MAWA EVENTS

Address: No. 857, Block A2. Leisure Commerce Square - No 9., 46150 Petaling Jaya, Selangor, Malaysia

Phone: +601116373203 | **Email:** info@mawaevents.net

GAS EXPLOSION HAZARDS, FIRE DETECTION & PROTECTION SYSTEMS DESIGN FOR OIL & GAS INDUSTRY

"Engineering Safer Facilities Through Hazard Analysis, Prevention Systems, and Design Excellence"

Schedule

Date	Venue	Fees (Face-to-Face)
20 – 24 Jul 2026	Dubai - UAE	USD 3495 per delegate

► **Available delivery methods:** Face-to-Face & Online Training

Introduction

The oil and gas industry presents high-risk environments where flammable gases, vapors, and ignition sources coexist. Effective fire detection and explosion protection systems are essential to safeguard personnel, assets, and the environment. Designing these systems requires a deep understanding of gas behavior, risk assessment, detection technologies, and code compliance.

This intensive training covers advanced techniques in analyzing explosion hazards and engineering fire protection systems tailored for hydrocarbon facilities. Participants will learn about risk-based design, layout strategies, flame and gas detection, suppression systems, and international standards including NFPA and API.

Objectives

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

- Analyze explosion risks using gas behavior and dispersion modeling principles
- Design and evaluate fire detection and suppression systems for hazardous zones
- Apply fire and gas mapping techniques to improve sensor placement and coverage
- Select appropriate detection technologies for offshore and onshore installations
- Ensure compliance with NFPA, API, and IEC fire safety codes and practices

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Why Attend

- Gain critical insight into explosion science and mitigation design
- Strengthen your ability to prevent, detect, and respond to fire emergencies
- Improve project design by integrating fire protection early in engineering phases
- Avoid system overdesign or underprotection using quantitative tools
- Learn from real accidents and case studies in the oil & gas sector

Target Audience

This program is designed for:

- HSE, fire protection, and process safety engineers
- Facilities and plant design engineers
- Project and maintenance managers in oil, gas, and petrochemicals
- Instrumentation and control engineers
- Risk assessors and safety system auditors

Individual Benefits

Key competencies that will be developed include:

- Understanding fire dynamics and gas explosion mechanisms
- Designing compliant fire detection and suppression systems
- Applying hazard zoning, detector placement, and firewater system concepts
- Interpreting technical codes, layouts, and system schematics
- Conducting hazard reviews, gap analysis, and performance audits

Organizational Benefits

Upon completing the training course, participants will demonstrate:

- Safer facility design and improved emergency preparedness
- Reduced risk of loss from fire and explosion events
- Enhanced compliance with industry and regulatory standards
- Optimized investment in protection systems through risk-based planning
- Better integration between engineering, safety, and operations teams

Instructional Methodology

The course follows a blended learning approach combining theory with practice:

- Strategy Briefings – Explosion risk theory, codes, and system types
- Case Studies – Lessons from past accidents and design failures
- Workshops – Fire hazard mapping, system layout planning, code application
- Peer Exchange – Shared practices in detection/suppression system management
- Tools – Risk matrices, detector coverage modeling, NFPA/API reference tools

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Course Outline

Training Hours: 7:30 AM – 3:30 PM Daily Format: 3–4 Learning Modules | Coffee breaks: 09:30 & 11:15 | Lunch Buffet: 01:00 – 02:00

Day 1: Explosion Hazards and Fire Fundamentals

- Module 1: Gas Explosion Mechanisms and Incident Drivers (07:30 – 09:30) • Vapor clouds, overpressure effects, flammability limits
- Module 2: Fire Behavior and Combustion Science (09:45 – 11:15) • Heat transfer, fire stages, flashpoint concepts
- Module 3: Hazard Area Classification and Zoning (11:30 – 01:00) • IEC and API standards for hazardous area classification
- Module 4: Workshop – Explosion Scenario Analysis (02:00 – 03:30) • Analyze a gas release and ignition sequence

Day 2: Detection Systems and Technologies

- Module 5: Flame, Gas, and Smoke Detection Systems (07:30 – 09:30) • Point, open path, ultrasonic, IR/UV detectors
- Module 6: Fire and Gas Mapping and Coverage Modeling (09:45 – 11:15) • Tools for optimal detector placement and redundancy
- Module 7: Fire Alarm and Control Panel Integration (11:30 – 01:00) • Interface design, response logic, and SIL considerations
- Module 8: Workshop – Design a Detection Layout (02:00 – 03:30) • Build a flame/gas detector layout with coverage overlay

Day 3: Fire Suppression and Protection Systems

- Module 9: Fire Suppression System Types and Selection (07:30 – 09:30) • Water mist, foam, CO_2, dry chemicals, deluge systems
- Module 10: Firewater Network Design and Hydraulic Requirements (09:45 – 11:15) • Flow rates, hydrants, foam proportioning, NFPA 11/13
- Module 11: Passive Fire Protection and Blast-Resistant Design (11:30 – 01:00) • Thermal insulation, fireproofing, separation distances
- Module 12: Workshop – Evaluate Suppression System for a Process Unit (02:00 – 03:30) • Determine appropriate protection based on risk level

Day 4: Engineering Integration and System Validation

- Module 13: Integrating F&G Systems with ESD and Control Systems (07:30 – 09:30) • Cause & effect diagrams, shutdown logic
- Module 14: Fire Risk Assessments and Design Basis Memorandum (09:45 – 11:15) • Performance-based vs. prescriptive design
- Module 15: Inspection, Testing, and Maintenance Practices (11:30 – 01:00) • NFPA 72, maintenance schedules, false alarm prevention
- Module 16: Workshop – Build a Fire & Gas System Verification Plan (02:00 – 03:30) • Develop inspection and performance test protocols

Day 5: Case Studies and Emergency Response

- Module 17: Fire and Explosion Case Studies in Oil & Gas (07:30 – 09:30) • Analysis of Buncefield, Piper Alpha, Texas City, others
- Module 18: Emergency Planning and Fire Response Coordination (09:45 – 11:15) • Fire drills, response teams, mutual aid agreements
- Module 19: Auditing and Gap Identification Techniques (11:30 – 01:00) • Audit checklists, KPI reporting, continuous improvement
- Module 20: Final Workshop – Design a Fire & Gas Strategy for a New Plant (02:00 – 03:30) • Team design and presentation with expert review

Certification

Participants will receive a Certificate of Completion in Gas Explosion Hazards, Fire Detection & Protection Systems Design for Oil & Gas Industry, validating their ability to assess fire/explosion risks and design compliant, reliable detection and suppression systems in line with global safety standards.

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Why Choose MAWA Events

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