OCEANEERING®

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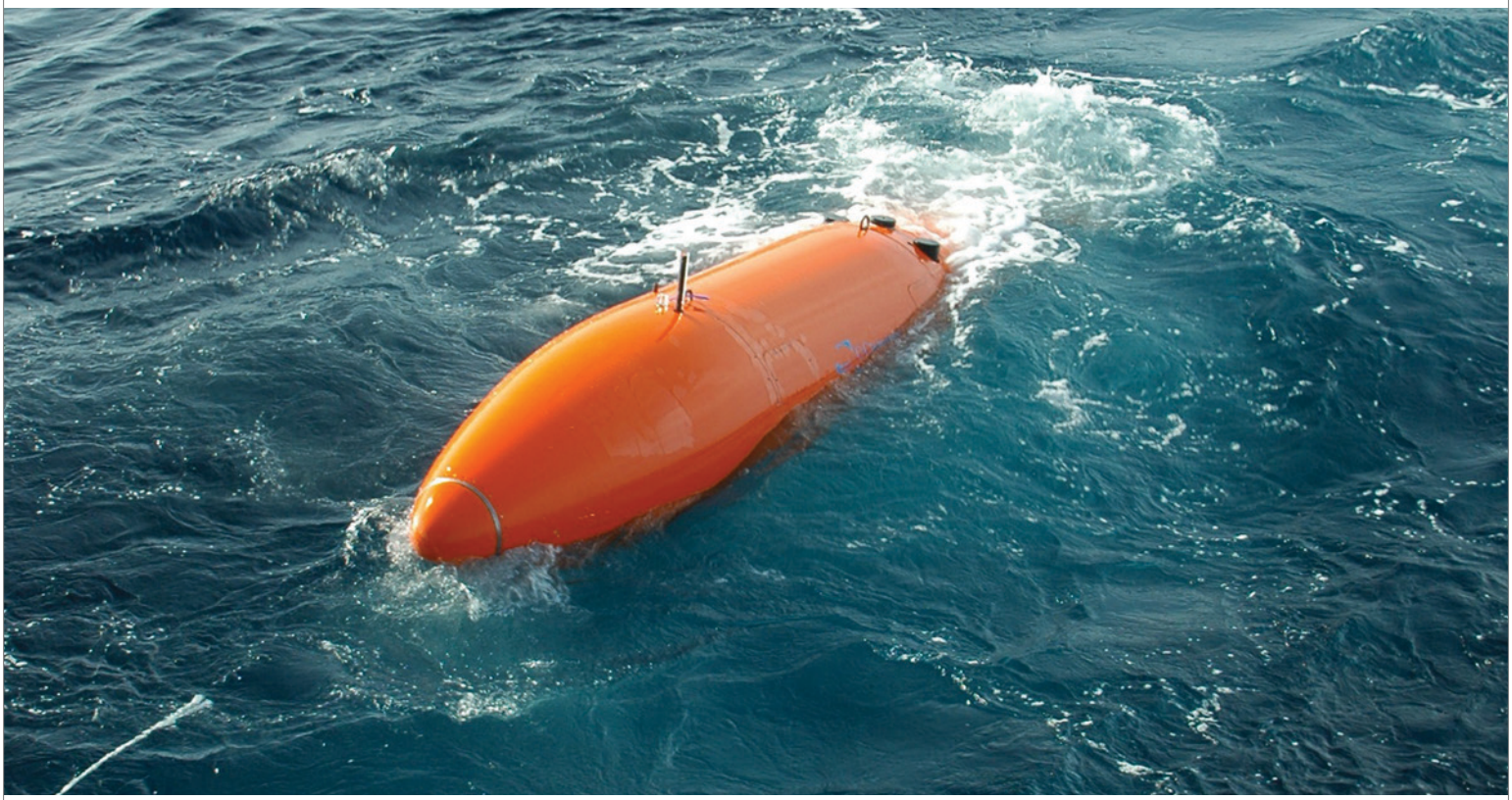
Autonomous Underwater Vehicle (AUV) Surveys

Setting the standard in deepwater AUV capability



Connecting What's Needed with What's Next™

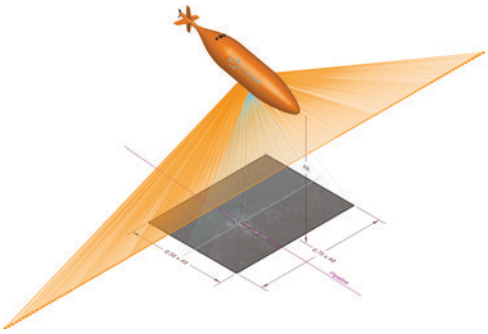
Autonomous Underwater Vehicle (AUV)

Survey Services

AUV Capabilities

Oceaneering Survey Services pioneered the world's first commercially operated deepwater AUV for oil & gas exploration. Now the company leads the market with its four AUVs, including the first complete pipeline inspection AUV incorporating a state-of-the-art laser micro bathymetry system.

As the frontrunner in the fields of AUV technology and deepwater mapping, Oceaneering professionals have an unmatched depth of talent and experience. Oceaneering sets the standard in deepwater AUV capability with more than 366,000 km of survey for 74 clients, on 530 different deepwater projects.



Enhancements

Enhancements to our AUV fleet include a sub-bottom profiler using a frequency range of 1-6 kHz for deeper penetration with four transmit transducers and a 6 element receiver array. The C-Surveyor's proprietary camera system takes flash illuminated black and white photographs of the seabed. The camera takes images at fixed intervals and each photograph has a resolution of 1360 by 1024 pixels with 30% overlap to support high-resolution seafloor mosaics.

Introducing C-Surveyor VI the First Complete Pipeline Inspection AUV

Combining the **Oceaneering®** camera system, laser, upgraded multibeam, geo-chemical suite of sensors, and "Auto Pipeline Tracking" Oceaneering can provide pipeline inspection with one pass over the top of the pipe or one pass on either side for full inspection and spanning analysis. The 4,500 m rated laser micro bathymetry system provides high detail span measurements, while the Kongsberg EM 2040 multibeam supports seep/leak detection with water column data.

The high-resolution digital camera provides geo-referenced photo mosaics, pseudo-video of pipeline routing, and subsea infrastructure mosaics with 5 mm resolution at 8 m altitude. Utilizing these technologies, the C-Surveyor VI is capable of running all sensors at a survey speed of 3 to 4 kts for up to 40 to 44 hours, with a selectable survey altitude of 4 to 8 m ensuring optimum efficiency coverage.

C-Surveyor III, V & VI Technical Data

Dimensions	III	V & VI
Depth Rating:	14,763 ft / 4,500 m	9,842 ft / 3,000 m
Length:	21 ft / 6.4 m	20.99 ft / 6.4 m
Power:	Lithium Ion Polymer Battery	

Multibeam: Kongsberg Simrad EM 2040	
Transducer Depth Rating:	6,000 m
Transducer Head Angle:	140°
Number of Beams:	256 beams @ 200 kHz 400 beams @ 400 kHz
Operating Frequency:	200 or 400 kHz
Ping Rate:	Adjustable to 20 Hz / 3Hz
Nominal Depth Resolution:	.3% of Altitude
Recording Format:	Simrad Datagram

Side Scan Sonar: Edge Tech / AUV / UUV / Seafloor Mapper	
Transducer Depth Rating:	6,000 m
Operating Frequency (1):	120 +/- 7.5 kHz Chirp
Operating Frequency (2):	410 +/ - 25 kHz Chirp
Recording Format:	Edge Tech Seg-y

C-Surveyor III, V & VI Technical Data (continued)

Subbottom Profiler: EdgeTech Full Spectrum Chirp
Subbottom Profiler - 1-6 kHz
Chirp with 6-element receiver array

High Resolution Laser Bathy System: 2G Robotics/ULS-500	
Range Resolution:	5 mm
Swath Coverage Angle:	50°
Samples Per Swath:	1,400
Max Range:	10 m
Swaths Per Second:	29

Camera:
High Resolution Camera System with Photo Mosaic Capability at 6-10 m from seafloor

Magnetometer: Micritesla / MDM 63000-001	
Sample Rate:	4

Ancillary System:
Seabird Electronics SBE 49 FastCAT CTD Digiquartz Depth Sensor
IMU90
RDI Navigator Doppler Velocity Log

Payload:
Oceaneering Proprietary

Acoustic Positioning System:
Kongsberg Simrad HiPAP Ultra Short Baseline (USBL) Acoustic Positioning System

Acoustic Data Link:
Link Quest Acoustic Data Modem for real time data display

C-Surveyor IV Technical Data

Dimensions	
Model:	Hugin 1000 AUV
Length:	15 ft / 4.75 m
Power:	Lithium Rechargeable Batteries
Depth Rating:	9,842 ft / 3,000 m
Side Scan Sonar:	EdgeTech 2200 Side Scan Sonar

Subbottom Profiler: EdgeTech / AUV / UUV Seafloor Mapper	
Transducer model:	DW216 2-16 kHz Chirp Subbottom
Operating Frequency:	1-12 kHz Chirp

Camera:
High Resolution Camera System with Photo Mosaic Capability at 8 m from seafloor

Ancillary System:
Seabird Electronics SBE 49 FastCAT CTD Digiquartz Depth Sensor
Honeywell 9900G IMU
RDI Navigator DVL - WHN300 - 300 kHz

Acoustic Positioning System:
Kongsberg Simrad HiPAP Ultra Short Baseline (USBL) Acoustic Positioning System

Acoustic Data Link:
Link Quest Acoustic Data Modem for real time data display

- For more information: **oceaneering.com/survey**

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