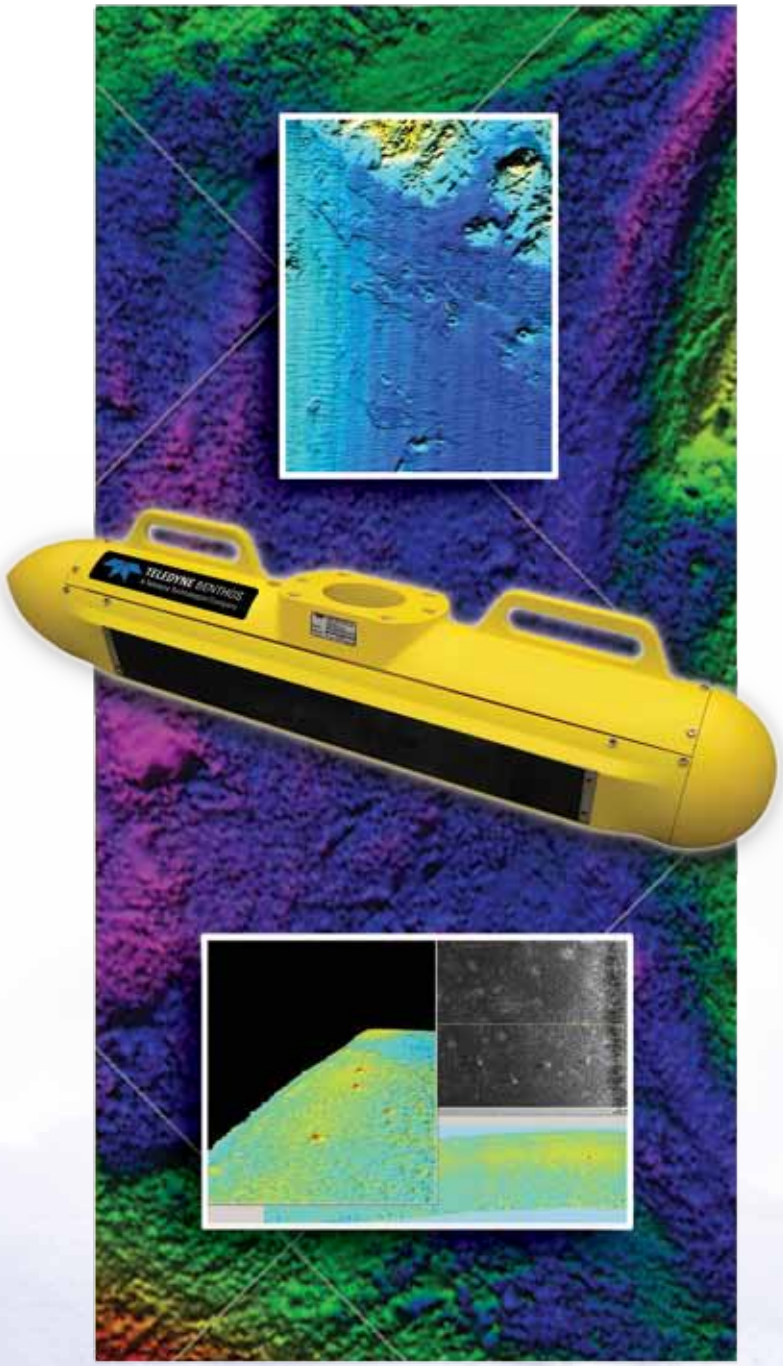
Geophysical

SIDE SCAN SONAR IMAGING SYSTEM

C3D-LPM Lightweight Pole Mount

The C3D-LPM system combines high-resolution imagery and wide swath bathymetry for bottom mapping, image interpretation, and a 3-dimensional look at the seafloor. It represents the latest in sonar imaging with patented technology under license from Simon Fraser University using a technique called CAATI (Computed Angle of Arrival Transient Imaging). This technique incorporates a multi-array transducer and is capable of solving for multiple angles-of-arrival, resulting in a more detailed view of the seafloor.



Applications

- Channel clearance studies
- Hydrographic charting
- Engineering and scientific studies
- Biomass for fisheries
- Object detection
- Cable/pipeline surveys

Benefits

- Man-portable at just 19 kg (42 lbs)
- No subsea electronics bottle

INNOVATIVE UNDERSEA SYSTEMS TECHNOLOGY

TELEDYNE BENTHOS

A Teledyne Technologies Company

Description

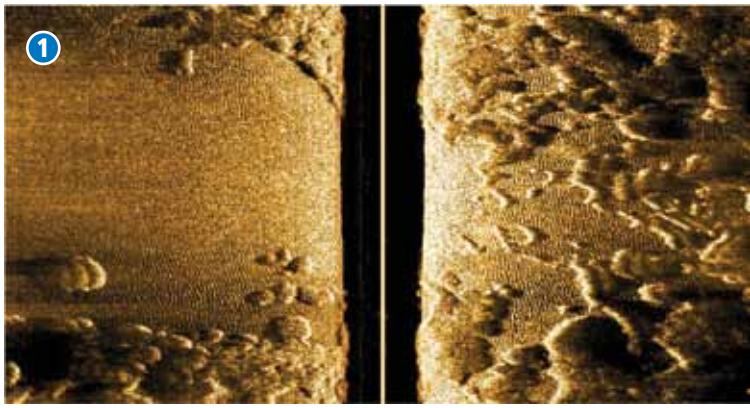
The C3D-LPM is available in over-the-side mount and UUV/AUV configurations. The cable lengths from the subsea unit to the surface can be adapted to your vessel configuration. The system is delivered with a pair of standard 20 meter cables.

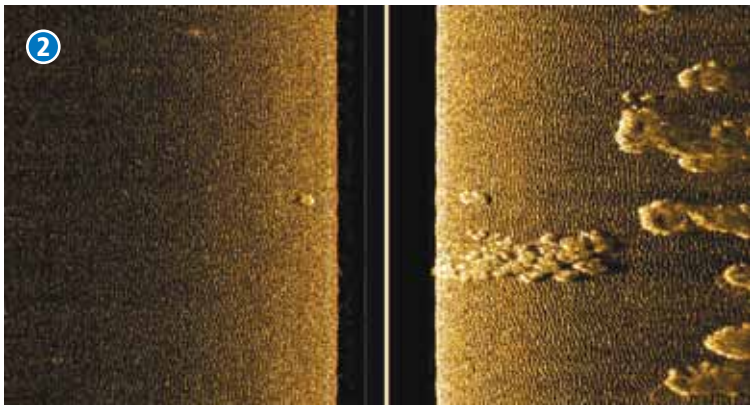
The C3D-LPM is the Lightweight Pole Mount model in the C3D series. This ultra-portable system is highly suitable for small craft operation. The system produces high-resolution imagery, wide swath bathymetry (for bottom mapping), image interpretation, and a 3-dimensional view of the seafloor.

The C3D system provides many efficiencies for surveyors by offering a wider swath, imagery and bathymetry - and it is all generated by one sensor in a convenient, portable configuration. This lightweight solution is most efficient for use in shallow coastal waters up to 100 meters in depth. The system is ideal for fisheries habitat mapping, port and harbor security, coastal studies and mine countermeasures.

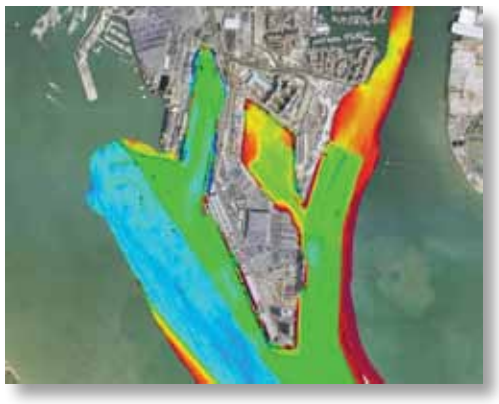
CAATI (Computed Angle of Arrival Transient Imaging) is a patented technique licensed to Teledyne Benthos by Simon Fraser University. CAATI resembles interferometry in that it uses a similar angle-of-arrival estimation but differs in it's use of amplitude and phase. The C3D solves the problem of concurrent arrivals from multiple angles.

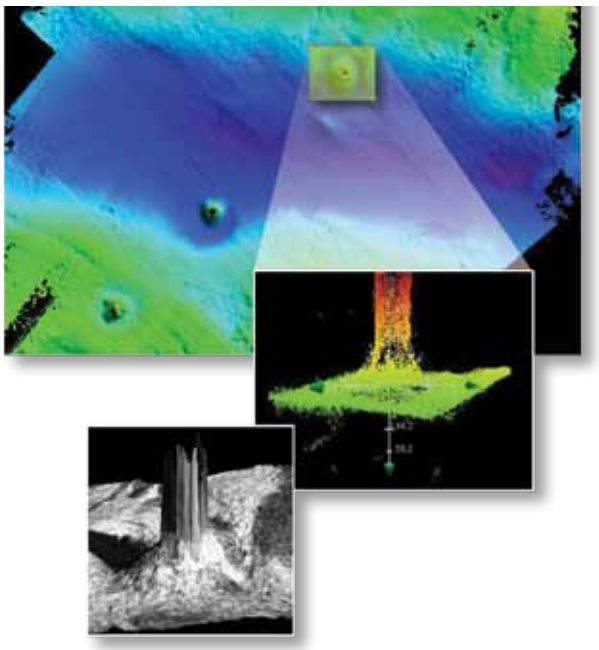
The C3D-LPM is the best solution for combining side scan imagery and bathymetric data. The data sets are collected at the same place and time and there is no need to merge data sets as with multi-beam and side scan sonar systems running separately. Each point along the track has X, Y and Z components. The resolution is based on pulse length rather than footprint, allowing for a much larger swath since the system is not limited by the physical number and shape of arrays.



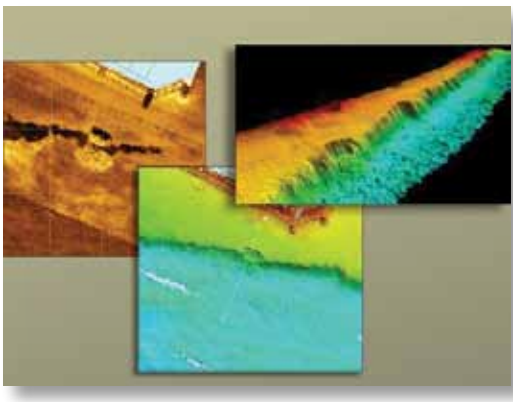


Figures 1 & 2 (above): Data images of habitat patches, sand ripples as small as 5cm with Eelgrass patches. Courtesy of Provincetown Center for Coastal Studies.





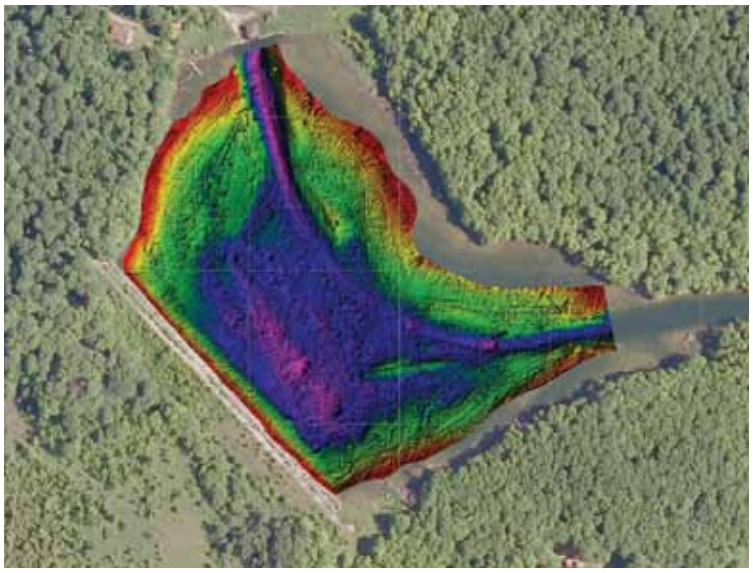
At the 100 meter range there are 2000 points compared to only a few hundred when using multi-beam systems. This allows for much greater cross-track resolution and higher definition of the image of the seafloor.

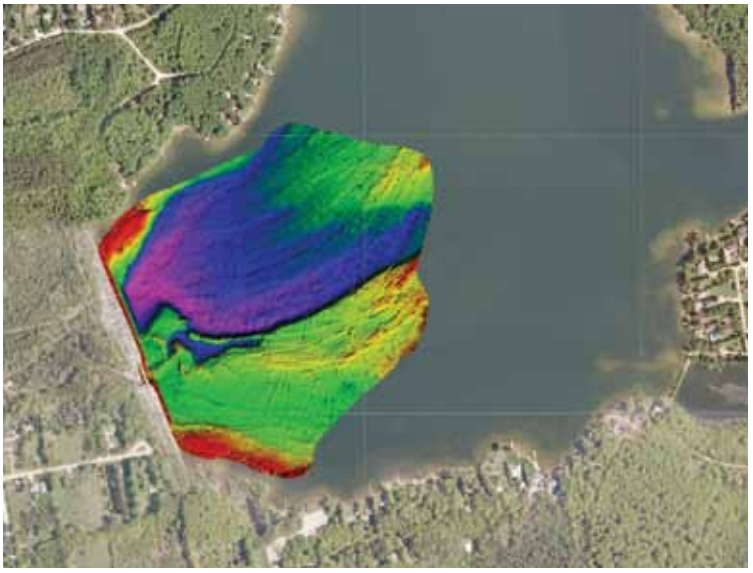


Features and Benefits

The C3D-LPM Lightweight Pole Mount System is designed for shallow water, small vessel operations in depths to 100 meters. The LPM comes with two 6-array transducers for port/starboard simultaneous operation for side scan and bathymetry. The system is equipped with a streamlined enclosure for the pole mount, mounting bracket for standard 3-inch pipe flanges, and two 20-meter cables which connect directly into the C3D-LPM transceiver.

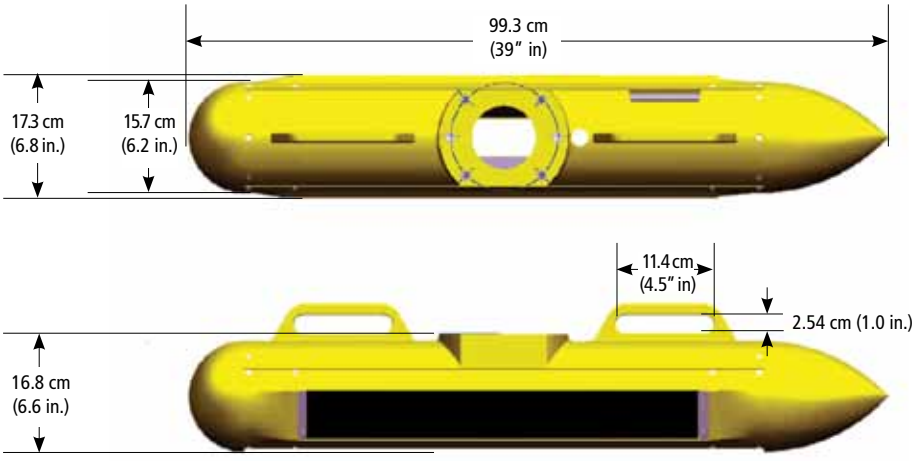
- Exclusive Computed Angle of Arrival Transient Imaging (CAATI) Processing
- 1000 Data Points per 50 m Range
- 5cm Resolution
- Ethernet Interface
- Collocated Side Scan and Bathymetry
- Simultaneous Port and Starboard Pinging/Receiving
- 6 Receive Channels in Each (Port/Starboard) Transducer
- Time Stamping of C3D Data and Motion Data
- Altimeter Option
- Adjustable C3D Transducer Depression Angles
- Hydrodynamic Transducer Pod





- ***Man-portable at just 19 kg (42 lbs)***
- ***No subsea electronics bottle***

Dimensions



C3D-LPM
Lightweight Pole Mount
Subsea Assembly
Only 19 kg (42 lbs)

System Specifications

Physical Characteristics

Case Size:	14.0 cm (5.5 in.) high by 53.3 cm (21.0 in.) wide by 51.4 cm (20.25 in.) deep including covers front and back
Weight including case:	10 kg (22.0 lb)
Case type:	48.3 cm (19 in.) standard rack mount
Electronics chassis size:	8.9 cm (3.5 in.) high by 48.3 cm (19.0 in.) wide by 45.7 cm (18.0 in.) deep including connectors and handles
Electronics chassis weight:	5.7 kg (12,5 lb)

Input/Output

Transducer:	Port transducer Starboard transducer
External:	Ethernet 10/100BaseT RS-232 serial (sound velocity sensor) RS-232 serial (spare)
Commands input:	Range Port side scan sonar on/off Starboard side scan sonar on/off Port side scan sonar receiver gain Starboard side scan sonar receiver gain
Sonar data output:	Port side scan Starboard side scan Bathymetry
Status information output:	Port side scan receiver gain setting Starboard side scan receiver gain setting Command echo

Power Requirements

Power input:	100–130 VAC or 200–260 VAC, 50–60 Hz (autosensing at startup only), 100 watts

Physical Characteristics

Construction:	316 stainless steel frame with high density polyethylene shell
Overall dimensions:	17.5 cm (6.9 in.) OD, not including handles, by 100.0 cm (39.4 in.) long
Deck cable:	Two 10 m (32.8 ft) long
Weight:	19 kg (42 lb)
Vessel speed:	1–10 knots operational
Mounting:	Flange for mounting to a standard low pressure 3-inch pipe flange

Side Scan Sonar

Transducers:	Combination 1-element transmit transducer and a 6-element receive hydrophone array, one port and one starboard
Frequency:	200 kHz
Acoustic source level:	+224 dB re 1 µPa @ 1 meter
Side scan range:	25–300 m (82–984 ft) each side (200 kHz) 25–600 m (82–1968 ft) each side (100 kHz)
Bathymetry range (swath):	10–12 times water depth
Side scan across track resolution:	4.5 cm (1.8 in.)
Bathymetry across track resolution:	5.5 cm (2.2 in.)
Bathymetry vertical resolution:	1.0 cm (2.5 in.)
Pulse width:	0.125–3 msec in accordance with range selection
Repetition rate:	Up to 30 pings/sec in accordance with range selection
Transducer radiation:	1° horizontal, 100° vertical
Down-look angle:	20°, 30°, or 40°, adjustable; factory setting is 30°

Processor

CPU:	Intel® Pentium® Processor
Memory:	512MB DDR2 SDRAM or more
I/O ports:	Keyboard Mouse USB (6) RS-232 serial Parallel Ethernet 10/100/1000BaseT
Graphics processor:	Integrated 224MB Intel® Graphics Media Accelerator 950
Data storage:	80GB SATA 7200 rpm hard drive CD-RW / DVD combo drive
Display:	19-inch LCD flat panel (1280 x 1024)

Software

Applications:	C3D Server C3D Display Third party data acquisition and display Third party real time 3D display Third party 3D post processing
Format:	XTF
Operating system:	Microsoft Windows® XP

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