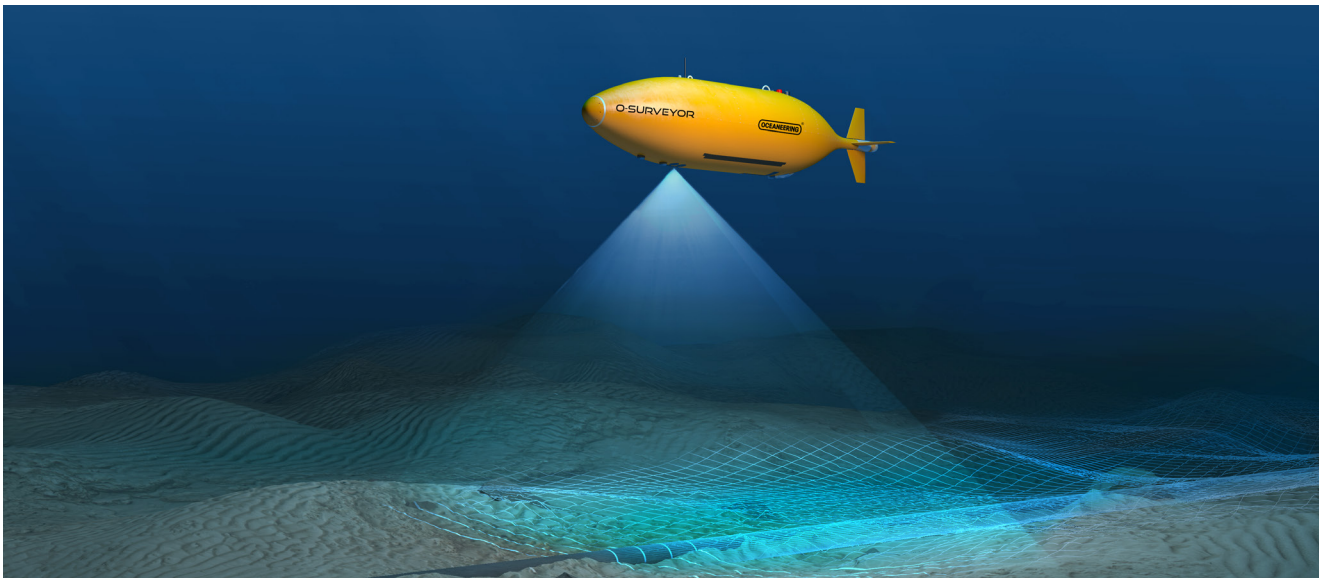


Autonomous Underwater Vehicle (AUV) Survey Services

Setting the standard in deepwater AUV capability



AUV Capabilities

Oceanengineering Survey Services pioneered the world's first commercially operated deepwater AUV nearly two decades ago. Oceanengineering now leads the market with the Ocean Surveyor AUVs and our AUV pipeline inspection capabilities incorporating a state-of-the-art laser micro bathymetry system. Combining side scan sonar, multibeam, camera, laser, and auto pipeline tracking, we provide pipeline inspection with a single pass over the top of the pipe or a single pass on either side of the pipe for full inspection and spanning analysis.

As industry leaders in the fields of AUV technology and deepwater mapping, Oceanengineering professionals have an unmatched depth of expertise and experience. Oceanengineering sets the standard in deepwater AUV capability and has completed more than 383,000 kilometers of survey for 93 clients on 580 different deepwater projects.

Autonomous Underwater Vehicle (AUV) Survey Services

Ocean Surveyor AUV Technical Data

AUV Specifications: Kongsberg Hugin Body

| | |
|--------------|-------------------------------------|
| Depth Rating | 9,840 - 14,760 ft / 3,000 - 4,500 m |
| Length | 18 - 20 ft / 5.4 - 6.4 m |
| Power | Lithium ion polymer battery |
| Endurance | 24-40 hours per dive |

Multibeam Kongsberg EM 2040

| | |
|-------------------|--------------------------------|
| Swath Angle | 140° |
| Number of Beams | 256 beams @ 200 kHz or 400 kHz |
| Ping Rate | Adjustable to 3 Hz to 20 Hz |
| Water Column Data | Recording enabled |
| Output | all Format, XYZ, or other |

Side Scan Sonar Edge Tech Seafloor Mapper

| | |
|----------------|---------------|
| Low Frequency | 120 kHz Chirp |
| High Frequency | 410 kHz Chirp |
| Output | XTF |

Sub-bottom Profiler: EdgeTech Full Spectrum Chirp

| | |
|-------------|----------------------------------|
| Transducers | 1 to 4 units at 1.5-10 kHz Chirp |
| Hydrophones | 6 element receiver array |
| Output | SEG-Y |

Laser Bathymetry System: 2G Robotics

| Model | ULS-500 | ULS-500-PRO |
|----------------------|--------------------|-----------------------|
| Range Resolution | 5 mm @ 8m altitude | 4.5 mm @ 10m altitude |
| Swath Coverage Angle | 50° | 50° |
| Samples Per Swath | 1,400 | 2,048 |
| Max Range | 32.8 ft / 10 m | 65.6 ft / 20 m |
| Swaths Per Second | 21 | 30 |
| Output | LAS, XYZ, or other | |



AUV Sensor Array

Still Camera

| | |
|------------|---------------------------------|
| Resolution | 1360 x 1024 pixels |
| Pixel Size | 5 mm @ 8 m altitude |
| Output | Georeferenced images and mosaic |

Magnetometer: Microtesla / MDM 63000-001

| | |
|-------------|--------------------------|
| Sample Rate | 4 Hz |
| Output | Georeferenced ASCII file |

Ancillary Systems

| | |
|------------------------------|--|
| Payload and Acquisition | Oceaneering Proprietary |
| CTD | Sea-Bird Electronics SBE 49 FastCAT |
| Motion/INS | IXSEA IMU90 |
| DVL | RDI Navigator Doppler Velocity Log |
| Pressure | Paroscientific Digiquartz Depth Sensor |
| Acoustic Positioning System: | Kongsberg Simrad HiPAP® Ultra Short Baseline (USBL) |
| Acoustic Data Link | LinkQuest Acoustic Data Modem for real time data display |

- For more information: oceaneering.com/survey-and-mapping/