

Advanced Upstream Oil and Gas Materials Selection Training Course

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Overview

Advanced Upstream Oil and Gas Materials Selection Training Course is a one-week advanced course for materials, corrosion, mechanical, piping, project, inspection, and integrity teams who leave with an Upstream Materials Selection Basis. Participants connect service conditions, degradation mechanisms, metallic and nonmetallic options, fabrication implications, specifications, life-cycle cost, and technical assurance. The course converts scattered design inputs into traceable oil and gas materials selection decisions. Agile Leaders Training Center presents upstream materials selection practice.

Who Should Attend

- Materials functions responsible for selection philosophy, specifications, and material approval
- Corrosion functions responsible for service-environment assessment and degradation controls
- Mechanical, piping, and pipeline functions responsible for equipment and system design conditions
- Project functions responsible for design interfaces, procurement requirements, and technical queries
- Inspection and integrity functions responsible for verification evidence and life-cycle feedback
- Technical authorities responsible for approving deviations and material-selection records

The course assumes participants review process, design, materials, corrosion, fabrication, or integrity evidence at work, and it leaves out introductory metallurgy, welding technique instruction, detailed inspection practice, and general asset-integrity management.

Departments and Industries

The course supports departments and industries that specify materials for hydrocarbon, utility, and corrosive-fluid service.

- Upstream oil and gas wells, gathering systems, and production facilities
- Flowline, pipeline, piping, and pressure-equipment engineering departments
- Petrochemical, geothermal, carbon-management, and industrial-water projects
- Materials, corrosion, welding, inspection, and asset-integrity functions
- Engineering contractors, equipment suppliers, fabricators, and technical assurance teams

Learning Objectives

By the end of this course, participants will be able to:

- Analyze service conditions and degradation threats
- Compare carbon steel, CRA, polymer, and elastomer options
- Apply ISO 21457:2010 selection and corrosion-control guidance
- Evaluate fabrication, compatibility, and protection implications
- Prioritize life-cycle cost and assurance requirements
- Build an Upstream Materials Selection Basis

Course Agenda

Day 1: Establish the Service Environment

- Process Composition and Design-Condition Data Sheet
- Pressure, Temperature, Phase, and Velocity Operating Envelope
- Water Chemistry, Chloride, CO2, and H2S Evidence Register
- ISO 21457:2010 Materials Selection Scope Map
- Service-Criticality and Design-Life Classification Matrix

Day 2: Screen Materials and Degradation Threats

- General, Localized, Galvanic, and Erosion-Corrosion Threat Matrix
- Hydrogen Damage and Sour-Service Screening Record
- Carbon Steel Corrosion Allowance Decision Model
- Corrosion-Resistant Alloy Candidate Comparison Table
- Material Compatibility and Mixed-Metals Interface Review

Day 3: Select Materials for Production Systems

- Wellhead, Flowline, and Gathering-System Selection Diagram
- Pipeline, Piping, and Pressure-Equipment Materials Map
- Polymer, Composite, Lining, and Coating Suitability Matrix
- Seal, Gasket, and Elastomer Compatibility Worksheet
- Utility, Injection, and Produced-Water Service Selection Sheet

Day 4: Specify and Assure the Selection

- Welding, Heat Treatment, and Fabrication Constraint Register
- Material Specification and Procurement Data Requirement Sheet
- Qualification, Traceability, and Verification Evidence Plan
- Life-Cycle Cost and Maintainability Comparison Model
- Materials Selection Deviation and Technical Query Log

Day 5: Practice Materials Selection Decisions

- Suggested Exercise: Define a Corrosive Service Environment
- Suggested Exercise: Screen Carbon Steel and CRA Options
- Suggested Exercise: Select Nonmetallic Components and Seals
- Suggested Exercise: Review a Material Specification Deviation
- Capstone Exercise: Complete the Upstream Materials Selection Basis

Practical Exercises

The course uses suggested activities to turn process, design, degradation, fabrication, and commercial evidence into documented selection decisions.

- Suggested activity: establish a service envelope and rank credible degradation mechanisms for a production system.
- Suggested activity: compare carbon steel, corrosion-resistant alloys, polymers, coatings, and elastomers against defined conditions.
- Suggested activity: test a material choice against fabrication, compatibility, procurement, verification, and life-cycle implications.
- Suggested activity: defend a selection basis with assumptions, diagrams, specifications, deviations, and assurance actions.

FAQs

Who suits upstream oil and gas materials selection training, and what does it assume?

Materials, corrosion, mechanical, piping, pipeline, project, inspection, integrity, and technical-authority teams suit the course. It assumes experience reviewing engineering data, specifications, equipment, fabrication, or degradation evidence.

How does oil and gas materials selection differ from general corrosion-control training?

Oil and gas materials selection compares candidate materials against service, design, fabrication, compatibility, cost, and assurance requirements. General corrosion-control training focuses more broadly on corrosion mechanisms, monitoring, protection, and mitigation.

What evidence defines an upstream materials selection service environment?

Fluid composition, water chemistry, pressure, temperature, phase behavior, velocity, solids, chlorides, acid gases, operating variation, design life, fabrication constraints, and consequence evidence define the service environment.

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When are corrosion-resistant alloys considered in oil and gas materials selection?

Corrosion-resistant alloys are considered when defined service conditions, degradation risks, reliability needs, corrosion-control limits, fabrication feasibility, and life-cycle evidence do not support an acceptable carbon-steel solution.

Why are polymers and elastomers included in upstream materials selection?

Polymers and elastomers influence liners, seals, gaskets, coatings, flexible components, and chemical compatibility. Temperature, pressure, permeation, swelling, aging, decompression, and fluid exposure affect their suitability.

Conclusion

Participants take back an Upstream Materials Selection Basis linking service conditions, threats, candidates, specifications, fabrication, cost, and assurance evidence. It changes isolated material choices into one traceable engineering decision record. Teams can update the basis as process data, operating limits, supplier evidence, and field experience change.

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