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COURSE BROCHURE

AI-Driven Process Safety Management Training Course

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Registered in the United Kingdom and Saudi Arabia

AI-Driven Process Safety Management Training Course

AI-driven process safety management is a 1-week training course for process safety engineers and HSE leads in chemical, refining and gas processing plants, who leave with a Barrier Health and Precursor Watchlist for their unit. Alarm floods, bypassed interlocks and unreported near misses now generate more signals than people can read, and machine learning helps sort the weak safeguards from the noise. Jupiter Prime Training runs this course on AI-driven process safety management.

Why AI-Driven Process Safety Management Matters Now

Three forces shape the subject. Plants hold years of historian, alarm and permit records that rarely feed hazard studies. Experienced engineers are retiring. Boards and insurers want proof that safeguards work between audits, not only on the day of inspection. A site that reads these signals early catches drifting barriers before a release. The course rests on ISO/IEC 42001, the AI management system standard, and the NIST AI Risk Management Framework AI RMF for trustworthy models in safety-critical settings.

Who Gains Most from AI-Driven Process Safety Management

- Engineers who facilitate hazard studies and keep safeguard registers current
- HSE leads who report leading and lagging indicators to site management
- Instrument and control specialists who own interlocks, trips and alarm rationalisation
- Operations superintendents who authorise overrides and bypasses on shift
- Reliability analysts who link equipment condition to containment integrity

A site process safety committee gains most when its engineering, operations and instrumentation members attend together and agree one view of barrier condition.

AI-Driven Process Safety Management Capabilities

Participants turn alarm journals, trip histories and incident narratives into evidence of eroding safeguards.

- Assess alarm and interlock records for precursor patterns — site safety committee
- Apply text classification to near-miss narratives — incident investigation leads
- Design barrier health scores for critical safeguards — operations superintendents
- Test AI suggestions against HAZOP deviations and causes — hazard study facilitators
- Specify human checks on safety-related model outputs — technical authority
- Communicate leading indicator trends in plain terms — plant leadership

Key AI-Driven Process Safety Management Terms

- Loss of containment — an unplanned release of process fluid or energy from its intended boundary, the event process safety aims to prevent.
- Safeguard barrier — an engineered or human measure that stops a hazard developing into a release or limits its consequences.
- Precursor event — a lower-severity occurrence, such as a trip demand or bypass, that signals a path towards a larger incident.
- Alarm flood — a burst of alarms faster than an operator can respond to, which hides the alarms that matter.
- Barrier health score — a combined measure of a safeguard's test results, demands, defects and bypass time showing whether it still performs.
- Anomaly detection — a machine learning method that flags readings or sequences that differ from normal plant behaviour.

AI-Driven Process Safety Management Day by Day

Day 1: Safety Signals in Plant Records

- Process Safety Fundamentals Revisited — Where Containment Losses Begin
- Historian, Alarm Journal and Permit Records — Which Sources Hold Precursors
- Lagging Versus Leading Indicators — What the Site Reports Today
- ISO/IEC 42001 and NIST AI RMF — Trust in Safety-Critical Models
- Data Quality in Shift Logs — Gaps That Distort Safety Signals

Day 2: Machine Learning on Alarms and Interlocks

- Alarm Flood Clustering — Which Sequences Precede Upsets
- Interlock Demand and Bypass Analysis — Safeguards Under Hidden Strain
- Anomaly Detection on Process Variables — Early Drift Toward Limits
- Model Thresholds and False Alarms — Operator Trust and Workload
- Root Cause Hints From Trip Histories — Priorities for Instrument Checks

Day 3: Near Misses and AI-Assisted Hazard Studies

- Text Classification of Near-Miss Narratives — Recurring Failure Themes
- Language Models in HAZOP Preparation — Deviation and Cause Prompts
- Cross-Checking AI Suggestions Against Engineers — Accepting or Rejecting Findings
- Bow-Tie Diagrams Linked to Live Data — Threats and Barriers Mapped
- Management of Change Screening — Spotting Modifications That Weaken Barriers

Day 4: Barrier Health and Leading Indicator Dashboards

- Barrier Health Scoring Method — Ranking Critical Safeguards by Condition
- Leading Indicator Dashboard Design — What Supervisors See Each Shift
- Human Oversight of Safety Models — Who Signs Off Each Alert
- Comparing Refinery and Gas Plant Cases — Transferable Lessons on Barriers
- Escalation Rules for Degraded Safeguards — Shutdown or Continue Decisions

Day 5: Practising the Barrier Health and Precursor Watchlist

- Selecting Priority Units and Safeguards — Scope From Earlier Alarm Findings
- Applying Precursor Models to Sample Plant Data — Testing the Day 2 Methods
- Linking Near-Miss Themes to Bow-Tie Barriers — Evidence From Day 3
- Presenting Barrier Scores to a Mock Safety Committee — Challenge and Response
- Completing the Barrier Health and Precursor Watchlist — Ready for Site Use

Applying AI-Driven Process Safety Management After the Course

- Run an alarm flood clustering exercise on one month of a unit's alarm journal and share the top precursor sequences with the operations team.
- Score five critical safeguards with the barrier health method and table the results at the next process safety committee.

AI-Driven Process Safety Management Questions FAQ

What is AI-driven process safety management and why does it matter now?

It is the use of machine learning on alarm, interlock and near-miss records to find weakening safeguards before a release. It matters now because plants hold far more safety data than engineers can read, while experienced staff are leaving.

Which roles gain most from AI-driven process safety management?

Hazard study facilitators, HSE leads, instrument and control specialists, operations superintendents and reliability analysts gain most.

How does AI-driven process safety management differ from a general process safety course?

It assumes you already know hazard study and barrier concepts and adds data methods on top. A general course teaches the safety system; this one shows how models read plant records to reveal its weak points.

What do you bring back from AI-driven process safety management training?

You bring back a Barrier Health and Precursor Watchlist for your unit. It ranks critical safeguards, lists precursor patterns to watch and sets escalation rules your safety committee can adopt.

AI-Driven Process Safety Management: The Way Forward

The Barrier Health and Precursor Watchlist first informs which safeguards receive testing or repair before the next turnaround. Operations superintendents, instrument engineers and the site safety committee use it to decide on bypass approvals and maintenance priority. After its first quarter in use, revisit the model thresholds and ask whether flagged precursors matched what operators saw on shift.