

# Engineering Support of Underwater Operations

Phoenix's Engineering Division is comprised of marine/ocean, mechanical, and electrical engineers, and naval architects with a comprehensive knowledge of marine operations and decades of practical expertise. Our engineers provide timely, practical support and solutions for maritime campaigns, including operations planning, pier-side ship husbandry, offshore operations, and real-world tooling for divers, ROV operators, and customers with special requirements.

## Operations Planning

Attaching equipment to a ship for deploying an ROV or attaching a habitat requires multiple levels of engineering planning and analysis. Analyses that Phoenix Engineering performs include:

- Control and Telemetry Design
- Naval Architecture for the Ship Motions and Deck Load Analyses
- Power Design for Electric and Hydraulic Equipment
- Special Training Systems
- Stress Analysis of Lifts (Air and Subsea)
- Design and Documentation for Class Society Compliance
- Others, as required by the Operation

## Offshore Operations Support

The success and safety of offshore operations depends on engineering the equipment, rigging, deck layouts, power, and the whole system. Phoenix engineers provide complete and comprehensive engineering solutions to meet client-specific requirements, while adhering to all applicable regulations and standards. Offshore operations support services include those regarding transportation, mobilization, salvage, etc.

## Contact us to learn more

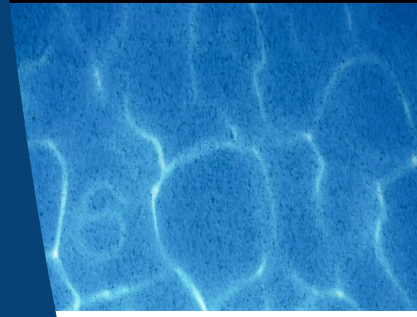
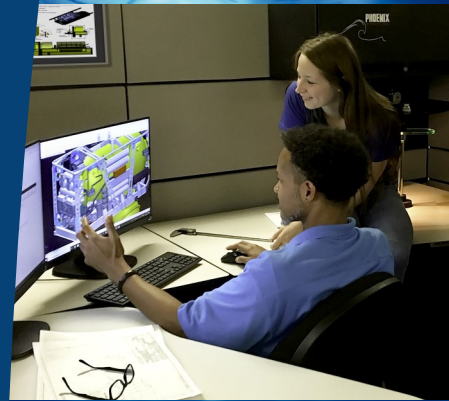
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# Underwater Ship Husbandry (UWSH) Support

For UWSH repairs to be permanent and class society approved, engineering is required of both the repair and the procedure. Phoenix's engineering division can provide practical, experienced-based repair solutions accompanied by quality drawings, specifications, and procedures that meet class society requirements to ensure approval.

Support services for ship repair include critical analysis and design, and repair procedure writing for tasks ranging from damaged vessel repairs to manned habitats. As many of our engineers are trained professional divers, they can work directly alongside our divers, providing operational support on the pier and in the water.

Engineering support includes:

## Cofferdam/Manned Habitat Design

- Open Top Habitats
- Rudder Repairs
- Shaft Wraps
- Unique Application Cofferdams

## Rigging Analysis/Rigging Plan

- Habitat Installation
- Propeller Changes
- Rudder Replacement
- Special Purpose Rigging Fixtures

## Collision Assessment

- Dry Dock Planning
- Temporary Transit Repairs

## Underwater Ship Repair Procedures

- Diving Operation Plans (DOPs) for the U.S. Army Corps of Engineers
- Formal Work Packages (FWPs) for the U.S. Navy
- Process Control Work Packages (PCWPs) for the U.S. Navy
- Process Control Procedures (PCPs) for the U.S. Navy and Army Corps of Engineers
- Safe Work Plans (SWPs) for the U.S. Army Corps of Engineers

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