Improved Operational Efficiency with Laser Scanning
Scott Gray, Operations Manager, Seatronics Ltd.
Overview

- ULS Underwater Laser Systems
- Trade-offs with Sonar and laser
- System Operation
- Results
- Preview of the PRO
2G Robotics

- Founded in 2007 in Waterloo, Ontario, Canada.
- Dedicated to advanced research, development, and engineering for the production of innovative and cutting-edge solutions.
- Over fifty systems built and deployed worldwide on all seven continents.

Seatronics

- The Marine Technology Specialists
- Global leaders in provision of marine electronics to the subsea services market
- Global partners and distributors of 2G Robotics ULS range of systems
ULS Laser Systems

ULS-100

ULS-200

ULS-500

The Marine Technology Specialists
How the ULS Systems Work

360° Head Rotation

Scanner Head

Scanner Body

Collects Data Points

50° Laser Swath

Target Object

RS-485 Connection for ROV, AUV & Diver Deployment
Dynamic

Static

Top View

The Marine Technology Specialists
Trade-offs between Sonar and Laser
Static Deployment

100 - 240 VAC
50/60 Hz

Scanner Command and Data

Ethernet

Junction Box

Underwater Cable

ULS-500 Inputs:
-12-76 VDC Power
-Scanner Command

ULS-500 Scanners

2G Robotics Software

ULS-500 Outputs:
-Scanner Data
Vessel Deployment

The Marine Technology Specialists
ROV Deployment
AUV Deployment

AUV Power Supply

AUV Computer

Laser Controller

Laser Receiver

Laser Transmitter

18-75 VDC, 200W

PMU, DVL, INS

Scan Data

AUV Instruments
ULS-500:
Laser Transmitter
Laser Receiver
Control Computer

Positioning:
USBL transponder
INS
DVL

GPS Antennas

USBL

GPS Data

Third Party Processing Software

AUV Computer

3rd Party Topside POS Computer

GPS Data

2GRobotics

seatronics
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.
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
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
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.
Structure Inspection

Real Time QINSy Data
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.
Pipeline Survey- Adus Deepocean

Objective

- Assess pipeline integrity

Solution

- ULS-500 integrated with ROV and positioning and navigation systems and interfaced with QPS QINSy to survey the pipeline
Pipeline Survey

ADUS DeepOcean
Dynamic Seabed Scanning with Sonardyne

- ULS-500 integrated with ROV and SPRINT for positioning along with EIVA NaviSuite
Dynamic Spool Metrology with Sonardyne
<table>
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<th>Metrology From</th>
<th>To</th>
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<th>Ref. Acoustic Baseline [m]</th>
<th>Difference [m]</th>
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<td><strong>RMS</strong></td>
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<td></td>
<td><strong>45.28m</strong></td>
<td><strong>3.11cm</strong></td>
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What does this mean for operational efficiencies?

- 15m hub to hub metrology completed in 20 minutes- 4 scans 3 of which were redundant.
  Compared to stationary laser scanner approach which took 6 hours
- Operational in conditions where other systems couldn’t operate due to proximity of ROV ranges to target.
- Contactless method of performing metrologies
- Real time 3D data in large volumes
- **Seabed profile**
  Inherent part of the delivery (3D point cloud).
- **Minimal Calibration**
  Auto-calibration, mechanical integration,...
- Reduced operational vessel and ROV time!
ULS-500 PRO Preview

- Range: 15m+
- Up to 30,720 points/sec and 30 profiles/sec
- Integrated stills imaging and smart subsea light
Dynamic U-Boat scanning
Dynamic U-boat Scanning

Objective

- Provide 3D documentation of an underwater WWII battlefield

Solution

- ULS-500 PRO interfaced with EIVA NaviSuite and attached to a frame mounted to a Triton 1000/2 submarine with SPRINT for positioning
Dynamic U-boat Scanning
Dynamic U-boat Scanning
Thank you for your time.
Any Questions?