

Course No. 1671

Process Safety Management & Major Accident Prevention Training Course

INDUSTRIAL SAFETY & HSE
INDUSTRIAL ENGINEERING, MAINTENANCE & OPERATIONS

DURATION

5 Days

DELIVERY

Classroom



Course Overview

The Process Safety Management & Major Accident Prevention Training Course provides an advanced and practical framework for managing high-hazard process risks and preventing major accidents that may result in fires, explosions, toxic releases, loss of containment, significant asset damage, environmental harm, or serious consequences to people and operations. The course focuses on strengthening process safety systems and ensuring that critical risks are identified, controlled, monitored, and continuously improved.

Major accident prevention requires a structured approach that goes beyond conventional occupational safety practices. It requires effective management of process hazards, critical equipment, protective systems, safety barriers, human factors, operational controls, maintenance activities, and organizational conditions. This training course enables participants to understand how these elements interact and how weaknesses in one or more areas can contribute to major accident scenarios.

The program addresses the core components of Process Safety Management, including process hazard identification and analysis, risk assessment, management of change, mechanical integrity, operating procedures, maintenance, permit-to-work systems, contractor management, emergency preparedness, incident investigation, and process safety performance measurement. Particular attention is given to critical safety barriers and the importance of ensuring their availability, reliability, effectiveness, and ongoing verification.

A strong focus is placed on identifying high-consequence scenarios, understanding how incidents can escalate, and evaluating the barriers designed to prevent or mitigate their consequences. Participants will learn how to identify weaknesses in process safety systems, assess residual risks, evaluate barrier performance, and develop corrective and improvement actions that strengthen organizational capability to prevent major accidents.

Through practical case studies, process safety scenarios, barrier analysis exercises, incident simulations, and structured workshops, participants will develop the ability to assess Process Safety Management performance and integrate major accident prevention principles into daily operations, maintenance, engineering, risk management, and emergency response. The course is particularly relevant to organizations operating in oil and gas, petrochemicals, refining, chemicals, energy, manufacturing, and other high-hazard industries.

Objectives

- Analyze the fundamental principles of Process Safety Management and their role in preventing major accidents.
- Assess process hazards and high-consequence scenarios that could lead to major incidents.
- Apply structured process hazard analysis and risk assessment techniques to identify critical risks and required safeguards.
- Evaluate the integrity and reliability of critical equipment and systems whose failure could contribute to a major accident.
- Develop effective Management of Change approaches for operational, technical, organizational, and procedural changes.
- Assess operating, maintenance, inspection, and testing practices from a process safety perspective.
- Analyze the performance of preventive and mitigative safety barriers and identify weaknesses or failures.
- Improve the management of human factors, contractor activities, and organizational conditions that influence process safety.
- Apply emergency preparedness and response principles to major accident scenarios and high-consequence events.
- Develop leading and lagging process safety performance indicators to monitor the effectiveness of critical controls.
- Evaluate process safety incident investigation findings and translate lessons learned into system improvements.
- Develop a practical action plan for strengthening Process Safety Management and major accident prevention by the end of the course.

Who Should Attend

This training course is designed for process safety managers and specialists, HSE managers and professionals, operations managers, maintenance managers, engineering managers, reliability engineers, process engineers, safety engineers, risk management professionals, technical integrity specialists, inspection professionals, and members of emergency response and incident management teams.

The program is particularly suitable for professionals working in oil and gas, petrochemicals, refining, chemicals, energy, manufacturing, heavy industry, utilities, and other facilities involving hazardous materials or high-risk processes. It is also relevant to government authorities, regulatory organizations, and professionals responsible for industrial safety, process safety oversight, major accident prevention, and risk governance.

The course will also benefit executives, department heads, operations leaders, supervisors, and decision makers responsible for process safety, operational reliability, asset integrity, risk management, emergency preparedness, and business continuity. Participants will develop a common understanding of major accident hazards and practical approaches for strengthening barriers and controls across the organization.

Learning Outcomes

- Explain the principles of Process Safety Management and their relationship to major accident prevention.
- Identify major accident hazards and high-consequence process safety scenarios.
- Conduct structured assessments of process risks and establish appropriate risk priorities.
- Analyze preventive and mitigative barriers and evaluate their effectiveness in controlling major accident scenarios.
- Assess the integrity and reliability of safety-critical equipment and systems.
- Apply Management of Change principles to operational, technical, procedural, and organizational changes.
- Evaluate operating, maintenance, inspection, and testing practices from a process safety perspective.
- Assess human factors, organizational conditions, and contractor activities that may influence process safety performance.
- Apply emergency preparedness and response principles to major accident scenarios.
- Develop process safety performance indicators for monitoring critical controls and organizational performance.
- Translate incident investigation findings, audits, and barrier performance reviews into corrective actions and sustainable improvements.
- Develop a practical Process Safety Management improvement plan focused on critical risks, safety barriers, performance indicators, and major accident prevention.

Course Outline

DAY 01

Process Safety Management Fundamentals & Major Accident Hazards

- Principles and objectives of Process Safety Management
- Process safety versus occupational safety and their relationship within an integrated safety system
- Characteristics, causes, and potential consequences of major accidents
- Identification of major accident hazards and high-consequence scenarios

PRACTICAL APPLICATION

Analyze a major accident scenario and identify process hazards, escalation pathways, potential consequences, and critical safety barriers

DAY 02

Process Hazard Analysis, Risk Assessment & Safety Barriers

- Process hazard identification and structured risk analysis
- Evaluation of high-consequence process safety scenarios
- Preventive, protective, and mitigative safety barriers
- Layers of protection and critical control effectiveness

PRACTICAL APPLICATION

Analyze a major accident scenario, evaluate existing barriers, and identify weaknesses and control gaps

DAY 03

Mechanical Integrity, Management of Change & Human Factors

- Safety-critical equipment and mechanical integrity principles
- Inspection, testing, maintenance, and reliability of critical process safety systems

DAY 03 — CONTINUED

- Management of Change for process, equipment, technology, procedures, and organizational changes
- Human factors, decision-making, competency, and organizational influences on process safety

PRACTICAL APPLICATION

Assess a proposed operational or technical change and identify new risks, required barriers, and control measures

DAY 04

Safe Operations, Contractor Management & Emergency Response

- Safe operating procedures and control of critical process conditions
- Maintenance activities, permit-to-work systems, isolation, and safe work practices
- Contractor management and process safety responsibilities
- Emergency preparedness and response to major accident scenarios

PRACTICAL APPLICATION

Conduct a major accident simulation requiring coordination between operations, emergency response teams, management, and relevant stakeholders

DAY 05

Process Safety Performance, Incident Investigation & Continuous Improvement

- Leading and lagging process safety performance indicators
- Process safety incident investigation and root cause analysis
- Review of critical barrier performance and control effectiveness
- Building a strong process safety culture and major accident prevention capability

DAY 05 — CONTINUED

FINAL WORKSHOP

Develop a comprehensive Process Safety Management improvement plan covering critical hazards, safety barriers, performance indicators, corrective actions, responsibilities, and implementation priorities

Register or Request More Information

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

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