Alvin Upgrades

Navigation

- Top Lab now using updated navigation software (Nav-g/Navest); DVLNav officially retired. Progressive development and implementation of *Alvin* navigation post-processing software (developed by *Sentry* team). End goal: produce daily semi-automated, first-cut navigational maps and data for science use.

Reson Sonar

- Reinstalled and test operated during AT29-04. Some follow on evaluation required to complete installation.

BlueView Sonar

- Installed for AT29-02 and AT29-04, initial evaluation for regular use on *Alvin*. Overall sonar is excellent but likely will install dedicated computer in-hull to improve usability.

Alvin Upgrades

In-Hull Toxicity/Flammability Testing

- First opportunity to utilize new Navy-approved testing vendor. Testing expense is approximately half previous cost.

Kongsberg PATZ Cameras

- Cameras returned from dome repair and are working well

Jason Upgrades

- **New recovery line technique**
  - Line direct to *Medea*
  - Faster and safer
- **Additional flotation and adjustable ballast**
  - Added foam and movable lead
- **Syntactic elevator flotation**
  - No more glass implosions
- **Upgraded elevator frames**
  - Stronger
- **New ‘minivator’**
  - Easier, compact
- **New LARS HPU**
  - Faster crane motion, safer, quieter
  - Uses common hydraulic fluid
  - Aux function for hydraulic function and manipulator testing on *Jason*

Jason Upgrades

- New rope dropper on Medea for package recovery
- New navigation & dynamic positioning system
- DVDs eliminated
- New ‘K’ tube .681 cable
- Improved frame grabber
  - Captures 2X simultaneous images
- Data delivered on hard drive

Revelle Cable Damage

- *Jason* utilized on board winch system with a .681 FO cable installed by SIO immediately prior to the cruise
- The cable had rust which contributed to failure of two of the three layers of armor, resulting in near loss of the *Jason* system.

Revelle Cable Damage

Prior to the use of this cable, NDSF requested and SIO performed:

- Electrical hi-pot test
- Destructive pull tests of the cable
- The cable met current Research Vessel Safety Standard (RVSS) specifications with regard to these tests, and was therefore deemed suitable for use

Subsequent to the failure it has been learned that the cable had been stored with the wet (working) end buried on the drum and the dry end exposed.

The tests were performed to the dry end (non working), which had not been subject to deployment cycles. The rusted areas were determined to be on parts of the cable that had been subject to numerous deployments, i.e. not the part tested.

To address this NDSF has taken the following actions:

- The failed *Revelle* cable was purchased prior to RVSS and thus had not been maintained according to RVSS

- NDSF will make certain that any cable proposed for use with *Jason* will have adhered to all RVSS appendix requirements governing the maintenance of cables throughout the life of the cable

NUI Transition

Currently there are no deep submergence vehicles available to the US science community that routinely operate at high latitudes. This is due to the challenging operating conditions, not a lack of interest. *Nereid* Under Ice (NUI) has shown this capability, but requires additional work to become an operational asset.

Objective

This project aims to develop NUI into a science-ready vehicle for routine high-latitude operations.

Deliverables

- Hardware including acoustic comms, manipulator, multibeam
- Documentation
- Marketing plan for vehicle

Leveraging

- NSF funding of field trials in Antarctica

NDSF Data Convergence

NDSF vehicle developments have made possible a convergence of data collection, processing, and archiving systems that has the potential to improve science product generation while saving manpower.

Objective

This project will develop command/control, processing, and delivery software to ensure common data quality and format for all NDSF vehicles

Deliverables

- Common automated data processing system
- Networked system for delivering and tracking data products
- Development of next-generation post-dive data aggregator
- Study of cost benefits of telepresence enabled data processing

Leveraging

- NSF Cyber-infrastructure funds
- Goodwill of NSF and user community

Alvin 6500 System Design

Goals of the NLF effort are to:

- Ensure that ongoing maintenance and modifications to *Alvin* are consistent with a final 6500m system design
- Provide guidance for planning and budgeting future modification and periodic overhaul efforts

Objectives of the NLF effort are to:

- Complete systems engineering for the final 6500m *Alvin*
- Complete a top-level design for the final 6500m *Alvin*
- Document major subsystem specifications for the final system
- Produce subsystem interface definitions for the final system
- Follow a process consistent with the *Strategic Plan for the Alvin 6500 Project*

Sentry ASV Tending

ASV tending frees surface vessels to conduct parallel operations away from the AUV. It also enables remote operation of AUVs (e.g., long-range AUVs) and multi-AUV coordination.

Objective

This project aims to develop a robust capability for ASV tending of *Sentry*

Deliverables

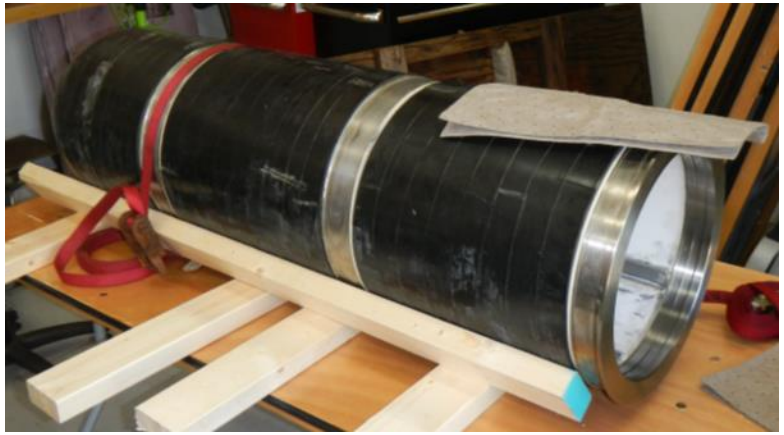
- Waveglider (SV2 or SV3) fit with acoustic and satellite comms packages
- Software for comms integrated with current nav software
- Launch, recovery, shipping procedures and equipment
- Field-trials on cruise of opportunity

Leveraging

- LRI participation with discounted Waveglider
- CMR participation for prediction-engine to automatically control ASV
- NSF proposal to develop ASV navigational aiding

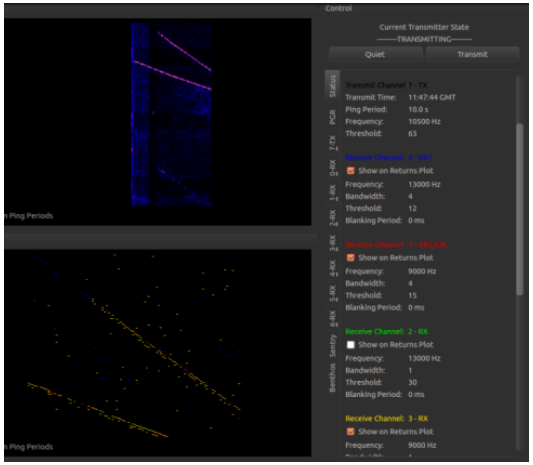
Battery Upgrade

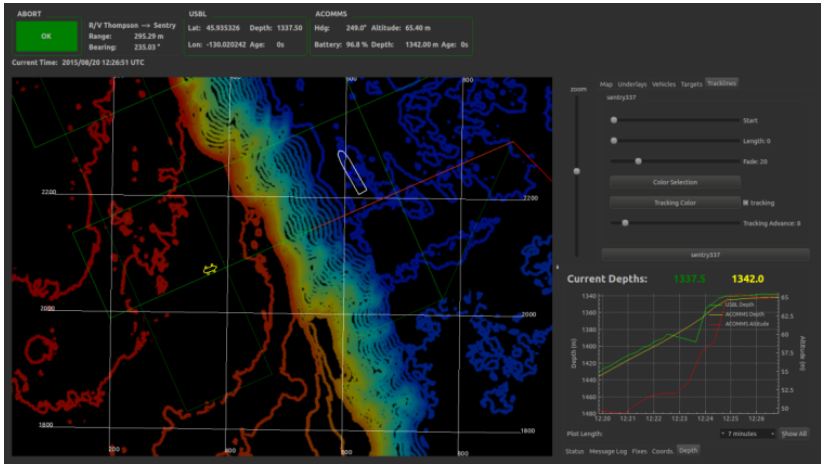
- New 1 atm batteries
- New ceramic housing
  - Old one had 300 dives = time to check
  - Old one inspected, serviced, and ready to use again in the future
- 2x the total power
  - Upgraded charging means similar turn around times
  - ~25-28 hour multibeam missions with 90-100km of track line
  - ~50+ hour photo missions with ~125km track line



User Interfaces

- NavG interface
  - Substantial additions to situational awareness
  - Now decent science, bridge, and watchstander interface
- PGR
  - Significant improvement to non-USBL tracking of *Sentry*
  - Removes last of topside legacy software no longer supportable
  - Adds logging and other features
- *Sentry* Sitter
  - Integrated seamless acoustic comms for Micromodem and Sonardyne
- Pre/post dive – many new scripts. Predive has shortened by ~30min over the last 2 years, postdive by similar





Data Pipelines

- MB system sidescan and sub-bottom pipelines fully online and highly automated
  - Navigated SEGY & strip plots for SBP
  - Navigated JSFs and strip plots for Sidescan
- New Multibeam tool makes process even more highly automated
  - Maps within 20 – 60 minutes of recovery now common – though not guaranteed
  - Very simple to use the basics but preserves advanced functionality

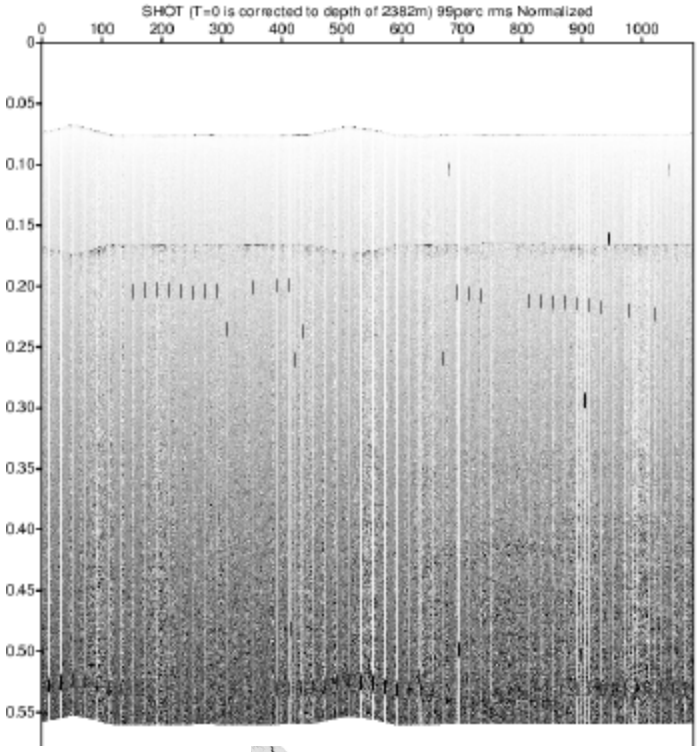
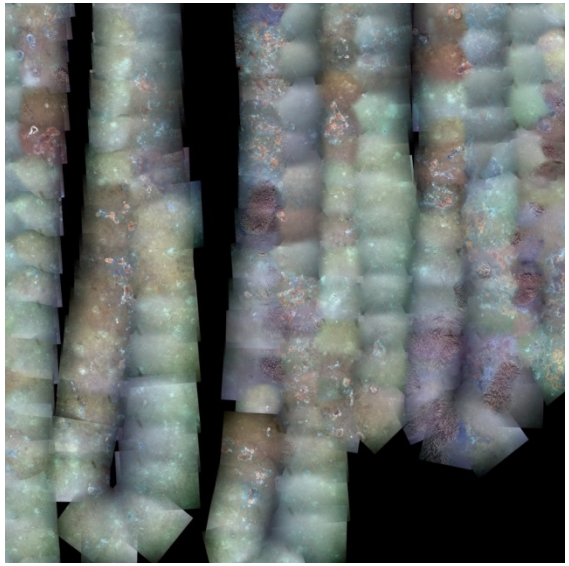


Photo-mosaics

- Mosaicing pipeline in process
- Getting results, but not automated enough to implement as standard
- Hoping to finish before end of the year, but may not have sufficient engineering resources – new position posting open



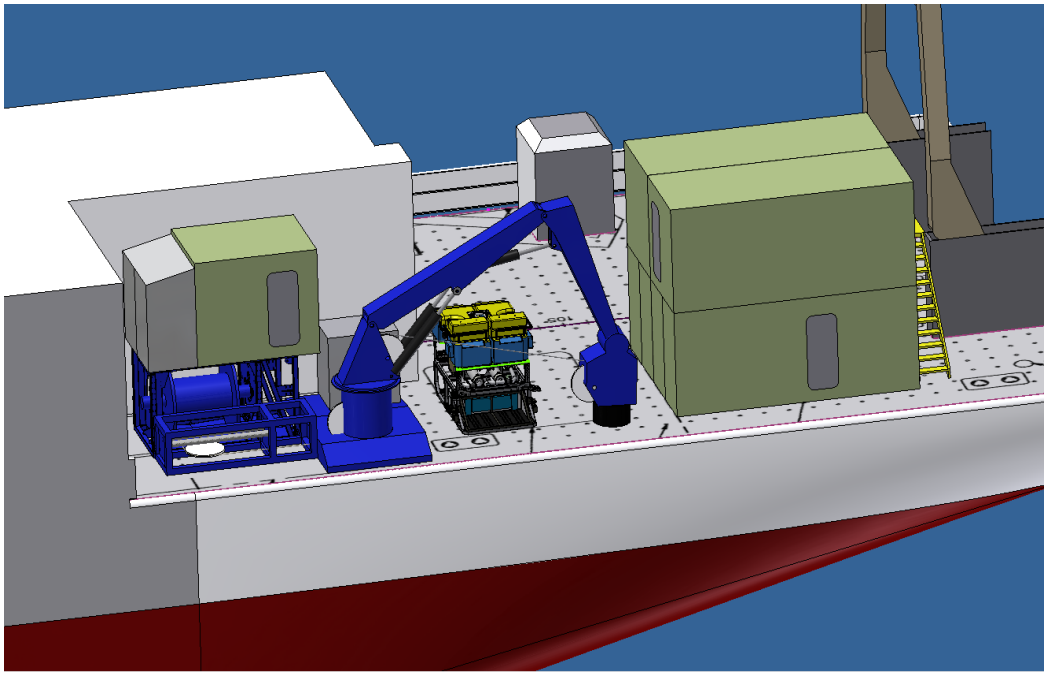
Metadata

- New scripts configure and read all possible data from instruments (e.g., serial num, cal constants, etc.)
- All responses logged
- Logs parsed by post processing
- Table created for dive report
- Should be in every dive report by end of year for some sensors
- Remaining sensors to be implemented next year

1.1 sentry338 Devices

Instrument	Model	Serial Num.	Comments
USBL	Sonardyne AvTrak2	U001A91	
DVL	RDI Navigator (300kHz)		
Magnetometer	APS 1540	APS 0689 Ver: 3.85BD7716F	
	APS 1540	APS 0688 Ver: 3.85BD7716F	
	APS 1540	APS 0690 Ver: 3.85BD7716F	
CTD	SBE 49	S/N: 222	

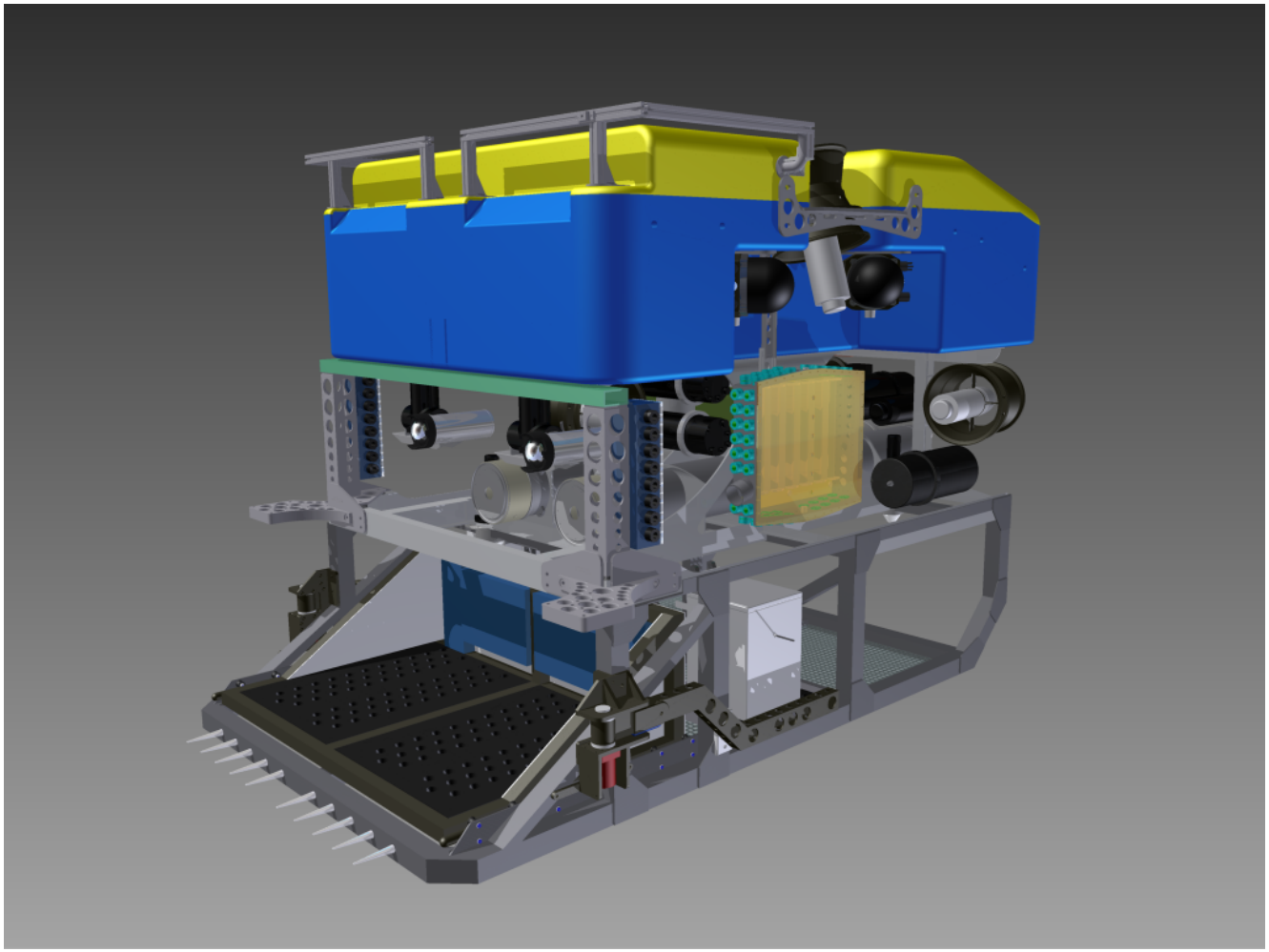
Jason on R/V Thompson



OBJECTIVE:
Modifications to the *Jason* system to enable routine operation and maintenance of OOI/RSN components

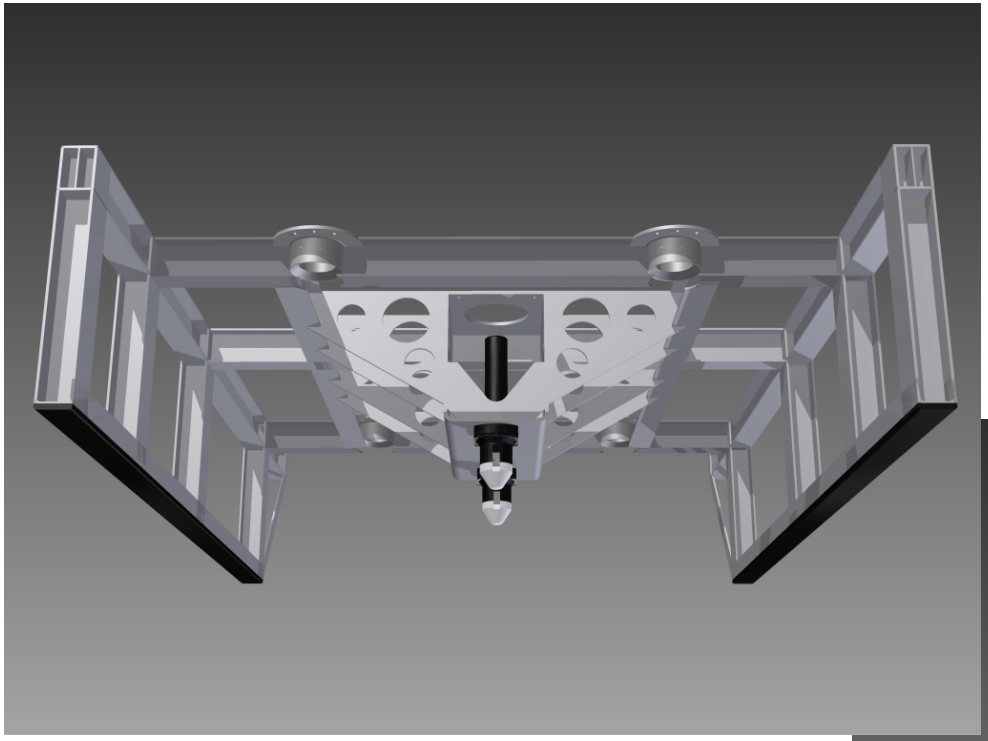
- New higher strength umbilical cable supporting operations to 5000 meters
- New LARS supporting single body vehicle operations.
- Modifications to vehicle frame for through frame lifting of RSN packages
- Ensure compatibility with RSN deck space requirements.

Jason OOI Upgrade



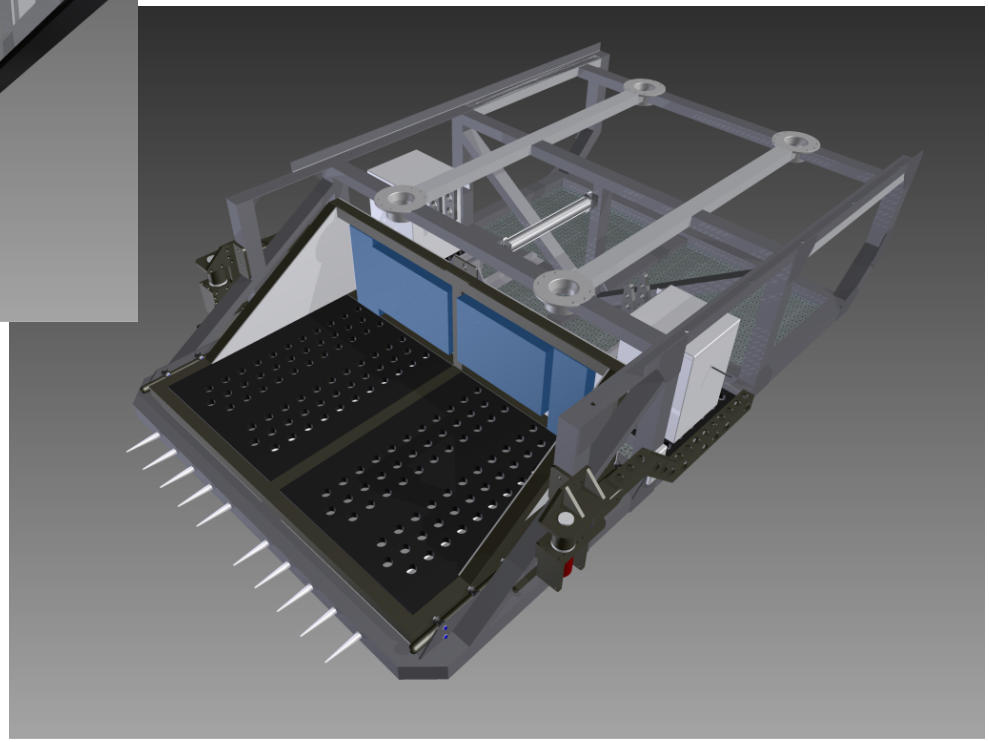
- New frame for thru-frame lifts up to 4000 lbs
- Short turn around tool skid swap
- Improve serviceability of vehicle components
- Increase free space in science bay

Swappable Tool Skid



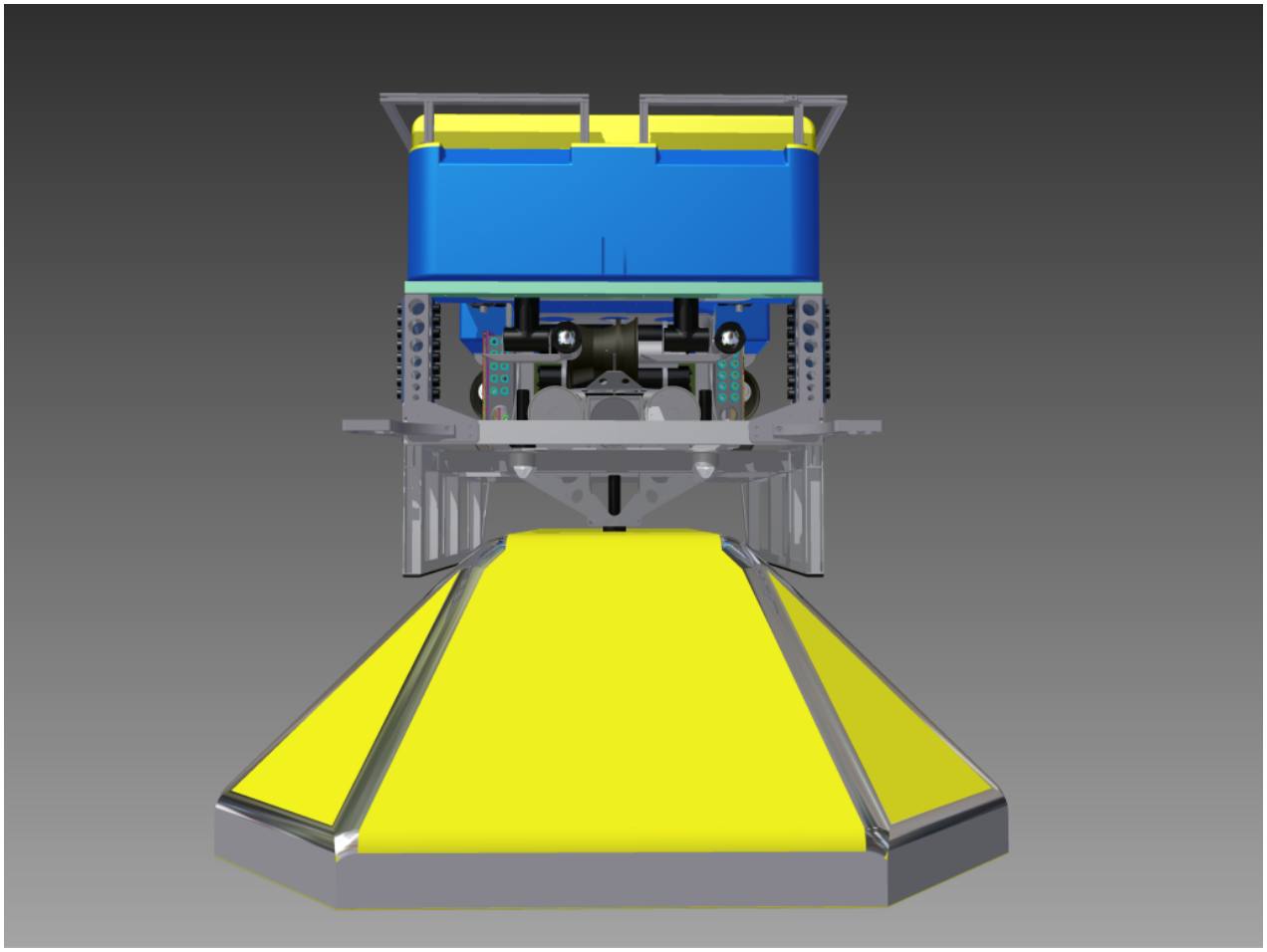
OOI skid – Purpose-built for package deployment with minimal other abilities

No science bay and fixed basket with a smaller working area



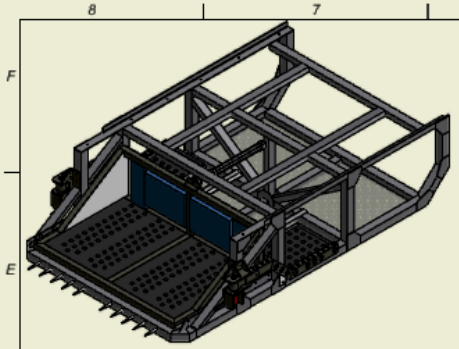
Jason tool skid – Almost Identical to the existing design, with the ability to be hot-swappable

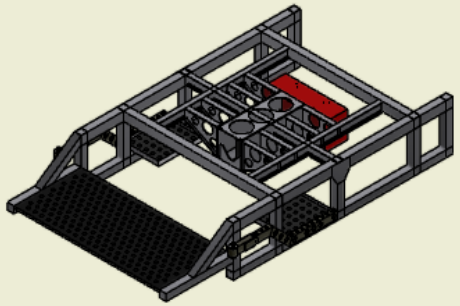
Package Attachment



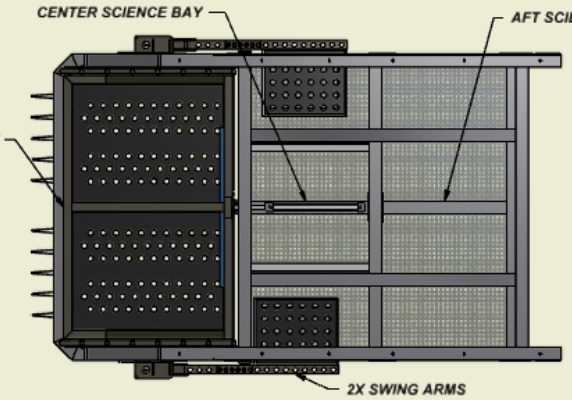
RSN Benthic Node

TOOLSKID OPTIONS



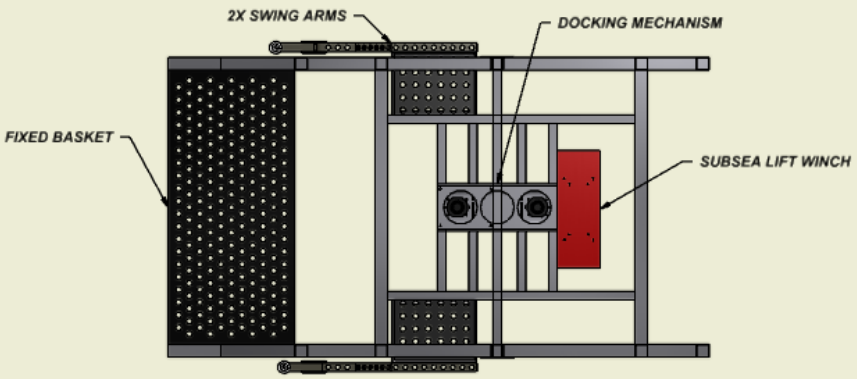


STANDARD JASON



SPECIFICATIONS:
Deployable Basket Dimensions (L"xW"xH"): 36x58x23
Center Science Bay: 28x43x25
Aft Science Bay: 32x72x25
Two Swing Arms : 20x16x21.5

OOI HEAVY LIFT



SPECIFICATIONS:
Fixed Basket Dimensions (L"xW"xH"): 30x65x16;
Two Swing Arms: 20x16x12.375;
Subsea Lift Winch - 4000 lb Lift Capacity
Docking Latch Mechanism - 4000 lb Lift Capacity

WOODS HOLE OCEANOGRAPHIC INSTITUTION
Deep Submergence Laboratory
Challenger Drive, WOODS HOLE, MA, 02543

DESIGN: Jesus
DATE: 6/6/2015
DRAFT
CHECKED
MATERIAL
FINISH
SEE APPLICABLE NOTES

TITLE

SIZE B | DWG NO OOI TOOL SKID | REV
SCALE | SHEET 2 OF 2

Overboard Handling System: Layout

Existing Rapp Winch power van. *Mounted on top of winch to use less deck space.*

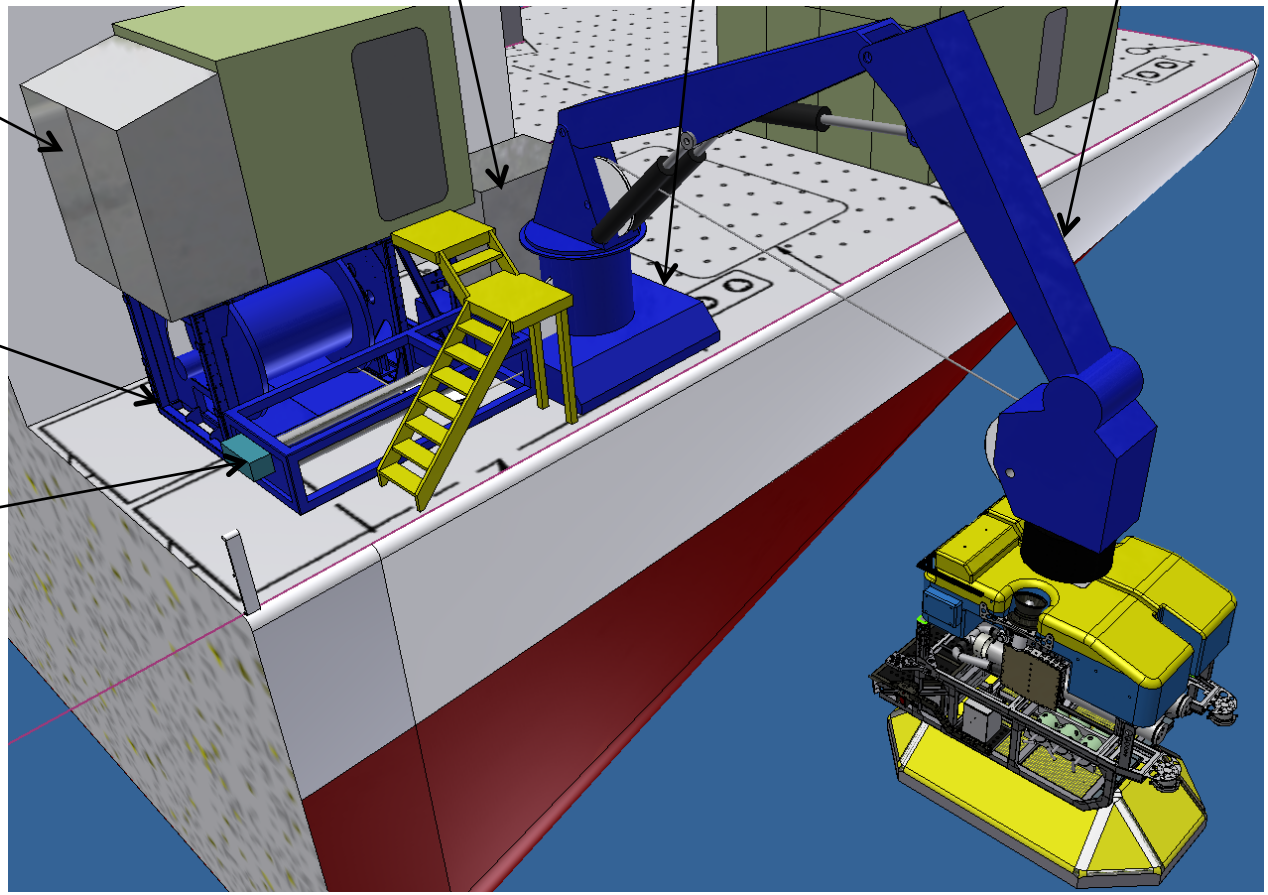
Recently purchased Airline Hydraulic HPU. *Mounted on top of LARS Base to use less deck space.*

In-house LARS Base. *Allows winch to mount to either forward or inboard edge depending on ship.*

North Pacific Crane Co. LARS *Includes latching docking head.*

Existing Rapp Winch with new drum and Lebus for 0.842” cable

New Rapp Level Wind for 0.842” cable in new side-mount position. *Braced against LARS base for reduced winch deck loads.*



Schedule Overview