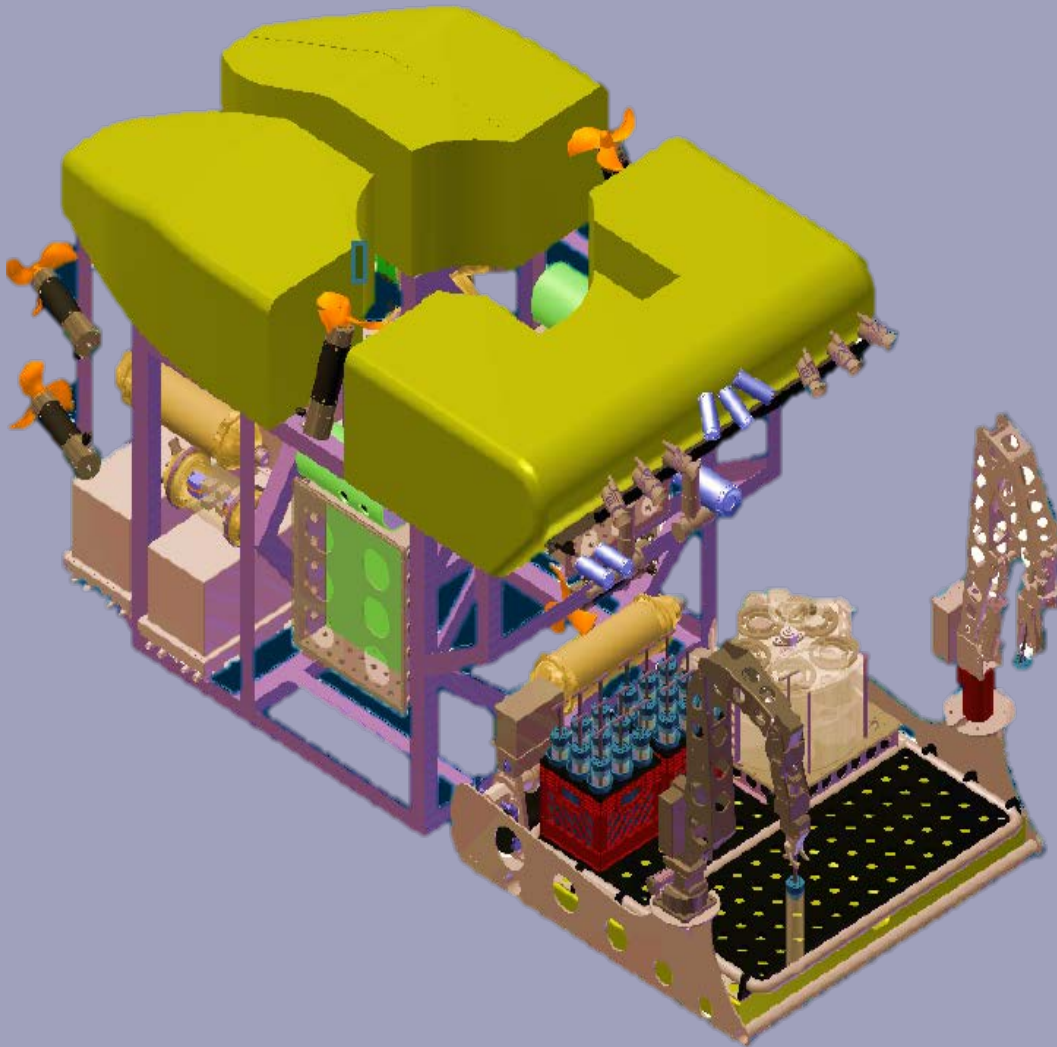


14 December 2014

SOI 11,000m HROV DeSSC Report

11km Program Objectives

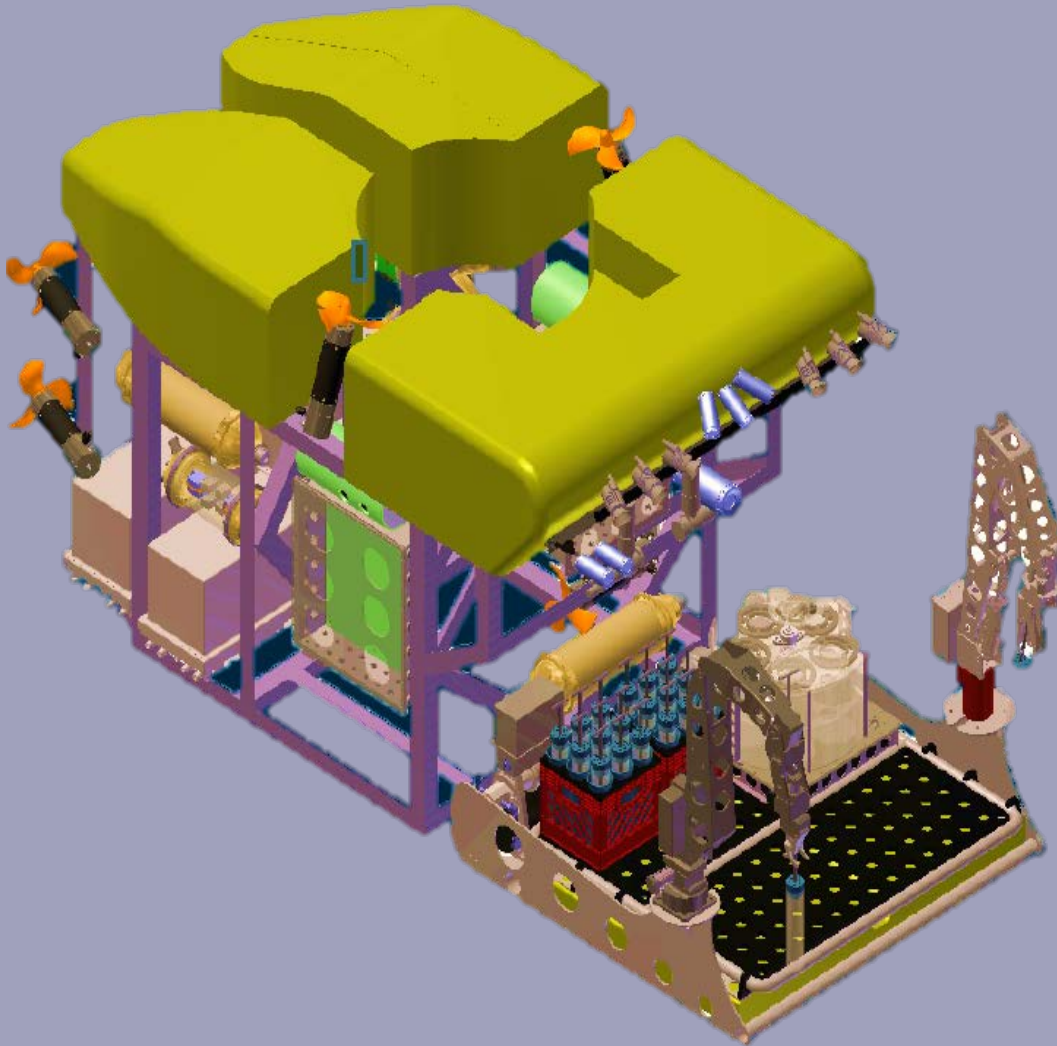
2



- Full ocean depth robotic research vehicle
- Operations in a remotely controlled, tethered, or autonomous modes
- Full spectrum of instrumentation including two robotic manipulator arms
- Advanced lighting and camera systems, 180 degree wide
- Live 3D-HD video stream from the vehicle to the ship
- Live video feed for scientific observation/recording
- Large vehicle payload (180 kg) and workspace

Vehicle Sensor Capabilities

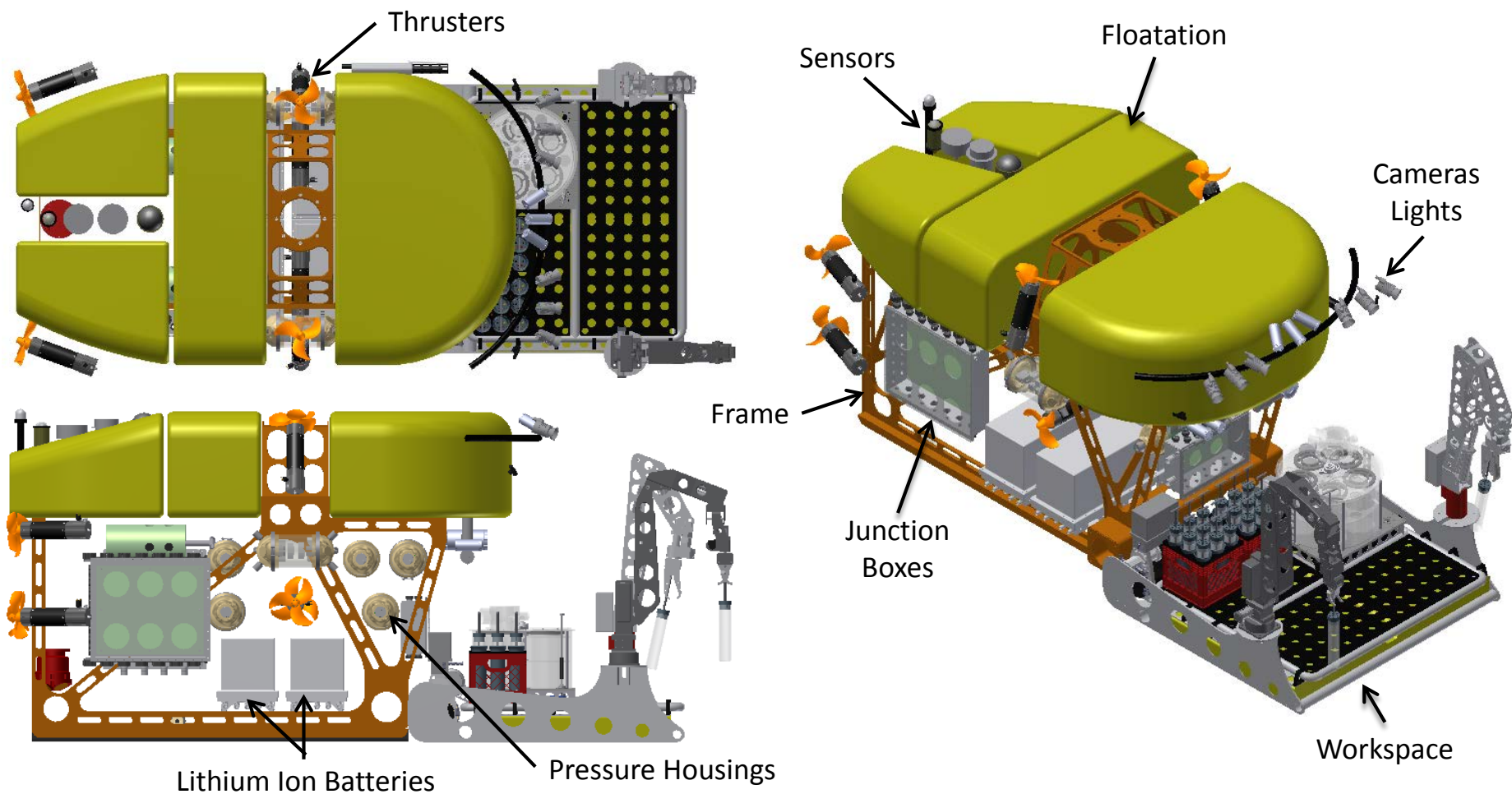
3



- Bathymetry, backscatter, water column: Reson 7125 AUV 3 Multibeam Echo Sounder (6km)
- Interferometric bathymetry, sub-bottom profiles, sidescan: Edgetech 2205m (11km)
- 3-axis magnetic flux: APS-1520 magnetometer (11km)
- Color video: 3DHD, panoramic, and UHD PZT cameras (11 km)
- Color photographs: WHOI / Insight Pacific Digital Still Camera with Strobe (6km)
- Turbidity: Seapoint Optical Backscatter sensor (>6km)
- Dissolved oxygen: Aandara Optode 4330-fastfoil (11km)

Vehicle Arrangement

4



Vehicle Weight/Balance Analysis

5

- The following weight/balance analysis results reflect PDR vehicle configuration:

Parameter	Requirement*	Predicted
Launch Air Weight	< 2950 kg	3385 kg
Buoyancy: Surfaced, Pre-Dive**	negative	- 114 kg
Buoyancy: Surfaced, Post-Dive** (no ascent or descent weight)	>= 45 kg	46 kg
Buoyancy: Submerged at 11,000m** (no descent weight)	+/- 10 kg	8 kg
Trim Angle	+/- 10 degrees	1.0° nose down
Vertical CB-CG Separation	>= 100 mm	400 mm
Payload Allowance	>= 182 kg	182 kg

* To Be Verified

** Buoyancy positive up, negative down.

Pressure Housings Overview

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- Subsystem comprises all pressure housings on the vehicle
 - Housings provide 1-ATM space for computers, electronics, sensors
- Each housing consists of a ceramic cylinder, two titanium end caps that pass conductors/fibers through, and an internal chassis on which components are mounted
- PDR work:
 - Housing configuration and arrangement
 - Endcap design and analysis
 - Preliminary chassis layouts

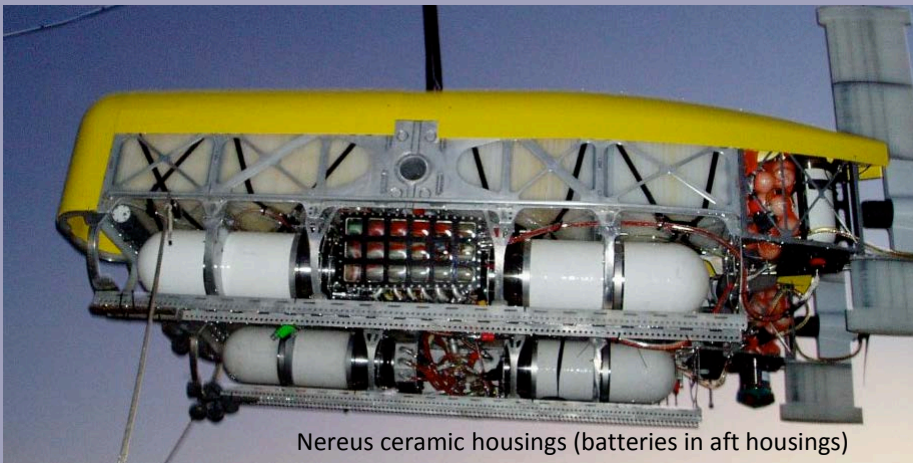


Example housing (Nereus)

Battery Concept Comparison

7

Nereus (2008)	Nereid (2014)
1-atmosphere ceramic housing	Pressure balanced, oil filled
Proven to 11 km depth	2 km depth (nUI) 5 km (nHT)
350 dives (Nereus and Sentry)	15 dives
Implosion Risk	No Implosion Possible
Handling and removal is complicated	Easily removed
Delicate, brittle materials	Robust, resilient materials



11km Landers, Rock Grabbers, FVCR

8



- Two full ocean depth landers / elevators for use on R/V *Falkor*
- To support N11k HROV or operate independently
- To assist other vehicles at depth to bring instruments up and down the water column
- Syntactic foam reduces size/weight
- Modular structure allows for a variety of scientific instruments such as sensors, HD cameras, lights, baited traps, corers, respirometers, etc.

