Tiburon II MBARI's new deepwater ROV





Tiburon

Tiburon II

Current and Future Tasks

- Ocean experimentation and sampling
 - Instrument deployment
 - Sample collection (mid-water and benthic habitats)
- Ocean observatory support
 - Cable installation
 - Sensor deployment & recovery (includes large payloads)
- Platform for research & design
- High resolution imaging
 - HDTV video, digital stills
 - Photo mosaics
- Ocean exploration
 - Gulf of California, Juan de Fuca Ridge
- Education & outreach

Project Status

Science requirements review – 2003 & 2006 (Long term needs – 5 to 10 years)
Contract awarded to SMD Hydrovision
Kick off meeting – 05/20/07
Preliminary Design Review – 08/20/07
Scheduled FAT date – 01/08
Scheduled Sea Trials date – 09/08

What's new and different?

- Significant increase in payload, thrust and power
- Easier to maintain (COTS tech.)
- Easier to interface new instrumentation
- Better capability to adapt to future requirements (bandwidth, power and payload)

General Specifications

4,000 meter depth rating
600 lbs (in water) science payload
Add on Tool skids
Dedicated support ship (Western Flyer)
Vehicle weight < 5,040 kg (11,100 lbs)
75 shp hydraulic system

Custom Requirements

- Variable Buoyancy (VB) system
- Science Interface (Power, Data, Tool skid)
- Precision control for sampling & observation
- R&D platform for MBARI and collaborators
- Easily reconfigurable and adaptable to future requirements
- Adaptation to WF and existing LARS
- Custom frame layout

VB System (Variable Buoyancy)

- Buoyancy is changed by flooding or evacuating sea water from 4 buoyancy tanks (spheres) built into the frame
- VB system is required to manipulate, deploy and recover large payloads
- 150 pounds of variable buoyancy
- Add on external tanks to increase capacity up to 300 pounds when needed



VB tanks (highlighted in orange)

Precision Control & Sampling

- Custom thrust control algorithm to minimize the disturbance of the viewing area from thruster wash.
- Scaling of Joy stick commands
- Maintain the advantages of the conventional vectored thruster configuration



MBARI Thrust Mode (continued)

Thrusters pictured in red are disabled



Forward thrust



Thrust to port



Reverse, spin to port & Stbd. thrust



Thrust to Stbd.

Science J-Box

Independent of vehicle control system if desired Fiber multiplexer - Ethernet, RS -485/422, 6 x RS-232 ports - 2 x Video channels 5, 12, 24, 48, 240vdc and 110vac power Modular Fieldbus I/O System Configurable GUI (LabView) Pressure Tolerant Electronics design (PTE)

Science J-Box (continued)



Advanced Navigation Controls (MBARI R&D)

 Tiburon II will continue act to as a platform for advance navigation and controls development



SMD Control System





Distributed Vehicle Control System (DVECS)
 All vehicle computing resources reside on the top side
 RS-485 network of pressure tolerant J-boxes which provides a modular digital and analog I/O system

SMD Control System

- Graphical User Interface (GUI)
 GUI is highly configurable via GUI editor and configuration files
 - New pages, buttons, and GUI widgets can be added on the fly without recompiling software





Touch screen page

Subsea Electrical Systems

- 10.5 kW available for hotel and instrument power
- Main subsea pod (1 atm.)
 - Focal video/data mux.
 - Power conditioning & switching
- 5, 12, 24, 48 and 240 DCV and 110 ACV power buses available for instrumentation

Auto Functions

Standard auto depth, altitude and heading

- Auto hold, step and home (dynamic positioning)
- Auto cable/pipe track
- Auto route
- Lost thruster compensation
- Auto pitch, roll, and vertical trim
- MBARI thrust mode

Viewing Systems

Dual camera system (Pilot/Scientist)

- HDTV Sci. Cam. / RGB Pilot Cam.
- Up to 6 (400 watt) HMI lights
- MBARI's IVIEW software
- Up to 12 video camera inputs
- Programmable video overlay (RGB)
- Digital still & strobe



Science Tools

Tool skids (Benthic, Mid-water and Cable)
Sea-Bird 19plus CTD

Transmissiometer
Aanderaa oxygen optode

Schilling T2 manipulator
Kraft Raptor manipulator
Science interface J-box

Navigation Instrumentation

- Octans FOG (Primary)
- Tritech FOG (Secondary)
- RDI Work Horse DVL (station keeping and nav.)
- Altimeter
- Depth sensor (Paroscientific)
- Sonardyne Fusion USBL
- 330 kHz forward looking scanning sonar
- Sonardyne ROV Homer

Instrument Frame

- Typical Work Class instrument frame is insufficient for our needs
- MBARI designed instrument frame
 - Allows us to set up sampling and camera equipment based on past experience.



Umbilical

17.3mm (.68") Diameter
5 x Steel tube single mode fibers
5 x 11 AWG thin wall insulation copper
3 Layer torque balanced armor

Hydraulic Systems

8 x 15 Lpm solenoid valves (6 spare)
4 x 8 Lpm proportional valves (4 spare)
1 x 30 Lpm HP spare tooling port
Additional solenoid valves are available on the tool skids

Crane Upgrade

Reached capacity of crane

- CT/Lift winch replacement
- Slip ring replacement





Questions?

