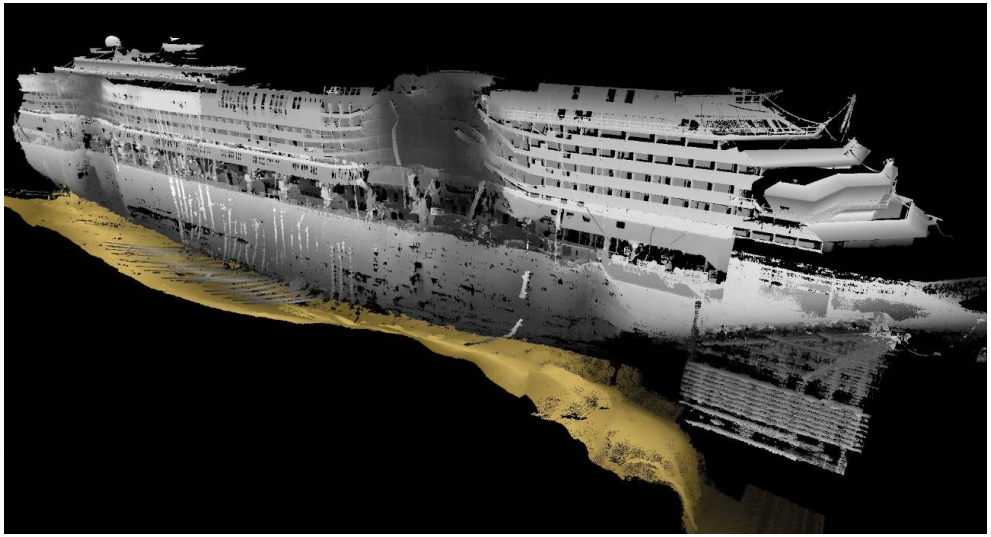
Solution

- ULS-500 operating in Profile mode was mounted to a pole and lowered into the water from a survey boat. The scanner produced high resolution 3D point cloud models of the damage.

Costa Concordia Parbuckling







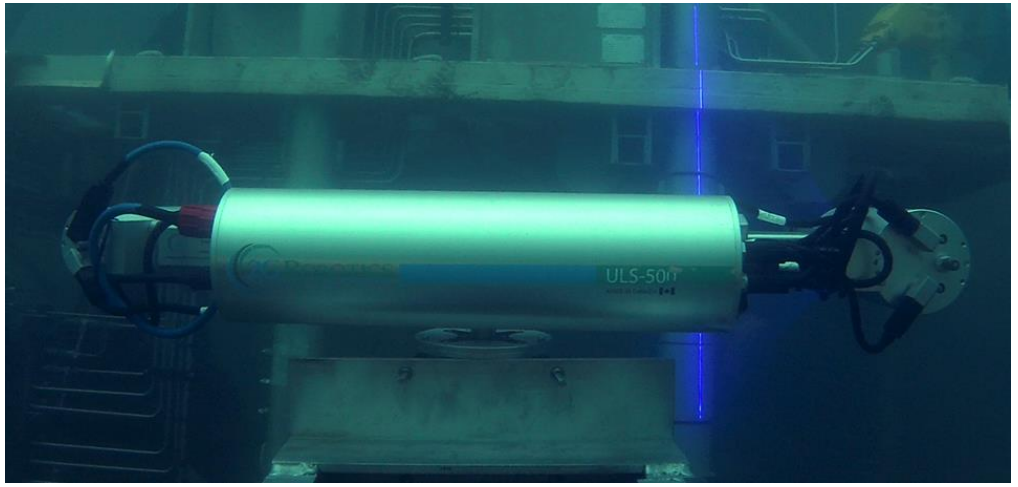
Structure Inspection

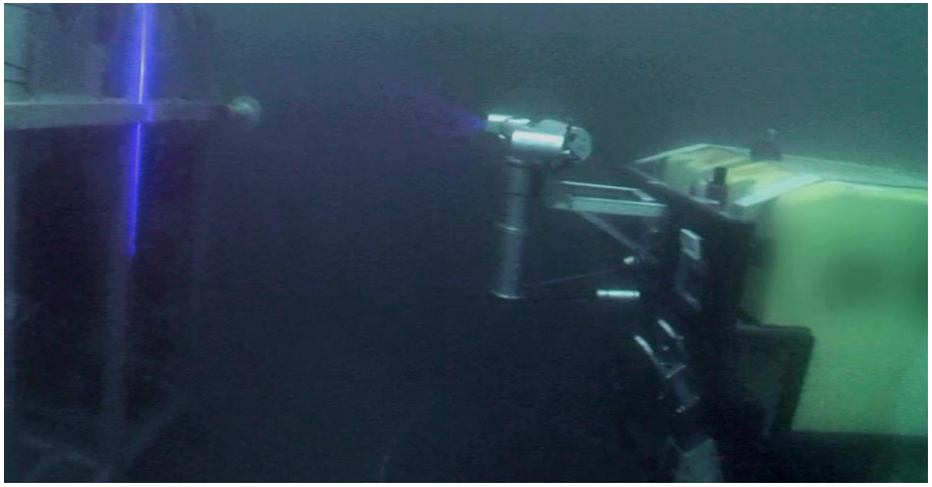
Objective

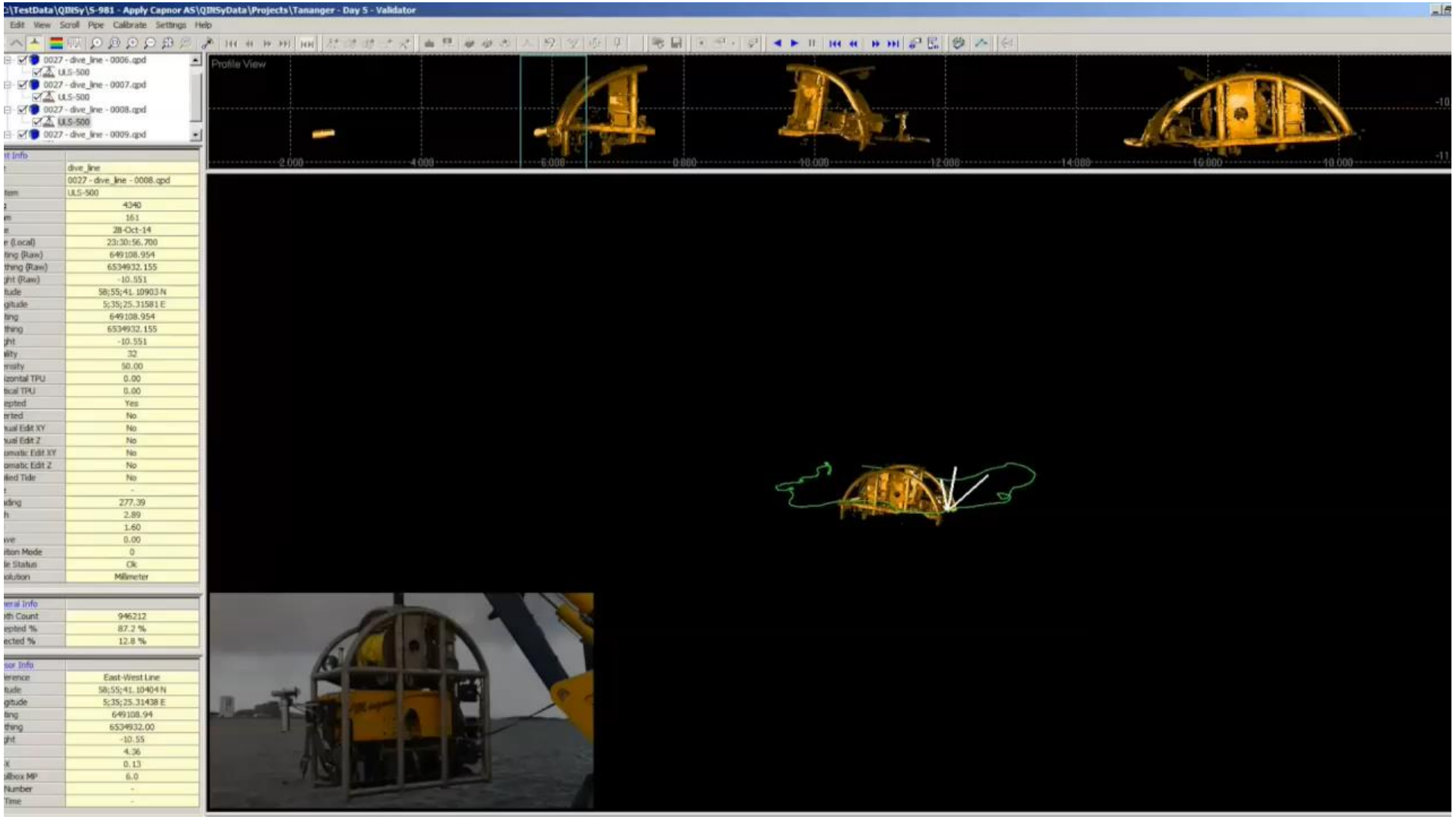
- Stationary and dynamic scanning trials performed with ULS-500 for structure inspection

Solution

- Apply Capnor integrated the ULS-500 with an Oceaneering Magnum ROV, Phins 6000 INS + DVL, Gen 5 MUX and interfaced with the hydrographic survey and navigation software, QINSy.



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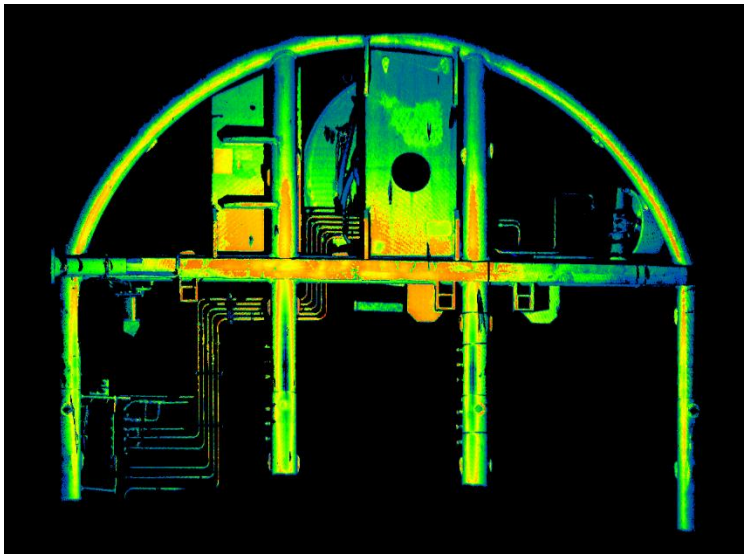
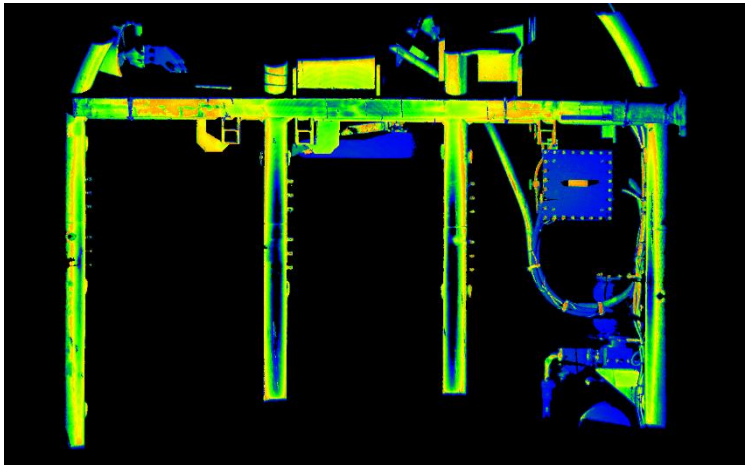
Profile View

Structure Inspection



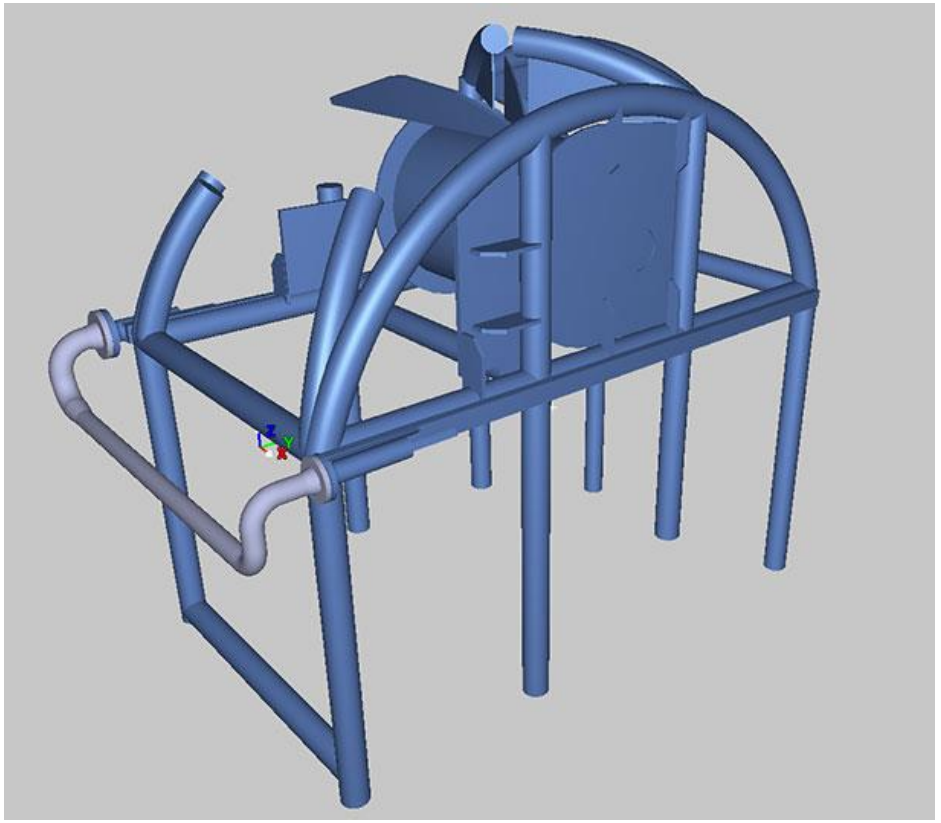


Real Time QINSy Data

Structure Inspection

Operation

- Apply Capnor produced an accurate 3D model and designed a spool between the two flanges located on the structure using the ULS-500 data



Spool Metrology

Background

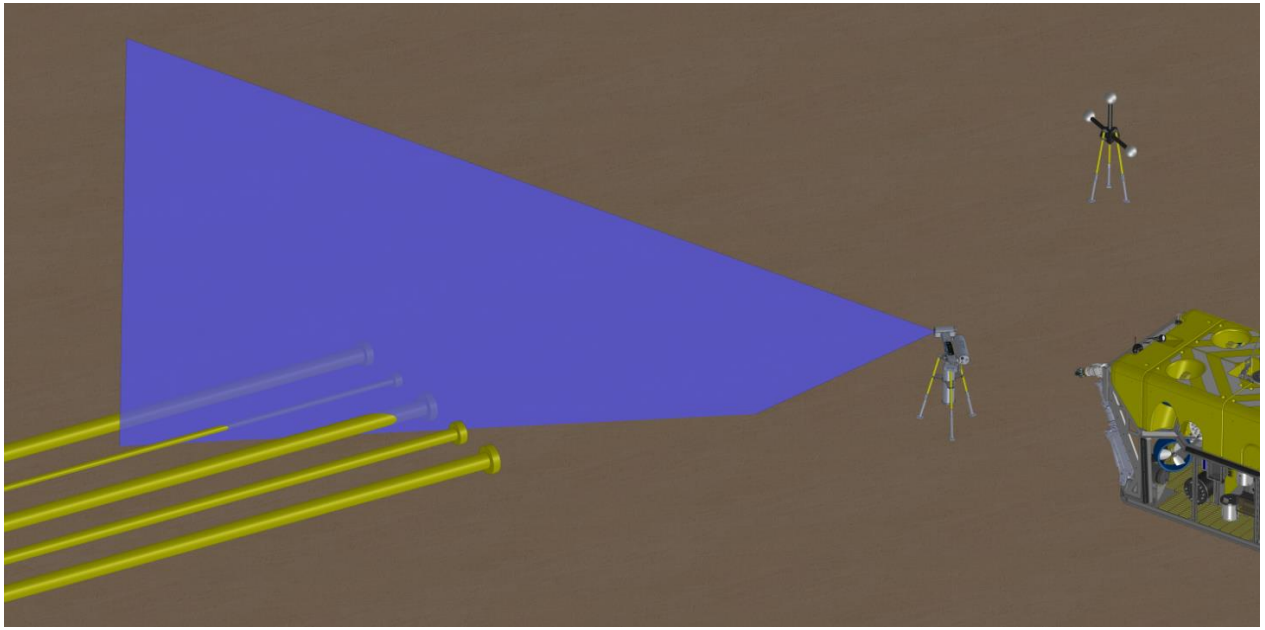
- 2G Robotics' ULS-500 underwater laser scanner selected by Subsea 7 for a hybrid long baseline (LBL)/laser scanning solution

- Metrology performed in the North Sea

Spool Metrology

Objective

- Design five spool pieces to connect a newly installed bundle towhead to five previously laid spool pieces

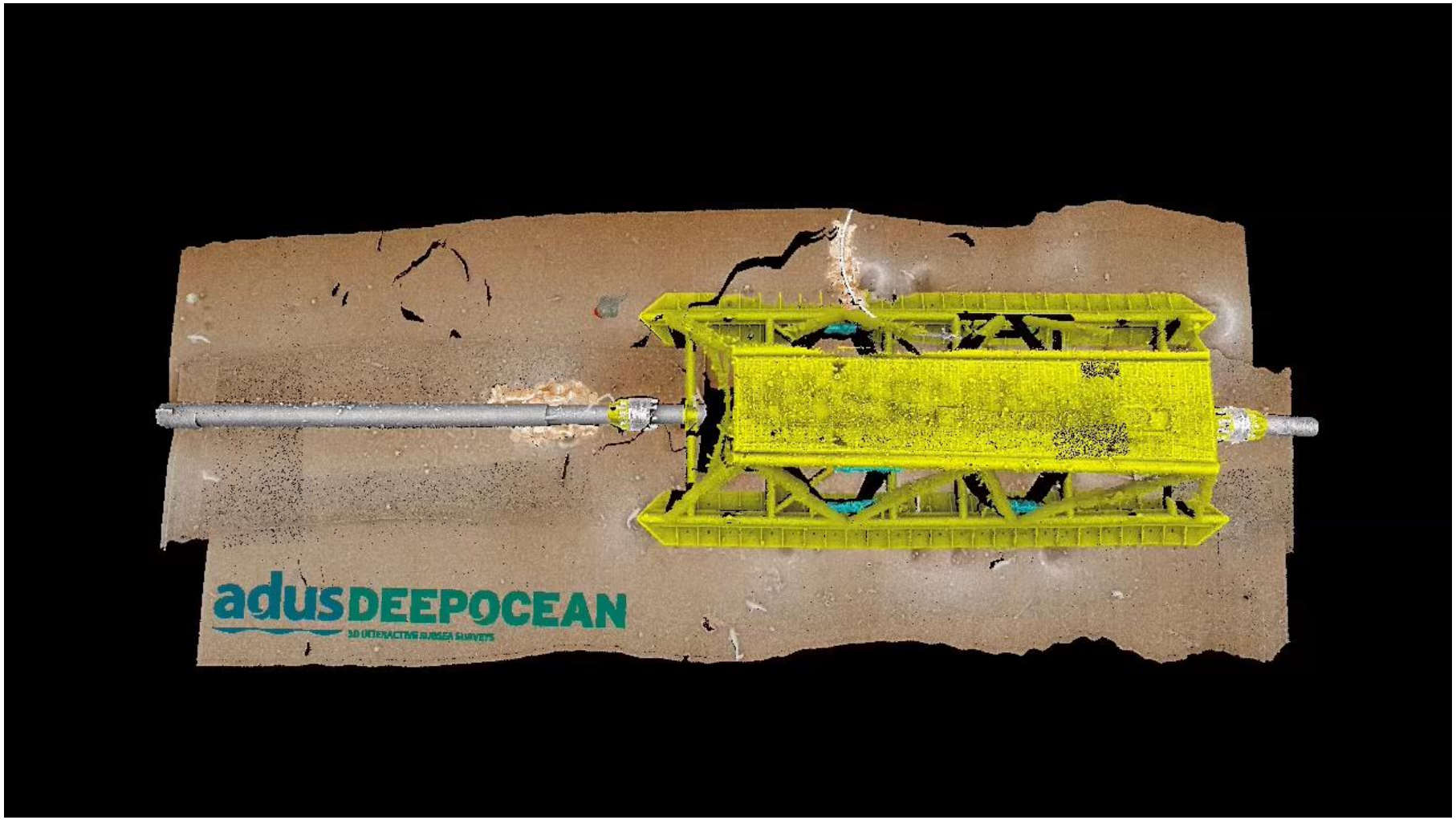


Spool Metrology

Solution

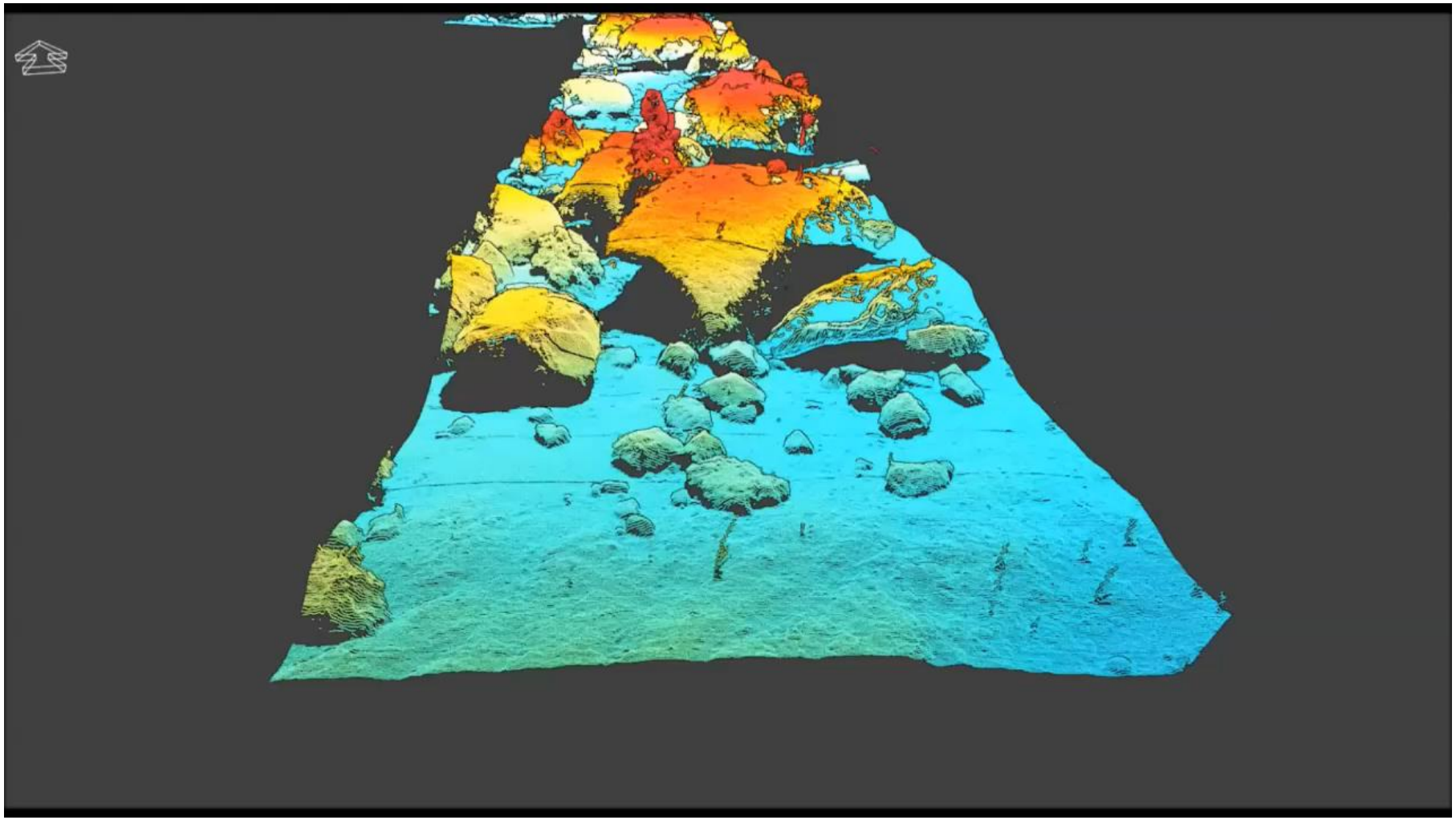
- Entire data set captured in only 3.5 hours
- Laser scanning approach generated a complete 3D visualization comprised of 14.6 million points
- Data captured in real-time and processed while offshore

Pipeline Assessment

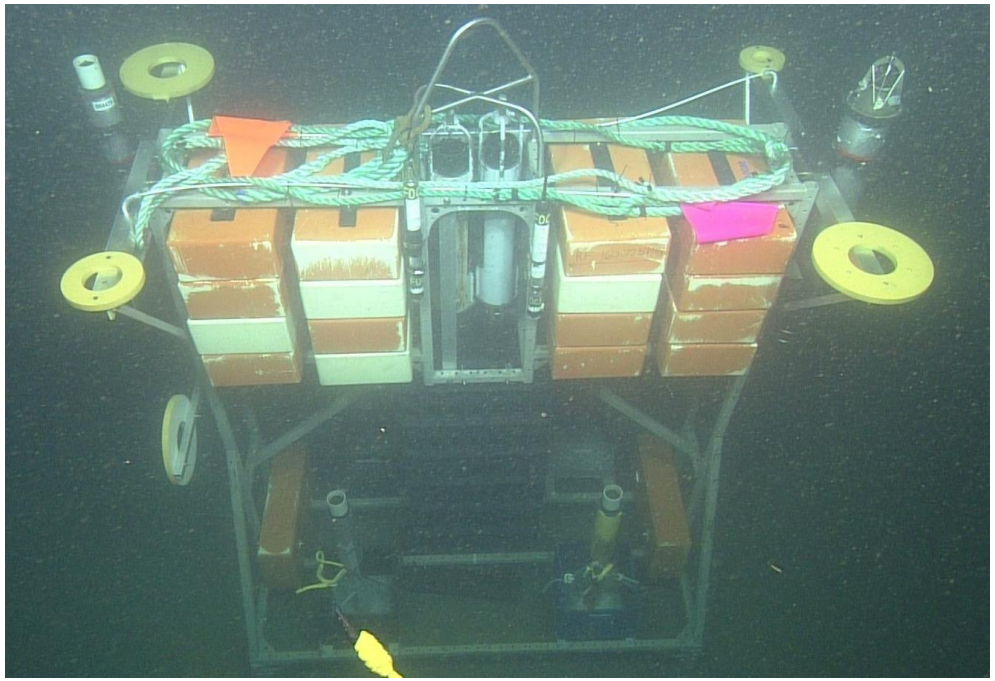


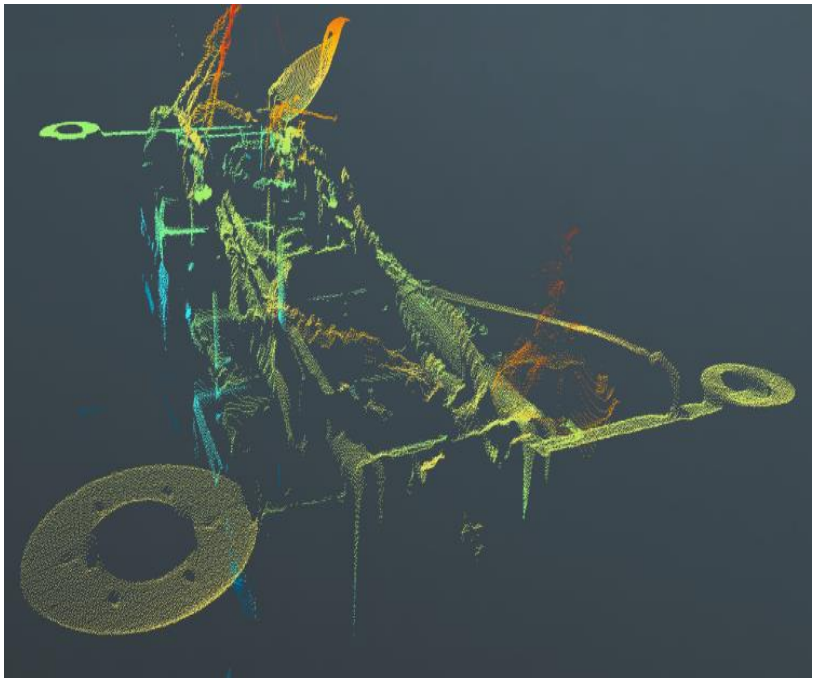
Pipeline Assessment

Trials with Sonardyne and MBARI



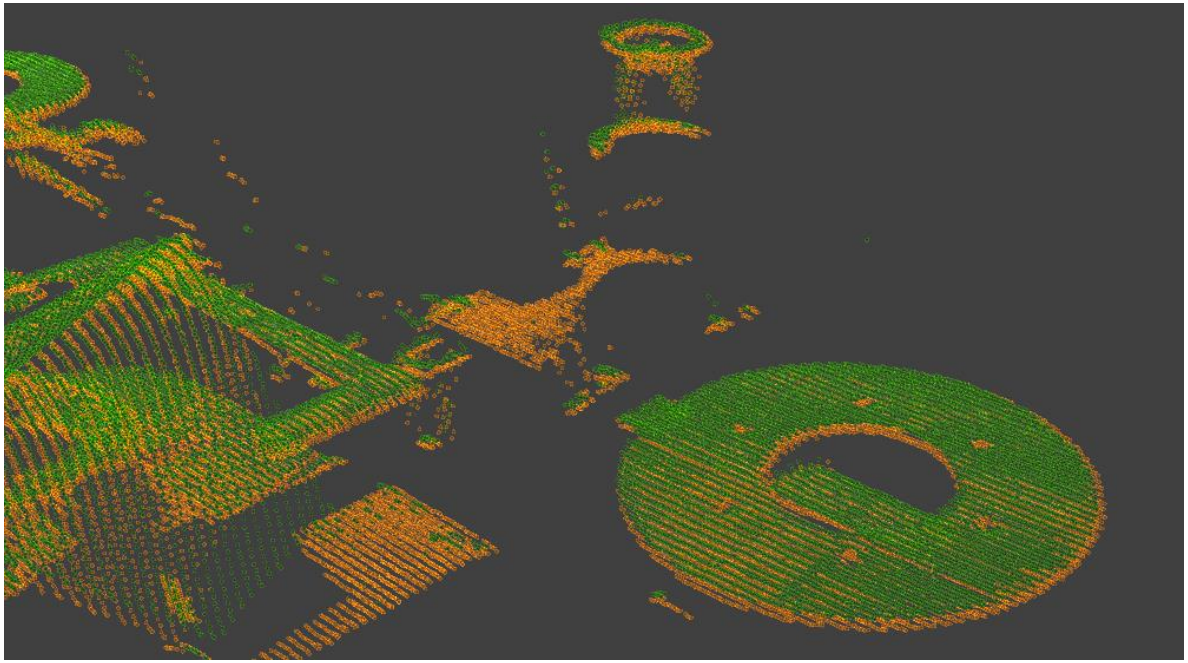
Trials with Sonardyne and MBARI





Trials with Sonardyne and MBARI

- Two consecutive passes of same flange (orange & green)
- Horizontal and vertical differences 0.5 – 1 cm
- Orientation difference << 1 deg. Flange point clouds match plane to 1.7mm RMS!
- Hub/flange orientation <<0.5 deg (likely 0.1 – 0.2 deg)



What does this mean for operational efficiencies?

- **1 hour operational ROV time per metrology is ahead**
  6 baselines mapped in 1hr 45 minutes (still improving) of ROV seabed time. Speed 0.1 m/s over structures and MAX when flying baselines
- **Contactless direct hub orientation**
  << 0.5 deg, likely 0.1-0.2 deg without ”DimCon”
- **Seabed profile**
  Inherent part of the delivery (3D point cloud).
- **Minimal Calibration**
  Auto-calibration, mechincal integration,...
  Less time, less complexity and less blunders.

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Thank you for your time.

Any Questions?

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an ACTEON company