

UNMANNED SEMI SUBMERSIBLE



USS CAPABILITIES

C & C Technologies, Inc. (C & C) has recently co-developed its new Unmanned Semi Submersible (USS).

The USS development was originally sponsored by the National Oceanic and Atmospheric Administration (NOAA) but C & C and the Naval Research Laboratory (NRL) have now been in cooperation in the multi-year development program.

The USS is designed to provide an extended survey presence over areas not suited to a manned survey launch. Its design provides both a wider operational weather window and a longer continuous operations time frame for more efficient and safer surveys.

Current problems with survey launches are fatigue, launch motion and weather safety. When weather is poor, launches are not deployed. C & C's solution is the USS, as it is less weather dependent than other vessels and minimizes the need for personnel to leave the mother ship.

C & C's USS can perform NOAA hydrographic surveys with a fleet of unmanned semi submersible vehicles operating simultaneously from one mother ship resulting in increased production and better data quality than alternative means.

C & C is currently the only company capable of providing hydrographic surveys via this advanced technology.



OPERATIONS & AREAS OF USE

C & C intends to use the USS in areas ranging from two meters to 60 meters of water depth, with sea states ranging from calm to significant wave heights.

In the normal semi submersible mode the sea state is largely mitigated due to the low center of gravity and stability in the USS. Several USS vehicles can be deployed from one mother ship to increase data collection capabilities.

The mother ship will stand off at a safe distance monitoring data collection in real time with the ability to control or change the mission in real time via a high speed radio data link. The USS can operate in semi submersible (normal operations) or semi floater (shallow) modes depending on the project water depths.

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USS SPECIFICATIONS

USS SENSOR PACKAGE

The hydrographic survey sensors on the USS are configurable. The current configuration includes the following:

- C-Nav Global GPS
- Coda Octopus F180 inertial navigation
- Real time surface sound velocity
- MBE Options: Reson 7125 or Kongsberg 3002
- EdgeTech 2200 MPX Sidescan soncar (300/600 kHz)
- Altimeters (downward and upward) for depth compensation
- Real time intelligent navigation and processing payload
- Real time video camera with infra-red night operation mode
- High speed radio telemetry data link to the mother ship

The following sensors are options to be installed and tested in Fall 2009:

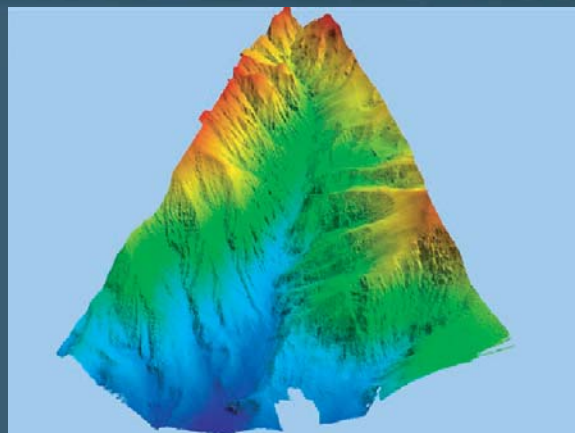
- AST ProSAS Synthetic Aperture Sonar
- Kongsberg HiSAS 1030 Synthetic Aperture Sonar
- Edgetech DW106 Sub-bottom Profiler

CONSTRUCTION & DESIGN SPECIFICATIONS

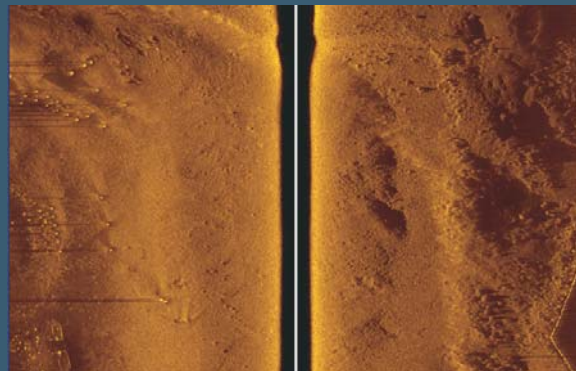
The USS is built of marine grade aluminum, drawing on C & C's experience of sensor integration and operation along with Autonomous Surface Vehicles, Ltd. (ASV) design and construction expertise. The USS is designed to be rugged in design and uses Commercial, off-the-shelf (COTS) parts for cost effective operations and repairs.

USS SPECIFICATIONS

| | |
|---------------------|----------------------------------|
| Length: | 6.3 m (20.3 ft) |
| Width: | 0.7 m (2.1 ft) |
| Weight: | 2000 kg |
| Draft Semi Sub: | 1.6 m (5.9 ft) |
| Draft Semi Floater: | 1.3 m (3.6 ft) |
| Engine: | 30 hp diesel |
| Fuel Capacity: | 180 liters (48 gallons) |
| Running Time: | 48 hrs @ 8 kts 96 hrs @ 4 kts |



Multibeam Echosounder Data Example
(Data Courtesy of Reson)



Post Processed Side Scan Data Example
(Data Courtesy of EdgeTech)



Unmanned Semi Submersible

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