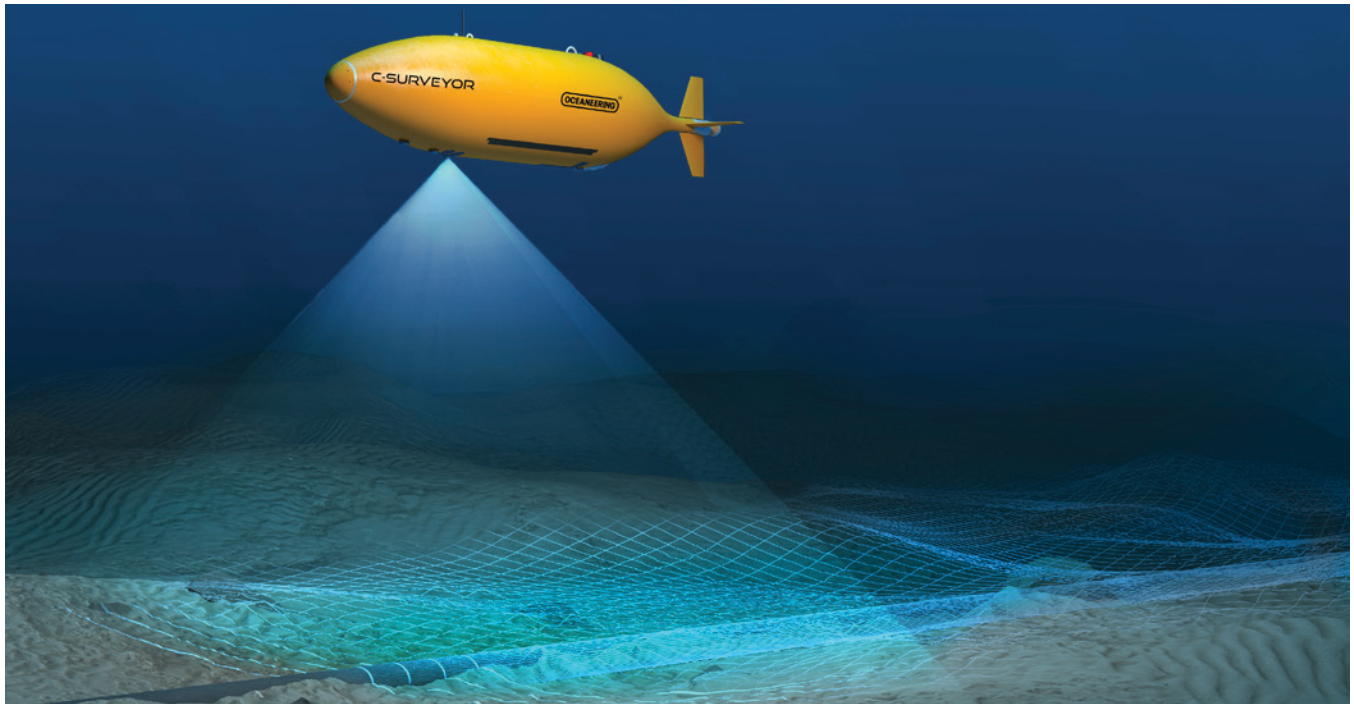


Oceaneering AUV Asset and Site Surveys

Survey for pre-lay, post-lay as-built, and detailed linear asset inspection services

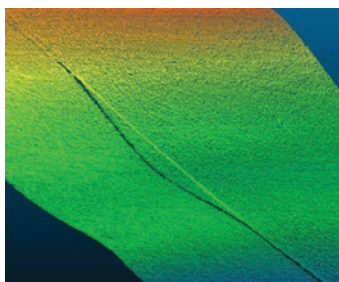


The Oceaneering fleet of Autonomous Underwater Vehicles (AUVs) works in depths up to 4,500 m anywhere in the world. In the past 16 years, **Oceaneering®** AUVs have surveyed over 401,000 km of data for over 75 clients in 14 countries, including over 2,000 km of pipeline inspection data.

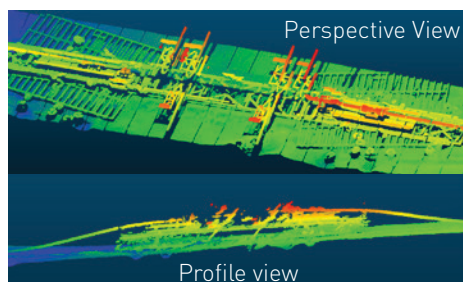
Oceaneering AUV Asset and Site Surveys

Survey for pre-lay, post-lay as-built, and detailed linear asset inspection services

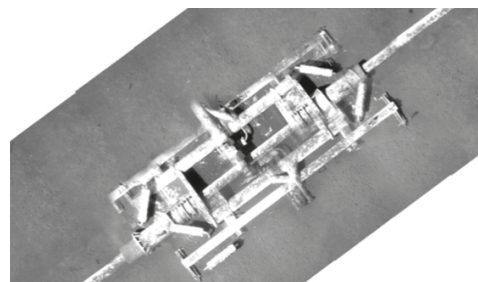
Multibeam point cloud at span



Laser point cloud at structure



Photomosaic at in-line structure



AUV vs. ROV Comparison

	AUV	ROV	Remarks
Speed of Survey	3.0 – 3.7 kn	0.25 - 0.50 kn	AUV is 10-15 x faster
Cost (nominal)	\$85,000/day	\$105,000/day	Less field time at lower rate
Visual Imagery	Geo-referenced photomosaics	Video (no geo-tagging)	Interactive GIS data
Laser Swath Bathymetry	✓	✗	Industry leading 5 mm resolution
Side Scan Sonar	✓	✗	AUV standard 410 Khz
Subbottom Profiler	✓	✗	Allows buried pipe detection
Multibeam	✓	✓	AUV standard 400 Khz ROV optional mob
Magnetometer	✓	✗	Allows buried pipe and hazard/UXO detection
ESRI Based Review Software	✓	✗	Oceaneering IntegReview™
Autonomous Top-of-Pipe Tracking	✓	✗	Unique to Oceaneering AUV fleet

Cost Comparison (50 mile Pipeline Survey)

ROV

Speed @ 0.25 knots = **8 Days**
Total Cost: **\$840,000***

AUV

Speed @ 3.5 knots = **< 1 Day**
Total Cost: **\$85,000****

Cost Savings of \$755,000

* Dockside mobilization of ROV with equipment and transit time not factored ** Dispatch and transit time not factored

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Portfolio of Past Success:

- » 16 years of commercial AUV operation
- » 2014 International Operator Inspection Survey (>500 km over 90 flowlines)
- » 2016 GOM Operator Span Analysis (>110 km of pipeline)

Proof of Concept (POC):

- » Oceaneering proves our industry leading capabilities by offering a free test day
- » Any GOM flowline 1 to 5 km in length with features that can highlight our technology

POC Field Acquisition Outline:

- » One 'recon' line to ensure flowline position and confirm heights of existing infrastructure
- » Two low pass lines; one center line and one 3-meter offset line
- » Additional transect lines at areas of interest

AUV Surveys Assure Value for:

- » Pre-lay/post-lay surveys
- » Areas of concern mapping
- » Span analysis
- » Asset inspection and integrity
- » Baseline surveys

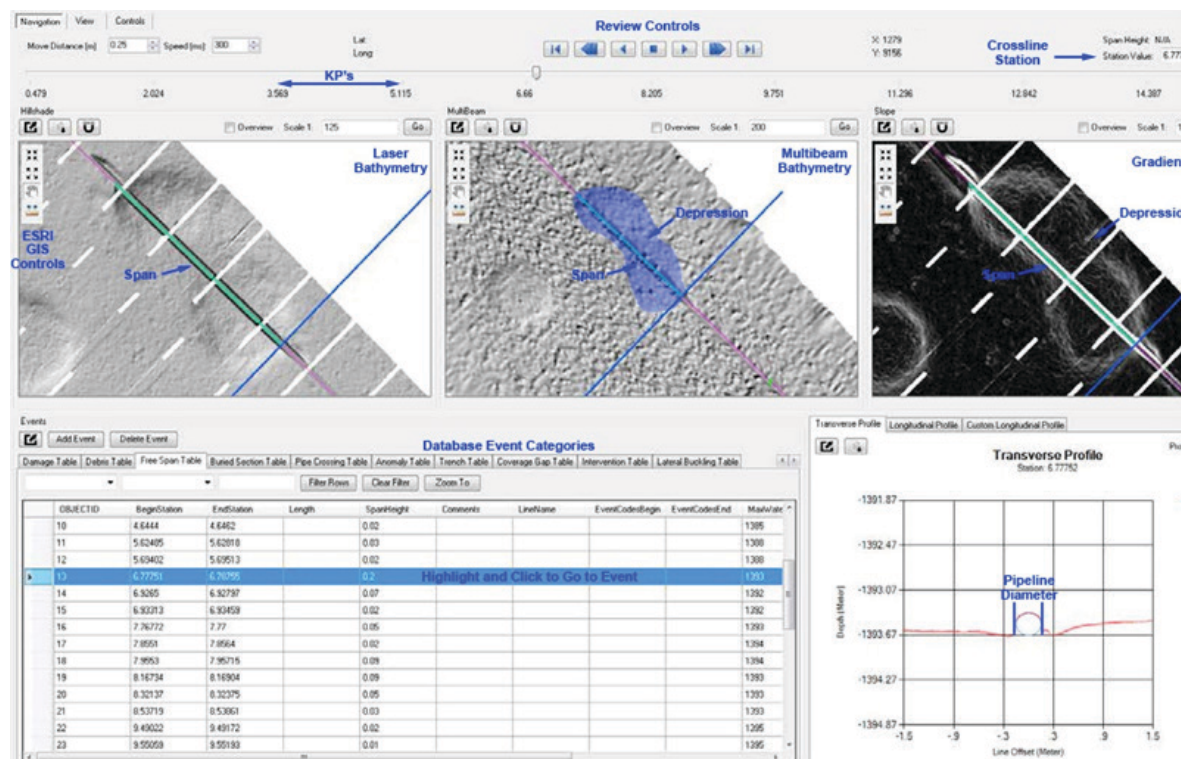
Features Classified:

- » Anodes
- » Field joints/engineering features
- » Lateral buckling
- » Free-span/burial
- » Debris/marine growth

Benefits:

- » Enhanced data quality
- » Dramatically lower cost
- » Real-time AUV data visualization
- » Support asset change detection
- » Oceaneering bespoke review software

Introducing Oceaneering GIS Tool IntegReview™ – Integrated Asset Reviewer



■ For more information, auv-request-oi@oceaneering.com or call +1 337.210.0000

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