

Course No. 1650

Advanced Process Safety Management Training Course

**PROCESS SAFETY MANAGEMENT
OIL & GAS**

DURATION

5 Days

DELIVERY

Classroom



Course Overview

The Advanced Process Safety Management Training Course provides a comprehensive and practical framework for strengthening process safety performance in high-hazard industries, with particular relevance to oil and gas, energy, refining, petrochemical, and complex industrial operations. The program moves beyond fundamental Process Safety Management principles and focuses on advanced approaches to major accident prevention, critical barrier management, process risk assessment, asset integrity, human factors, and risk-based decision-making.

Advanced process safety requires organizations to understand how equipment, processes, people, procedures, technology, and management systems interact to create or control major accident risks. Serious process safety events rarely result from a single failure. They can emerge from multiple weaknesses involving equipment degradation, inadequate operating controls, ineffective change management, procedural deficiencies, organizational factors, or the progressive deterioration of safety barriers. This course equips professionals to identify these weaknesses before they develop into high-consequence events.

The program is designed around the operational realities of upstream and downstream oil and gas facilities, offshore and onshore installations, refineries, gas processing plants, petrochemical facilities, pipelines, terminals, storage facilities, and other high-risk industrial environments. Participants explore advanced applications of process hazard analysis, layers of protection, safety-critical barriers, mechanical integrity, management of change, abnormal operations, human factors, incident investigation, and process safety performance measurement.

A strong practical emphasis is placed on connecting technical analysis with management decisions. Participants will assess the effectiveness of preventive and mitigative safeguards, examine barrier performance, evaluate the implications of operational and technical changes, interpret process safety indicators, and identify early warning signs of deteriorating risk controls. Practical exercises and scenario-based activities enable participants to apply advanced process safety concepts to realistic workplace situations.

The course also develops advanced process safety leadership and risk management capabilities. Participants will learn how to evaluate the maturity and effectiveness of Process Safety Management systems, prioritize improvement opportunities, strengthen critical controls, and develop practical improvement plans. The overall approach supports safer and more reliable

operations while helping organizations protect people, assets, the environment, and business continuity.

Objectives

- Analyze advanced Process Safety Management principles and apply them to high-hazard oil and gas and industrial operations.
- Evaluate major accident scenarios by identifying initiating events, potential consequences, preventive controls, mitigative controls, and critical safety barriers.
- Apply advanced process risk assessment methodologies to determine whether existing risk controls are adequate and effective.
- Assess layers of protection and evaluate the independence, reliability, availability, and effectiveness of critical safety barriers.
- Evaluate mechanical integrity and safety-critical equipment management and establish stronger connections between inspection, maintenance, reliability, and process safety risk.
- Apply advanced Management of Change principles to identify and control risks arising from technical, operational, organizational, and procedural modifications.
- Assess abnormal operating conditions, startup, shutdown, process deviations, and emergency conditions from a process safety perspective.
- Analyze human and organizational factors that influence process safety performance and identify opportunities to strengthen operational controls.
- Evaluate major incidents and near misses using advanced investigation and barrier analysis techniques to identify immediate, underlying, and systemic causes.
- Develop advanced leading and lagging process safety indicators that provide meaningful insight into the condition and effectiveness of critical controls.
- Assess the maturity and effectiveness of Process Safety Management systems and prioritize significant improvement gaps.
- Develop an advanced process safety improvement plan that strengthens major accident prevention and critical risk controls by the end of the course.

Who Should Attend

This training course is designed for experienced professionals and managers working in Process Safety Management, HSE, engineering, operations, maintenance, reliability, asset integrity, risk management, and technical safety within oil and gas and other high-hazard industries. It is particularly relevant to process safety engineers, process engineers, safety engineers, HSE professionals, risk specialists, reliability engineers, mechanical integrity engineers, technical safety specialists, and operations, production, maintenance, and engineering managers.

The program is also suitable for asset managers, facility managers, project managers, engineering managers, HSE managers, operations leaders, and professionals involved in process hazard analysis, safety studies, asset integrity, Management of Change, technical assurance, operational risk, and process safety auditing. It is especially valuable for professionals who are responsible for evaluating the effectiveness of process safety systems, critical safeguards, and major accident prevention measures.

Senior executives and decision makers responsible for facility safety, operational reliability, risk governance, business continuity, and organizational resilience can also benefit from the program. The course provides a strategic perspective that enables leaders to connect process safety performance with operational reliability, asset protection, regulatory responsibilities, and long-term organizational performance.

Learning Outcomes

- Analyze complex process safety risks and identify high-consequence accident scenarios using a structured approach.
- Evaluate the effectiveness of preventive and mitigative safety barriers used to prevent or reduce the consequences of major accidents.
- Apply layers of protection principles to assess the adequacy and independence of existing safeguards.
- Analyze the relationship between asset integrity, equipment reliability, and process safety performance.
- Evaluate safety-critical equipment using inspection, testing, maintenance, reliability, and performance information.
- Apply advanced Management of Change practices to assess risks associated with technical and

operational modifications.

- Evaluate process safety risks associated with startup, shutdown, abnormal operations, and emergency conditions.
- Identify human and organizational factors that can influence process safety performance and barrier effectiveness.
- Conduct advanced incident investigations and identify immediate, underlying, systemic, and barrier-related causes.
- Develop meaningful leading indicators that provide early warning of deteriorating process safety controls.
- Assess the effectiveness and maturity of a Process Safety Management system and identify priority areas for improvement.
- Prepare an advanced process safety improvement plan that links critical risks, barriers, performance indicators, corrective actions, responsibilities, and implementation priorities.

Course Outline

DAY 01

Advanced Process Safety Management & Major Accident Risk

- Evolution from conventional safety management to advanced Process Safety Management
- Characteristics of major accidents and escalation mechanisms in oil and gas facilities
- Identification and assessment of complex process safety hazards and high-consequence events
- Process safety governance, leadership accountability, and risk-based decision-making

PRACTICAL APPLICATION

Analyze a major accident scenario and identify initiating events, consequences, critical barriers, failed controls, and systemic weaknesses

DAY 02

Advanced Risk Analysis, Layers of Protection & Critical Barriers

- Advanced process hazard identification and risk assessment methodologies
- Scenario development, initiating events, consequences, and risk evaluation
- Layers of protection and assessment of safeguard independence and effectiveness
- Identification, monitoring, and management of safety-critical barriers

PRACTICAL APPLICATION

Conduct an advanced loss-of-containment scenario analysis and evaluate preventive and mitigative protection layers

DAY 03

Asset Integrity, Equipment Reliability & Management of Change

- Relationship between asset integrity, equipment reliability, and process safety
- Management of safety-critical equipment and safety-critical elements
- Inspection, testing, preventive maintenance, reliability, and degradation management
- Advanced Management of Change for technical, operational, organizational, and procedural modifications

PRACTICAL APPLICATION

Assess a proposed modification at a high-hazard facility and determine its impact on process risks, barriers, procedures, competency, documentation, and approvals

DAY 04

Human Factors, Operational Risk & Advanced Incident Investigation

- Human factors and their influence on operational decisions and process safety performance
- Operational discipline and management of deviations from procedures and operating limits
- Process safety risks during startup, shutdown, abnormal operations, and changing operating conditions

DAY 04 — CONTINUED

- Advanced incident investigation, root cause analysis, and barrier failure analysis

PRACTICAL APPLICATION

Investigate a complex process safety incident and identify immediate causes, underlying causes, organizational factors, and failed or weakened barriers

DAY 05

Process Safety Performance, Leadership & Continuous Improvement

- Leading and lagging process safety performance indicators
- Early warning indicators for deteriorating barriers and process safety controls
- Process Safety Management auditing, assurance, maturity assessment, and management review
- Process safety leadership, organizational culture, learning, and continuous improvement

FINAL WORKSHOP

Develop an advanced Process Safety Management improvement plan covering priority risks, critical barriers, performance indicators, corrective actions, responsibilities, governance, and implementation priorities

Register or Request More Information

Course page: <https://quest-training.com/courses/advanced-process-safety-management-training-course>

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