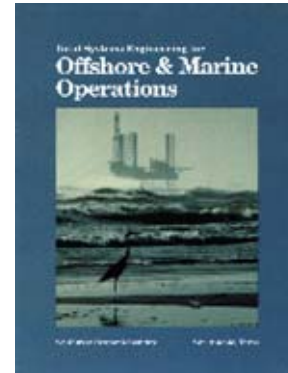


# Total Systems Engineering for Offshore and Marine Operations

## 用于滩海和海洋工业的全系统工程

With more than 40 years of experience in offshore and marine technologies, Southwest Research Institute (SwRI) offers research, design, development, prototype construction, testing, and field services. Expertise includes the design and analysis of offshore equipment, construction of prototype systems including manned and unmanned vehicles, and development and testing of offshore equipment to client requirements or international codes. The Institute's international clientele includes the offshore oil and gas industries, the U.S. Navy, and national and international organizations.



美国西南研究院在滩海和海洋技术上有超过四十年的经验，能够提供研究、设计、开发、原型制造、测试和现场服务，专业范围包括滩海设备的设计和分析、原型系统的建设，以及载人和非载人的交通工具，对客户需求或国际代码的滩海设备的开发和检测，美国西南研究院的国际客户包括滩海油气工业、美国海军、国内和国外的组织。

SwRI engineers, scientists, and skilled technical staff are problem solvers. Many are internationally recognized experts in their fields and share their expertise through technical publications, training courses, and participation in standards development organizations such as ASME and API.

美国西南研究院工程师、科学家、专业技师都是解决问题的高手，在相关的技术领域，大多数员工拥有被国际组织认可的专家，通过专业技术刊物、培训课程、标准开发的参与者（如 ASME 和 API），分享其专业知识。

The Institute's more than 1.5 million square feet of combined laboratory and office facilities, augmented by outdoor test areas, are served by a network of computerized

data acquisition and analysis equipment. Programs often involve design, analysis, and experimental or numerical modeling to achieve optimum results.

美国西南研究院拥有超过 150 万平方英尺的联合实验室、办公室等设施，远程检测区，由计算机数据采集和分析设备提供服务，研究课题一般包括设计、分析、经验模型和数字化模型来达到优化的结果。

The Institute's facilities and staff are available to solve complex and challenging problems in offshore or marine structures, components, or equipment.

美国西南研究院的实验设施和技术人员有能力解决复杂的滩海和海洋工程结构、部件或设备和具有挑战性的问题。



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

美国西南研究院改变了该甲板的减压舱结构，由双重密闭结构改为三重密闭结构，从而使它的海水下潜能力从 900 英尺提高到了 1200 英尺。

## Systems Design and Engineering

### 系统设计和工程

Institute engineers conduct conceptual studies, perform detailed hardware design, and execute complex, multidisciplinary systems engineering programs.

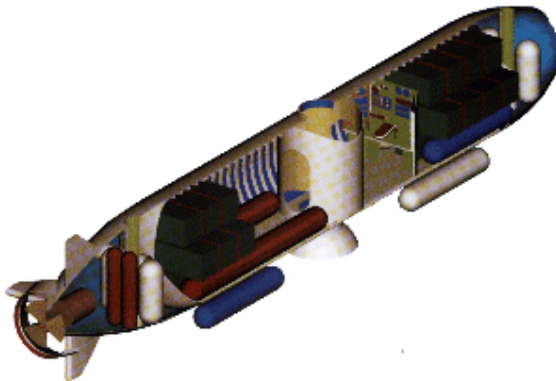
美国西南研究院工程师引入了概念研究，完成了详细的硬件设计，以及执行联合的、多学科系统工程的课题研究。

Services include:

- Systems concept
- Design and development
- Remedial design
- Computer-aided design

服务项目包括：

- 系统概念研究
- 设计和开发
- 补救设计
- 计算机辅助设计



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Using computer analysis techniques, the Institute conducted conceptual studies of a new generation of special operations submarines.

使用计算机分析技术，美国西南研究院将之引入了特殊操作的新一代潜艇的概念设计。

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Codes utilized in design include:

- American Bureau of Shipping (ABS)
- American Society of Mechanical Engineers (ASME)
- U.S. Coast Guard
- Det Norske Veritas
- American Welding Society (AWS)

- American National Standards Institute (ANSI)
- American Petroleum Institute (API)
- Military Specifications

设计中的代码应用：

- 美国船舶局 ( ABS )
- 美国机械工程师委员会(ASME)
- 美国海岸警备队
- Det Norske Veritas
- 美国焊接协会(AWS)
- 美国国家标准研究院(ANSI)
- 美国石油学会(API)
- 军队规程

## **Structural Analysis**

### **结构分析**

While solving a diversity of offshore engineering problems, SwRI has added to its expertise in a variety of analytical techniques and numerical procedures.

在解决复杂的海洋工程问题过程中，在多种分析技术和数字处理方面，美国西南研究院增强了自己的专业能力。

A full range of applied mechanical services are offered, assuring that the most effective analysis methods are applied to specific problems. Static analysis applications include:

- Submersible hulls/penetrations
- Offshore structures

能够提供广泛的应用机械服务，保障最有效方法应用在特殊问题中，静态应

用分析包括：

- 可潜水的船体/渗透性
- 滩海结构

Fatigue and fracture analysis methods include:

- Failure mode prediction
- Material selection
- Crack propagation analysis
- Residual stress analysis
- Fracture mechanics

失效和裂纹分析方法包括：

- 失效模式预测
- 材料选择
- 裂纹生长分析
- 残余应力分析
- 裂纹机理研究

## **Fabrication**

### **制造**

The Institute is expert in fabricating high-quality structural components of moderate to large sizes. The fabrication of large, precision components allows us to provide turnkey system development services on high-technology hardware.

美国西南研究院精通大中型尺寸的高性能结构部件的制造，在高新技术硬件方面，可为大型、精密部件提供总控系统的开发服务，

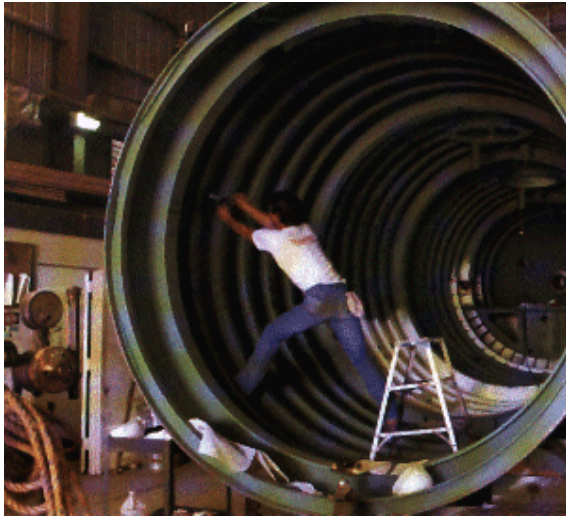
As a result of the many and varied fabrication programs conducted at SwRI, staff members have more experience in welding and joining high strength-low alloy (HSLA) steels than any company other than the major ship-builders. Welding capabilities cover the range of high-strength ferrous and nonferrous alloys (including titanium), weld procedure development, and welded structure failure analysis.

其结果是美国西南研究院得到了大多数课题以及不同类型的制造项目，员工们在焊接和连接高强度、低合金钢方面，超越了其它公司（除了一些大型的船舶建设公司）。特别是在大部分高强度的铁及非铁合金（包括钛）的焊接性能，焊接工艺的开发和焊接结构失效分析等方面获得了更多的经验。

Institute quality control systems comply with the rules and regulations of:

研究院品质控制系统遵从如下的规则和法则：

- MIL-C-45208
- ABS
- ASME (Section VIII, Divisions 1 and 2)
- ANSI B 31.1 power piping
- Det Norske Veritas
- Lloyds
- AWS
- U.S. Navy (NAVFAC)
- PVHO (Pressure Vessels for Human Occupancy)
- U.S. Coast Guard
- ASNT TC-1A (Level 3 in all NDE disciplines)



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

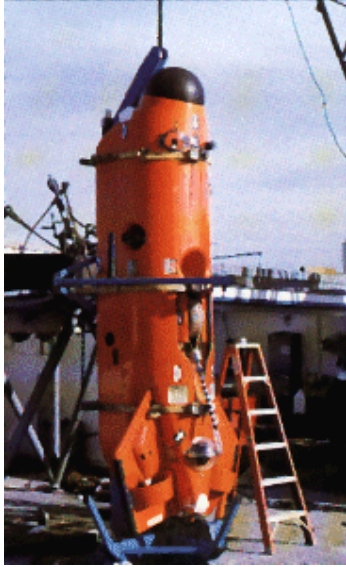
研究院建造了 Kokanee 潜艇，长约 100 英尺，直径约 10 英尺，模拟海狼级攻击潜艇的声学及水力学特性，这是世界上最大的非载人式潜艇，它的所有结构、基础及控制面板等都是西南院设计和制造的。

## Deep Ocean Simulation

### 深海模拟

A variety of deep ocean simulators, including internal pressure vessels up to 90 inches in diameter, are located in SwRI laboratories. These vessels operate at horizontal, vertical, or intermediate angles. All chambers are equipped with instrumentation and power penetrators, and high-speed or still photography is available in many of them.

安装在西南院的实验室中用途广泛的深海模拟器，包括内径达到 90 英寸的压力容器，，这些容器在水平的、垂直的及倾斜的角度下操作，所有的舱室都安装了仪器和动力装置，大多数舱室中还安装了高速或连续成像的技术。



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Using SwRI-designed load cells, staff members test the thrust of this mine neutralization vehicle's propulsion system.

使用美国西南研究院设计的负载单元，在以矿石中和方式的交通工具之推进系统中，技术人员进行推进力的测试。

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A collapse test of a pipe is conducted in SwRI's 10-inch diameter, 20,000-psig deep ocean simulator.

直径 10 英寸、20000psi 深海模拟器的管子的破坏性测试。

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## Structural Test and Evaluation

### 结构检测和评价

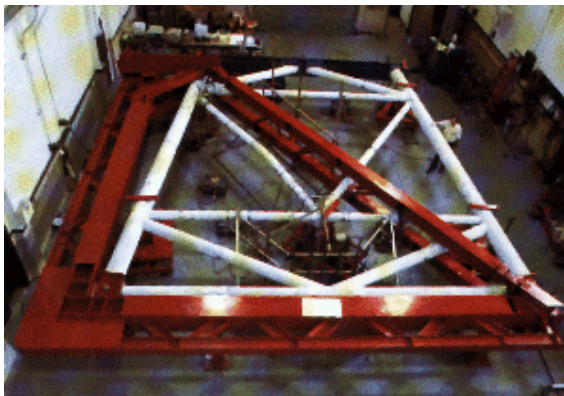
Since 1958, the Institute has used special instrumentation to test offshore structures. Large-scale, full-scale, and *in situ* testing capabilities include high-load, high-elongation, static, and dynamic tests, using a variety of instrumentation. Facilities include both open and closed loop load and displacement control systems. SwRI testing capabilities include:

- Stress analysis
- Fatigue and fracture

- Residual stress
- High-pressure, high-load capacity
- Corrosion in sour gas environments
- Large, precision models on a special test frame

从 1958 年以来，美国西南研究院已经具备使用特别的仪器检测滩海结构的大尺寸、全尺寸与现场测试的能力，使用各种仪器，开展大负荷、高延展性、静态及动态测试。实验设施包括开放的、封闭的环向负荷、位移控制系统。美国西南研究院的测试能力包括：

- 应力分析
- 失效及裂纹分析
- 残余应力
- 高压、高负荷的分析能力
- 酸气环境中的腐蚀
- 特殊平台测试中的大型、精确模型



SwRI evaluated the ability of an offshore platform to withstand storms. For this program, the staff conducted six large model tests, six K-joint tests, and six column tests using 2,000 channels of strain and displacement instrumentation. The Institute built and tested the models in four months.

美国西南研究院评价海洋平台抵御暴风雨的能力，在这个项目中，工程师们引入了六个大型的模型测试装置；使用 2000 个通道的应变和位移传感器，对六个 K 型结构进行检测。西南院

花了四个月的时间建设并检测了这套模型。

更多的信息请您联络美国西南研究院北京代表处李金武,北京朝阳区东三环北路  
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