



SOUTHWEST RESEARCH INSTITUTE



# Marine Systems

## Design, Analysis, Development and Testing

Southwest Research Institute® (SwRI®) has supported the marine and offshore industries for more than 40 years. Expert staff members can provide design, analysis, and experimental or numerical modeling to achieve optimum results. SwRI's laboratories and facilities, augmented by outdoor test areas, are served by a network of computerized data acquisition and analysis equipment.

### Expertise

#### Technical Disciplines

- Marine engineering
- Ocean engineering
- Structural systems engineering
- Rapid response engineering, prototyping and simulation
- Testing and assessment
- Materials selection
- Application of advanced materials and composites to marine and subsea systems
- Corrosion protection and detection
- Operations and training

#### Marine Systems

- Manned, unmanned, remotely operated and autonomous vehicle systems
- Surface and subsea structures and structural systems
- Manned and unmanned pressure vessels
- Deep ocean pressure vessels
- Large, full-scale and small-scale models
- Vehicle propulsion and hydrodynamics
- Power generation and transfer
- Subsea data transfer



SwRI built the Kokanee submarine, the largest unmanned sub in the world (roughly 100 feet long and 10 feet in diameter), to simulate the acoustic and hydrodynamic characteristics of the Seawolf Class attack submarine. All of its structures, foundations, and control panels were designed and fabricated at SwRI.

SwRI converted this deck decompression chamber from a double-lock to a triple-lock configuration and, through analysis, upgraded its rating from 900 to 1,200 feet of salt water (fsw).



SwRI designed, fabricated and tested the pressure hull system, support frame and lifting bridle for the US Navy's new submarine rescue vessel, the Pressurized Rescue Module System (PRMS). To enable operation at depths of 2,000 fsw and to minimize system weight, HY-100 steel was used for the pressure hull systems. The lifting bridle was machined from a single 6Al-4V ELI (Grade 23) titanium alloy forging.

## Life Support Systems

- Closed and semi-closed circuit diving systems
- Surface-supplied diving systems
- Saturation diving systems
- Scuba diving systems
- Damage control / first responder breathing gas systems
- Hyperbaric medical treatment systems
- Thermal protection

## Marine Salvage

- Marine salvage engineering
- Petroleum offloading
- Surface-supplied diving – air and mixed gas
- Saturation diving – air and mixed gas

## Welding and Fabrication

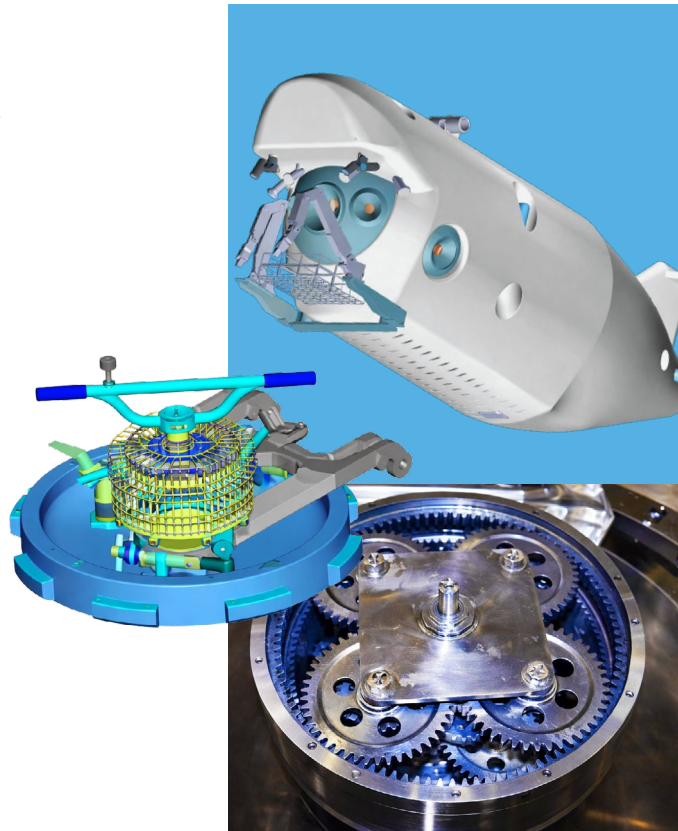
- SMAW, TIG, GTAW, SAW
- Low-alloy high-strength steel
- Titanium alloy (6Al-4V and 6Al-4V ELI)
- INCONEL
- Aluminum

## Design Codes

- American Bureau of Shipping
- U.S. Coast Guard
- Det Norske Veritas
- American Society of Mechanical Engineers
- American Welding Society
- American National Standards Institute
- American Petroleum Institute
- Military Specifications

## Processes and Procedures

- Quality assurance and inspection
- Engineering and design
- Failure mode effects analysis (FMEA)
- System safety and hazard analysis
- Manufacturing and fabrication
- Testing and evaluation
- Operations – systems and facilities
- Maintenance and repair – planning and performance



*SwRI conducted the New Alvin Deep Submersible Conceptual Development Study for the Woods Hole Oceanographic Institution (WHOI). Based on the study results, the National Science Foundation has authorized WHOI to proceed with design and fabrication of the 6Al-4V ELI titanium alloy pressure hull and the vehicle ballast and trim systems.*

*SwRI designed, fabricated and tested the hatch for the submarine rescue vessel, the Pressurized Rescue Module System (PRMS). This effort included successful development of the two PRMS hatch operating gearboxes.*

**We welcome  
your inquiries.**

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## SOUTHWEST RESEARCH INSTITUTE®

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