



Materials and Welding Challenges for  
Offshore Oil & Gas Industries





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## Introduction

Offshore Oil and Gas industries always operate in a highly demanding environment. Materials Selection, Welding, and corrosion challenges are immense and require excellent knowledge and expertise.

This offshore welding and materials challenges in oil and gas course is an extensive, in-depth 5-day course on welding, metallurgy, and corrosion aspects of various materials used in Offshore Oil and gas Industries. The offshore welding and materials challenge in the oil and gas course is targeted to develop the skills to handle these underlying issues.

This offshore welding and materials challenges in oil and gas course discusses, in great detail, various alloys, their metallurgical properties, design requirements as per the construction codes, welding practices, damage mechanisms, and mitigation in offshore oil and gas production environments. It narrates materials selection criteria, welding problems, corrosion requirements, and the best ways to achieve the best results under the most demanding offshore oil and gas production environments.

## Enhancing Offshore Welding Skills in Oil and Gas Industries

The challenges of offshoring, particularly in the oil and gas industries, require specialized knowledge and training. This offshore welding and materials challenges in the oil and gas course aims to address this by imparting comprehensive oil and gas welding training through a hands-on offshore welding course.

Participants, including welder oil and gas professionals, offshore welders, and those involved in oil and gas materials management, will gain insight into pipeline welding training and the unique practice of offshore welding. This training is geared towards ensuring that all procedures comply with the highest standards of oil and gas materials and that these craftsmen are equipped to meet industry demands.

## Targeted Groups

- Welding Personnel.
- Metallurgy Personnel.
- Inspection Personnel.
- Equipment Engineers.
- Maintenance Engineers and Planners.
- Design Engineers.
- Service Company Representatives.

## Course Objectives

At the end of this offshore welding and materials challenges in oil and gas course, the participants will be able to:

- Understand the various materials used in offshore O&G environments and associated welding engineering challenges.
- Learn about the corrosion issues in offshore O&G environments and associated life cycle engineering challenges.
- Get familiar with world-class engineering standards, e.g., NACE, EEMUA, ASME/ASTM, Norsok, and various leading oil and gas design/materials selection standards.
- Apply the proper design materials engineering to the best interest of the organization and projects related to O&G engineering.

## Targeted Competencies

By the end of this offshore welding and materials challenges in oil and gas course, the target competencies will be able to:

- World-class engineering standards.
- ISO 21457-2010-principles.
- Understand the materials for offshore O&G environments, metallurgy, and welding issues.

## Course Content

### Unit 1: Introduction to Guidelines for Materials Selection for Offshore O&G Production Equipment

- EEMUA publication 194, guidelines for materials selection and corrosion control for subsea oil and gas production equipment.
- ISO 21457- 2010: Material selection and corrosion control for oil and gas production systems.
- Petroleum, petrochemical, and natural gas industries and materials for use in H<sub>2</sub>S-containing environments in oil and gas production.
- NACE MR 0175-ISO 15156, 2015.
- Norsok M001.

### Unit 2: Materials for Offshore O&G Environments, Metallurgy, and Welding Issues

- Duplex stainless steel:
  - Introduction to duplex stainless steel.
  - Metallurgy.
  - Welding issues.

### **Unit 3: Super Austenitic Stainless Steels**

- Physical metallurgy.
- Welding considerations.
- Learn about super austenitic vs. duplex stainless steel.
- Design and fabrication pros and cons.
- Weldable super martensitic stainless steel.
- Metallurgy.
- Welding issues.

### **Unit 4: Nickel Alloys**

- Metallurgy.
- Welding issues.

### **Unit 5: Clad Steels**

- Metallurgy.
- Welding issues.

### **Unit 6: Martensitic 13Cr Stainless Steels**

- Metallurgy.
- Welding issues.

### **Unit 7: Precipitation Hardenable Stainless Steels**

- Metallurgy.
- Welding issues.

### **Unit 8: Austenitic Stainless Steels**

- Metallurgy.
- Welding issues.

### **Unit 9: Titanium Alloys**

- Metallurgy.
- Welding issues.