C3D

SONAR IMAGING SYSTEM

Add Depth to your Side Scan Survey

Teledyne Benthos has been a pioneer in the development of underwater acoustic and side scan sonar systems.

Now Teledyne Benthos combines high resolution side scan imagery with bathymetric data to produce a 3-dimensional look at the seafloor.

INNOVATIVE UNDERSEA SYSTEMS TECHNOLOGY

TELEDYNE
BENTHOS
A Teledyne Technologies Company

The C3D Side Scan/Bathymetry System

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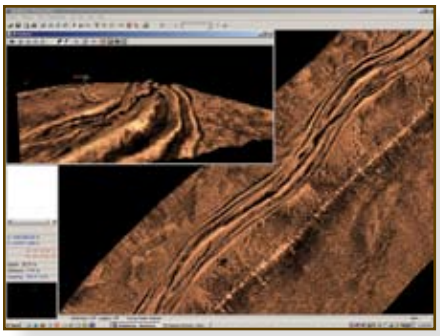
SARA CAATI (Small Aperture Range Angle and Computed Angle of Arrival Transient Imaging) is a patented technique licensed to Teledyne Benthos by Simon Frazier University. It is a method for estimating the backscatter arrival spectrum. SARA CAATI uses an angle-of-arrival estimation similar to interferometry. However, unlike interferometry, the C3D solves the problem of concurrent arrivals from multiple angles.

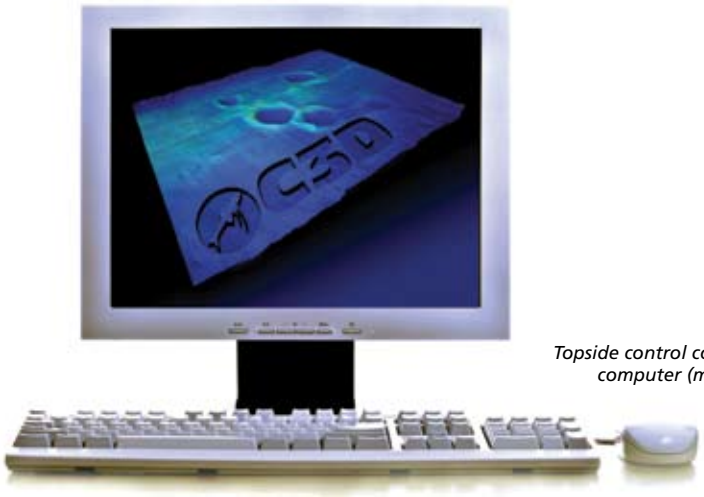
The C3D is the best solution for combining side scan imagery and bathymetric data. The data sets are collected at the same place and time and there is no need to merge data sets as with multi-beam and side scan sonar systems run separately. Each point along the track has X, Y and Z components. For example, at the 100 meter range there are 2000 points compared to only a few hundred using multi-beam systems. This allows for a much greater across-track resolution.

The C3D is available in towed, over-the-side mount and AUV configurations. In the towed version there are multiple cables and cable lengths available. The standard cable is the 100-meter CAT5 cable for short tows. For longer cable lengths the addition of a CL-160 ADSL high speed communications link is required. For extremely long cable lengths down to 3000 to 6000 meters it is recommended to use a fiber optic cable. All interfaces are available for most applications.

C3D deployment (tow vehicle)



Pipeline 2D and 3D imagery



Topside control console and all in one computer (model may vary)

APPLICATIONS

- Channel clearance studies
- Hydrographic charting
- Engineering and scientific studies
- Biomass for fisheries
- Object detection
- Cable/pipeline surveys
- Bridge inspection
- Bottom mapping
- Mine hunting

SYSTEM FEATURES

Streamlined
Tow Vehicle allows for stable operation from 1 to 10 knots (recommended speeds for normal survey operations are between 3 and 5 knots).

Portable
The towfish is designed with stainless steel framing and a fiberglass shell (an on-board handling system is highly recommended).

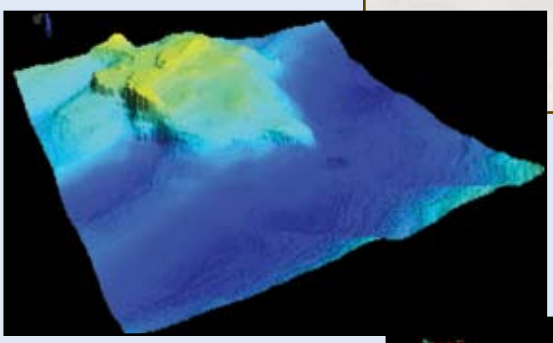
Modular Design
System interfaces easily to the topside processor via Ethernet connections.

Expansion of Sensors
Tow vehicle is designed to interface directly to an IXSEA Octans Optical Gyro, pressure sensors, magnetometers, CTD's etc.

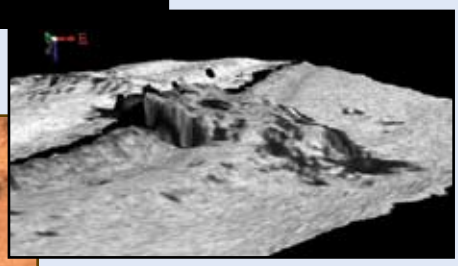
Flexible Communications
ADSL high-speed communications link and an optional fiber optic link are available.

Configurable
The tow vehicle is designed to be easily disassembled for over-the-side mounting and for AUV applications. The Topside power supply and Ethernet hub will accommodate any type of topside processor running sonar acquisition software.

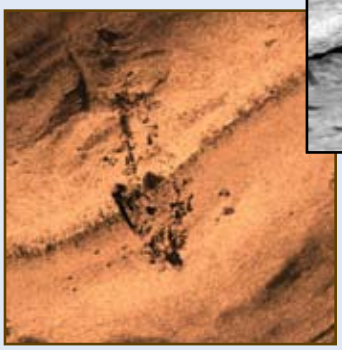
The freighter Steven R. Jones foundered on rocks in the Cape Cod Canal in Massachusetts on June 28, 1942. Explosives were later used to flatten the wreck on the canal floor where it still sits today. The images below were obtained in a C3D survey on October 28, 2003 and are the most detailed seen of the wreck site.



Bathymetry

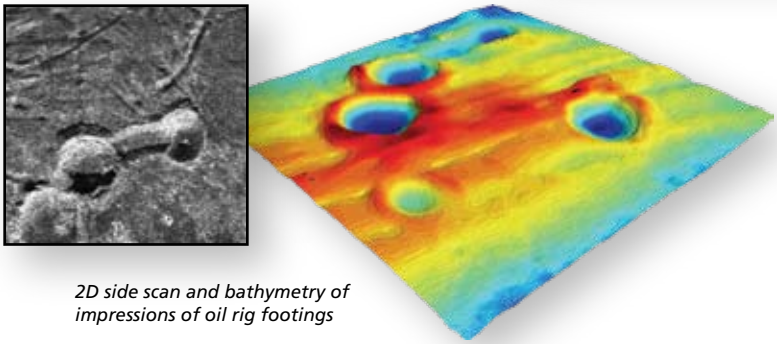


C3D



2D side scan

3D of barges used for fish habitat



2D side scan and bathymetry of impressions of oil rig footings

C3D Sonar Imaging System

SYSTEM SPECIFICATIONS

System

Sonar Frequency:	200 kHz (100 kHz optional)
Maximum Operating Depth:	2000 meters (6000 meters optional)
Side Scan Range:	25 to 300 Meters per side (200 kHz) 25 to 600 Meters per side (100 kHz)
Bathymetric Range:	10 to 12 times water depth
Resolution (across track)	
Side Scan Sonar:	4.5 cm
Bathymetry:	5.5 cm
Beam Width	1 degree (one-way)
Pulse Length:	25 usec to 1 msec (depending on range)
Repetition Rate:	Up to 30 pings/sec
Depression Angle:	20 degrees
Transmit Source Level:	Maximum 224dB re: 1uPa@1M
Vertical Resolution (Bathymetry):	1 cm
Auxillary Sensors:	Pressure (standard) Heading (standard) Pitch (standard) Roll (standard) Altimeter (optional) CTD (optional) Magnetometer (optional) Optical Gyro (optional) Motion Reference Unit (optional)

Tow Vehicle

Construction:	Stainless steel, fiberglass
Length:	203.2 cm (80 inches)
Diameter:	27.3 cm (10.75 inches)
Weight (in air):	112 kg (247 lbs)
Weight (in water):	45.3 kg (100 lbs)
Electrical power:	51 watts at 300 VDC

Over-the-Side Mount

Construction:	Stainless steel
Length:	96.5 cm (38 inches)
Diameter:	25.4 cm (10 inches)
Weight (in air):	40.8 kg (90 lbs)
Electrical power:	51 watts at 300 VDC

Topside Processor/Display (optional)

Operating System:	Windows XP
Processor:	Dual Pentium processors
Storage:	Large capacity hard drive, writable CD/DVD
Network Interface:	100base T Ethernet (compatible with ADSL high-speed communications interface)
Serial:	RS232
Display Monitor:	17" Flat Panel (built into processor)
Topside Interface Unit	
Power Supply:	Input 120/240 VAC auto sensing, output 300 VDC
Network interface:	Ethernet
Dimensions:	2U Rack mount 48.3 cm (19 inches)

Software

CAATI:	Proprietary (standard)
Acquisition:	Triton Isis (standard)
Post-Processing:	Triton Isis "Delph Map" (optional)
Format:	XTF

Cables

Call for specific cable requirements	
Kevlar:	100 meter CAT5 (standard)
Kevlar:	Co-axial cable (for use with ADSL communications link (optional)
Double armored:	Co-axial cable (for use with ADSL communications link (optional)

Side mount configuration

AUV configuration

Lightweight pole mount (see separate data sheet C3D-LPM)

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