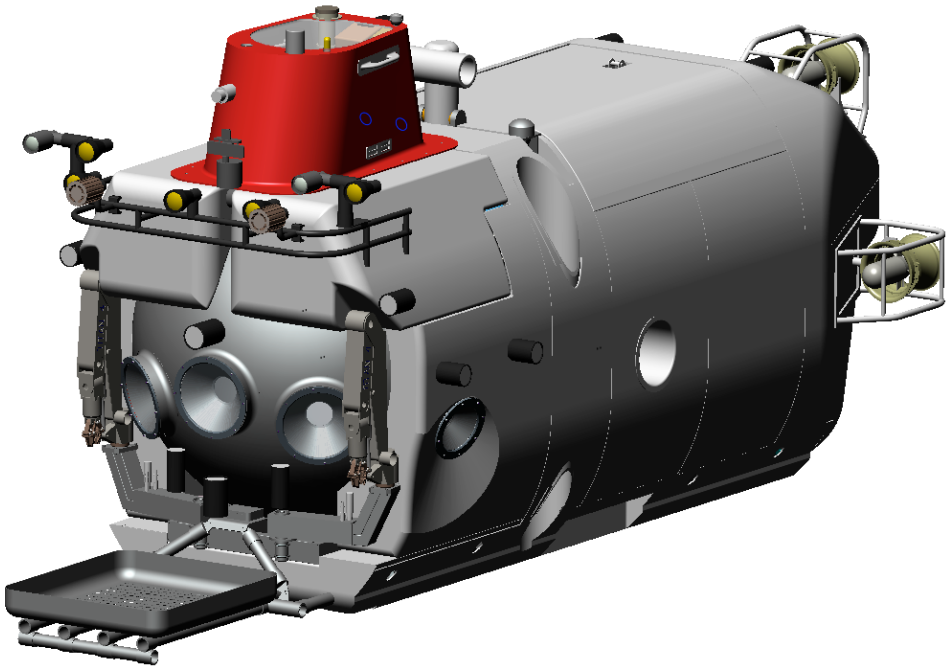
Replacement Human Operated Vehicle (RHOV)

RVOC Update

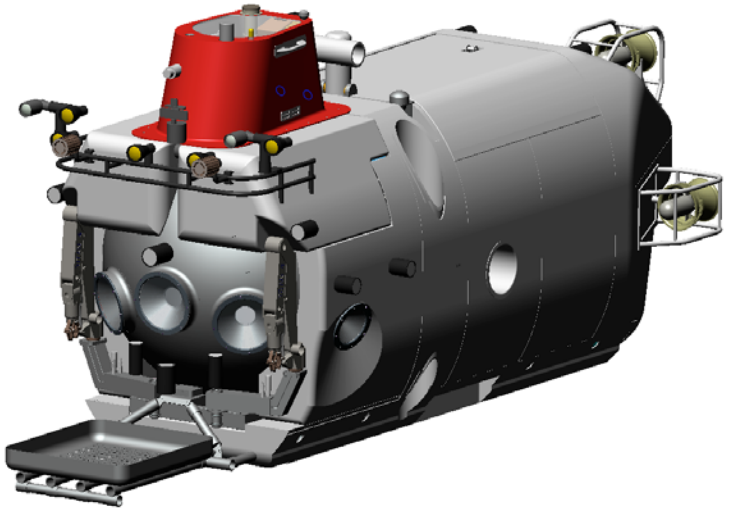


RHOV Construction Approach

Two Major Contracts:

- Design, Fabrication and Testing of the Personnel Sphere
  Southwest Research Institute (SwRI) is prime contractor

- Design, Fabrication and Testing of the New Vehicle
  (incl. integration with personnel sphere)
  Lockheed-Martin (Riviera Beach) is prime contractor

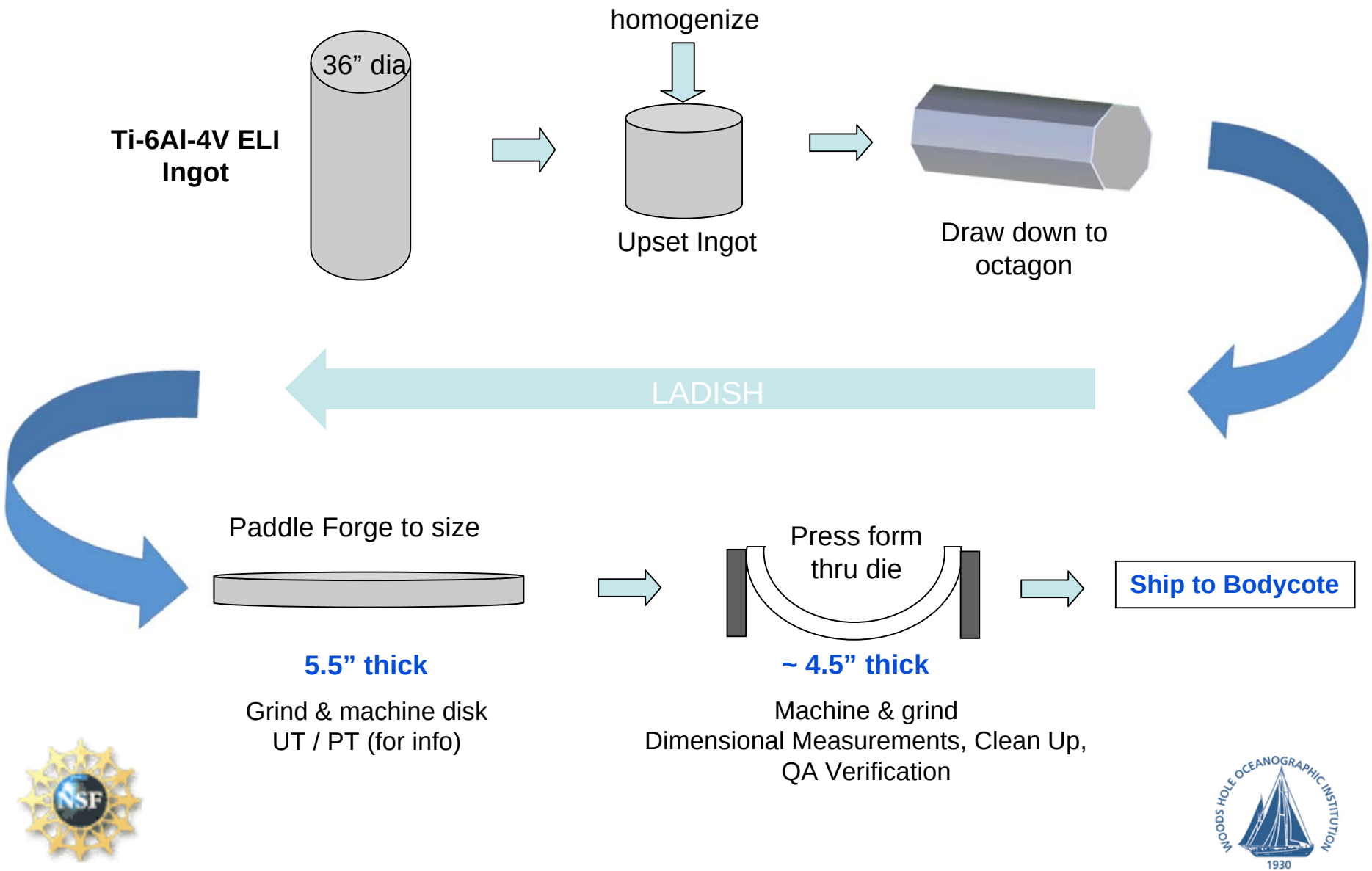


Personnel Sphere

Status of Personnel Sphere

- Oct. 14, 2005: contract signed with SwRI for personnel sphere design, fabrication and testing
- Dec. 12-13, 2006: successful completion of Preliminary Design Review (PDR)
- Feb. 7, 2007: RHOC and NSF approved Phase 1 => Phase 2 (begin personnel sphere detailed design & fabrication)
- Titanium 6Al-4V ELI testing completed
- Subcontracts with Ladish Forge (the forger); STADCO (machining and welding); Bodycoat Inc. (heat treatment and stress relief), and ABS America (certification) are in place.
- Sept. 5-6, 2007: Detailed Design Review (DDR) for RHOV personnel sphere successfully completed.
- ABS accepted hull design; concurrence by NAVSEA
- Forging process began in January 2008

Workflow Diagram

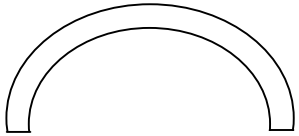


Workflow Diagram

continued

BODYCOTE

Receive Hemis from Ladish

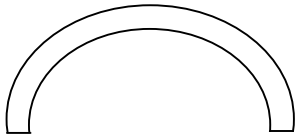


Ceramic Coat
Heat Treatment

LADISH

Machine
Material property tests, ABS QA
Verification, and rough machine
ABS Survey

BODYCOTE



Vacuum Anneal
1350F

STADCO

Final Machine, Welding
Dimensional Checks
Hydrogen & Microstructure
ABS Survey

Titanium Ingots

Two 36-inch Hemisphere Ingots (16,750 lb & 16,700 lb)
36-inch Insert Ingot (7,000 lb)

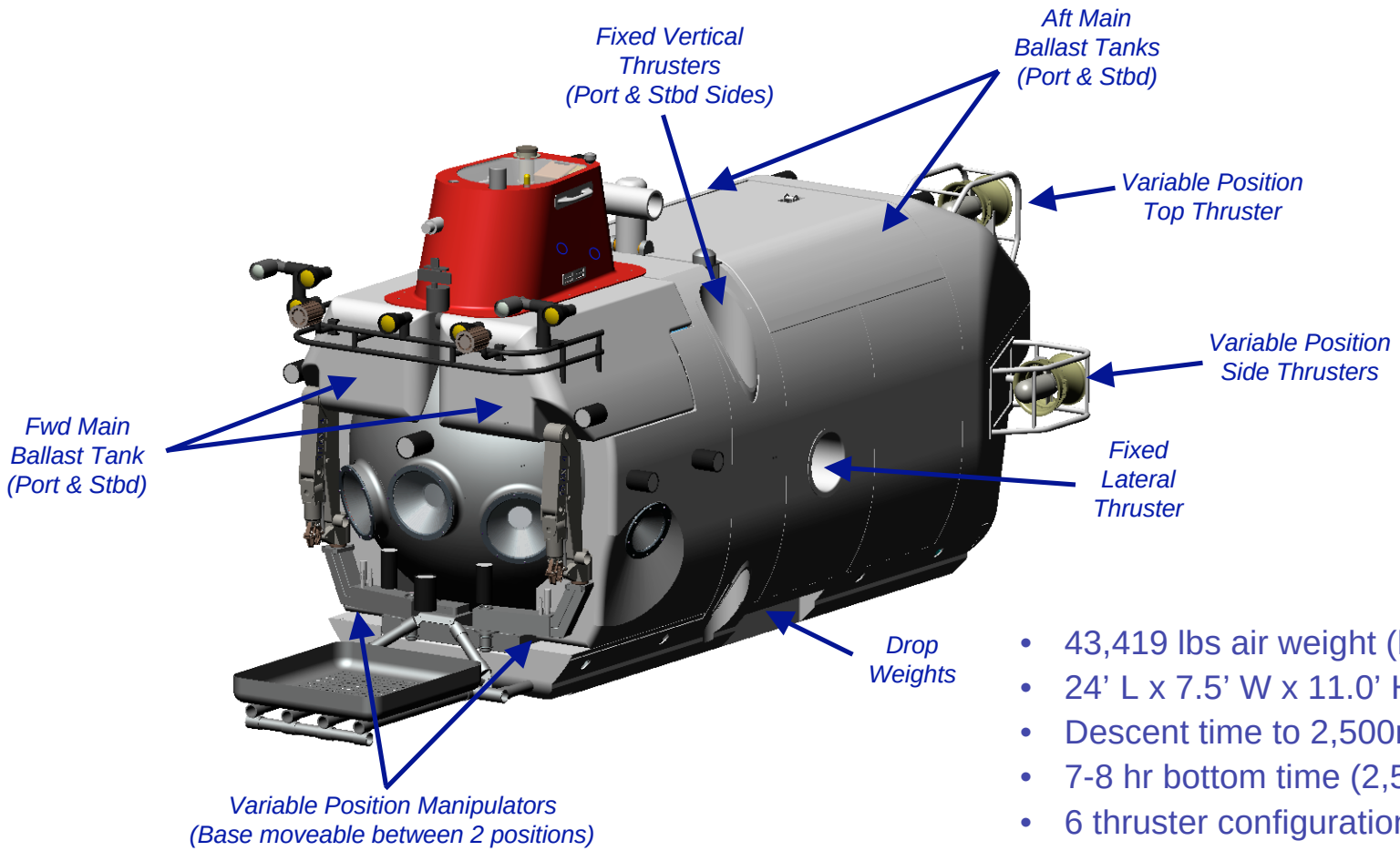
Forging Process

- HEMISPHERE DISKS WERE UPSET AND PADDELED
- SIDE-BY-SIDE OVENS WERE USED TO HEAT THE DISKS
- FORGING PROCESS SHOULD LARGELY BE COMPLETED BY JUNE 2008

RHOV Vehicle Contract History

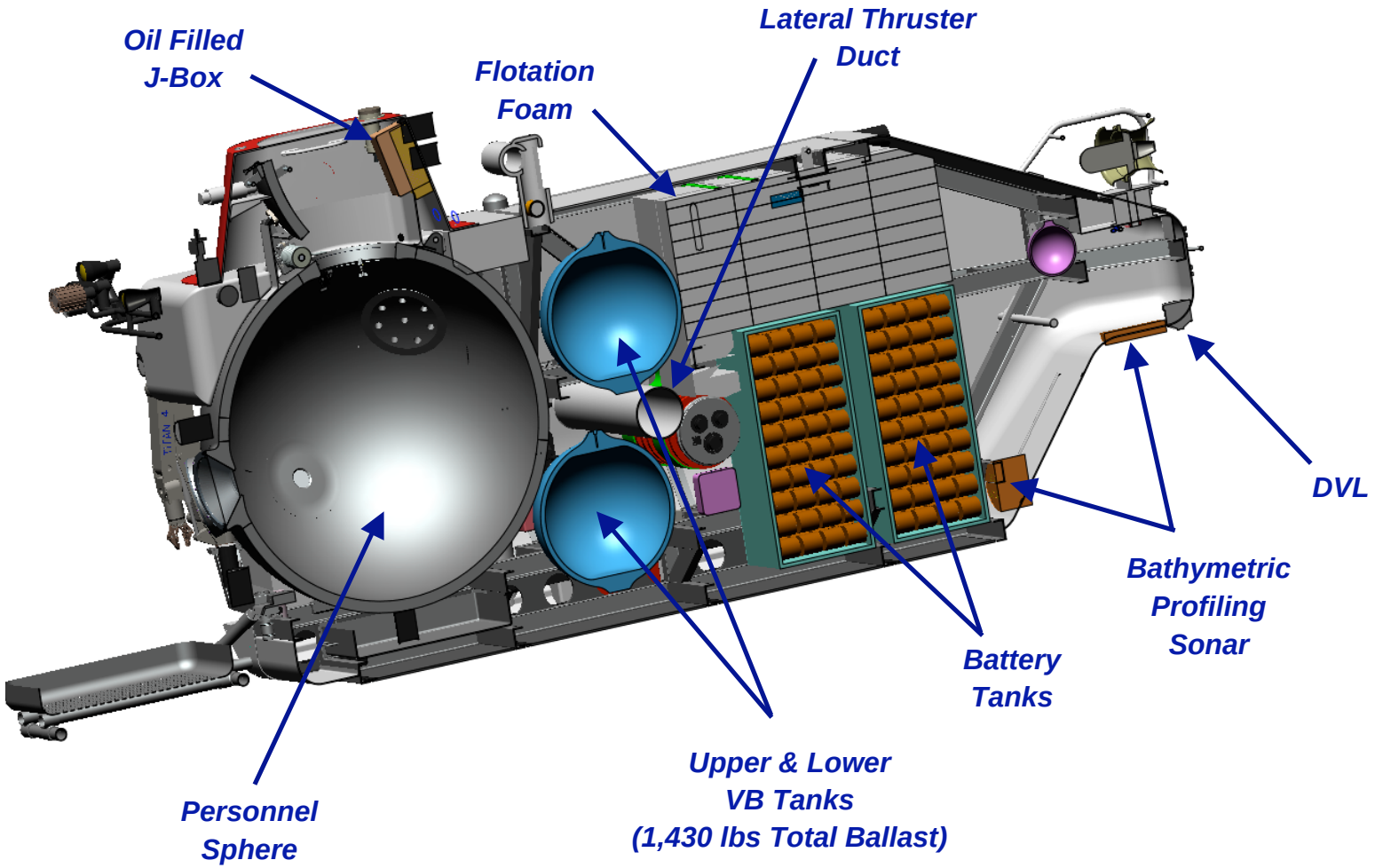
- Contract with Lockheed Martin (Riviera Beach) was signed on June 8, 2007 for CLIN1 (preliminary vehicle design and detailed cost estimate) was executed. CLIN2 (detailed design, fabrication and testing) will be executed following PDR and detailed costing provided cost is within budget.
- July 24-25, 2007: RHOV Requirements Review at LM-RB
- Preliminary Design Review for RHOV vehicle held Nov. 13-15, 2007 in Riviera Beach and successfully completed
- Detailed cost proposal received Jan. 25, 2007
- RHOC meeting to review results of PDR and detailed cost estimates held Feb. 20-21, 2008.

RHOV Vehicle Design



- 43,419 lbs air weight (heaviest state)
- 24’ L x 7.5’ W x 11.0’ H
- Descent time to 2,500m = 73 min
- 7-8 hr bottom time (2,500m)
- 6 thruster configuration
- Movable manipulator mounts
- Flat top and bottom surfaces
- Low profile sail
- Compatible with current A-Frame
- Maintain *Atlantis/Alvin* launch & recovery procedure

RHOV Vehicle Design



RHOV Project Status

Significant funding shortfall to complete RHOV. Currently evaluating three options:

1) Obtain additional funds to complete 6500-m rated new RHOV as planned (looking to NSF as well as potential private and corporate sponsors)
2) Complete new personnel sphere and use to upgrade present *Alvin* which would continue to operate as a 4500-m rated HOV (currently evaluating feasibility and cost of this option)
3) Terminate RHOV project; continue to operate *Alvin* as long as possible

⇒ RHOC (RHOV Oversight Committee) and DESSC have strongly recommended that additional funds be found to complete RHOV as planned

⇒ Next step will be joint meeting of RHOC and DESSC to review options (1) and (2) in June 2008.

Construction Schedule