CERASUS TECHNOLOGIES · PROCESS SAFETY, CONTROL AND OPTIMISATION

Training Catalogue

Fifty-nine practitioner-led courses across eight categories: process hazard analysis, consequence and risk, relief systems, process safety management, control and alarms, process engineering, operator programmes and Cerasus software.

59 COURSES

8 CATEGORIES

69 TRAINING DAYS

Practitioner-led training for the process industry

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Complete course index (1/3)

CODE	COURSE	DURATION	LEVEL	PRIMARY AUDIENCE
A · Process Hazard Analysis				
TR-A01	**HAZOP Leader / Facilitator** Certification-preparation course for engineers who will lead process hazard studies	3 days	Advanced	Process
TR-A02	**HAZOP Team Member & Scribe** How to contribute, challenge and record so the study is worth the team's time	1 day	Foundation	Operations
TR-A03	**HAZID, What-If and Checklist Techniques** Selecting and running the lighter hazard-identification methods across the project lifecycle	1 day	Foundation	Process
TR-A04	**LOPA — Layer of Protection Analysis and IPL Credit Rules** Semi-quantitative risk assessment from HAZOP scenario to SIL target	2 days	Intermediate	Process safety
TR-A05	**SIL Determination — Risk Graph, LOPA, Risk Matrix** Choosing and calibrating the target-SIL method under IEC 61511-3	1 day	Intermediate	Process safety and instrument engineers
TR-A06	**SIL Verification and SIF Design Basics (IEC 61511)** From safety requirements specification to PFDavg, architecture and proof-test interval	2 days	Advanced	Instrument
TR-A07	**Functional Safety Lifecycle — IEC 61508/61511 Overview** What the standards require, who owns each phase and where sites fall short	1 day	Foundation	Engineers
TR-A08	**Bow-Tie Analysis and Barrier Management** Turning major-accident hazards into barriers people can own, verify and report on	1 day	Intermediate	Process safety engineers
TR-A09	**PHA Revalidation and Management of PHA Actions** Keeping the hazard analysis current and closing what it found	½ day	Intermediate	PSM coordinators
TR-A10	**Facility Siting and Occupied Buildings (API RP 752/753)** Assessing and managing the risk to people in control rooms, workshops and portable buildings	1 day	Intermediate	Process safety engineers
B · Consequence Analysis & Risk				
TR-B01	**Consequence Modelling Fundamentals** Dispersion, fire and explosion modelling for siting, ERP and PHA decisions	2 days	Intermediate	Process safety and loss-prevention engineers
TR-B02	**Quantitative Risk Assessment (QRA) and Risk Criteria** Building, interpreting and defending a QRA for land-use planning, safety cases and design decisions	2 days	Advanced	Process safety and loss-prevention engineers
TR-B03	**Fire & Gas Mapping and Detection Philosophy** Performance-based detector layout, coverage assessment and voting under ISA-TR84.00.07	1 day	Intermediate	Instrument
TR-B04	**Hazardous Area Classification (IEC 60079-10)** Zoning for gases, vapours and dusts and keeping the drawings alive	1 day	Intermediate	Process
TR-B05	**Dust and Reactive-Chemical Hazards** Recognising, assessing and controlling the hazards that HAZOP guidewords miss	1 day	Intermediate	Process
C · Pressure Relief & Overpressure Protection				
TR-C01	**Relief Systems Design & PSV Sizing** Overpressure scenarios, sizing and documentation to API 520 / 521 / 526	3 days	Intermediate	Process engineers responsible for relief design
TR-C02	**PSV Validation and Relief Register Workshop** Checking existing relief devices against current process conditions and building a register that holds up	1 day	Intermediate	Process and pressure-equipment engineers responsible for the
TR-C03	**Flare and Vent System Design (API 521)** Header hydraulics, knock-out drums, flare tips and radiation for new and modified disposal systems	1 day	Intermediate	Process and project engineers designing or modifying flare a
TR-C04	**Tank Venting, Blanketing and Emergency Venting (API 2000)** Normal and emergency venting, inert gas blanketing and vacuum protection for atmospheric and low-pressure tanks	½ day	Foundation	Process
TR-C05	**Two-Phase Relief and Runaway Reactions (DIERS)** Vent sizing for flashing, foaming and reactive systems using the DIERS methodology	1 day	Advanced	Relief and process safety engineers in petrochemical

Complete course index (2/3)

CODE	COURSE	DURATION	LEVEL	PRIMARY AUDIENCE
D · Process Safety Management				
TR-D01	**PSM Fundamentals** OSHA 29 CFR 1910.119 and the CCPS Risk Based Process Safety elements	2 days	Foundation	PSM element owners
TR-D02	**Management of Change (MOC) and Pre-Start-up Safety Review** Recognising change, assessing it properly and confirming readiness before hydrocarbons are introduced	1 day	Foundation	MOC originators
TR-D03	**Mechanical Integrity and Safety-Critical Equipment** Building an MI programme around the equipment that keeps hazards contained	1 day	Intermediate	Inspection
TR-D04	**Process Safety Information and Safe Operating Limits** What the plant must know about its chemicals, technology and equipment, and how safe limits are set and kept	½ day	Foundation	Process engineers
TR-D05	**Operating Procedures and Operational Discipline / Conduct of Operations** Writing procedures people will follow and building the discipline to follow them	1 day	Foundation	Operations supervisors
TR-D06	**Shift Handover and Electronic Logbook Practice** Passing on what matters between shifts, on paper and in CeraShift	½ day	Foundation	Panel and field operators
TR-D07	**Process Safety Auditing — OSHA PSM / RBPS / Seveso** Planning, conducting and reporting a process safety audit that finds what matters	2 days	Advanced	Internal and corporate auditors
TR-D08	**Process Safety Performance Indicators (API RP 754)** Selecting, defining and using leading and lagging indicators that drive action	1 day	Intermediate	HSE and process safety managers
TR-D09	**Incident Investigation and Root Cause Analysis** Evidence, causal analysis and recommendations that address the management system, not the person	2 days	Intermediate	Incident investigation team leaders and members
TR-D10	**Process Safety Leadership for Managers** What site and business leaders must know, ask and do to prevent a major accident	½ day	Foundation	Site managers
TR-D11	**Human Factors and Safety-Critical Task Analysis** Identifying the tasks where human error leads to a major accident and designing them so error is less likely	1 day	Intermediate	Process safety
TR-D12	**Emergency Response Planning and Drill Design** Building a response plan on credible scenarios and testing it with drills that find weaknesses	1 day	Intermediate	Emergency response coordinators
E · Process Control & Alarm Management				
TR-E01	**Alarm Management — ISA-18.2 Lifecycle** Philosophy, rationalisation workshop and performance monitoring	2 days	Intermediate	Control and instrument engineers
TR-E02	**PID Loop Tuning Fundamentals** Model-based tuning, loop assessment and the reasons most loops on a unit are still in manual	2 days	Intermediate	Control and instrument engineers
TR-E03	**Control Valve Performance and Loop Diagnostics** Sizing basics, positioner behaviour, stiction and hysteresis testing, and separating valve problems from tuning problems	1 day	Intermediate	Instrument and control engineers
TR-E04	**Advanced Process Control (MPC) Principles and Maintenance** How multivariable predictive controllers work, how to design and step-test them, and why most of them end up switched off	2 days	Advanced	APC and control engineers
TR-E05	**Process Monitoring, Soft Sensors and Early-Warning Limits** Turning historian data into inferentials, monitoring limits and alerts that fire before the alarm does	1 day	Intermediate	Process
TR-E06	**Data Analytics and AI for Plant Operations** What machine learning and agentic AI can and cannot do in a plant, and how to deploy them without losing control	1 day	Foundation	Operations
TR-E07	**Safety Instrumented Systems Operation and Bypass Management** What operators and supervisors must know about trips, testing and the control of overrides	½ day	Foundation	Panel and field operators
F · Process Engineering & Design				
TR-F01	**Process Simulation Fundamentals** Steady-state and dynamic modelling for design, rating and troubleshooting	3 days	Intermediate	Process engineers building or reviewing simulation models fo

Complete course index (3/3)

CODE	COURSE	DURATION	LEVEL	PRIMARY AUDIENCE
TR-F02	**FEED and Basic Engineering Deliverables** What a process engineer must produce from concept to FEED, and how each deliverable is reviewed	2 days	Intermediate	Process and project engineers moving into front-end work
TR-F03	**Process Studies — Hydraulics, Utilities and Pinch** Line sizing, pump and control-valve hydraulics, utility balances and energy targeting for revamps and debottlenecking	2 days	Intermediate	Process engineers performing operability
TR-F04	**Heat Exchanger Design and Fouling Assessment** Thermal design, rating, TEMA selection and using plant data to track fouling and plan cleaning	1 day	Intermediate	Process and mechanical engineers specifying
TR-F05	**Compressor and Pump Selection and Operation** Machine types, performance curves, NPSH and surge, and the operating decisions that protect the machine	1 day	Intermediate	Process and rotating-equipment engineers
TR-F06	**P&ID Reading and Development (ISA 5.1)** Symbols, tagging and control narratives, and how a P&ID is built, revised and frozen	1 day	Foundation	Junior process
TR-F07	**Distillation Troubleshooting and Optimisation** Diagnosing flooding, weeping, maldistribution and control problems, and finding the energy and yield that a column is giving away	1 day	Advanced	Process and operations engineers responsible for distillatio
G · Operator & Field Programmes				
TR-G01	**Process Safety for Operators** Hazards, safeguards and the operator's role in preventing loss of containment	1 day	Foundation	Panel and field operators
TR-G02	**Operator Rounds and Abnormal Situation Recognition** What to look, listen and feel for on a round, and what to do about it	½ day	Foundation	Field operators
TR-G03	**Permit-to-Work, Isolation and Safe Work Practices** Permits, energy isolation and the hand-over of equipment between operations and maintenance	1 day	Foundation	Field operators
TR-G04	**Start-up, Shutdown and Transient Operations** Managing the periods when the unit is furthest from its design point	1 day	Intermediate	Panel operators
H · Software Product Training				
TR-H01	**CeraPHA Studio — User Training** Hands-on course for HAZOP, LOPA and SIL work in CeraPHA Studio	½ day	Foundation	PHA leaders
TR-H02	**CeraVent — User Training** Hands-on course for relief, venting and rupture-disc sizing in CeraVent	½ day	Foundation	Process and relief-systems engineers
TR-H03	**CeraImpact — User Training** Hands-on course for consequence and dispersion modelling in CeraImpact	½ day	Foundation	Process safety and loss-prevention engineers
TR-H04	**CeraShift — User Training** Hands-on course for the electronic logbook, rounds and shift handover in CeraShift	½ day	Foundation	Panel and field operators
TR-H05	**CeraPulse — User Training** Hands-on course for process-safety KPIs, indices and audits in CeraPulse	½ day	Foundation	PSM coordinators
TR-H06	**CauseIQ — User Training** Hands-on course for incident investigation and root cause analysis in CauseIQ	½ day	Foundation	Incident investigators
TR-H07	**CeraPID — User Training** Hands-on course for loop assessment and model-based tuning in CeraPID	½ day	Foundation	Control and instrument engineers
TR-H08	**ProcessVision — User Training** Hands-on course for real-time monitoring, historian trending and APC analytics in ProcessVision	½ day	Foundation	Process and control engineers
TR-H09	**Kairos — User Training** Hands-on course for predicted asset and process health and guardrailed agents in Kairos	½ day	Foundation	Reliability

Book any course or build a custom curriculum

Every course is delivered by practising engineers on your own P&IDs, data and procedures wherever possible

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CATEGORY A

Process Hazard Analysis

Leading, scribing and applying HAZOP, HAZID, LOPA, SIL determination and verification, bow-ties and facility siting - the studies that define a plant's safeguards.

10 COURSES

13.5 TRAINING DAYS

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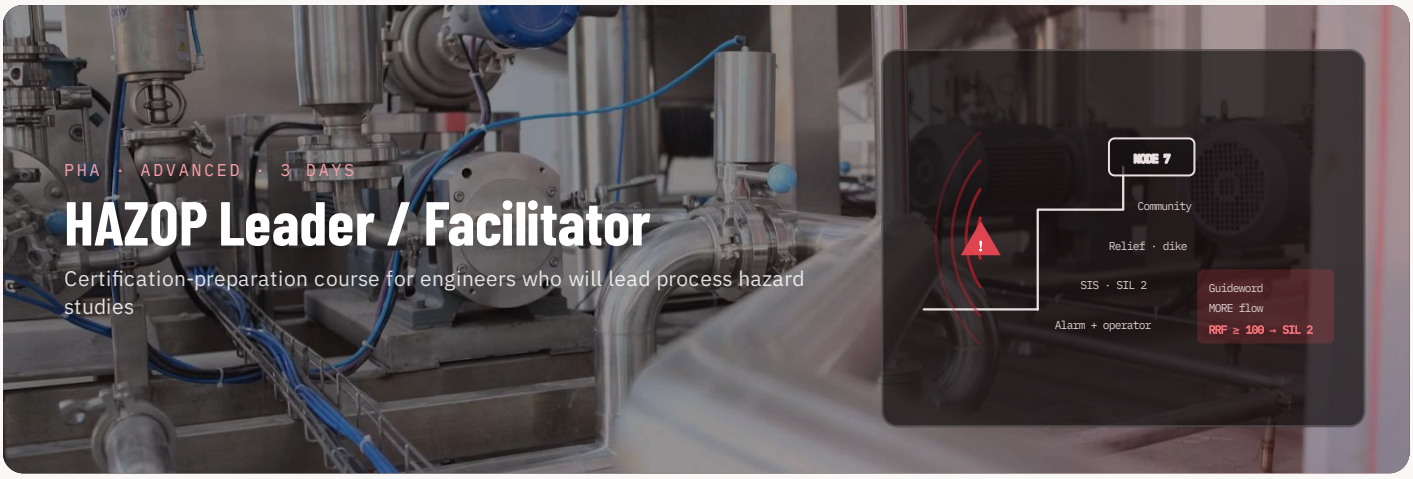

PHA · ADVANCED · 3 DAYS

HAZOP Leader / Facilitator

Certification-preparation course for engineers who will lead process hazard studies

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
3 days	Advanced	On-site classroom · virtual instructor-led	English	16

2 recorded practice sessions

60 % of time in workshop

1 competency assessment

Overview

A HAZOP is only as good as the person leading it. This course takes experienced engineers through the full facilitation cycle — node definition, guideword discipline, team dynamics, safeguard crediting and action quality — using real refinery and petrochemical P&IDs. Participants lead recorded practice sessions and receive individual feedback against the competencies expected of a certified HAZOP leader.

Learning outcomes

- Plan a study: scope, node breakdown, team composition, schedule and information requirements
- Apply guidewords and parameters systematically without losing the team's attention
- Judge when a safeguard may be credited and when it may not
- Write causes, consequences and recommendations that survive an audit
- Manage difficult sessions: dominant members, scope creep, design-freeze pressure
- Close out: report structure, action tracking, revalidation triggers

Who should attend

Process, safety and project engineers who will lead HAZOP, HAZID and revalidation studies; PSM coordinators

Course outline

DAY 1

HAZOP purpose and regulatory context · IEC 61882 methodology · study preparation and node definition · guideword/parameter matrices · recording standards

DAY 2

Safeguard and IPL logic · linking HAZOP to LOPA and SIL · facilitation skills and team management · practice session 1 on a live P&ID with feedback

DAY 3

Batch and procedural HAZOP · revalidation and cyclic reviews · reporting and action management · practice session 2 · competency assessment

Standards referenced

IEC 61882 · IEC 61511 · OSHA 29 CFR 1910.119(e) · CCPS Guidelines for Hazard Evaluation Procedures

Tools & exercises

Hands-on with CeraPHA Studio for worksheets, safeguard library and action register

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Three or more years of plant or design experience and participation in at least two HAZOP studies

CERTIFICATION
Certificate of completion with competency assessment result; preparation for TÜV-style HAZOP Leader examinations

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

Book this course or build a custom curriculum
On-site at your plant or virtual · in-house groups · competency assessment included

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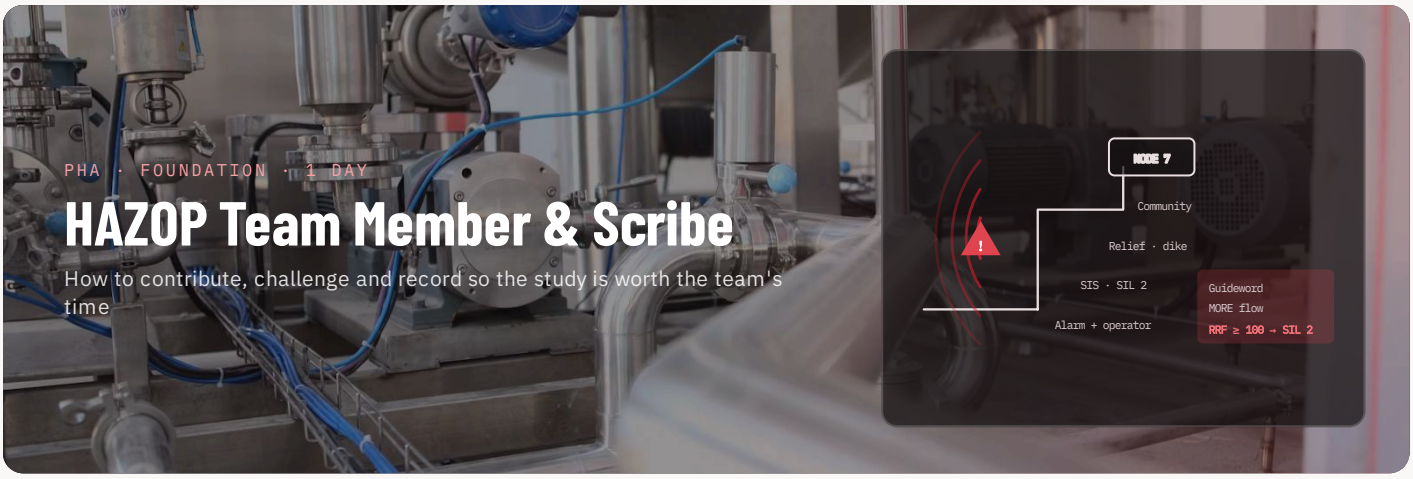

PHA · FOUNDATION · 1 DAY

HAZOP Team Member & Scribe

How to contribute, challenge and record so the study is worth the team's time

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
1 day	Foundation	On-site classroom · virtual instructor-led	English	16

4 nodes recorded live

50 % of time at the worksheet

1 recording-quality check

Overview

A HAZOP team spends most of its week waiting for someone to explain what a guideword means or why the safeguard they named was not credited. This course prepares team members to arrive knowing the method, the vocabulary and what the leader needs from them, and prepares scribes to record causes, consequences and safeguards in a form the study can actually use. Half the day is spent recording real nodes from participants' own units.

Learning outcomes

- Explain the purpose of a HAZOP and how the outcome is used downstream in LOPA, SIL and MOC
- Interpret guideword and parameter combinations and offer credible deviations
- State causes, consequences and safeguards precisely instead of as opinions
- Recognise which safeguards qualify as protection layers and which do not
- Record a worksheet that a reader outside the room can follow
- Prepare for a study: drawings, operating data, incident history and questions to bring

Who should attend

Operations, maintenance, instrument and process engineers and supervisors nominated to HAZOP teams; engineers and technical assistants who will scribe

Course outline

MORNING

What the regulator and the site expect of a HAZOP · IEC 61882 method and terminology · nodes, design intent and deviations · causes, consequences and safeguards · the difference between a safeguard and an IPL

AFTERNOON

Recording conventions and worksheet quality · writing recommendations that can be closed · scribing in CeraPHA Studio · live recording of four nodes from participants' P&IDs · recording-quality check and feedback

Standards referenced

IEC 61882 · OSHA 29 CFR 1910.119(e) · CCPS Guidelines for Hazard Evaluation Procedures

Tools & exercises

Worksheets recorded in CeraPHA Studio with the guideword templates and safeguard library

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Ability to read a P&ID

CERTIFICATION
Certificate of completion; recorded as HAZOP team-member training for the site training matrix

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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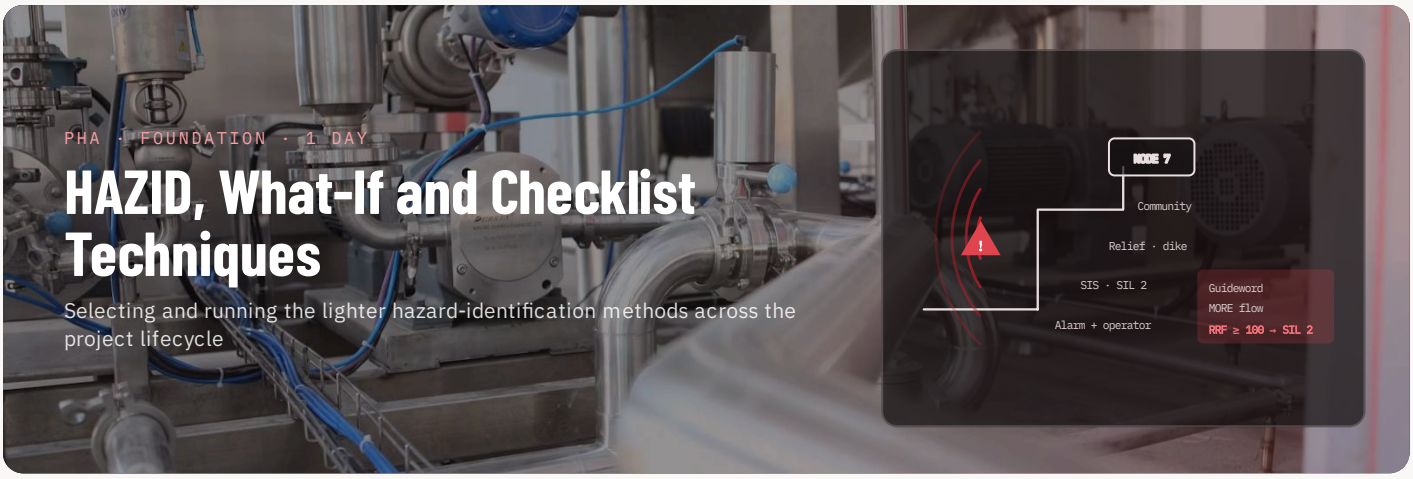

PHA · FOUNDATION · 1 DAY

HAZID, What-If and Checklist Techniques

Selecting and running the lighter hazard-identification methods across the project lifecycle

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
1 day	Foundation	On-site classroom · virtual instructor-led	English	16

3 techniques applied to one plant

1 checklist built for your site

1 method-selection guide

Overview

Not every question deserves a HAZOP. HAZID at concept stage, What-If reviews for changes and checklists for start-up and routine tasks each find hazards a guideword study would miss or reach too late. The course covers when each technique is the right choice, how to structure and facilitate it, how to record the result so it links to the later HAZOP, and how to keep a checklist from becoming a tick-box exercise.

Learning outcomes

- Choose the hazard-identification technique that suits the lifecycle stage and the decision being made
- Plan and run a HAZID with a hazard/guideword register suited to the facility
- Facilitate a structured What-If review for a change or a non-standard operation
- Build and maintain checklists that ask about the site's real hazards
- Record results in a register that feeds the HAZOP, the risk register and MOC
- Judge when a lighter study has found something that needs a full HAZOP or a consequence model

Who should attend

Process, safety, project and operations engineers who run or take part in hazard identification at concept, FEED, MOC and operations stages

Course outline

MORNING

Hazard identification across the lifecycle · HAZID structure: hazard categories, guidewords and register · facilitation and team composition · HAZID exercise on a concept plot plan · linking HAZID to ENVID and HAZOP

AFTERNOON

What-If and What-If/Checklist method · running a What-If on an MOC package · checklist design and pitfalls · building a site checklist from incident history · recording in CeraPHA Studio and report expectations

Standards referenced

IEC 31010 · ISO 17776 · IEC 61882 · CCPS Guidelines for Hazard Evaluation Procedures · OSHA 29 CFR 1910.119(e)

Tools & exercises

Registers and worksheets recorded in CeraPHA Studio; checklist templates supplied

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
None; some plant or project experience helpful

CERTIFICATION
Certificate of completion

INSTRUCTORS
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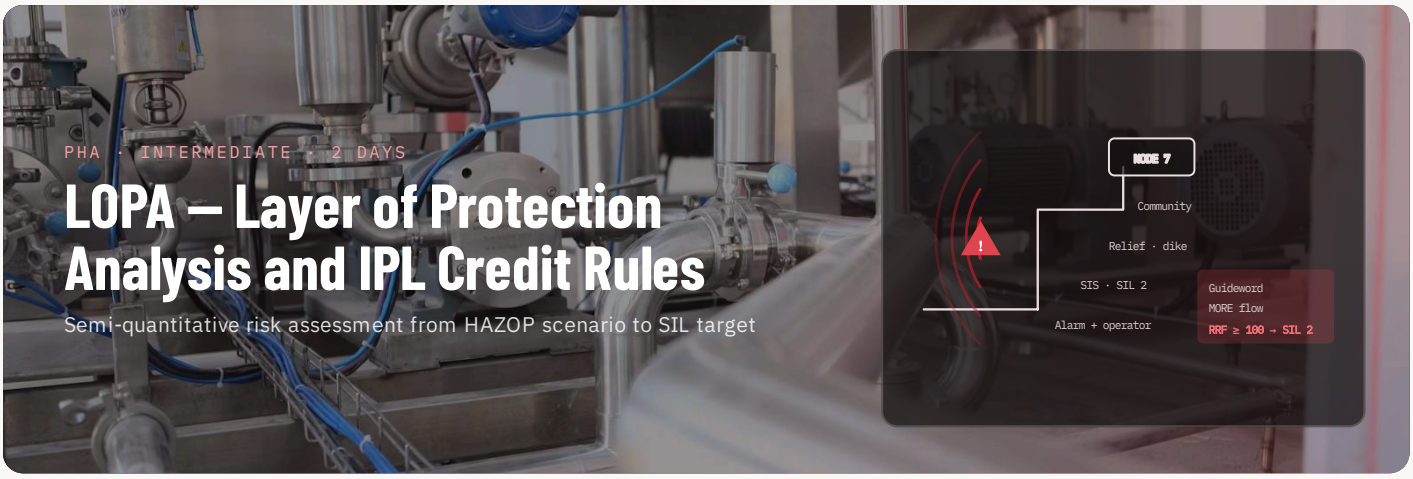

PHA · INTERMEDIATE · 2 DAYS

LOPA — Layer of Protection Analysis and IPL Credit Rules

Semi-quantitative risk assessment from HAZOP scenario to SIL target

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
2 days	Intermediate	On-site classroom · virtual instructor-led	English	16

10 LOPA scenarios worked

1 IPL credit rulebook

1 calibration exercise against site criteria

Overview

LOPA is where a HAZOP scenario becomes a number that decides whether a SIF is needed and at what SIL. The method is simple; the mistakes are in the details — initiating-event frequencies taken from the wrong table, safeguards credited that are not independent, conditional modifiers applied twice, tolerable-frequency criteria nobody has agreed. The course works through scenario selection, frequency and probability data, IPL qualification rules and documentation, then runs ten scenarios from real HAZOP worksheets.

Learning outcomes

- Select LOPA scenarios from a HAZOP and define them with a single cause and consequence
- Assign initiating-event frequencies from recognised data sources and site history
- Apply the independence, effectiveness, auditability and specificity tests before crediting an IPL
- Credit BPCS loops, alarms with operator response, relief devices and mitigation layers correctly
- Use enabling conditions and conditional modifiers without double counting
- Set tolerable-frequency targets and derive SIL targets and gap-closure options

Who should attend

Process safety, process and instrument engineers who perform or review LOPA; HAZOP leaders; SIS engineers who receive LOPA results

Course outline

DAY 1

LOPA in the PHA and IEC 61511 lifecycle · scenario definition and consequence categories · initiating events and frequency data · enabling conditions and conditional modifiers · tolerable risk criteria and risk matrices · IPL qualification rules

DAY 2

Crediting BPCS, alarms, relief, dikes and F&G · human IPLs and time to respond · common-cause and shared components · SIL target derivation and gap closure · worked scenarios in CeraPHA Studio · documentation, review and revalidation of LOPA records

Standards referenced

CCPS Layer of Protection Analysis

CCPS Guidelines for Initiating Events and Independent Protection Layers

IEC 61511-3 · ANSI/ISA-84.00.01 · OSHA 29 CFR 1910.119(e)

Tools & exercises

Scenarios worked in CeraPHA Studio using its LOPA module and IPL library

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Participation in at least one HAZOP; basic probability arithmetic

CERTIFICATION
Certificate of completion

INSTRUCTORS
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PHA · INTERMEDIATE · 1 DAY

SIL Determination — Risk Graph, LOPA, Risk Matrix

Choosing and calibrating the target-SIL method under IEC 61511-3

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
1 day	Intermediate	On-site classroom · virtual instructor-led	English	16

3 methods applied to the same SIFs

8 SIFs classified in the workshop

1 method-calibration record

Overview

IEC 61511 allows several routes to a SIL target and each gives a different answer unless it has been calibrated to the same tolerable risk. The course explains the risk graph, calibrated risk graph, risk matrix and LOPA methods, how to calibrate them against the site's risk criteria, and how to run a SIL classification workshop that produces a consistent, documented target for every SIF. Participants classify eight SIFs by three methods and compare the results.

Learning outcomes

- Explain what a SIL target means and how it is used in SIF design and verification
- Apply the risk graph and calibrated risk graph with defensible parameter definitions
- Use a risk matrix and LOPA for the same SIF and reconcile the results
- Calibrate a method against the site's individual and societal risk criteria
- Run a SIL classification workshop with the right team and information
- Record the classification so it survives audit and revalidation

Who should attend

Process safety and instrument engineers, HAZOP and LOPA leaders, SIS responsible engineers and PSM coordinators

Course outline

MORNING

SIL targets in the IEC 61511 lifecycle · consequence, frequency, occupancy and avoidance parameters · risk graph and calibrated risk graph · risk matrix approaches · calibration against tolerable risk criteria

AFTERNOON

LOPA as a SIL determination method · reconciling method disagreements · classification workshop on eight SIFs in CeraPHA Studio · demand rate, mode of operation and RRF · documenting the SIL target and safety requirement inputs

Standards referenced

IEC 61511-3 · IEC 61508-5 · ANSI/ISA-84.00.01 · CCPS Layer of Protection Analysis

Tools & exercises

Classification exercises in CeraPHA Studio's SIL determination module

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
HAZOP participation; LOPA course (TR-A04) or equivalent recommended

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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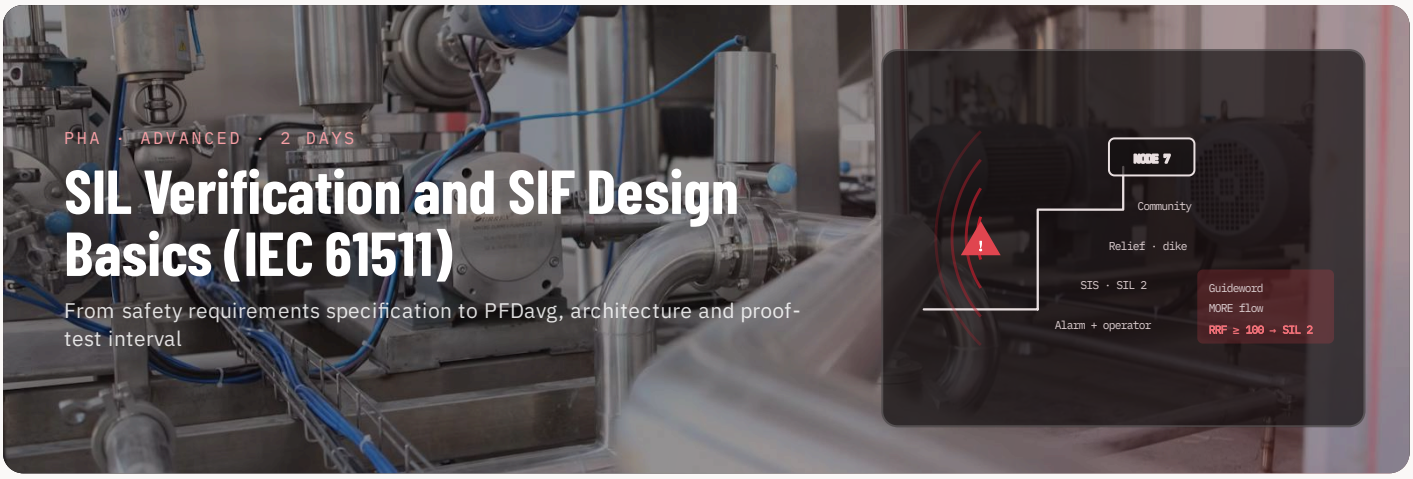

PHA · ADVANCED · 2 DAYS

SIL Verification and SIF Design Basics (IEC 61511)

From safety requirements specification to PFDavg, architecture and proof-test interval

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
2 days	Advanced	On-site classroom · virtual instructor-led	English	16

6 SIFs verified end to end

3 architectures compared

1 SRS template

Overview

A SIL target is a promise; verification is where it is checked. The course takes the SIF from the safety requirements specification through sensor, logic-solver and final-element selection, failure-rate data, PFDavg calculation, architectural constraints and systematic capability, to the proof-test interval and coverage that keep it in SIL for the life of the plant. Six SIFs are verified end to end with the calculations shown, not just the tool output.

Learning outcomes

- Write a safety requirements specification that a designer and a verifier can both use
- Select failure-rate data from certificates, OREDA and site records and justify it
- Calculate PFDavg for 1oo1, 1oo2, 2oo3 and mixed architectures including common cause
- Apply hardware fault tolerance and route 1H/2H architectural constraints
- Set proof-test intervals and coverage and see their effect on achieved SIL
- Recognise systematic failure sources and the role of prior-use and certified devices

Who should attend

Instrument, control and functional-safety engineers who design, verify or assess safety instrumented functions; SIS maintenance leads

Course outline

DAY 1

IEC 61511 realisation phase · safety requirements specification content · sensor, logic-solver and final-element selection · failure modes and failure-rate data · diagnostics, safe and dangerous failures · PFDavg by simplified equations

DAY 2

Voting architectures and beta-factor common cause · hardware fault tolerance and route 1H/2H · systematic capability and prior use · proof-test interval, coverage and partial-stroke testing · verification of six SIFs in CeraPHA Studio · design review and hand-over to operations

Standards referenced

`IEC 61511-1 / -2` `IEC 61508-2 / -6` `ANSI/ISA-84.00.01` `ISA-TR84.00.02` `ISA-TR84.00.03`

Tools & exercises

Verification calculations in CeraPHA Studio with independent hand checks

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Instrumentation background; SIL determination course (TR-A05) or equivalent

CERTIFICATION
Certificate of completion with competency assessment result; supports application for TÜV or exida functional-safety examinations

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

PHA · FOUNDATION · 1 DAY

Functional Safety Lifecycle — IEC 61508/61511 Overview

What the standards require, who owns each phase and where sites fall short

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
1 day	Foundation	On-site classroom · virtual instructor-led	English	16

16 lifecycle phases explained

1 role-and-responsibility map

1 gap check against your FSMS

Overview

Most of the people who influence whether a SIS works — operators who bypass it, technicians who test it, engineers who change the set-point — have never read IEC 61511. This course explains the safety lifecycle from hazard analysis to decommissioning in plain language, what each phase produces, who is responsible, and how functional safety management, competence and assessment hold it together. It ends with a gap check against the site's own functional safety management system.

Learning outcomes

- Describe the IEC 61508 and IEC 61511 lifecycle phases and their deliverables
- Explain SIL, PFDavg, demand mode and proof testing without the mathematics
- Identify the responsibilities of operations, maintenance, engineering and management in each phase
- Recognise how bypasses, MOC and proof-test deferrals affect achieved SIL
- Explain functional safety management, competence and assessment requirements
- Locate the gaps in a site's functional safety management system

Who should attend

Engineers, supervisors and managers who touch a safety instrumented system without being SIS specialists: process, operations, maintenance, projects, HSE and asset integrity

Course outline

MORNING

Why functional safety standards exist · IEC 61508 and IEC 61511 relationship and scope · analysis phase: hazard and risk assessment, allocation, SRS · realisation phase: design, verification, installation and validation · SIL, PFD, demand mode and RRF explained

AFTERNOON

Operation and maintenance phase: proof testing, bypasses, demand recording · modification and decommissioning · functional safety management, competence and assessment · what an FSA looks for · gap check against the site's FSMS and lifecycle records

Standards referenced

IEC 61508-1 · IEC 61511-1 · ANSI/ISA-84.00.01 · OSHA 29 CFR 1910.119 · CCPS Guidelines for Safe and Reliable Instrumented Protective Systems

Tools & exercises

Lifecycle records and SIF register illustrated in CeraPHA Studio; no software skills required

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
None

CERTIFICATION
Certificate of completion; awareness-level evidence for functional safety competence records

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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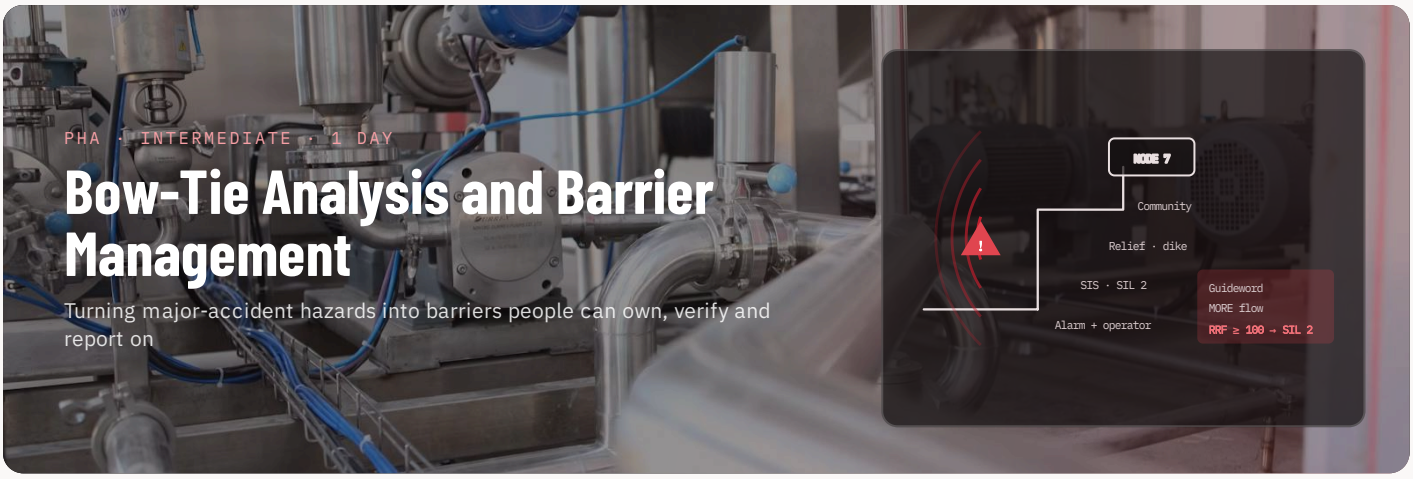

PHA · INTERMEDIATE · 1 DAY

Bow-Tie Analysis and Barrier Management

Turning major-accident hazards into barriers people can own, verify and report on

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
1 day	Intermediate	On-site classroom · virtual instructor-led	English	16

4 bow-ties built for your MAHs

1 barrier-criteria checklist

1 barrier-status dashboard concept

Overview

A bow-tie makes a major-accident scenario visible in a way a HAZOP worksheet never will: the threats on the left, the top event in the middle, the consequences on the right and, on every line, the barriers that must work. The course covers building bow-ties to the CCPS/EI method, deciding what qualifies as a barrier, assigning ownership and performance standards, and using the diagrams for barrier-status reporting, incident review and communicating with the workforce. Participants build four bow-ties for their own major-accident hazards.

Learning outcomes

- Define top events and threats at the right level of abstraction
- Distinguish barriers from degradation factors and safeguards that are not barriers
- Apply barrier criteria: effective, independent, auditable
- Assign barrier owners, performance standards and verification activities
- Link bow-ties to HAZOP, LOPA, SCE lists and the incident-investigation process
- Use bow-ties for barrier-status reporting and workforce engagement

Who should attend

Process safety engineers, HSE leads, operations and maintenance managers, safety-case and Seveso report authors, barrier owners

Course outline

MORNING

Major-accident hazards and the Swiss-cheese model · bow-tie anatomy: hazard, top event, threats, consequences · barrier criteria and common errors · degradation factors and degradation controls · building the first bow-tie for a site MAH

AFTERNOON

Barrier ownership, performance standards and assurance · barrier management systems and status reporting · bow-ties in Seveso reports and safety cases · linking to HAZOP, LOPA and SCE records in CeraPHA Studio · three further bow-ties and review

Standards referenced

CCPS / EI Bow Ties in Risk Management · IEC 31010 · ISO 17776 · EI Guidance on Process Safety Barriers · Seveso III Directive

Tools & exercises

Diagrams built in the participants' bow-tie tool of choice; barriers cross-referenced to HAZOP and LOPA records in CeraPHA Studio

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Familiarity with the site's major-accident hazards; HAZOP participation helpful

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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PHA · INTERMEDIATE · ½ DAY

PHA Revalidation and Management of PHA Actions

Keeping the hazard analysis current and closing what it found

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
½ day	Intermediate	On-site classroom · virtual instructor-led	English	16

3 revalidation approaches compared

1 action-register health check

1 revalidation plan for your unit

Overview

A PHA that is five years old and an action register with 300 open items are the two findings that appear in almost every PSM audit. This half-day session explains the revalidation options — update, redo or a combination — how to choose based on the change history, incident record and quality of the previous study, and how to run a revalidation that does not repeat the original three weeks. The second half addresses the action register: writing closable actions, risk-ranking, tracking and what 'resolved' has to mean.

Learning outcomes

- Choose between update, redo and hybrid revalidation using documented criteria
- Assemble the revalidation inputs: MOCs, incidents, audit findings, prior study quality
- Plan and staff a revalidation to the scope it needs, not the scope of the original
- Write recommendations that an owner can implement and an auditor can close
- Rank, track and report open actions with clear resolution criteria
- Keep PHA records in a state that supports MOC and the next revalidation

Who should attend

PSM coordinators, PHA leaders, unit engineers and action owners responsible for the five-year revalidation and the PHA action register

Course outline

SESSION 1

Regulatory basis for revalidation · study quality review and change history · update versus redo decision · running an efficient revalidation · revalidation plan for a participant's unit

SESSION 2

Recommendation quality and the resolution options · risk-ranking and due dates · action tracking and escalation · closing actions with evidence · action-register health check in CeraPHA Studio

Standards referenced

OSHA 29 CFR 1910.119(e)(6)
CCPS Guidelines for Revalidating a Process Hazard Analysis
IEC 61882
EPA 40 CFR 68.67

Tools & exercises

Revalidation pack and action register handled in CeraPHA Studio

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
PHA participation; responsibility for a PHA or action register

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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PHA · INTERMEDIATE · 1 DAY

Facility Siting and Occupied Buildings (API RP 752/753)

Assessing and managing the risk to people in control rooms, workshops and portable buildings

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
1 day	Intermediate	On-site classroom · virtual instructor-led	English	16

1 siting study on your plot plan

3 hazard types: explosion · fire · toxic

1 building risk register

Overview

Texas City put facility siting on every refinery's agenda; API RP 752, 753 and 756 tell you how to do it, but not how to make the decisions. The course covers identifying occupied buildings, selecting the explosion, fire and toxic scenarios, applying consequence-based, risk-based and spacing-table approaches, and deciding what to do when a building fails the criteria: relocate, strengthen, reduce occupancy or accept. A siting study is carried out on the participants' own plot plan.

Learning outcomes

- Identify buildings in scope and classify them by occupancy and function
- Select credible explosion, fire and toxic scenarios for a siting study
- Apply consequence-based, risk-based and spacing-table approaches and know their limits
- Interpret overpressure, radiation and toxic contours against building damage levels
- Evaluate portable and tent buildings under API RP 753 and 756
- Produce a building risk register with prioritised, defensible actions

Who should attend

Process safety engineers, plant layout and civil engineers, project managers, facilities and HSE staff responsible for occupied buildings

Course outline

MORNING

Lessons from Texas City and Flixborough · API RP 752, 753 and 756 scope and criteria · building inventory and occupancy · scenario selection for explosion, fire and toxic · building damage levels and occupant vulnerability

AFTERNOON

Consequence-based versus risk-based approaches · siting study on the participants' plot plan in CeraImpact · mitigation: relocation, blast-resistant design, occupancy limits · portable buildings and temporary structures · building risk register and management of change

Standards referenced

API RP 752 · API RP 753 · API RP 756 · CCPS Guidelines for Evaluating Process Plant Buildings · ASCE Design of Blast-Resistant Buildings in Petrochemical Facilities

Tools & exercises

Siting study run in CeraImpact on the participants' georeferenced plot plan

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Consequence Modelling Fundamentals (TR-B01) or equivalent

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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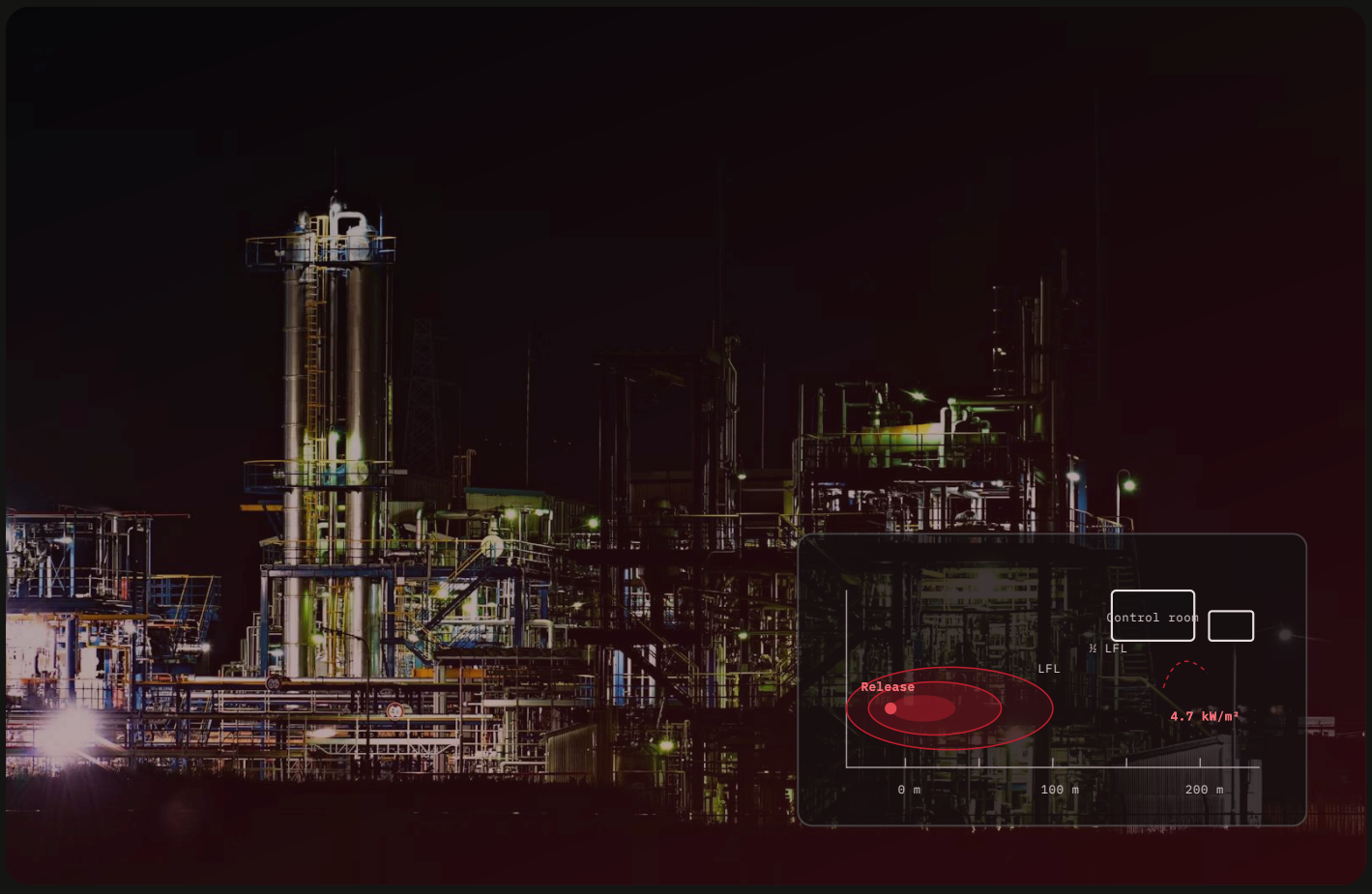

CATEGORY B

Consequence Analysis & Risk

Dispersion, fire and explosion modelling, QRA and risk criteria, fire-and-gas mapping, area classification and dust or reactive hazards - turning consequences into design decisions.

5 COURSES

7 TRAINING DAYS

Practitioner-led training for the process industry

On-site at your plant or virtual · custom curricula · competency assessment and certificates

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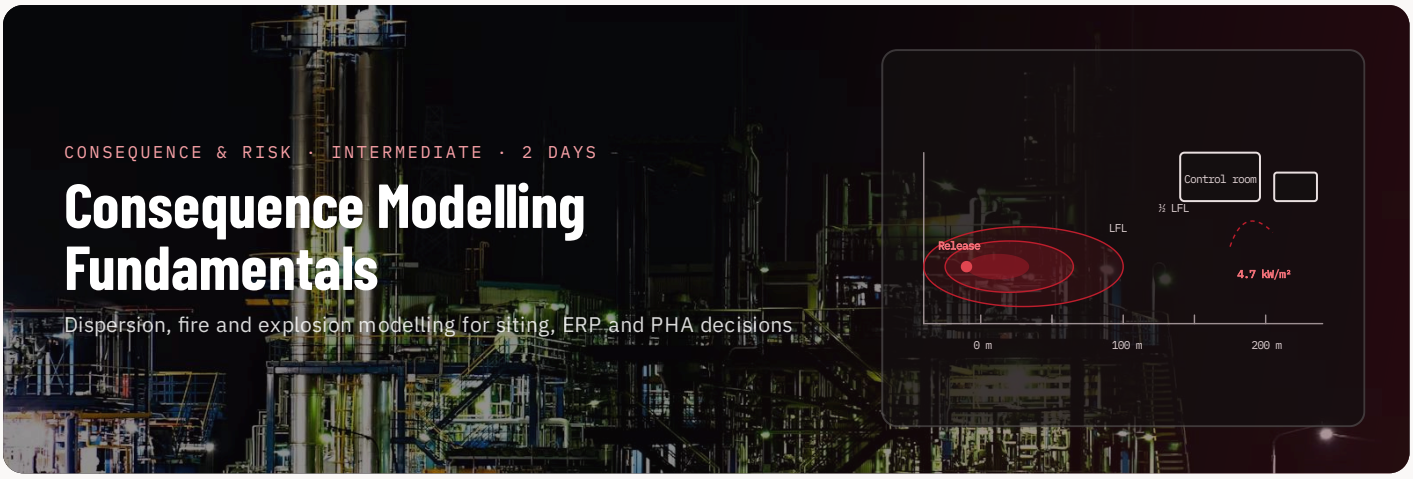

CONSEQUENCE & RISK · INTERMEDIATE · 2 DAYS

Consequence Modelling Fundamentals

Dispersion, fire and explosion modelling for siting, ERP and PHA decisions

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
2 days	Intermediate	On-site classroom · virtual instructor-led	English	16

6 worked plant cases

3 model families: dispersion · fire · explosion

1 siting exercise on a plot plan

Overview

Knowing how far a release travels, how hot a fire burns and how far overpressure reaches is what turns a HAZOP consequence into a design decision. The course covers source terms, dispersion, fire and explosion models and — most importantly — how to choose scenarios, interpret contours on a plot plan and defend the results in front of an authority.

Learning outcomes

- Build a credible source term for liquid, gas and two-phase releases
- Select and apply dispersion models for neutral and dense gases
- Estimate pool fire, jet fire, flash fire and BLEVE effects
- Apply TNT-equivalent, multi-energy and Baker–Strehlow explosion methods
- Set harm criteria and map results to buildings and escape routes
- Document assumptions so the study can be revalidated

Who should attend

Process safety and loss-prevention engineers, plant layout and project engineers, emergency-response planners

Course outline

DAY 1

Scenario selection and hole sizes · discharge and flashing · atmospheric stability and weather sets · Gaussian and dense-gas dispersion · toxic dose and flammable extent

DAY 2

Fire models and radiation thresholds · explosion methods and overpressure damage levels · facility siting (API RP 752/753) · worked refinery and LNG cases in CeraImpact · reporting

Standards referenced

CCPS Guidelines for Consequence Analysis

TNO Yellow Book / Purple Book · API RP 752 / 753 / 756 · API 521

Tools & exercises

Worked cases on CeraImpact with georeferenced plot plans

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Chemical or process engineering background

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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CONSEQUENCE & RISK · ADVANCED · 2 DAYS

Quantitative Risk Assessment (QRA) and Risk Criteria

Building, interpreting and defending a QRA for land-use planning, safety cases and design decisions

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
2 days	Advanced	On-site classroom · virtual instructor-led	English	16

1 complete QRA on a live unit

2 criteria frameworks compared

1 event-tree and F-N workshop

Overview

A QRA is a chain of assumptions with a contour at the end, and the contour is only as defensible as the weakest link. The course covers the CPQRA method end to end — scenario and failure-case selection, failure-rate data, event trees, consequence and vulnerability modelling, individual and societal risk aggregation — and then the part that decides the outcome: risk criteria, ALARP demonstration and how to present results to an authority or a project board. Participants build a QRA for a live unit and defend it in a review.

Learning outcomes

- Scope a QRA to the decision it must support and choose the level of detail
- Select failure cases, hole sizes and frequencies from IOGP, HSE and other data sets
- Build event trees with ignition, weather and mitigation branches
- Calculate location-specific and individual risk, F-N curves and PLL
- Apply UK HSE R2P2, Dutch and site-specific criteria and demonstrate ALARP
- Review a consultant's QRA critically and document the assumptions for revalidation

Who should attend

Process safety and loss-prevention engineers, safety-case and Seveso report authors, project engineers reviewing QRA deliverables from consultants

Course outline

DAY 1

QRA purpose and regulatory drivers · CPQRA method and study scoping · failure-case selection and parts count · failure-rate data sources and their limits · ignition probability and event trees · consequence models and vulnerability criteria

DAY 2

Individual risk contours and occupancy · societal risk, F-N curves and PLL · risk criteria: R2P2, Seveso, IOGP · ALARP demonstration and cost-benefit · QRA on a live unit in CeraImpact · reporting, sensitivity analysis and QRA review checklist

Standards referenced

`CCPS Guidelines for Chemical Process Quantitative Risk Analysis`
`UK HSE Reducing Risks, Protecting People (R2P2)`
`TNO Purple Book (CPR 18E)`
`IOGP Risk Assessment Data Directory (Report 434)`
`ISO 17776`
`Seveso III Directive`

Tools & exercises

QRA built in CeraImpact with event trees and risk contours on the georeferenced site map

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Consequence Modelling Fundamentals (TR-B01) or equivalent; basic probability

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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CONSEQUENCE & RISK · INTERMEDIATE · 1 DAY

Fire & Gas Mapping and Detection Philosophy

Performance-based detector layout, coverage assessment and voting under ISA-TR84.00.07

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
1 day	Intermediate	On-site classroom · virtual instructor-led	English	16

1 coverage map on your plot plan

4 detector technologies compared

1 F&G philosophy template

Overview

Fire and gas detectors are usually placed where the pipe rack has a free flange, not where the gas will be. The course explains a performance-based approach: defining detection objectives from the hazard, selecting technologies, setting coverage targets, mapping geographic and scenario coverage on the plot plan, and deciding voting, alarm and executive actions. Participants produce a coverage map and a philosophy outline for one of their own areas.

Learning outcomes

- Write an F&G philosophy that states what the system is for and what it must achieve
- Select flame, point gas, open-path and acoustic detectors for the hazard and environment
- Set coverage targets and assess geographic and scenario-based coverage
- Position detectors using dispersion and fire modelling rather than rules of thumb
- Define voting, alarm and executive-action logic and their effect on availability
- Assess an existing installation and prioritise improvements

Who should attend

Instrument, fire-protection and process safety engineers who specify, lay out or assess fire and gas detection; SIS and F&G system owners

Course outline

MORNING

F&G in the layers of protection · ISA-TR84.00.07 performance-based method · detection objectives and hazard zones · flame, gas, acoustic and toxic detector technologies · coverage targets and detector effectiveness

AFTERNOON

Geographic and scenario-based mapping on the plot plan in CeraImpact · voting, alarm setpoints and executive actions · F&G within the SIS and IEC 61511 · testing, maintenance and performance monitoring · assessment of a participant's existing area

Standards referenced

ISA-TR84.00.07 · NFPA 72 · IEC 60079-29-1 / -2 · ISO 13702 · IEC 61511

Tools & exercises

Coverage mapping in CeraImpact on the participants' plot plan

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Instrumentation or fire-protection background; P&ID and plot-plan reading

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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CONSEQUENCE & RISK · INTERMEDIATE · 1 DAY

Hazardous Area Classification (IEC 60079-10)

Zoning for gases, vapours and dusts and keeping the drawings alive

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
1 day	Intermediate	On-site classroom · virtual instructor-led	English	16

8 zone-extent calculations

1 HAC drawing for your unit

2 code frameworks: IEC · API/NFPA

Overview

Hazardous area drawings are often inherited, seldom questioned and frequently wrong. The course covers the classification method of IEC 60079-10-1 and -10-2 — sources of release, release grades, ventilation and dilution, zone type and extent — with worked calculations, and compares it with the API RP 505/500 and NFPA 497 approaches used on North American designs. Participants classify part of their own unit and produce a drawing and data sheet.

Learning outcomes

- Identify sources of release and assign release grades correctly
- Estimate release rates and apply the dilution and ventilation assessment of IEC 60079-10-1
- Determine zone type and extent for gas, vapour and mist releases
- Classify combustible dust areas to IEC 60079-10-2
- Translate between IEC zones and API/NFPA divisions where both apply
- Maintain HAC drawings and data sheets through management of change

Who should attend

Process, electrical and instrument engineers responsible for hazardous area classification; inspection and Ex maintenance staff; project engineers reviewing HAC deliverables

Course outline

MORNING

Flammable atmospheres and ignition · IEC 60079-10-1 method: sources, grades, zones · release rate estimation and dilution degree · ventilation availability and zone extent · eight worked calculations for typical equipment

AFTERNOON

Dust classification to IEC 60079-10-2 · API RP 505 / 500 and NFPA 497 comparison · EI 15 point-source approach · classification of a participant's unit and drawing · data sheets, equipment selection interface and MOC

Standards referenced

IEC 60079-10-1 · IEC 60079-10-2 · EI Model Code of Safe Practice Part 15 · API RP 505 / 500 · NFPA 497 · IEC 60079-14

Tools & exercises

Zone-extent calculations by hand and spreadsheet following the worked examples of IEC 60079-10-1

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Process or electrical engineering background; familiarity with P&IDs

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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CONSEQUENCE & RISK · INTERMEDIATE · 1 DAY

Dust and Reactive-Chemical Hazards

Recognising, assessing and controlling the hazards that HAZOP guidewords miss

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
1 day	Intermediate	On-site classroom · virtual instructor-led	English	16

2 hazard families in one day

1 dust hazard analysis walkthrough

1 reactivity screening on your chemicals

Overview

Combustible dust and reactive chemistry are the hazards most often absent from a hydrocarbon site's PHA, and both have produced fatal explosions in plants that thought they were low risk. The morning covers dust explosibility, the dust hazard analysis required by NFPA 652/660 and the prevention and protection measures of NFPA 68 and 69. The afternoon covers reactive-chemical screening, incompatibility, thermal runaway and the design and operating controls that keep a reaction inside its envelope.

Learning outcomes

- Interpret dust explosibility data: Kst, Pmax, MIE, MEC and layer ignition temperature
- Carry out a dust hazard analysis on a process handling combustible powder
- Select prevention and protection: inerting, venting, suppression, isolation, housekeeping
- Screen chemicals and mixtures for reactivity and incompatibility hazards
- Assess thermal runaway potential from calorimetry data and set safe operating limits
- Bring dust and reactivity scenarios into the site PHA and MOC process

Who should attend

Process, safety and operations engineers on sites handling powders, polymers, catalysts, monomers, peroxides or other reactive materials; PHA leaders

Course outline

MORNING

Dust explosion mechanisms and case histories · explosibility parameters and testing · dust hazard analysis to NFPA 652/660 · deflagration venting, suppression and isolation (NFPA 68/69) · housekeeping, ignition sources and Ex equipment

AFTERNOON

Reactive-chemical case histories · reactivity screening and compatibility matrices · calorimetry: DSC, ARC and what the data mean · runaway reaction scenarios and emergency relief basis · operating controls, safe limits and PHA integration · reactivity screening on participants' chemicals

Standards referenced

NFPA 652 / NFPA 660 · NFPA 68 · NFPA 69 · NFPA 654 · CCPS Essential Practices for Managing Chemical Reactivity Hazards · HSE HSG143

Tools & exercises

Worked exercises with published explosibility and calorimetry data; screening templates supplied

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Chemical or process engineering background

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

Book this course or build a custom curriculum

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CATEGORY C

Pressure Relief & Overpressure Protection

Overpressure scenarios, PSV and rupture-disc sizing, flare and vent systems, tank venting and two-phase relief - the last line of protection, designed and documented to code.

5 COURSES

6.5 TRAINING DAYS

Practitioner-led training for the process industry

On-site at your plant or virtual · custom curricula · competency assessment and certificates

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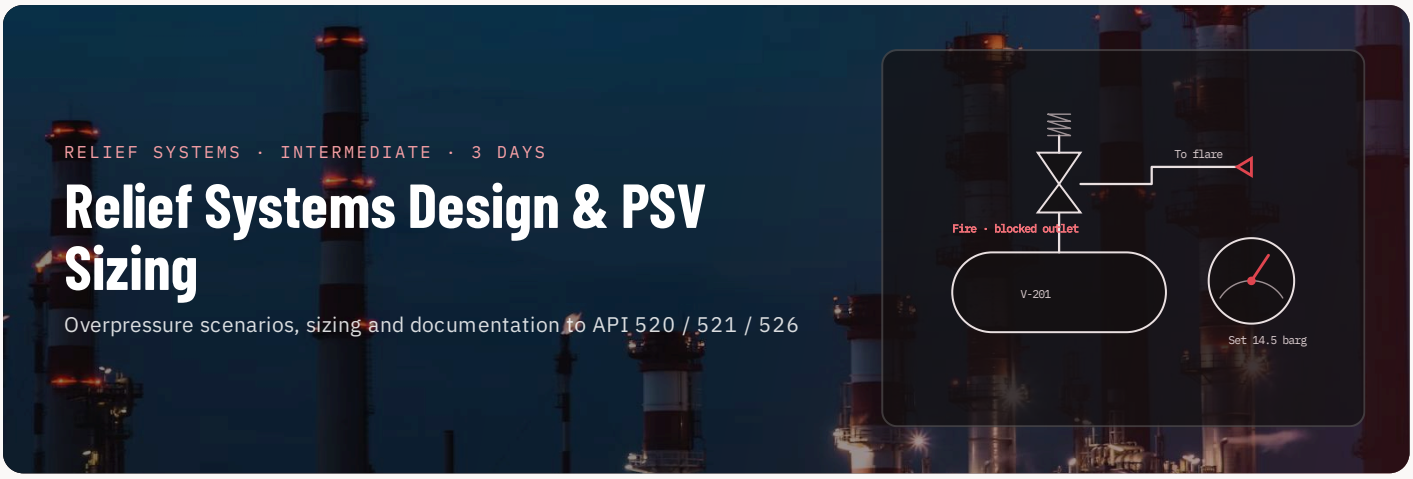

RELIEF SYSTEMS · INTERMEDIATE · 3 DAYS

Relief Systems Design & PSV Sizing

Overpressure scenarios, sizing and documentation to API 520 / 521 / 526

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
3 days	Intermediate	On-site classroom · virtual instructor-led	English	16

12 sizing exercises

8 overpressure scenarios covered

1 relief-register template

Overview

Every relief valve on the unit is the last line of protection for the equipment behind it. The course works through scenario identification, load calculation and sizing for vapour, liquid, two-phase and fire cases, then the parts most audits find missing: inlet and outlet constraints, installation effects and a relief register that survives management of change.

Learning outcomes

- Identify and screen overpressure scenarios per API 521
- Calculate relief loads for blocked outlet, fire, control-valve failure, tube rupture and thermal expansion
- Size conventional, balanced-bellows and pilot-operated valves and rupture discs
- Check inlet pressure drop, built-up back pressure and reaction forces
- Handle two-phase and supercritical fluids with the DIERS methods
- Compile a relief register with design basis, calculations and MOC hooks

Who should attend

Process engineers responsible for relief design, validation and the relief register; inspection engineers

Course outline

DAY 1

Overpressure protection philosophy · code requirements (ASME VIII, API 520/526) · scenario identification workshop · vapour and liquid sizing

DAY 2

Fire case and wetted area · heat-exchanger tube rupture · thermal expansion and utility failure · rupture discs and combination devices · installation: inlet/outlet losses, back pressure

DAY 3

Two-phase and flashing flow (DIERS/Omega) · flare header and knock-out drum basics · PSV validation on an existing unit · relief register and documentation · CeraVent workshop

Standards referenced

API 520 Part I & II · API 521 · API 526 / 527 · ASME BPVC Section VIII · ISO 4126 · API 2000

Tools & exercises

Sizing exercises performed in CeraVent

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Process engineering degree; familiarity with P&IDs and hydraulics

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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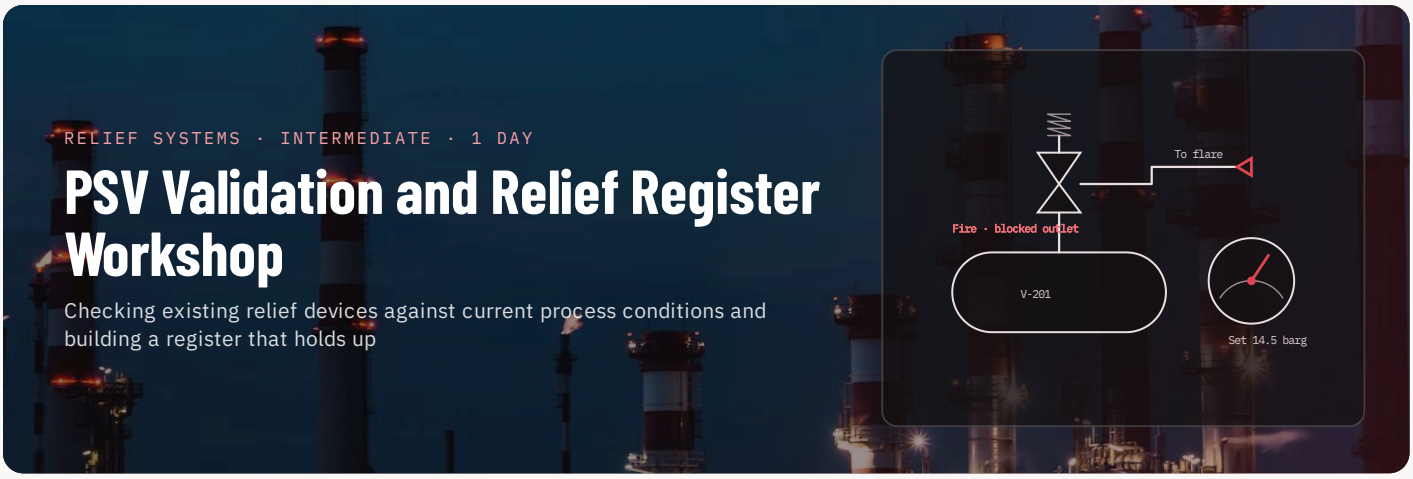

RELIEF SYSTEMS · INTERMEDIATE · 1 DAY

PSV Validation and Relief Register Workshop

Checking existing relief devices against current process conditions and building a register that holds up

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
1 day	Intermediate	On-site classroom · virtual instructor-led	English	16

Your own relief register and PSV data sheets

10 validation checks per valve

1 gap list ready for MOC

Overview

Most relief valves on a mature unit were sized for a process that no longer exists. This workshop takes the participants' own PSV data sheets, P&IDs and current operating envelopes and runs each device through a structured validation: is the governing scenario still the governing scenario, does the installed orifice still pass the load, and do the inlet and outlet lines still meet the code. The output is a gap list with prioritised actions and a register format that an auditor can follow from scenario to calculation.

Learning outcomes

- Reconstruct the design basis of an existing relief device from drawings, data sheets and operating data
- Re-screen overpressure scenarios after revamps, debottlenecking and set-point changes
- Check installed capacity against recalculated loads for vapour, liquid and fire cases
- Verify the 3 % inlet loss rule, built-up and superimposed back pressure and bellows limits
- Rank findings by risk and route them through MOC and the inspection plan
- Structure a relief register that links PSI, PHA, calculations and inspection history

Who should attend

Process and pressure-equipment engineers responsible for the relief register; inspection engineers; PSM coordinators covering PSI and mechanical integrity

Course outline

MORNING

Why validation programmes exist: incidents and audit findings · relief register as process safety information · reconstructing the design basis · scenario re-screening on a changed unit · capacity checks in CeraVent

AFTERNOON

Inlet and outlet line verification · chattering and back-pressure findings · rupture disc and combination device checks · risk-ranking the gap list · register format, MOC and inspection interface · workshop on participants' own valves

Standards referenced

API 520 Part I & II · API 521 · API 576 · API 510 · OSHA 29 CFR 1910.119(d) and (j) · ASME BPVC Section VIII

Tools & exercises

Validation calculations and register templates in CeraVent, working on the participants' own valve data

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Relief sizing basics (TR-C01 or equivalent experience)

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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RELIEF SYSTEMS · INTERMEDIATE · 1 DAY

Flare and Vent System Design (API 521)

Header hydraulics, knock-out drums, flare tips and radiation for new and modified disposal systems

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
1 day	Intermediate	On-site classroom · virtual instructor-led	English	16

1 flare-network case built end to end

5 global scenarios analysed

3 radiation and dispersion checks

Overview

A correctly sized PSV discharging into an undersized header is still an unprotected vessel. This course covers the disposal side of relief: defining global scenarios, building the flare load summary, sizing headers for back-pressure and Mach limits, and designing the knock-out drum, seal, tip and stack so that radiation, noise and dispersion are acceptable. Participants build one complete flare network case from load summary to stack height.

Learning outcomes

- Define global relieving scenarios (total power failure, cooling water failure, fire zones) and build a load summary
- Size flare and vent headers for allowable back pressure, Mach number and noise
- Design knock-out drums and liquid seals for the governing liquid load
- Select flare tip type and estimate radiation, stack height and sterile radius
- Check flashback, purge, air ingress and low-flow smoking conditions
- Assess the impact of a new tie-in on an existing flare system

Who should attend

Process and project engineers designing or modifying flare and vent systems; relief engineers moving from single-valve sizing to the collection network

Course outline

MORNING

Disposal system philosophy and API 521 structure · global scenario definition and fire zoning · load summary and simultaneity · header hydraulics: back pressure, Mach, temperature and material limits · segregated wet, dry and acid headers

AFTERNOON

Knock-out drum and seal drum sizing · flare tip selection and radiation calculation · stack height, dispersion and noise · purge, flashback and smokeless operation · adding a new relief source to an existing network · worked case in CeraVent

Standards referenced

API 521 · API 537 · API 520 Part II · ASME BPVC Section VIII · NFPA 30

Tools & exercises

Network hydraulics and radiation calculations worked in CeraVent

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Relief sizing basics (TR-C01 or equivalent); familiarity with compressible flow

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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RELIEF SYSTEMS · FOUNDATION · ½ DAY

Tank Venting, Blanketing and Emergency Venting (API 2000)

Normal and emergency venting, inert gas blanketing and vacuum protection for atmospheric and low-pressure tanks

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
½ day	Foundation	On-site classroom · virtual instructor-led	English	16

8 venting calculations worked

2 tank types: fixed-roof and floating-roof

1 blanketing case study

Overview

Storage tanks are protected by a few inches of water column, and they fail when nobody has checked the arithmetic. This half-day course covers thermal in-breathing and out-breathing, pump-in and pump-out rates, fire-case emergency venting and the sizing of pressure/vacuum valves, flame arresters and blanketing regulators to API 2000. It closes with the operating failures that collapse tanks: blocked vents, blanketing gas running out and steam-out without vacuum protection.

Learning outcomes

- Calculate normal in- and out-breathing for thermal and liquid-movement cases per API 2000
- Size emergency venting for the fire case with and without insulation credit
- Select and size pressure/vacuum relief valves and emergency vents
- Design a nitrogen blanketing system: regulator, set points and gas demand
- Apply flame arrester and detonation arrester requirements correctly
- Recognise the operating scenarios that over-pressure or collapse tanks

Who should attend

Process, tank-farm and utilities engineers; inspection engineers covering storage tanks; operations staff responsible for tank-farm safe operating limits

Course outline

SESSION 1

Tank types and design pressures (API 650 / API 620) · normal venting: thermal and pump-driven cases · API 2000 methods and the ISO 28300 alignment · fire-case emergency venting and wetted area · PVRV selection and set points

SESSION 2

Blanketing systems and regulator sizing · flame and detonation arresters · vent line losses and set-point margin · tank collapse and overfill lessons (Buncefield and others) · sizing exercises in CeraVent

Standards referenced

API 2000 / ISO 28300 · API 650 · API 620 · API 2350 · NFPA 30

Tools & exercises

Venting and blanketing calculations worked in CeraVent

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
None

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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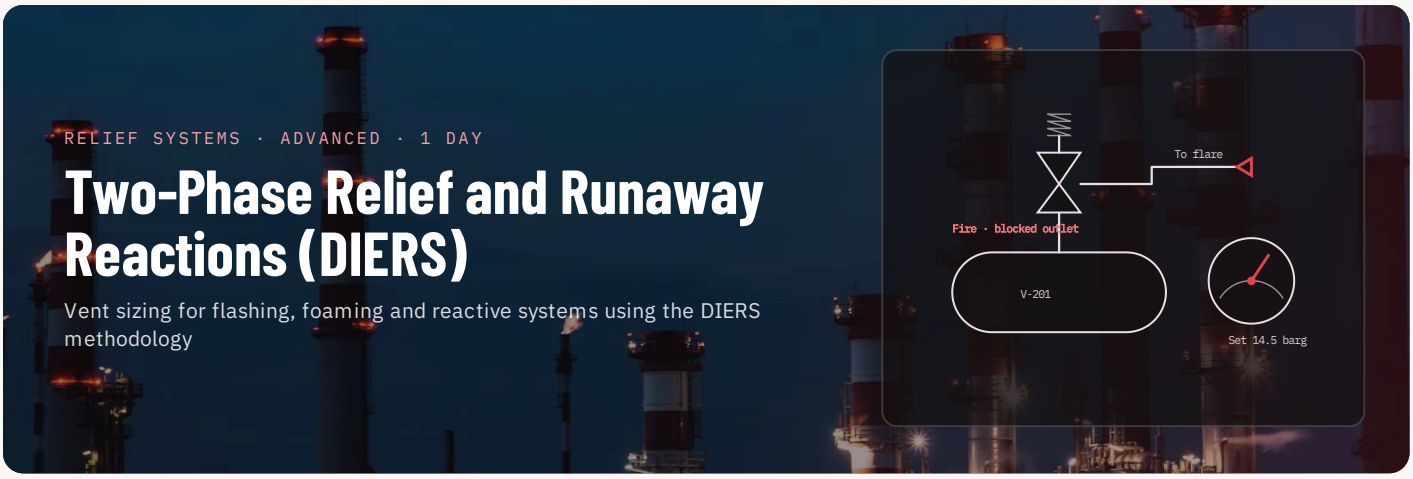

RELIEF SYSTEMS · ADVANCED · 1 DAY

Two-Phase Relief and Runaway Reactions (DIERS)

Vent sizing for flashing, foaming and reactive systems using the DIERS methodology

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
1 day	Advanced	On-site classroom · virtual instructor-led	English	16

4 reactive systems characterised

3 two-phase sizing methods compared

1 runaway-reaction case study

Overview

Single-phase vapour sizing under-predicts the required area by a factor of several when the vessel swells and vents a two-phase mixture. The course explains when two-phase flow must be assumed, how to characterise a reactive system from calorimetry data, and how to size the vent with the DIERS methods: Omega, homogeneous equilibrium, Leung and the tempered/gassy/hybrid classification. A runaway reaction case study runs from calorimeter trace to vent area and effluent handling.

Learning outcomes

- Judge when two-phase venting must be assumed: level swell, foaming, reactive and viscous systems
- Interpret adiabatic calorimetry (ARC, VSP2) data for onset, adiabatic temperature rise and pressure rate
- Classify systems as vapour, gassy or hybrid and choose the sizing basis accordingly
- Size vents with the Omega method, HEM and the Leung equation for tempered systems
- Handle flashing and non-flashing flow through valves, discs and inlet lines
- Design effluent handling: catch tanks, quench and separation to avoid a second release

Who should attend

Relief and process safety engineers in petrochemical, polymer and specialty-chemical plants; engineers responsible for reactor and batch relief design

Course outline

MORNING

Why single-phase sizing fails: incidents and DIERS history · level swell and flow regimes · thermal runaway fundamentals · reading calorimetry data · vapour, gassy and hybrid system classification

AFTERNOON

Omega method and HEM · Leung and tempered-system sizing · gassy and hybrid systems · inlet line, disc and valve behaviour in two-phase flow · effluent handling and catch-tank design · runaway case study in CeraVent

Standards referenced

CCPS Guidelines for Pressure Relief and Effluent Handling Systems · DIERS Project Manual · API 520 Part I · API 521 · ISO 4126-10 · ASME BPVC Section VIII

Tools & exercises

Two-phase and reactive sizing exercises worked in CeraVent

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Relief sizing basics (TR-C01 or equivalent); chemical engineering degree

CERTIFICATION
Certificate of completion

INSTRUCTORS
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CATEGORY D

Process Safety Management

The elements of OSHA PSM and CCPS Risk Based Process Safety: MOC, mechanical integrity, procedures and operational discipline, handover, audits, indicators, investigation and leadership.

12 COURSES

13.5 TRAINING DAYS

Practitioner-led training for the process industry

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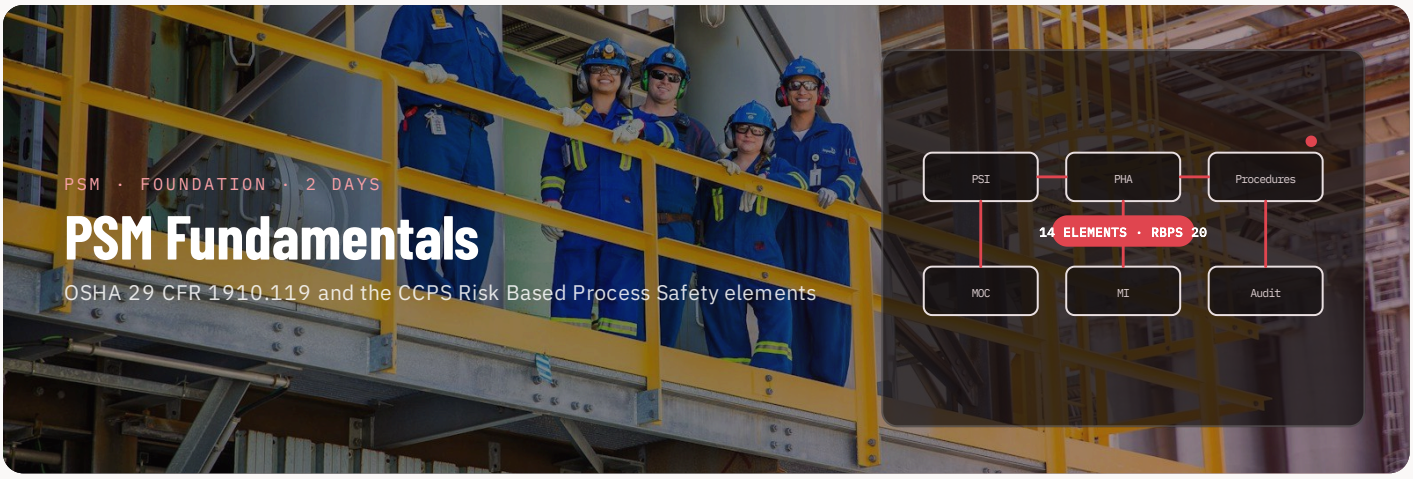

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
2 days	Foundation	On-site classroom · virtual instructor-led	English	16

14 + 20
OSHA and RBPS elements

1
gap-assessment workshop

30+
audit-ready record types

Overview

Process safety management is how a plant keeps its hazards under control every day, not just on the day of the HAZOP. This course explains each of the 14 OSHA PSM elements and the 20 CCPS RBPS elements, what 'good' looks like in practice, how the elements connect, and where programmes typically decay between audits.

Learning outcomes

- Explain the intent and requirements of every PSM element
- Recognise the documents and records an auditor will ask for
- Connect PHA, MOC, PSI, mechanical integrity and training into one system
- Use leading and lagging indicators (API RP 754) to monitor the programme
- Identify common gaps and prioritise corrective actions
- Describe the roles of element owners, operations and leadership

Who should attend

PSM element owners, engineers, supervisors and HSE staff new to a formal PSM programme; managers accountable for compliance

Course outline

DAY 1

Why PSM exists: major accident lessons · OSHA 1910.119 and Seveso context · process safety information and safe limits · PHA · operating procedures and conduct of operations · training · contractors

DAY 2

Mechanical integrity and SCE · MOC and PSSR · hot work and permits · incident investigation · emergency planning · compliance audits · RBPS elements beyond OSHA · metrics with CeraPulse · gap-assessment workshop

Standards referenced

OSHA 29 CFR 1910.119 · CCPS Risk Based Process Safety · API RP 754 · Seveso III Directive · EI PSM Framework

Tools & exercises

Gap-assessment exercise using the CeraPulse audit module

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
None

CERTIFICATION
Certificate of completion

INSTRUCTORS
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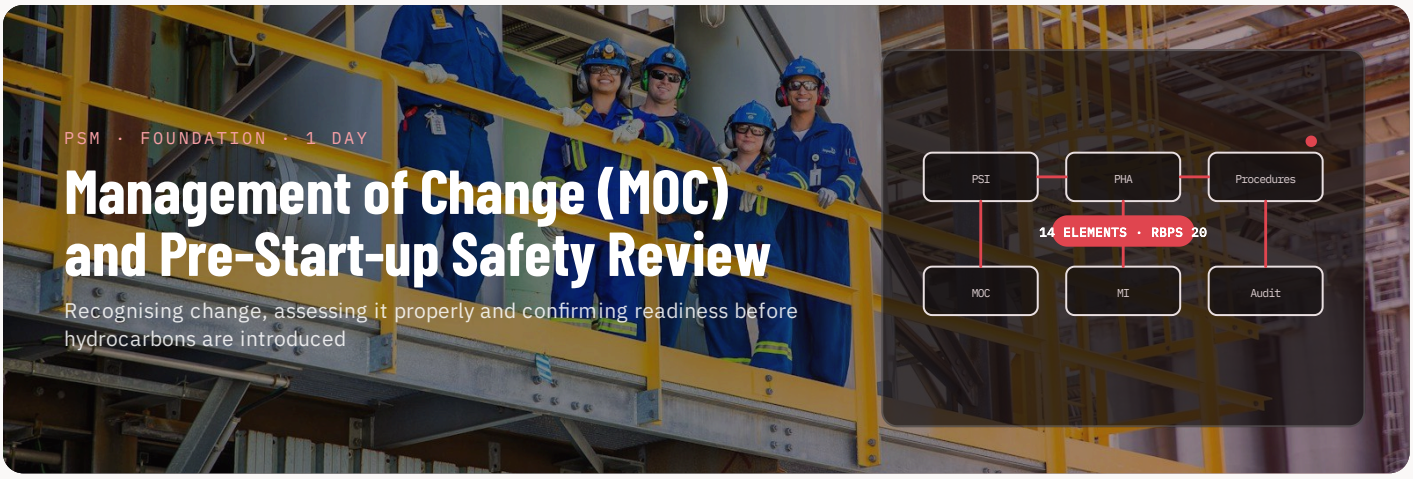

PSM · FOUNDATION · 1 DAY

Management of Change (MOC) and Pre-Start-up Safety Review

Recognising change, assessing it properly and confirming readiness before hydrocarbons are introduced

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
1 day	Foundation	On-site classroom · virtual instructor-led	English	16

12 MOC cases judged: change or not?

1 PSSR walkdown checklist

2 workflow templates to take home

Overview

Most major accidents involve a change that somebody did not think was a change. The course covers what counts as change (equipment, chemicals, procedures, organisation, temporary and emergency changes), how to scope the review so it is proportionate, and how the PSSR confirms that the change was built as designed, procedures and training were updated, and PHA actions were closed. Participants judge twelve real cases and run a tabletop PSSR on a modification package.

Learning outcomes

- Distinguish replacement-in-kind from change, including organisational and procedural change
- Scope a technical review proportionate to the hazard: checklist, What-If or full HAZOP
- Manage temporary changes with expiry dates and restoration checks
- Update PSI, procedures, training and PHA records as part of closure
- Run a PSSR: field walkdown, punch-list categories and authorisation to start up
- Audit an MOC system with metrics such as overdue temporary changes and closure quality

Who should attend

MOC originators, reviewers and approvers; operations, maintenance and project engineers; PSSR team members and PSM coordinators

Course outline

MORNING

Change-related incidents (Flixborough and others) · OSHA 1910.119(l) and RBPS requirements · what is a change: twelve cases · MOC workflow and roles · risk-based review depth · temporary and emergency changes

AFTERNOON

Organisational change management · closure: PSI, procedures, training · PSSR per 1910.119(i): walkdown, punch list, authorisation · tabletop PSSR on a modification package · MOC metrics and audit questions

Standards referenced

- OSHA 29 CFR 1910.119(l) and (i)
- CCPS Guidelines for the Management of Change for Process Safety
- CCPS Risk Based Process Safety
- EI Guidance on Organisational Change
- Seveso III Directive

Tools & exercises

Workflow and PSSR templates provided; exercises on participants' own MOC procedure

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
None

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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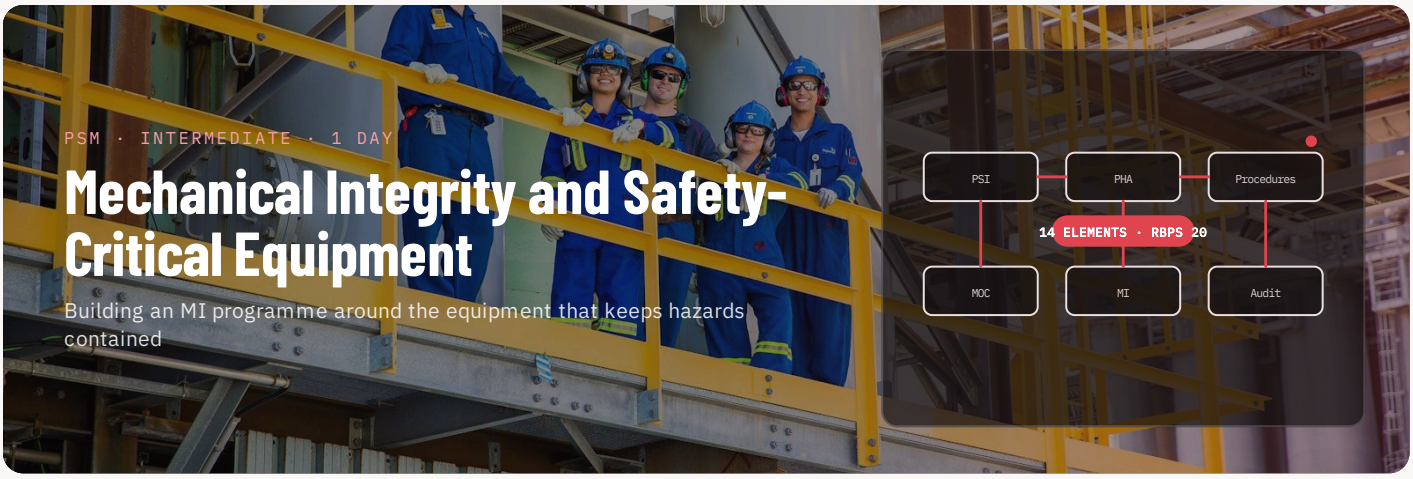

PSM · INTERMEDIATE · 1 DAY

Mechanical Integrity and Safety-Critical Equipment

Building an MI programme around the equipment that keeps hazards contained

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
1 day	Intermediate	On-site classroom · virtual instructor-led	English	16

1 SCE identification exercise on a unit

5 equipment classes covered

1 performance-standard template

Overview

Mechanical integrity is the PSM element with the most records and the least clarity about which ones matter. The course explains how to identify safety-critical equipment from the PHA and bow-ties, write performance standards for it, set inspection and test intervals using API 510/570/580 and IEC 61511, and manage deficiencies and deferrals so that a known defect never becomes an accepted condition. Participants identify the SCE on a unit and write a performance standard for one item.

Learning outcomes

- Identify safety-critical equipment and link each item to the hazard it controls
- Write performance standards: functionality, availability, reliability, survivability
- Set inspection intervals for pressure vessels, piping, tanks, relief devices and SIF using RBI and proof-test logic
- Manage deficiencies, temporary repairs and deferrals with the right approval level
- Assure quality of new and repaired equipment: materials, procedures, positive material identification
- Use MI KPIs: overdue inspections, backlog, failures on test, integrity operating windows

Who should attend

Inspection, maintenance and reliability engineers; PSM coordinators owning the MI element; operations engineers responsible for safeguards on their unit

Course outline

MORNING

MI incidents and what auditors find · OSHA 1910.119(j) and RBPS asset integrity · SCE identification from PHA and bow-ties · performance standards · pressure vessel and piping inspection (API 510/570) · RBI concepts (API 580/581)

AFTERNOON

Relief devices, tanks and rotating equipment · SIF proof testing and IEC 61511 · integrity operating windows (API 584) · deficiency management and deferrals · QA/QC of new equipment · MI metrics · SCE exercise on a unit

Standards referenced

`OSHA 29 CFR 1910.119(j)` `API 510 / 570 / 653` `API 580 / 581` `API 584` `API 576` `IEC 61511`

Tools & exercises

Performance-standard and deferral templates provided; exercises on participants' own equipment lists

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Plant engineering or inspection experience

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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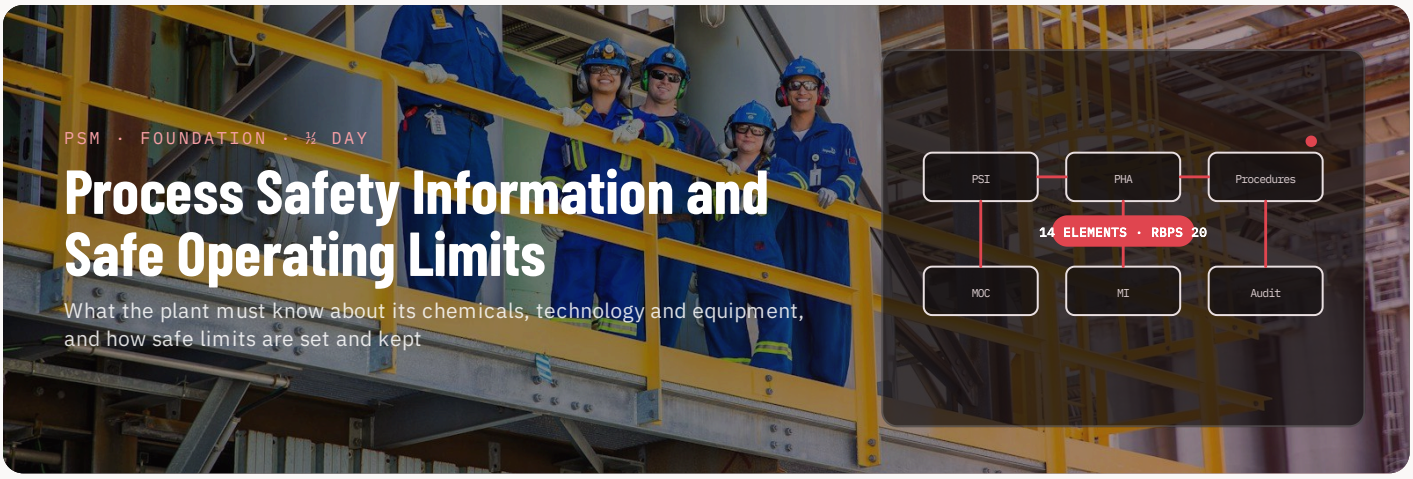

PSM · FOUNDATION · ½ DAY

Process Safety Information and Safe Operating Limits

What the plant must know about its chemicals, technology and equipment, and how safe limits are set and kept

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
½ day	Foundation	On-site classroom · virtual instructor-led	English	16

1 PSI gap check on a live unit

3 limit types: design, safe operating, alarm

1 safe-limits table template

Overview

Every other PSM element depends on process safety information being complete, current and findable. This half-day course sets out the three PSI groups of OSHA 1910.119(d): chemical hazards, process technology and equipment design, then concentrates on the part that operators use daily, the safe operating limits table: how design limits, safe upper and lower limits, alarm settings and consequence-of-deviation statements are derived and kept consistent with the PHA, alarm database and procedures.

Learning outcomes

- List the PSI required for chemicals, technology and equipment and know where it lives on their site
- Derive safe operating limits from design limits with documented margins
- Write consequence-of-deviation statements that operators can act on
- Keep P&IDs, relief design basis and materials data controlled under MOC
- Check that PSI, alarm settings, procedures and PHA agree with each other
- Prepare PSI for an audit or PHA revalidation

Who should attend

Process engineers, technical authorities, PSM coordinators and document controllers; operations supervisors responsible for safe operating limits

Course outline

SESSION 1

PSI-related incidents · OSHA 1910.119(d) and RBPS process knowledge management · chemical hazard data and SDS limits · process technology: block flow, chemistry, inventories, safe upper and lower limits · equipment: codes, materials, relief design basis, P&ID control

SESSION 2

Setting safe operating limits: design limit, safe limit, alarm, normal envelope · consequence of deviation and integrity operating windows · consistency with PHA and alarm database · document control and MOC hooks · PSI gap check on a unit

Standards referenced

OSHA 29 CFR 1910.119(d) · CCPS Risk Based Process Safety · API 584 · ISA-18.2 · Seveso III Directive

Tools & exercises

Safe-limits table and PSI index templates provided; exercise on participants' own unit data

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
None

CERTIFICATION
Certificate of completion

INSTRUCTORS
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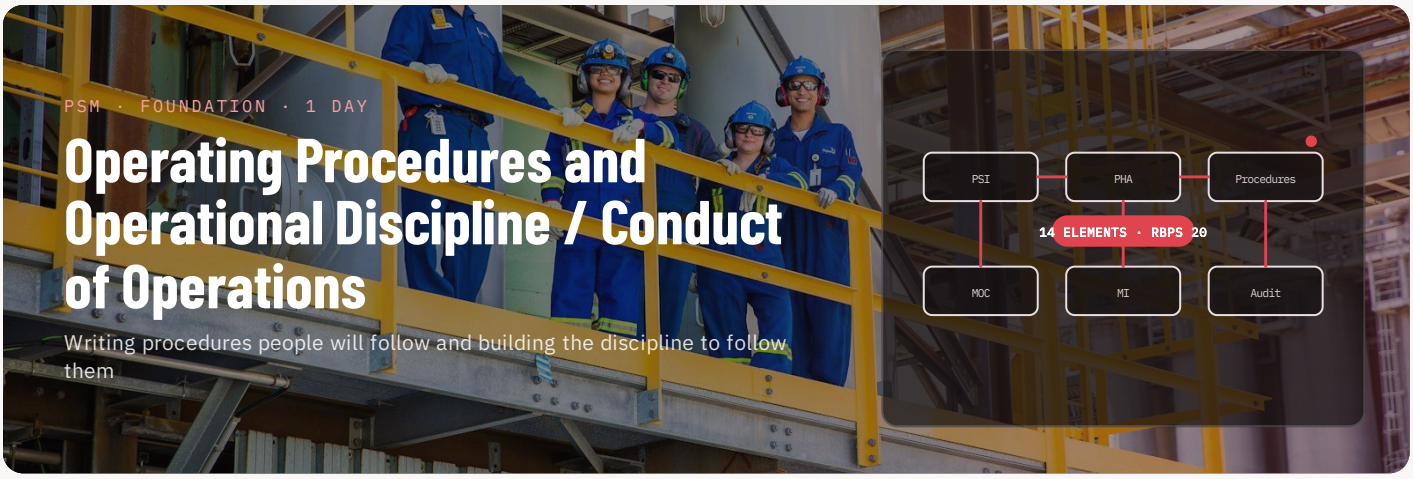

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
1 day	Foundation	On-site classroom · virtual instructor-led	English	16

2 procedures rewritten in the workshop

1 procedure-quality checklist

6 conduct-of-operations practices

Overview

A procedure that is technically correct but unusable at three in the morning is a hazard. The course covers what 1910.119(f) requires for start-up, normal, temporary, emergency and shutdown operations, how to write steps with the right level of detail, warnings and verification points, and how to keep procedures current through annual certification and MOC. The second half addresses conduct of operations: the practices that turn a written procedure into what actually happens on shift.

Learning outcomes

- Structure a procedure set covering every operating phase required by 1910.119(f)
- Write steps with clear action, expected response, limits and hold points
- Build in critical-step verification and sign-off without making the document unusable
- Manage temporary procedures, deviations and annual certification
- Apply conduct-of-operations practices: shift routines, log-keeping, bypass control, housekeeping
- Measure procedure adherence and use findings to improve the documents, not just the people

Who should attend

Operations supervisors, procedure writers, training coordinators and unit engineers; managers accountable for operational discipline

Course outline

MORNING

Procedure-related incidents · OSHA 1910.119(f) and RBPS operating procedures · procedure hierarchy and formats · writing style, level of detail, warnings and cautions · critical steps and verification · procedure-quality checklist

AFTERNOON

Annual certification and MOC of procedures · temporary procedures and deviations · conduct of operations and operational discipline (CCPS) · shift routines, bypass and override control · rewriting two participants' procedures · adherence measurement

Standards referenced

- OSHA 29 CFR 1910.119(f)
- CCPS Conduct of Operations and Operational Discipline
- CCPS Guidelines for Writing Effective Operating and Maintenance Procedures
- EI Human Factors Briefing Note 4 (Procedures)
- CCPS Risk Based Process Safety

Tools & exercises

Procedure templates and quality checklist provided; workshop on participants' own procedures

What's included

- ✓ Course manual and slide pack
- ✓ Exercise and case-study pack
- ✓ Software access for the course
- ✓ Competency quiz and certificate
- ✓ Post-course Q&A with the instructor
- ✓ Templates used in the exercises

PREREQUISITES
None

CERTIFICATION
Certificate of completion

INSTRUCTORS
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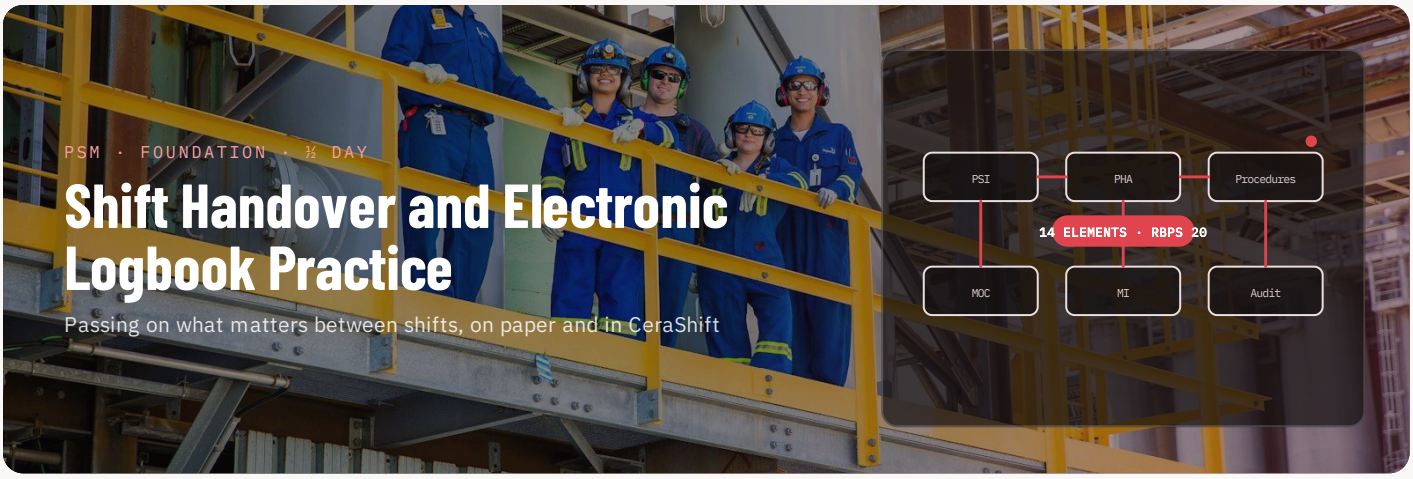

PSM · FOUNDATION · ½ DAY

Shift Handover and Electronic Logbook Practice

Passing on what matters between shifts, on paper and in CeraShift

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
½ day	Foundation	On-site classroom · virtual instructor-led	English	16

2 handover role-plays

1 handover-quality checklist

CeraShift hands-on e-logbook

Overview

Piper Alpha turned on a permit that did not survive the shift change. This half-day course covers what a good handover contains, how to structure the logbook so that abnormal conditions, overrides, open permits and incomplete work stand out, and the human factors that make handovers fail: time pressure, interruptions and assumed knowledge. Participants practise two handovers and then repeat them in CeraShift, using its structured logbook, open-item tracking and DCS capture.

Learning outcomes

- State what a handover must always cover: plant status, abnormal conditions, overrides, permits, work in progress
- Keep a logbook that separates routine entries from safety-relevant ones
- Conduct a face-to-face handover with two-way confirmation and no interruptions
- Use the electronic logbook to carry open items across shifts until closed
- Recognise the handover failure modes in incidents and on their own site
- Apply a handover-quality checklist for supervisory checks

Who should attend

Panel and field operators, shift supervisors and maintenance leads; superintendents who set the standard for handover

Course outline

SESSION 1

Handover incidents (Piper Alpha, Buncefield) · EI and HSE guidance on shift handover · content of a good handover · logbook structure and language · human factors: interruptions, fatigue, assumed knowledge · role-play 1 with feedback

SESSION 2

CeraShift: structured log entries, open items, overrides and permits · DCS and historian capture in the log · rounds data and PM tasks in the handover · role-play 2 in CeraShift · supervisory review and handover-quality checklist

Standards referenced

`EI Guidance on Safety Critical Communications`
`HSE Human Factors: Safe Shift Handover`
`EI Human Factors Briefing Note 1 (Communication)`
`CCPS Conduct of Operations`
`OSHA 29 CFR 1910.119(f)`

Tools & exercises

Hands-on handover and logbook exercises in CeraShift

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
None

CERTIFICATION
Certificate of completion; competency record for the training matrix

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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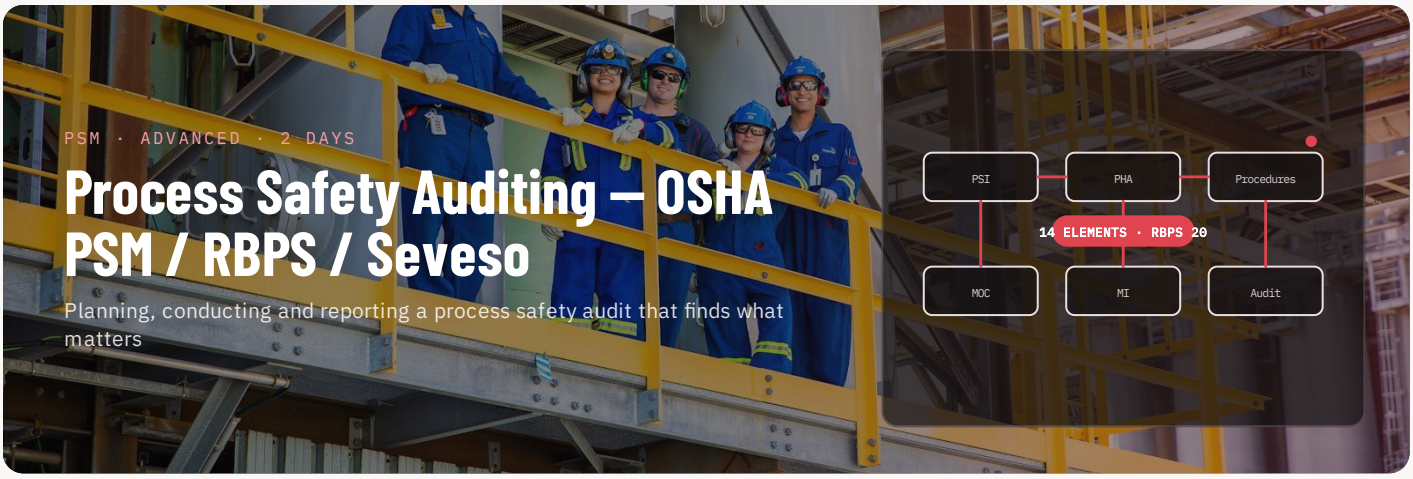

PSM · ADVANCED · 2 DAYS

Process Safety Auditing — OSHA PSM / RBPS / Seveso

Planning, conducting and reporting a process safety audit that finds what matters

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
2 days	Advanced	On-site classroom · virtual instructor-led	English	16

3 frameworks: OSHA PSM · RBPS · Seveso

1 mock audit on a plant

20+ protocol questions per element

Overview

An audit that only confirms the paperwork exists misses the programmes that are decaying in the field. This course covers the three frameworks most sites in the region are measured against, how to build a protocol that tests implementation rather than existence, how to sample records, interview and walk the plant, and how to write findings that lead to correction. Day 2 is a mock audit of three elements on a case plant, from opening meeting to report.

Learning outcomes

- Plan an audit: scope, team, protocol, sampling strategy and schedule
- Distinguish existence, implementation and effectiveness for each element
- Interview, review records and verify in the field without leading the answers
- Write findings with the requirement, evidence, gap and risk clearly separated
- Grade findings and agree corrective actions and closure evidence
- Track audit status and recurring findings as a leading indicator in CeraPulse

Who should attend

Internal and corporate auditors, PSM coordinators, HSE managers and element owners preparing for or conducting compliance audits

Course outline

DAY 1

Audit-related incidents and regulatory expectations · OSHA 1910.119(o) triennial audits · CCPS RBPS auditing element · Seveso III safety management system and inspection · protocol design and element questions · sampling, interviewing and field verification · finding quality

DAY 2

Mock audit: opening meeting · PHA and MOC element audit · mechanical integrity element audit · training and procedures element audit · reporting and closing meeting · corrective action tracking and audit metrics in CeraPulse

Standards referenced

`OSHA 29 CFR 1910.119(o)` `CCPS Guidelines for Auditing Process Safety Management Systems` `CCPS Risk Based Process Safety` `Seveso III Directive` `API RP 754`

Tools & exercises

Audit protocol and findings tracked in the CeraPulse audit module

What's included

- ✓ Course manual and slide pack
- ✓ Exercise and case-study pack
- ✓ Software access for the course
- ✓ Competency quiz and certificate
- ✓ Post-course Q&A with the instructor
- ✓ Templates used in the exercises

PREREQUISITES
PSM Fundamentals (TR-D01) or two years of PSM-related experience

CERTIFICATION
Certificate of completion with mock-audit assessment

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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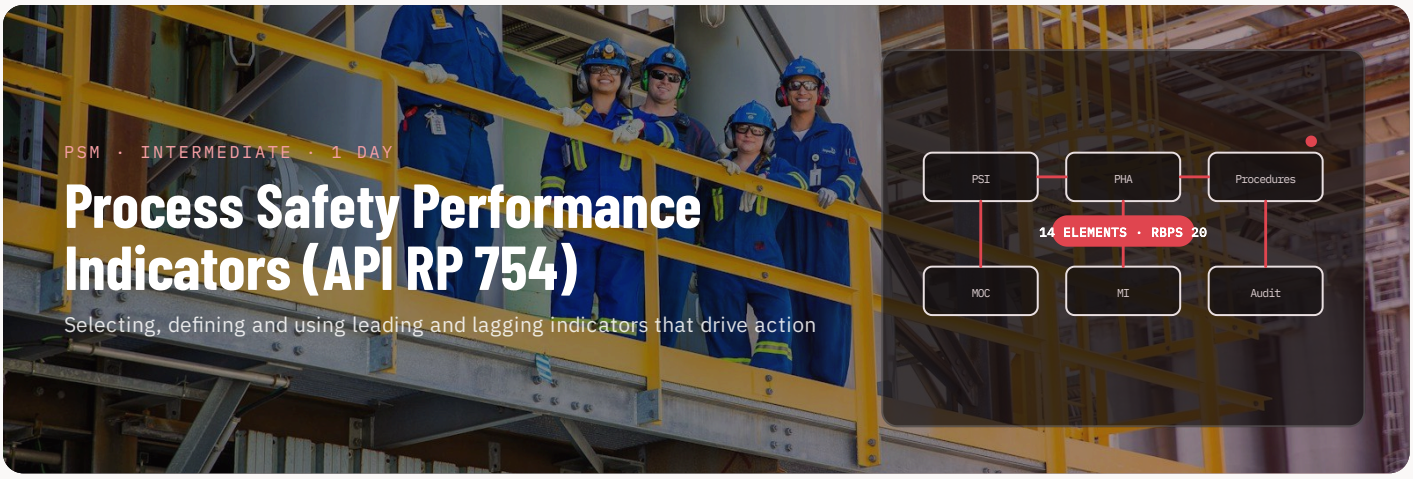

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
1 day	Intermediate	On-site classroom · virtual instructor-led	English	16

4
API RP 754 tiers

1
indicator set built for your site

CeraPulse
hands-on dashboards

Overview

A dashboard of lagging indicators tells management about last year's accidents. The course explains the four API RP 754 tiers, the classification rules for Tier 1 and 2 events, and how to select Tier 3 and 4 leading indicators that measure the health of barriers and management systems. Participants build an indicator set for their own site, define each indicator so it is counted the same way every month, and configure it in CeraPulse.

Learning outcomes

- Classify loss-of-containment events correctly as Tier 1, Tier 2 or neither using the API RP 754 thresholds
- Select Tier 3 indicators tied to barriers: demands on safety systems, SOL excursions, inspections overdue
- Select Tier 4 indicators tied to management systems: action closure, PHA and MOC quality, training
- Write an indicator definition: numerator, denominator, source, owner, frequency
- Present indicators so that trends and targets lead to decisions, not just reporting
- Use the Safety Performance Index to compare units and sites fairly

Who should attend

HSE and process safety managers, PSM coordinators, data owners and site leadership who review process safety performance

Course outline

MORNING

Why metrics failed at Texas City and Buncefield · API RP 754 structure and tiers · Tier 1 and 2 classification rules and worked examples · Tier 3 barrier indicators · Tier 4 management-system indicators · CCPS and IOGP guidance

AFTERNOON

Indicator definition and data quality · targets, normalisation and Safety Performance Index · building the site indicator set · dashboards and reviews in CeraPulse · reporting to leadership and the board · common pitfalls

Standards referenced

API RP 754 · CCPS Process Safety Leading and Lagging Metrics · IOGP Report 456 · HSE HSG254 · CCPS Risk Based Process Safety

Tools & exercises

Indicator definitions and dashboards built in CeraPulse

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
None

CERTIFICATION
Certificate of completion

INSTRUCTORS
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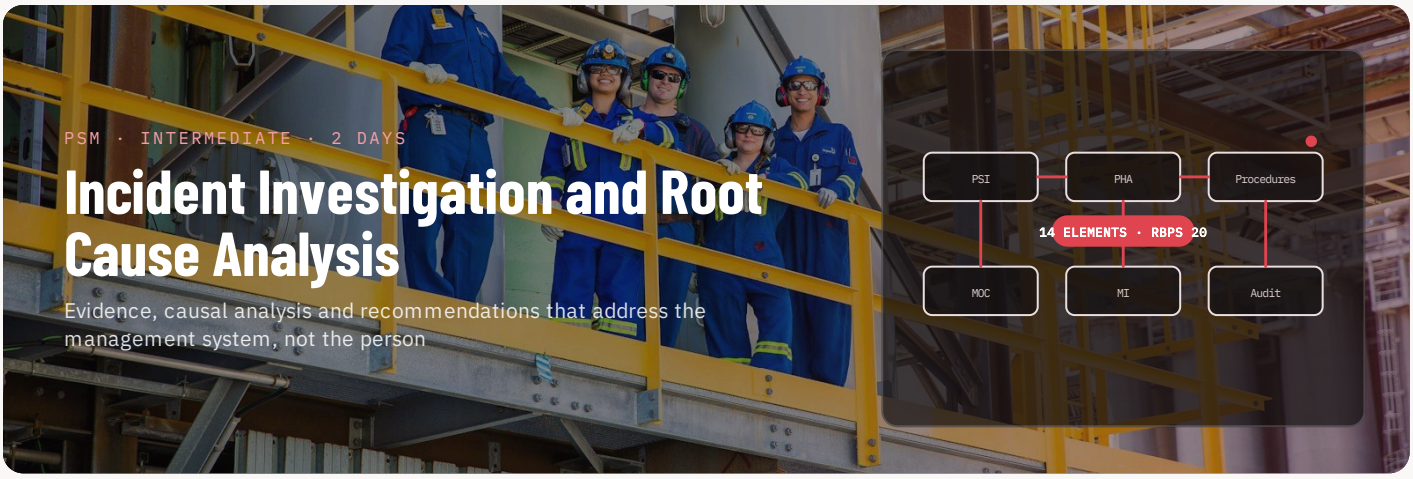

PSM · INTERMEDIATE · 2 DAYS

Incident Investigation and Root Cause Analysis

Evidence, causal analysis and recommendations that address the management system, not the person

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
2 days	Intermediate	On-site classroom · virtual instructor-led	English	16

2 full investigations run in class

4 RCA methods practised

CauseIQ hands-on from evidence to report

Overview

Most investigations stop at the operator error and never reach the reason the error was possible. The course covers the full investigation cycle: initial response and evidence preservation, timeline construction, causal analysis with 5-Whys, fault tree and barrier analysis, then recommendations that are specific, verifiable and aimed at the management system. Two complete investigations are run in class, one on paper and one in CauseIQ, with reports written and critiqued.

Learning outcomes

- Meet the 1910.119(m) requirements: 48-hour start, team composition, report content, action tracking
- Secure and document physical, electronic and human evidence, including historian and logbook data
- Build a timeline that separates fact from inference
- Apply 5-Whys, fault tree and barrier analysis and know the limits of each
- Identify root causes in management systems and link them to PSM elements
- Write recommendations and reports that survive review and lead to change

Who should attend

Incident investigation team leaders and members; HSE, operations and maintenance engineers; PSM coordinators owning the investigation element

Course outline

DAY 1

Investigation-related lessons: CSB case studies · OSHA 1910.119(m) and near-miss reporting · initial response and evidence preservation · interviewing witnesses · historian and DCS data recovery · timeline construction · investigation 1 on paper

DAY 2

Causal analysis: 5-Whys, fault tree, barrier and bow-tie analysis · human factors in causation · root causes in management systems · recommendation quality and hierarchy of controls · report writing · investigation 2 in CauseIQ with PHA linkage · sharing lessons

Standards referenced

- OSHA 29 CFR 1910.119(m)
- CCPS Guidelines for Investigating Process Safety Incidents
- CCPS Risk Based Process Safety
- EI Human Factors Briefing Note 13 (Incident Investigation)
- API RP 754

Tools & exercises

Timeline, causal analysis and reporting performed in CauseIQ

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
None; prior incident investigation participation helpful

CERTIFICATION
Certificate of completion; qualifies participants as investigation team members on the training matrix

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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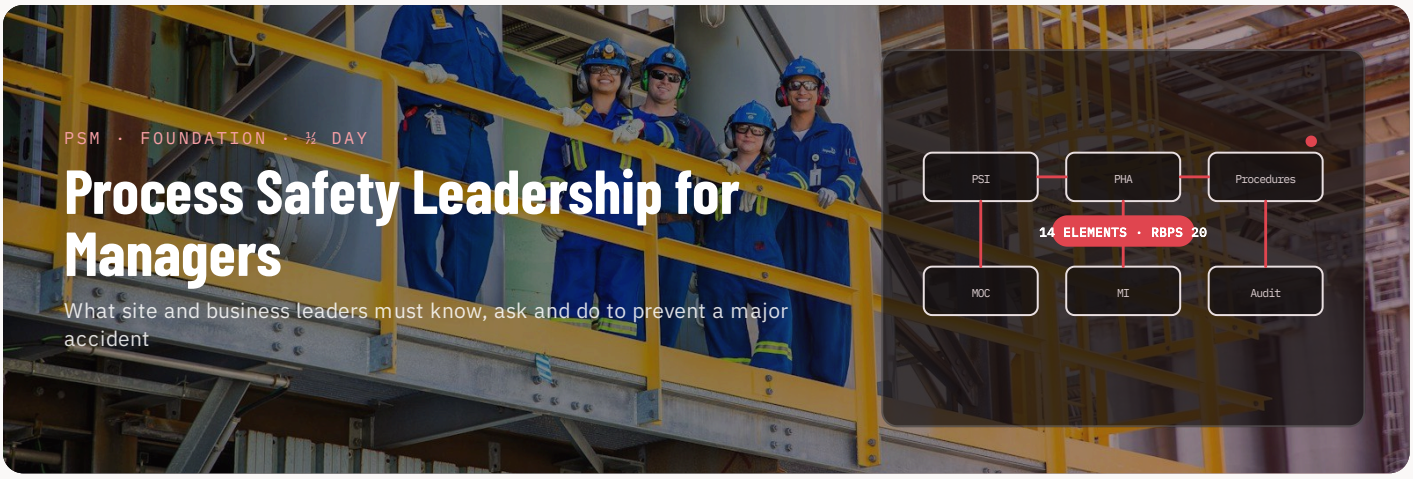

PSM · FOUNDATION · ½ DAY

Process Safety Leadership for Managers

What site and business leaders must know, ask and do to prevent a major accident

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
½ day	Foundation	On-site classroom · virtual instructor-led	English	16

½ day — built for a leadership calendar

3 — board-level case studies

1 — personal commitment list

Overview

After Texas City the Baker Panel found that leadership had measured the wrong things and asked the wrong questions. This half-day session gives leaders a working understanding of major-accident hazards, the barriers that control them and the management system that keeps the barriers working, then focuses on their own role: the questions to ask on a site visit, the indicators to review, the signals of a decaying programme and the decisions on budget, staffing and production that shift risk.

Learning outcomes

- Explain the site's major-accident hazards and the barriers that control them in their own words
- Read process safety indicators and ask the questions that test barrier health
- Recognise the warning signs identified by the Baker Panel and CSB: normalised deviation, backlog, overrides, production pressure
- Set the tone: visible commitment, resourcing, response to bad news
- Make production, cost and staffing decisions with process safety risk explicit
- Leave with a personal list of actions and questions for the next quarter

Who should attend

Site managers, department heads, business-unit leaders and board members with accountability for process safety; new managers moving into hazardous-plant roles

Course outline

SESSION 1

Texas City, Buncefield and Deepwater Horizon: what leadership did and did not do · major-accident hazards and barriers · the PSM system in one page · leading indicators and what they really say · the leadership questions

SESSION 2

Warning signs of a decaying programme · culture: reporting, response to bad news, challenge · resourcing and competency decisions · site walk and conversation practice · personal commitments and follow-up

Standards referenced

- CCPS Risk Based Process Safety (Process Safety Culture, Leadership)
- OGP Report 452 Process Safety: Recommended Practice on Key Performance Indicators
- EI Process Safety Management Framework
- API RP 754
- Seveso III Directive

Tools & exercises

Case material and indicator examples presented; no software required

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
None

CERTIFICATION
Certificate of attendance

INSTRUCTORS
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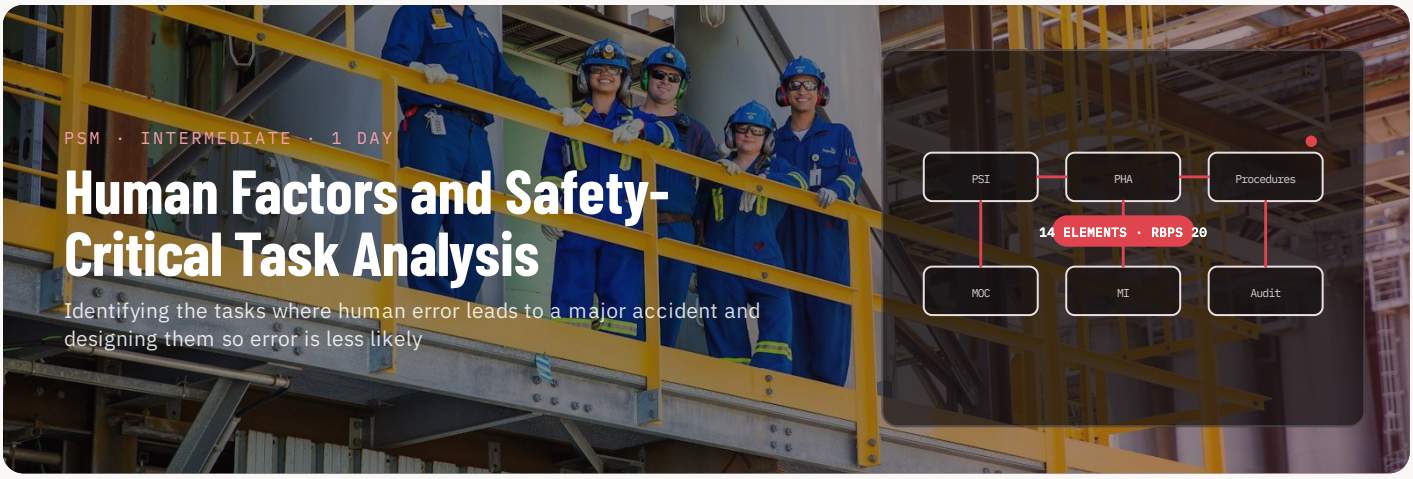

PSM · INTERMEDIATE · 1 DAY

Human Factors and Safety-Critical Task Analysis

Identifying the tasks where human error leads to a major accident and designing them so error is less likely

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
1 day	Intermediate	On-site classroom · virtual instructor-led	English	16

2 safety-critical tasks analysed in class

8 performance-influencing factors assessed

1 SCTA template

Overview

Operators are blamed in most incident reports and designed out of most safeguards; both approaches miss the point. The course explains how human performance depends on the task, the equipment and the organisation, then teaches safety-critical task analysis as practised under UK COMAH and Seveso: screening tasks by consequence, breaking them down hierarchically, identifying credible errors and assessing performance-influencing factors. Participants analyse two tasks from their own plant and specify the improvements to procedures, interfaces and staffing.

Learning outcomes

- Explain human error types (slips, lapses, mistakes, violations) and what each responds to
- Screen and rank safety-critical tasks from the PHA and bow-ties
- Perform hierarchical task analysis on a start-up, isolation or loading task
- Identify credible errors and assess performance-influencing factors
- Specify controls in the right order: design, interface, procedure, competence, supervision
- Use the analysis to support procedures, training, staffing and alarm and HMI design

Who should attend

Process safety, HSE and operations engineers; procedure writers; human factors focal points; engineers preparing COMAH or Seveso safety reports

Course outline

MORNING

Human factors in major accidents · error types and the Swiss-cheese view · EI and HSE human factors topics · safety-critical task screening · hierarchical task analysis · task 1 from participants' plant

AFTERNOON

Error identification and performance-influencing factors · human error probability data and LOPA human IPLs · controls: interface, procedures, competence, staffing, fatigue · task 2 and report-out · linking SCTA to procedures, training matrix and HMI design

Standards referenced

- EI Human Factors Briefing Notes
- HSE HSG48 Reducing Error and Influencing Behaviour
- EI Guidance on Human Factors Safety Critical Task Analysis
- CCPS Guidelines for Preventing Human Error in Process Safety
- ISA-101

Tools & exercises

SCTA and PIF templates provided; exercises on participants' own tasks and procedures

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Plant operations, engineering or HSE experience

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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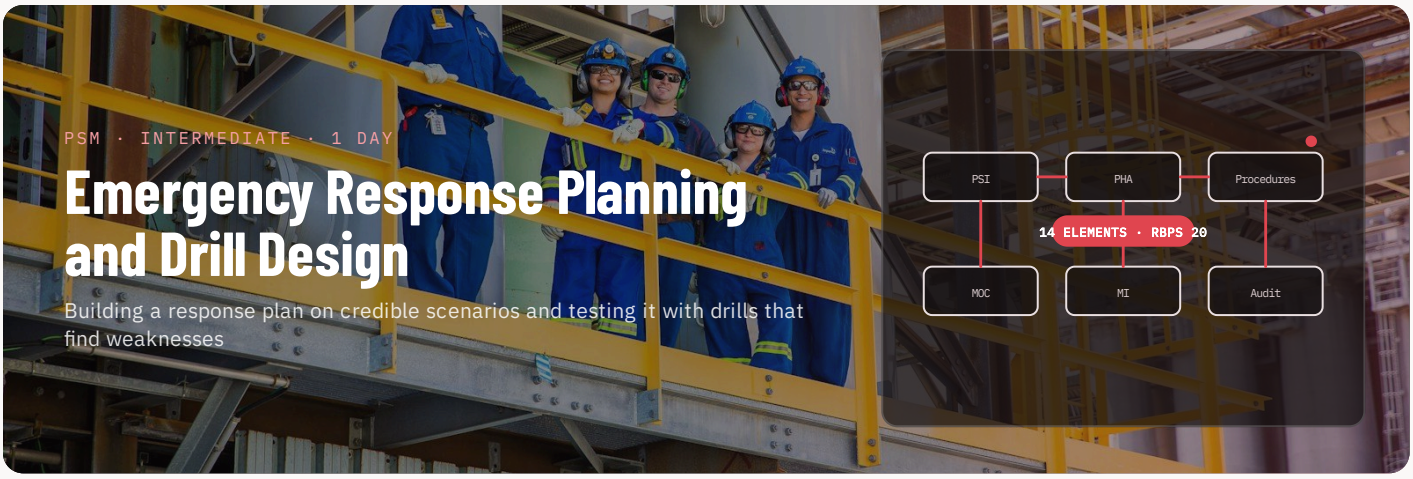

PSM · INTERMEDIATE · 1 DAY

Emergency Response Planning and Drill Design

Building a response plan on credible scenarios and testing it with drills that find weaknesses

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
1 day	Intermediate	On-site classroom · virtual instructor-led	English	16

1 tabletop drill run and debriefed

4 scenario families: toxic · fire · explosion · spill

1 drill-design template

Overview

An emergency plan that has never been exercised against a realistic scenario is a document, not a capability. The course connects the plan to the PHA and consequence analysis, so that toxic, fire, explosion and spill scenarios drive muster, shelter-in-place and evacuation decisions; covers the organisation, communication and mutual aid required by 1910.119(n), 1910.38 and Seveso; and then teaches how to design drills with objectives, injects and evaluators. Participants run a tabletop drill on a case plant and debrief it.

Learning outcomes

- Derive planning scenarios from PHA and consequence contours, including escalation
- Structure the plan: organisation, roles, command post, communications, external agencies
- Set muster, shelter-in-place and evacuation decision rules from dispersion and fire results
- Meet the requirements of 1910.119(n), 1910.38, 1910.120 and the Seveso internal emergency plan
- Design a drill: objectives, scenario script, injects, evaluators and safety controls
- Debrief and convert drill findings into plan, training and equipment actions

Who should attend

Emergency response coordinators, HSE and process safety engineers, incident commanders and shift supervisors; contributors to the site emergency plan and Seveso internal emergency plan

Course outline

MORNING

Response lessons from Bhopal and Toulouse · regulatory framework: 1910.119(n), 1910.38, 1910.120, Seveso III · scenario selection from PHA and consequence analysis · organisation and incident command · alarms, muster, shelter-in-place and evacuation logic · communications and mutual aid

AFTERNOON

Plan document structure and maintenance · drill types and progression: tabletop, functional, full-scale · drill design: objectives, script, injects, evaluators · tabletop drill on a case plant · debrief and corrective action tracking · annual programme

Standards referenced

`OSHA 29 CFR 1910.119(n)` `OSHA 29 CFR 1910.38 and 1910.120` `NFPA 1600` `Seveso III Directive` `CCPS Guidelines for Technical Planning for On-Site Emergencies`

Tools & exercises

Scenario contours from CeraImpact used as drill inputs; drill-design templates provided

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
None

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

CATEGORY E

Process Control & Alarm Management

Loop tuning, control-valve diagnostics, alarm management, advanced process control, monitoring, plant analytics and safe operation of safety instrumented systems.

7 COURSES

9.5 TRAINING DAYS

Practitioner-led training for the process industry

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CONTROL & ALARMS · INTERMEDIATE · 2 DAYS

Alarm Management — ISA-18.2 Lifecycle

Philosophy, rationalisation workshop and performance monitoring

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
2 days	Intermediate	On-site classroom · virtual instructor-led	English	16

1 rationalisation workshop on your alarms

6 ISA-18.2 KPIs

1 priority matrix template

Overview

Nuisance alarms are a symptom; the disease is an alarm system nobody owns. The course walks the ISA-18.2 lifecycle from philosophy to audit, then runs a real rationalisation workshop on the participants' own alarm list so they leave with a documented method, a priority matrix and the first rationalised loops.

Learning outcomes

- Write or improve a site alarm philosophy document
- Set priorities with a consequence/time-to-respond matrix
- Rationalise alarms: cause, consequence, operator action, set-point and priority
- Use advanced techniques — state-based alarming, shelving, flood suppression
- Measure performance against ISA-18.2 and EEMUA 191 benchmarks
- Manage change so the database does not decay

Who should attend

Control and instrument engineers, console operators and shift supervisors, alarm-management champions

Course outline

DAY 1

Alarm-related incidents · ISA-18.2 lifecycle · philosophy and priority matrix · alarm database and documentation · rationalisation method

DAY 2

Rationalisation workshop on participants' alarm list · KPIs: rate, floods, standing alarms · state-based and dynamic alarming · HMI and ISA-101 principles · monitoring with ProcessVision · MOC for alarms

Standards referenced

ANSI/ISA-18.2 · IEC 62682 · EEMUA 191 · ISA-101

Tools & exercises

Alarm KPIs and rationalisation records in ProcessVision

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Familiarity with DCS operation or configuration

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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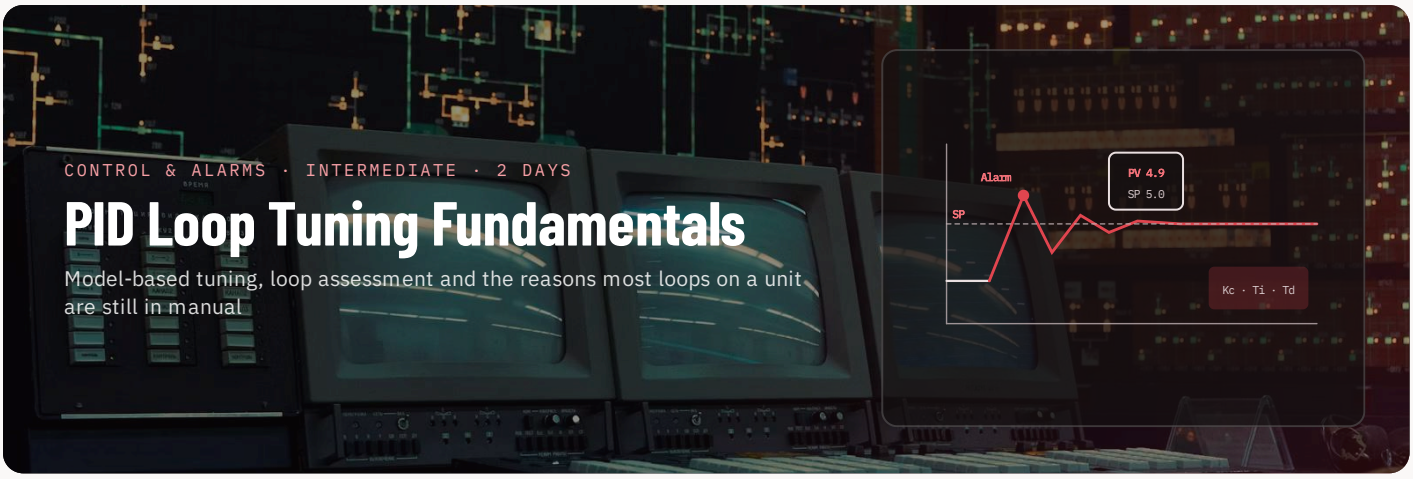

CONTROL & ALARMS · INTERMEDIATE · 2 DAYS

PID Loop Tuning Fundamentals

Model-based tuning, loop assessment and the reasons most loops on a unit are still in manual.

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
2 days	Intermediate	On-site classroom · virtual instructor-led	English	16

Your own loops assessed in CeraPID

8 tuning exercises on live-data models

1 loop KPI baseline for the unit

Overview

On a typical unit a third of the loops are in manual, a third oscillate and the rest were last tuned at commissioning. This course teaches tuning as an engineering method rather than a trial-and-error art: identify a process model from a bump test, choose a closed-loop response with a defensible lambda, and check the result on the trend. Participants work on their own loops exported from the historian, so the second day doubles as the first loop-assessment pass for their unit.

Learning outcomes

- Recognise the PID forms, units and options implemented in the site DCS and convert between them
- Run and interpret a bump or step test and fit FOPDT and integrating models
- Tune with IMC/lambda and SIMC rules for self-regulating, integrating and dead-time-dominant loops
- Diagnose oscillation, stiction, hysteresis and poor tuning from routine trend data
- Tune cascade, ratio, feedforward and override schemes in the right order
- Set loop KPIs and a review cycle so tuning does not decay

Who should attend

Control and instrument engineers, DCS configuration engineers, process engineers responsible for unit performance; experienced panel operators

Course outline

DAY 1

What a loop is for: variability, constraints and money · PID algorithm forms, units and DCS-specific options · process dynamics: gain, time constant, dead time, integrating processes · bump testing on a live loop · model identification in CeraPID · IMC/lambda and SIMC tuning · robustness and aggressiveness trade-off

DAY 2

Level, flow, pressure and temperature loop characteristics · cascade, ratio and feedforward tuning order · override and split-range schemes · stiction, hysteresis and valve issues seen from the controller · loop-assessment KPIs: variance, oscillation index, saturation, time in manual · workshop on participants' own loops · tuning records and MOC

Standards referenced

ISA-5.1 · ISA-51.1 · IEC 61131-3 · ISA-75.25.01 / .02 · API RP 554

Tools & exercises

Model identification, tuning and loop KPIs in CeraPID on participants' own historian data

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Familiarity with DCS operation or configuration; basic control theory helpful but not required

CERTIFICATION
Certificate of completion

INSTRUCTORS
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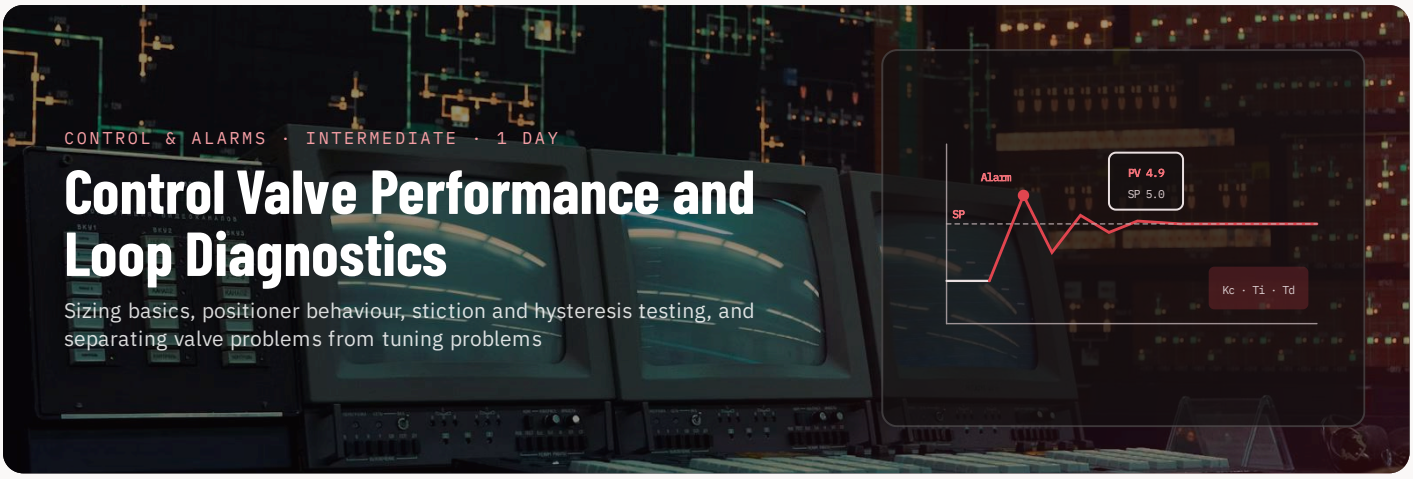

CONTROL & ALARMS · INTERMEDIATE · 1 DAY

Control Valve Performance and Loop Diagnostics

Sizing basics, positioner behaviour, stiction and hysteresis testing, and separating valve problems from tuning problems

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
1 day	Intermediate	On-site classroom · virtual instructor-led	English	16

20 valve signatures interpreted

5 diagnostic tests you can run yourself

1 bad-actor list for the unit

Overview

Half the loops blamed on tuning are actually valve problems, and retuning a sticking valve only makes it oscillate more slowly. This course covers what a control valve has to do — capacity, characteristic, rangeability, response — and how to prove from controller output and process variable trends whether it is doing it. Participants learn the field tests defined in ISA-75.25, read positioner and valve signatures, and build a bad-actor list from their own unit's data.

Learning outcomes

- Check a valve sizing calculation for Cv, choked flow, cavitation and noise per IEC 60534
- Match inherent and installed characteristics to the loop and explain why a wrong choice limits tuning
- Run step-response, resolution and dead-band tests to ISA-75.25.01 and interpret the results
- Recognise stiction, hysteresis, backlash and positioner problems on PV/OP plots
- Read smart-positioner diagnostics and decide whether the valve goes to the workshop
- Rank valves for maintenance from loop-assessment data rather than complaints

Who should attend

Instrument and control engineers, valve and instrument technicians, reliability engineers; process engineers who sign valve data sheets

Course outline

MORNING

Valve function and the loop: what the controller sees · sizing basics: Cv, pressure recovery, choked flow, cavitation and flashing (IEC 60534-2-1) · inherent vs installed characteristic and rangeability · actuators, positioners and bench range · noise and trim selection overview

AFTERNOON

Response testing per ISA-75.25.01: step, resolution, dead band, overshoot · stiction and hysteresis on PV-OP plots · smart-positioner diagnostics and valve signatures · separating valve, tuning and process issues · bad-actor ranking on participants' loop data in CeraPID · field checks and maintenance hand-over

Standards referenced

ISA-75.25.01 / ISA-75.25.02 · IEC 60534-2-1 / 60534-8 · ISA-75.01.01 · ISA-5.1 · API RP 554

Tools & exercises

Valve diagnostics and stiction detection in CeraPID; participants' own loop data

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Basic instrumentation or loop-tuning experience; TR-E02 recommended

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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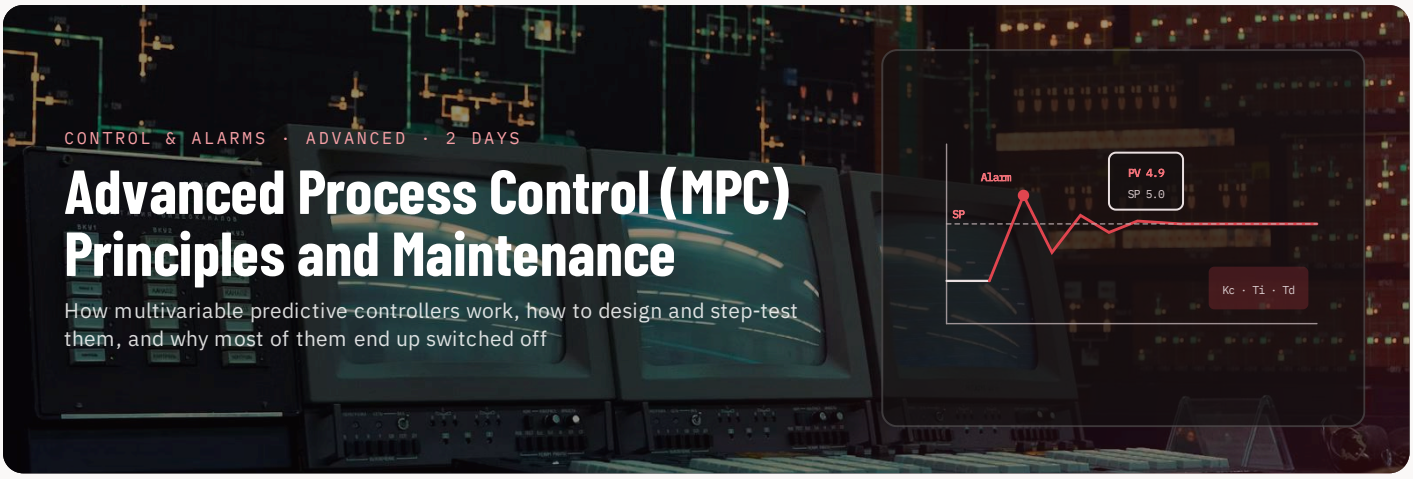

CONTROL & ALARMS · ADVANCED · 2 DAYS

Advanced Process Control (MPC) Principles and Maintenance

How multivariable predictive controllers work, how to design and step-test them, and why most of them end up switched off

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
2 days	Advanced	On-site classroom · virtual instructor-led	English	16

1 MPC design built end to end

3 step-test plans reviewed

12 monitoring KPIs for an APC application

Overview

An MPC application is a set of models, limits and economics that must be maintained like any other piece of equipment; the industry's experience is that half of them are off within three years. The course explains what a predictive controller actually does with its models and objective function, then works through the lifecycle that keeps it on: benefits estimation, base-layer preparation, step-test planning, model identification, commissioning, and the monitoring that detects model mismatch before the operators lose confidence. Exercises use a distillation column case in ProcessVision.

Learning outcomes

- Explain prediction, move suppression, constraint handling and LP/QP steady-state optimisation in operator and manager terms
- Estimate benefits and define the constraint set and economics for a candidate application
- Prepare the base layer: loop tuning, valve health, inferentials and instrument checks
- Plan and supervise a step test and identify models with adequate quality
- Commission an application: tuning weights, limit ranges, operator interface and hand-over
- Monitor service factor, constraint activity and model quality and decide when to re-identify

Who should attend

APC and control engineers, process engineers supporting APC applications, console supervisors and operations engineers who own the benefits

Course outline

DAY 1

Why APC pays: variability reduction and constraint pushing · MPC anatomy: models, prediction horizon, control horizon, move suppression · steady-state optimiser and economics · benefits estimation and functional design · base-layer audit with CeraControl · inferential and soft-sensor requirements · step-test planning: signals, amplitude, duration, PRBS

DAY 2

Model identification and model-quality judgement · controller tuning weights and limit ranges · operator interface, alarms and ISA-101 considerations · commissioning and benefit verification · monitoring KPIs: service factor, limits active, prediction error, model mismatch · sustaining: MOC for APC, re-identification triggers, roles · workshop on a column application in ProcessVision

Standards referenced

ISA-95 / IEC 62264 · ISA-101 · ISA-18.2 · API RP 554 · IEC 61131-3

Tools & exercises

Base-layer analytics, step-test planning and model discovery in ProcessVision (CeraControl) with CeraTrace historian trends

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Control engineering background and loop-tuning experience; TR-E02 or equivalent

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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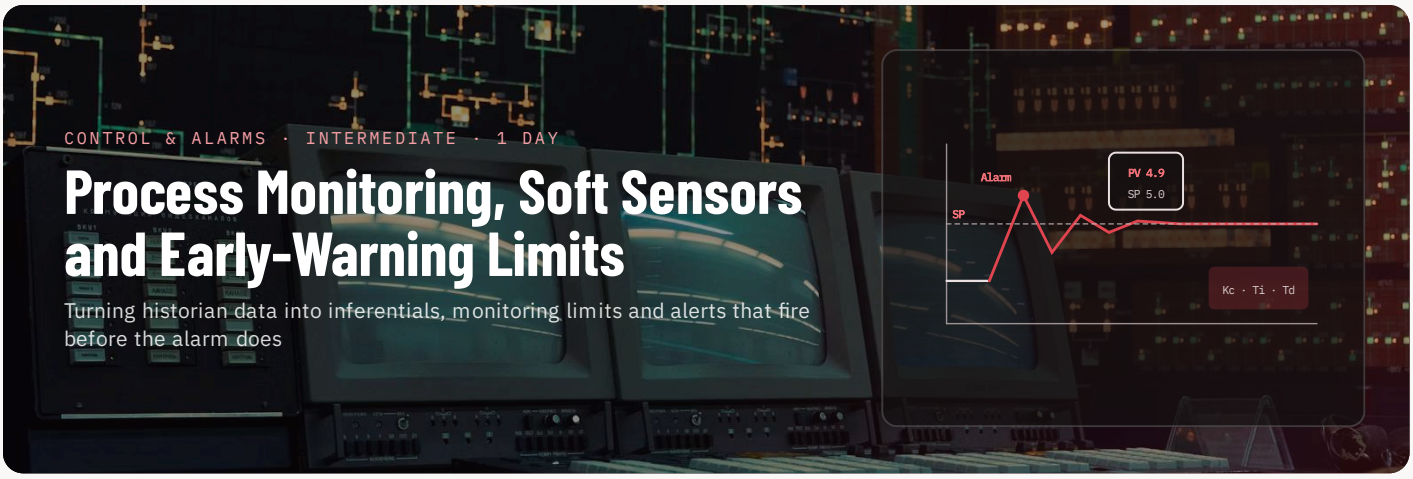

CONTROL & ALARMS · INTERMEDIATE · 1 DAY

Process Monitoring, Soft Sensors and Early-Warning Limits

Turning historian data into inferentials, monitoring limits and alerts that fire before the alarm does

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
1 day	Intermediate	On-site classroom · virtual instructor-led	English	16

1 soft sensor built and validated

Your own historian tags trended in CeraTrace

3 early-warning limit methods

Overview

Every plant historian holds years of data that nobody looks at until something has already tripped. This course teaches practical monitoring: which variables actually indicate unit health, how to build and validate a regression or first-principles soft sensor for a lab-measured property, and how to set early-warning limits that catch drift in fouling, catalyst activity or column loading days before the alarm. Participants work on their own tags in CeraTrace.

Learning outcomes

- Select and clean historian data: sampling, compression, outliers and steady-state detection
- Build a linear or PLS inferential for a lab property and validate it against lab samples with bias update
- Distinguish operating envelopes, safe operating limits and early-warning limits and set each correctly
- Apply statistical limits, trend-based and multivariate (PCA) methods to detect abnormal drift
- Design monitoring displays and daily reports that operations will actually use
- Maintain soft sensors and limits under management of change

Who should attend

Process, control and operations engineers responsible for unit monitoring; APC support engineers; anyone setting operating envelopes and daily-report limits

Course outline

MORNING

What to monitor: key performance variables, constraints and degradation indicators · historian data quality: compression, sampling, time alignment with lab data · steady-state detection and data reconciliation basics · building an inferential: variable selection, regression, PLS, first-principles · validation, bias update and lab-sample handling

AFTERNOON

Operating envelope vs safe operating limits vs early-warning limits · statistical and trend-based limits · multivariate monitoring with PCA and contribution plots · early-warning alerts and their relationship to ISA-18.2 alarms · dashboards and daily reports in ProcessVision · workshop on participants' own unit data · maintenance and MOC

Standards referenced

ISA-18.2 · ISA-101 · ISO 13374 · ISO 17359 · API RP 554

Tools & exercises

Historian trending, soft-sensor building and monitoring limits in ProcessVision (CeraTrace and CeraControl)

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Process engineering background; familiarity with the site historian

CERTIFICATION
Certificate of completion

INSTRUCTORS
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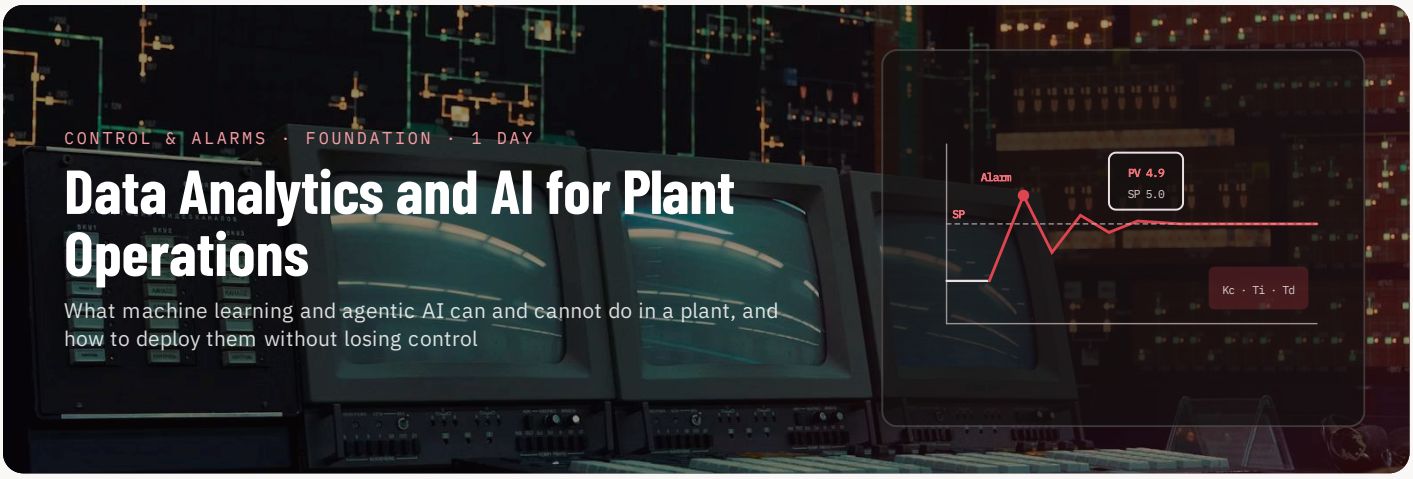

CONTROL & ALARMS · FOUNDATION · 1 DAY

Data Analytics and AI for Plant Operations

What machine learning and agentic AI can and cannot do in a plant, and how to deploy them without losing control

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
1 day	Foundation	On-site classroom · virtual instructor-led	English	16

4 worked use cases: assets, process, energy, quality

1 explainability exercise on a real alert

1 guardrail checklist for agents

Overview

Most plant AI projects fail on data, not algorithms, and most of the rest fail because the operators do not trust an alert they cannot explain. This course gives engineers enough understanding of anomaly detection, predictive models and large-language-model agents to judge a vendor's claims, scope a use case, and set the guardrails a safety-critical facility needs. It uses Kairos as the worked example, from condition-monitoring data models to explained alerts and agent permissions.

Learning outcomes

- Describe the main analytics types — descriptive, anomaly detection, predictive, prescriptive — and match each to a plant problem
- Assess data readiness: historian coverage, tag quality, context data, lab and maintenance records
- Explain how asset and process health models are trained, validated and drift over time
- Read an explained alert and decide what action, if any, an operator should take
- Define guardrails for agentic AI: read-only vs write actions, approvals, audit trails, cybersecurity
- Build a business case and a pilot plan with measurable success criteria

Who should attend

Operations, process and reliability engineers, control-room supervisors, digitalisation leads and managers evaluating AI projects for the plant

Course outline

MORNING

Analytics landscape for plants: from trends to agents · data foundations: historian, OPC UA, context and asset hierarchy (ISA-95) · condition monitoring and health indices per ISO 13374 and ISO 17359 · anomaly detection and predictive models: how they learn and how they fail · worked cases: rotating equipment health, heat-exchanger fouling, energy and quality

AFTERNOON

Explainability: why an alert fired and what it means for the operator · human-in-the-loop design and alarm-system integration (ISA-18.2) · agentic AI: what an agent may read, recommend and do · guardrails, approvals and IEC 62443 zones for AI systems · pilot scoping and success metrics · Kairos walkthrough on a plant dataset

Standards referenced

ISO 13374 · ISO 17359 · IEC 62443 · OPC UA (IEC 62541) · ISA-95 / IEC 62264 · ISA-18.2

Tools & exercises

Worked examples and hands-on session in Kairos: health models, explained alerts and agent guardrails

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
None; plant operations or engineering experience assumed

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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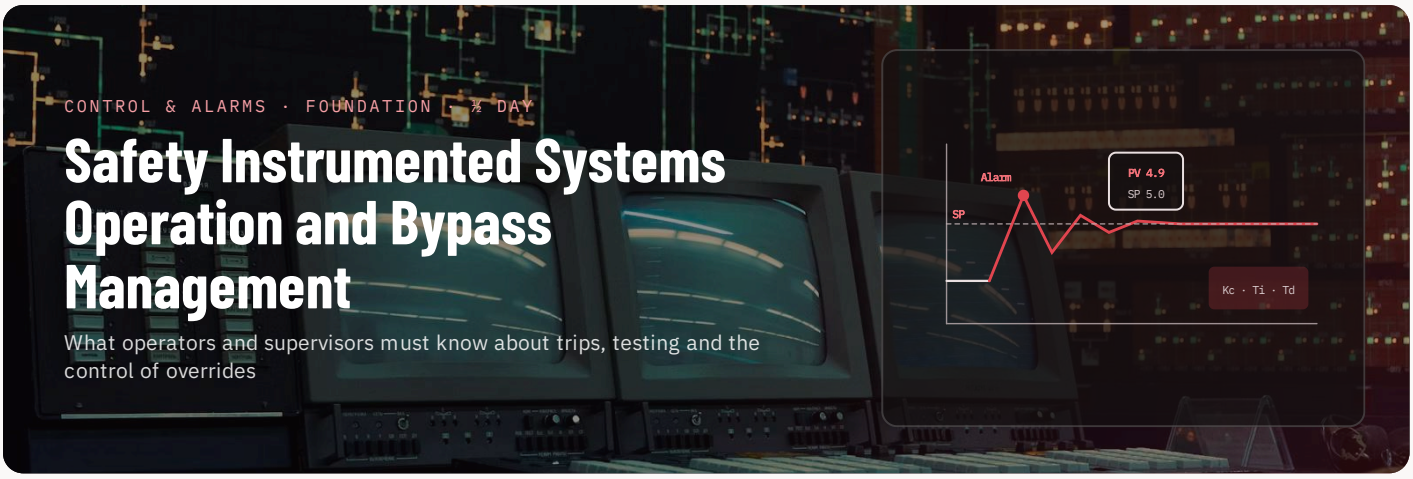

CONTROL & ALARMS · FOUNDATION · ½ DAY

Safety Instrumented Systems Operation and Bypass Management

What operators and supervisors must know about trips, testing and the control of overrides

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
½ day	Foundation	On-site classroom · virtual instructor-led	English	16

1 bypass procedure reviewed against IEC 61511

6 operator responsibilities for SIS

1 override register template

Overview

A safety instrumented function that is bypassed is a hole in the safety case, and most sites cannot say at any moment how many holes are open. This half-day session explains in plain terms what an SIS is, why its trips are set where they are, what a proof test does and what IEC 61511 requires when a function is bypassed, overridden or found to have failed. It ends with a review of the participants' own override procedure and register.

Learning outcomes

- Explain the difference between the BPCS, alarms and the SIS, and why the SIS is independent
- Read the trip settings and demand rate of a SIF and relate them to the hazard it protects against
- Apply the site rules for bypass authorisation, time limits, compensating measures and logging
- Recognise dangerous failures, degraded voting and diagnostics alarms and respond correctly
- Support proof testing and partial-stroke testing without introducing new hazards
- Keep the override register current and report bypasses as a leading indicator

Who should attend

Panel and field operators, shift supervisors, maintenance technicians and operations engineers who authorise or apply SIS bypasses

Course outline

SESSION 1

Layers of protection and the role of the SIS · SIF anatomy: sensor, logic solver, final element, voting · SIL, PFD and why trips must not be moved casually · demand, spurious trip and degraded modes · diagnostics alarms and what operators should do

SESSION 2

IEC 61511 clause 11 and 16 requirements for bypass and maintenance · bypass authorisation, time limits, compensating measures · override register and shift-handover practice · proof testing and partial-stroke testing from the operator's side · review of the site's own procedure · quiz and certificate

Standards referenced

IEC 61511 · IEC 61508 · ISA-84.91.01 · ANSI/ISA-18.2 · API RP 754

Tools & exercises

Exercises on the site's own SIS cause-and-effect matrix and override register

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
None

CERTIFICATION
Certificate of completion; competency record for the training matrix

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

CATEGORY F

Process Engineering & Design

FEED deliverables, simulation, hydraulic and utility studies, exchangers, rotating equipment, P&ID practice and distillation - the engineering behind a plant that runs as designed.

7 COURSES

11 TRAINING DAYS

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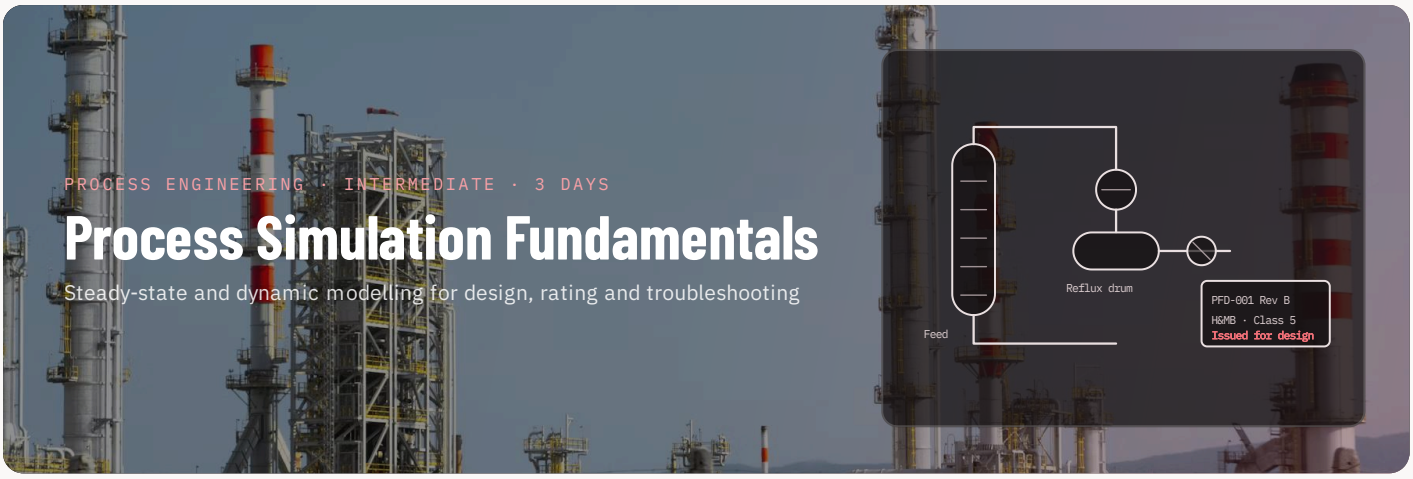

PROCESS ENGINEERING · INTERMEDIATE · 3 DAYS

Process Simulation Fundamentals

Steady-state and dynamic modelling for design, rating and troubleshooting

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
3 days	Intermediate	On-site classroom · virtual instructor-led	English	16

50 % hands-on modelling

4 unit-operation case studies

1 dynamic scenario

Overview

A simulation is only useful when its assumptions are understood. The course builds thermodynamic judgement first — property packages, binary interaction, convergence — then applies it to columns, exchangers, compressors and flow networks, and finishes with dynamic modelling for relief loads, start-up and control studies.

Learning outcomes

- Select property packages and validate them against plant data
- Build and converge flowsheets with recycles and specifications
- Rate columns, exchangers and compressors against real operating cases
- Use models for relief-load estimation and operability checks
- Set up a dynamic model and run a transient scenario
- Document the model basis for hand-over and reuse

Who should attend

Process engineers building or reviewing simulation models for design, revamp, relief and operability studies

Course outline

DAY 1

Thermodynamics for engineers · equations of state and activity models · component and pseudo-component definition · flowsheet building and convergence

DAY 2

Distillation design and rating · heat exchanger rating and fouling · compressors and hydraulics · case studies and sensitivity · data reconciliation

DAY 3

Dynamic simulation basics · controller and valve modelling · relief and depressuring cases · start-up scenario · model documentation and QA

Standards referenced

GPSA Engineering Data Book · API 521 · DIPPR / NIST data · TEMA / API 660

Tools & exercises

Exercises on the client's simulator of choice; digital-twin basis for ProcessVision

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Chemical engineering degree; basic simulator exposure

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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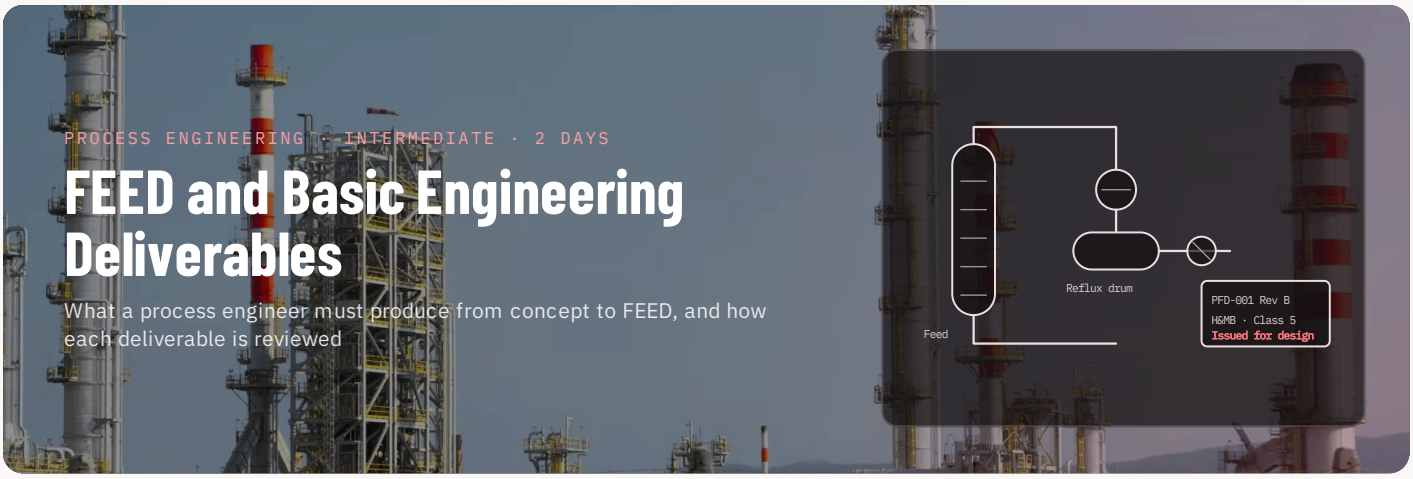

PROCESS ENGINEERING · INTERMEDIATE · 2 DAYS

FEED and Basic Engineering Deliverables

What a process engineer must produce from concept to FEED, and how each deliverable is reviewed

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
2 days	Intermediate	On-site classroom · virtual instructor-led	English	16

30+ deliverables mapped to project phase

1 FEED package reviewed

4 estimate classes explained

Overview

A FEED package sets the cost, the schedule and most of the safety of the plant for the next thirty years, and the engineers writing it rarely get to see how it is used. This course walks the process deliverables in the order they are developed — design basis, simulation, PFDs, heat and material balances, equipment lists, data sheets, P&IDs, line lists, safeguarding — with the interfaces to other disciplines and the review gates each must pass. Participants review a real FEED package extract and produce a deficiency list.

Learning outcomes

- Define the scope and content of concept, pre-FEED and FEED phases and the estimate class each supports
- Write a design basis that fixes feed, product, utility and site conditions before simulation starts
- Develop PFDs, H&MB and utility summaries with a consistent numbering and revision system
- Produce process data sheets for vessels, exchangers, pumps and compressors that other disciplines can use
- Take P&IDs from IFD to IFH through HAZOP and design freeze
- Review a contractor's FEED package for completeness, consistency and safety content

Who should attend

Process and project engineers moving into front-end work; owner's engineers reviewing contractor FEED packages; discipline leads coordinating with process

Course outline

DAY 1

Project phases and stage gates · estimate classes (AACE 18R-97) and what process must deliver for each · design basis and process design criteria · simulation basis and case definition · PFDs, H&MB and stream tables (ISO 10628) · utility and effluent summaries · equipment list and sizing philosophy

DAY 2

Process data sheets by equipment type · P&ID development, revision control and hold management · line list, tie-in list, instrument index handover · relief and blowdown philosophy, hazardous area, safeguarding narratives · HAZOP, design review and technical-integrity gates · deliverable schedule and interfaces with piping, instrument and mechanical disciplines · workshop: FEED package review

Standards referenced

AACE 18R-97 · ISO 10628 · ISA-5.1 · API 521 · ASME B31.3 · IEC 61511

Tools & exercises

Review of an anonymised FEED package; templates for design basis, data sheets and deliverable register

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Two or more years of process engineering experience

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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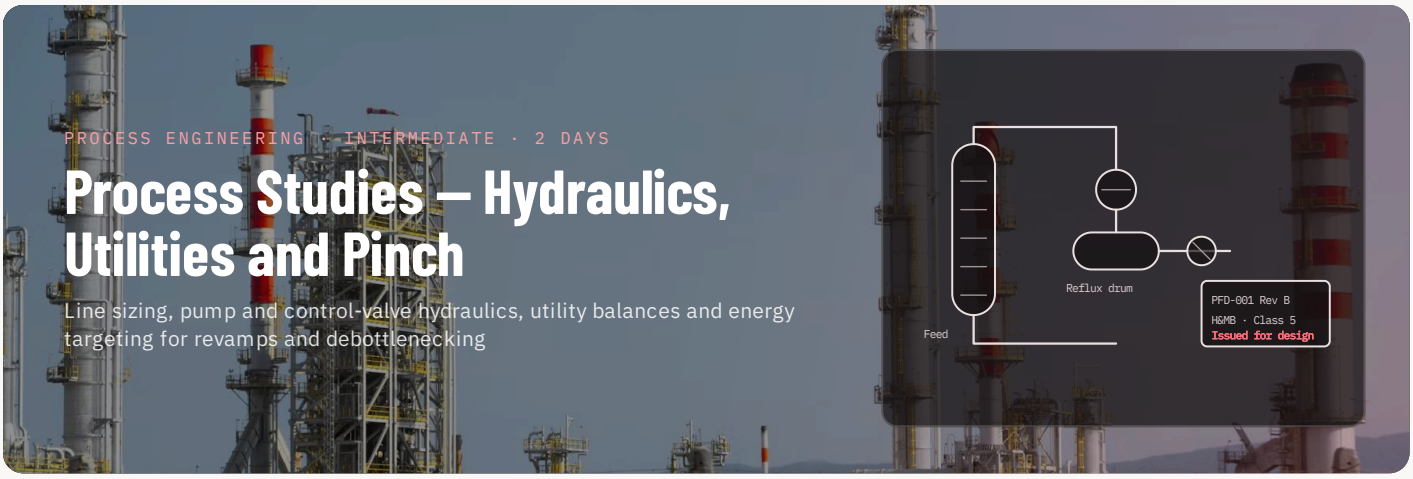

PROCESS ENGINEERING · INTERMEDIATE · 2 DAYS

Process Studies — Hydraulics, Utilities and Pinch

Line sizing, pump and control-valve hydraulics, utility balances and energy targeting for revamps and debottlenecking

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
2 days	Intermediate	On-site classroom · virtual instructor-led	English	16

3 hydraulic networks solved by hand and by software

1 pinch analysis on a real unit

1 utility balance workshop

Overview

Most capacity and energy questions on an existing unit come down to a hydraulic calculation and a heat balance done properly. The course covers single-phase and two-phase line hydraulics, pump and control-valve system curves, steam and cooling-water balances and pinch analysis, always with the question of which constraint actually limits the unit. Exercises are worked by hand first so that software results can be checked.

Learning outcomes

- Size lines for liquid, gas and two-phase service using velocity, pressure-drop and erosion criteria
- Build a system curve, check NPSHa and control-valve authority, and find the true bottleneck
- Calculate steam, condensate, cooling-water and fuel balances and identify imbalances and losses
- Apply pinch analysis to set energy targets and screen heat-exchanger network modifications
- Structure a debottlenecking study from data gathering to option ranking
- Present hydraulic and energy results in a form that project and operations can act on

Who should attend

Process engineers performing operability, revamp and energy studies; plant engineers investigating capacity limits

Course outline

DAY 1

Line sizing criteria: velocity, pressure drop, erosional velocity (API RP 14E / ISO 13703) · friction factor and fittings (Crane TP-410) · compressible and two-phase flow methods · pump system curves, NPSH and control-valve authority · network solution and worked hydraulic cases · flare header and vent hydraulics overview

DAY 2

Steam, condensate and BFW balances · cooling water and fuel balance · utility losses and unaccounted-for streams · pinch analysis: composite curves, targets, cross-pinch heat transfer · HEN retrofit screening · debottlenecking study structure and option ranking · workshop on a participant unit

Standards referenced

API RP 14E / ISO 13703 · Crane TP-410 · GPSA Engineering Data Book · ASME B31.3 · API 521

Tools & exercises

Hand calculations and the client's simulator or hydraulic package of choice

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Chemical engineering degree; basic fluid mechanics

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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PROCESS ENGINEERING · INTERMEDIATE · 1 DAY

Heat Exchanger Design and Fouling Assessment

Thermal design, rating, TEMA selection and using plant data to track fouling and plan cleaning

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
1 day	Intermediate	On-site classroom · virtual instructor-led	English	16

6
exchanger rating cases

1
fouling-monitoring method with historian data

TEMA
types and their selection

Overview

Exchangers are specified once and then blamed for the next twenty years. This course covers enough thermal design to write a good data sheet and check a vendor's rating — LMTD, effectiveness, film coefficients, pressure drop, vibration — then turns to the operating question: how to calculate the fouling resistance from historian data, when to clean, and what the process can do to slow it down.

Learning outcomes

- Select the exchanger type and TEMA configuration for a given duty and fouling service
- Perform a rating calculation and check tube-side and shell-side pressure drop and velocities
- Review a vendor thermal design against API 660 / 661 and the process data sheet
- Calculate the actual overall coefficient and fouling resistance from plant data
- Set up a fouling-monitoring trend and a cleaning-interval economics calculation
- Diagnose common problems: temperature cross, vibration, maldistribution, tube leaks

Who should attend

Process and mechanical engineers specifying, rating or troubleshooting shell-and-tube, air-cooled and plate exchangers; energy and reliability engineers

Course outline

MORNING

Heat-transfer basics: LMTD, F factor, NTU-effectiveness · film coefficients and controlling resistance · shell-and-tube geometry and TEMA types · air-cooled exchangers and plate exchangers · process data sheet content · rating exercise and vendor design review (API 660 / 661)

AFTERNOON

Fouling mechanisms: crude preheat, cooling water, crystallisation, coking · calculating U and Rf from historian data · fouling-monitoring trends and cleaning-interval economics · mitigation: velocity, temperature, chemistry, design features · troubleshooting cases: cross, vibration, maldistribution, leaks · workshop on participants' exchangers

Standards referenced

TEMA · API 660 · API 661 · ASME BPVC Section VIII · HTRI / HTFS design practice

Tools & exercises

Rating exercises on the client's thermal design software; fouling trends from historian data

What's included

- ✓ Course manual and slide pack
- ✓ Exercise and case-study pack
- ✓ Software access for the course
- ✓ Competency quiz and certificate
- ✓ Post-course Q&A with the instructor
- ✓ Templates used in the exercises

PREREQUISITES
Chemical or mechanical engineering degree

CERTIFICATION
Certificate of completion

INSTRUCTORS
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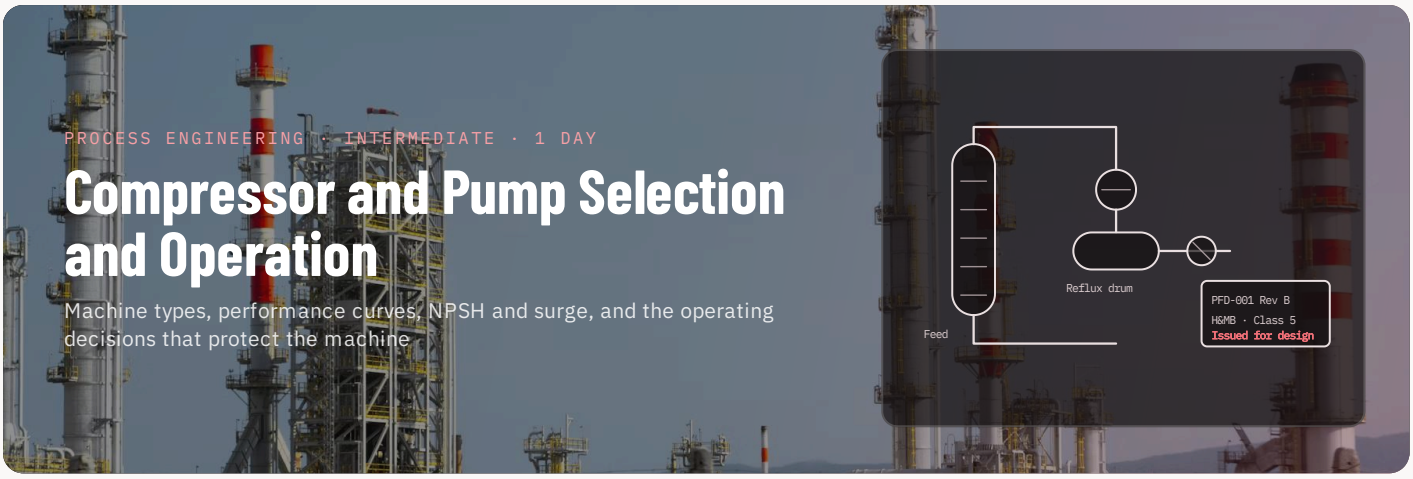

PROCESS ENGINEERING · INTERMEDIATE · 1 DAY

Compressor and Pump Selection and Operation

Machine types, performance curves, NPSH and surge, and the operating decisions that protect the machine.

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
1 day	Intermediate	On-site classroom · virtual instructor-led	English	16

5 performance-curve exercises

2 surge and NPSH case studies

1 selection checklist per machine type

Overview

A pump or compressor is the one item of equipment where the process engineer's data sheet and the operator's actions interact every minute. The course covers selection between centrifugal, reciprocating and screw machines, reading performance curves, NPSH, minimum flow, surge and anti-surge control, and the process conditions — gas composition, suction pressure, parallel operation — that push machines outside their envelope.

Learning outcomes

- Select pump and compressor types for a duty from process conditions and turndown requirements
- Read and apply performance, head-capacity and surge curves to actual operating cases
- Calculate NPSHa and minimum-flow requirements and specify the protection needed
- Explain surge, anti-surge control and the effect of molecular-weight and suction changes
- Specify a machine using API 610 / 617 / 618 data sheets and recognise the key clauses
- Recognise operating problems — cavitation, recycle, parallel-machine instability — from trends

Who should attend

Process and rotating-equipment engineers, operations engineers and supervisors responsible for pumps and compressors; project engineers writing specifications

Course outline

MORNING

Pump types and selection · centrifugal pump curves, system curves, affinity laws · NPSH, cavitation and minimum flow · reciprocating and PD pumps · parallel and series operation · API 610 data sheet essentials · sealing and seal plans overview (API 682)

AFTERNOON

Compressor types: centrifugal, reciprocating, screw · head, polytropic efficiency and gas property effects · surge, stonewall and anti-surge control · performance-curve exercises and MW change case · API 617 / 618 specification essentials · operating and trending: start-up, load sharing, degradation · troubleshooting cases

Standards referenced

API 610 · API 617 · API 618 · API 682 · API 670 · GPSA Engineering Data Book

Tools & exercises

Curve and performance exercises worked by hand and in the client's simulator or vendor selection tool

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Process or mechanical engineering background

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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PROCESS ENGINEERING · FOUNDATION · 1 DAY

P&ID Reading and Development (ISA 5.1)

Symbols, tagging and control narratives, and how a P&ID is built, revised and frozen

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
1 day	Foundation	On-site classroom · virtual instructor-led	English	16

Your own P&IDs used in exercises

1 P&ID developed from a PFD

40+ symbols and tags decoded

Overview

The P&ID is the drawing every discipline, every HAZOP and every permit depends on, and it is also the one most people read only partly. The course covers ISA-5.1 symbols and identification, instrument and line tagging, control loops and interlocks as drawn, and typical site lead-sheet conventions, then has participants develop a P&ID from a PFD and mark up an existing one for a change so that they understand what a revision costs.

Learning outcomes

- Read instrument symbols, function identifiers and loop numbers to ISA-5.1 and the site lead sheet
- Trace process lines, utility connections, spec breaks and insulation classes from the line number
- Identify control loops, interlocks, relief devices and their set-points as drawn
- Develop a P&ID from a PFD, including valves, drains, vents and instrumentation needed for operation
- Mark up a P&ID for a change and follow it through MOC and as-built
- Spot common drawing errors and omissions before they reach a HAZOP

Who should attend

Junior process, instrument and project engineers; operators and supervisors moving into technical roles; maintenance planners and HAZOP scribes

Course outline

MORNING

Drawing hierarchy: BFD, PFD, P&ID, isometrics (ISO 10628) · ISA-5.1 symbols and identification letters · loop numbering, tag formats and lead sheets · line numbering, piping classes, spec breaks · valves, drains, vents, sample points, spectacle blinds · reading exercise on participants' own P&IDs

AFTERNOON

Control loops, cascades and split ranges as drawn · interlocks, SIS functions and cause-and-effect references · relief devices and set-points · P&ID development from a PFD workshop · revision control, holds, clouds and as-built · MOC mark-up exercise and common errors checklist

Standards referenced

ANSI/ISA-5.1 · ISA-5.3 · ISO 10628 · ISO 14617 · PIP PIC001 · ASME B31.3

Tools & exercises

Exercises on the site's own P&IDs and lead sheets; drawing templates provided

What's included

- ✓ Course manual and slide pack
- ✓ Exercise and case-study pack
- ✓ Software access for the course
- ✓ Competency quiz and certificate
- ✓ Post-course Q&A with the instructor
- ✓ Templates used in the exercises

PREREQUISITES
None

CERTIFICATION
Certificate of completion

INSTRUCTORS
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PROCESS ENGINEERING · ADVANCED · 1 DAY

Distillation Troubleshooting and Optimisation

Diagnosing flooding, weeping, maldistribution and control problems, and finding the energy and yield that a column is giving away

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
1 day	Advanced	On-site classroom · virtual instructor-led	English	16

8 troubleshooting cases from real columns

1 column rating on plant data

3 optimisation levers with economics

Overview

Columns rarely fail; they underperform, and the reasons are usually visible in pressure-drop, temperature-profile and reflux trends long before anyone opens the manway. Built around the Kister troubleshooting approach and FRI-based hydraulic guidance, the course teaches how to read a column from plant data, rate the internals against the current load, identify the operating limit, and then decide which of reflux, pressure, feed condition or product specification is worth changing.

Learning outcomes

- Interpret pressure drop, temperature profile and gamma-scan results to identify flooding, weeping, foaming and maldistribution
- Rate trays and packing hydraulically against the current load and set the real capacity limit
- Reconcile plant data with a simulation and estimate tray efficiency or HETP
- Diagnose control problems: pressure, temperature-control tray selection, reflux and reboiler interactions
- Quantify optimisation levers: reflux-to-minimum ratio, pressure minimisation, feed preheat and product give-away
- Prepare a turnaround inspection list and revamp options with a supporting case

Who should attend

Process and operations engineers responsible for distillation units; APC and control engineers supporting column control; unit supervisors

Course outline

MORNING

Column fundamentals refresher: stages, reflux, minimum reflux, pinch · tray and packing hydraulics: flooding, weeping, entrainment, pressure drop · reading a column from plant trends and gamma scans · common malfunctions and their signatures (Kister) · rating exercise on plant data

AFTERNOON

Data reconciliation and efficiency estimation · column control: pressure, temperature-tray selection, reflux and boil-up interaction · optimisation levers and economics: reflux, pressure, feed preheat, give-away · energy savings and constraint pushing · inspection and revamp options · troubleshooting cases workshop

Standards referenced

`Kister, Distillation Troubleshooting and Distillation Operation` `FRI design practices` `GPSA Engineering Data Book` `Perry's Chemical Engineers' Handbook` `API RP 554`

Tools & exercises

Exercises worked in the client's simulator with plant historian data; column monitoring examples from ProcessVision

What's included

- ✓ Course manual and slide pack
- ✓ Exercise and case-study pack
- ✓ Software access for the course
- ✓ Competency quiz and certificate
- ✓ Post-course Q&A with the instructor
- ✓ Templates used in the exercises

PREREQUISITES
Chemical engineering degree and experience with a distillation unit; TR-F01 helpful

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

CATEGORY G

Operator & Field Programmes

Short, practical programmes for panel and field operators: hazards and safeguards, rounds and abnormal situations, permits and isolation, start-up and shutdown.

4 COURSES

3.5 TRAINING DAYS

Practitioner-led training for the process industry

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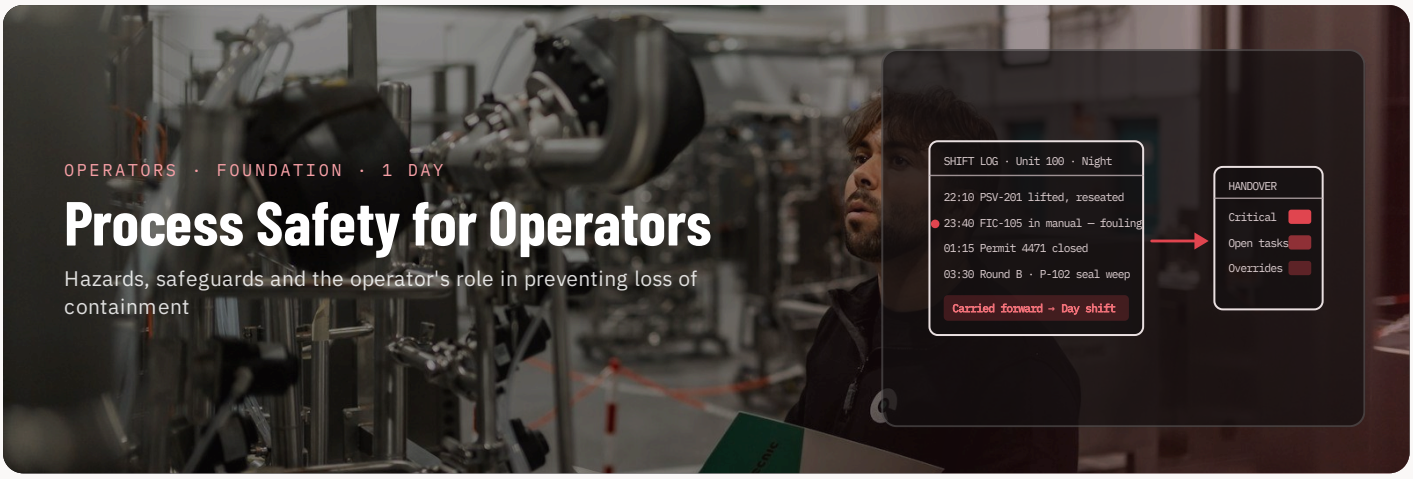

OPERATORS · FOUNDATION · 1 DAY

Process Safety for Operators

Hazards, safeguards and the operator's role in preventing loss of containment

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
1 day	Foundation	On-site classroom · virtual instructor-led	English	16

Your own P&IDs and logbook

1 tabletop unit-upset exercise

100 % operator-focused

Overview

Operators are the layer of protection that thinks. This one-day course explains the hazards of the units they run, why each safeguard exists, what the trip and alarm settings mean, and what to do — and record — when things drift. It is delivered on the site's own P&IDs, logbook and incident history.

Learning outcomes

- Explain the major-accident hazards of their own unit
- Identify the safeguards on a P&ID and what defeats them
- Respond to alarms with the intended action, not habit
- Recognise abnormal situations early on a round or a trend
- Use the logbook and shift handover to pass on what matters
- Apply permit, isolation and override rules correctly

Who should attend

Panel and field operators, shift supervisors, new operations staff; refresher for experienced crews

Course outline

MORNING

Lessons from major accidents · loss of containment and its causes · safe operating limits · alarms, trips and their meaning · safeguards on our P&IDs

AFTERNOON

Operator rounds and abnormal-situation recognition · overrides and bypasses · shift handover practice with CeraShift · tabletop exercise on a unit upset · quiz and certificate

Standards referenced

OSHA 29 CFR 1910.119(g) · CCPS Conduct of Operations · ISA-18.2

Tools & exercises

Exercises on the site's own P&IDs and CeraShift logbook

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
None

CERTIFICATION
Certificate of completion; competency record for the training matrix

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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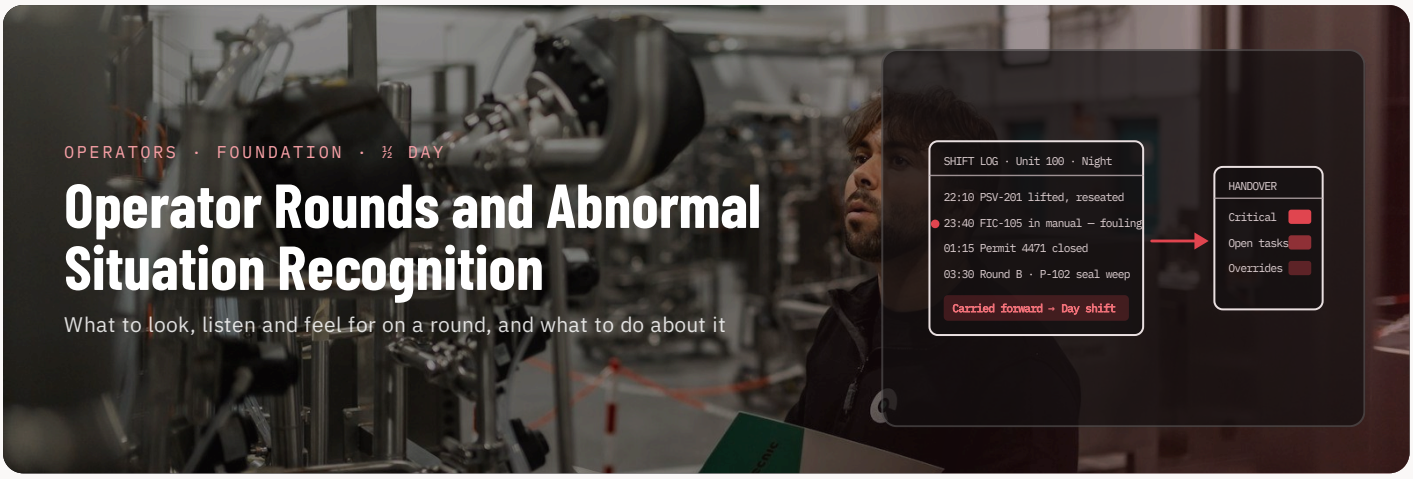


OPERATORS · FOUNDATION · ½ DAY

Operator Rounds and Abnormal Situation Recognition

What to look, listen and feel for on a round, and what to do about it

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
½ day	Foundation	On-site classroom · virtual instructor-led	English	16

1 guided round on your own unit

8 abnormal-situation drills

Tablet rounds in CeraShift

Overview

A good round finds the seal leak, the passing valve and the vibrating pump before the alarm does. This half-day course gives field and panel operators a structured way to look at their unit: what normal looks like, which deviations matter, how to read a trend or a sight glass against the safe operating limits, and how to report what they found so the next shift and the engineer can act on it. Exercises use the site's own round sheets, P&IDs and recent near-miss reports.

Learning outcomes

- Plan a round around the safety-critical equipment and safe operating limits of the unit
- Recognise the early signs of loss of containment, fouling, cavitation and instrument drift
- Compare field observations with panel trends and question a mismatch
- Escalate an abnormal situation through the right channel at the right time
- Record findings on the electronic round sheet so they become work orders, not memories
- Use round data to spot slow deterioration between shifts

Who should attend

Field operators, panel operators, shift supervisors and trainee operators; refresher for experienced crews

Course outline

SESSION 1

Why rounds matter: incidents caught and missed on the round · safe operating limits and the operating envelope · sensory checks on pumps, exchangers, furnaces and relief systems · reading local gauges against panel values · leaks, passing valves and small releases

SESSION 2

Abnormal situation recognition and the 'stop and question' rule · escalation and shift-supervisor notification · electronic rounds on the tablet with CeraShift · guided round on the participants' unit · eight short drills and debrief · quiz and certificate

Standards referenced

OSHA 29 CFR 1910.119(f) / (g) · CCPS Conduct of Operations · ISA-18.2 · CCPS Guidelines for Safe Process Operations and Maintenance

Tools & exercises

Round sheets and exception reports built in CeraShift on the site's own equipment list

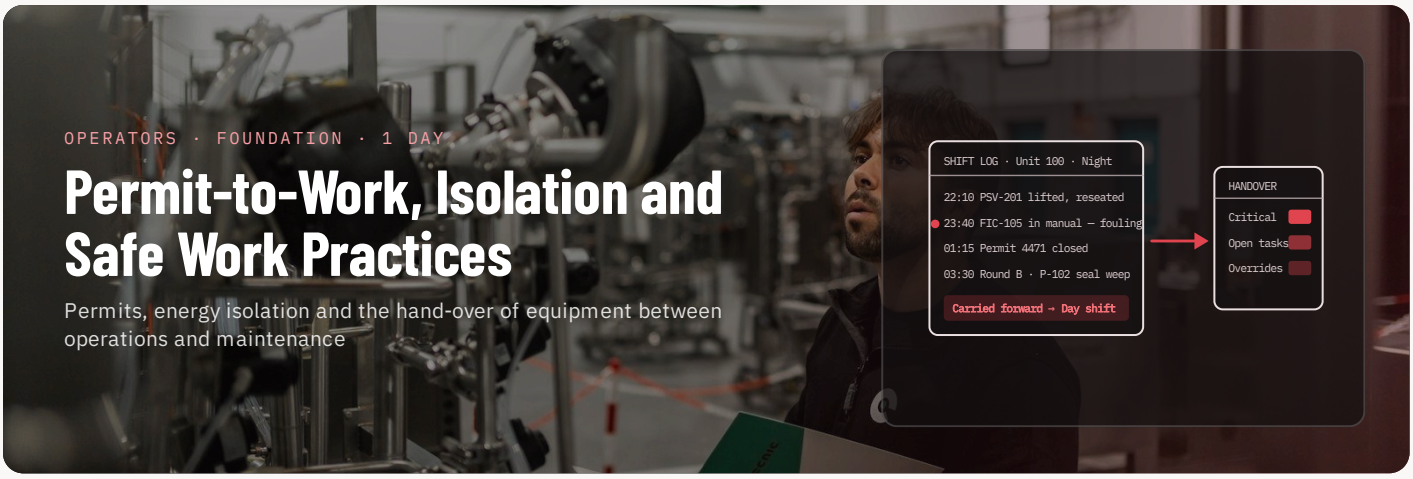
What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
None

CERTIFICATION
Certificate of completion; competency record for the training matrix

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.



OPERATORS · FOUNDATION · 1 DAY

Permit-to-Work, Isolation and Safe Work Practices

Permits, energy isolation and the hand-over of equipment between operations and maintenance

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
1 day	Foundation	On-site classroom · virtual instructor-led	English	16

1 isolation plan built on a real P&ID

5 permit types worked through

LOTO audit on the plant

Overview

Most maintenance-related process safety incidents trace back to a permit that was signed but not understood, or an isolation that was assumed rather than proven. This course covers the full permit-to-work cycle from job planning to close-out, positive isolation and lock-out/tag-out, gas testing and confined-space entry, and the hand-back to operations. Participants build an isolation plan on one of their own P&IDs and audit a live permit in the plant.

Learning outcomes

- Explain the roles of issuer, receiver, area authority and performing authority in the permit cycle
- Select the correct isolation method — valve, double block and bleed, spade or physical disconnection — for the fluid and the job
- Apply lock-out/tag-out so that stored energy, not just the main supply, is controlled
- Specify gas testing, confined-space and hot-work controls that match the hazard
- Recognise simultaneous-operations conflicts and manage permit interactions
- Hand equipment back to operations with a documented de-isolation and leak test

Who should attend

Field operators, area authorities, permit issuers and receivers, maintenance supervisors and contractor supervisors

Course outline

MORNING

Incidents caused by permit and isolation failures · permit-to-work system: types, roles and authorities · job hazard analysis at the permit desk · isolation standards: single valve to positive isolation · lock-out/tag-out and stored energy · isolation plan workshop on a participants' P&ID

AFTERNOON

Gas testing, confined-space entry and hot work · working at height, excavation and lifting interfaces · simultaneous operations and permit conflicts · permit suspension, extension and close-out · de-isolation, leak testing and hand-back · live permit audit walk-down and debrief

Standards referenced

OSHA 29 CFR 1910.119(f) / (g)
OSHA 29 CFR 1910.147 (Lockout/Tagout)
API RP 2201
CCPS Guidelines for Safe Work Practices
CCPS Conduct of Operations

Tools & exercises

Isolation plan and permit walk-down exercises on the site's own P&IDs and permit forms

What's included

- ✓ Course manual and slide pack
- ✓ Exercise and case-study pack
- ✓ Software access for the course
- ✓ Competency quiz and certificate
- ✓ Post-course Q&A with the instructor
- ✓ Templates used in the exercises

PREREQUISITES
None; area familiarity helps for the walk-down

CERTIFICATION
Certificate of completion; competency record for permit issuer/receiver authorisation

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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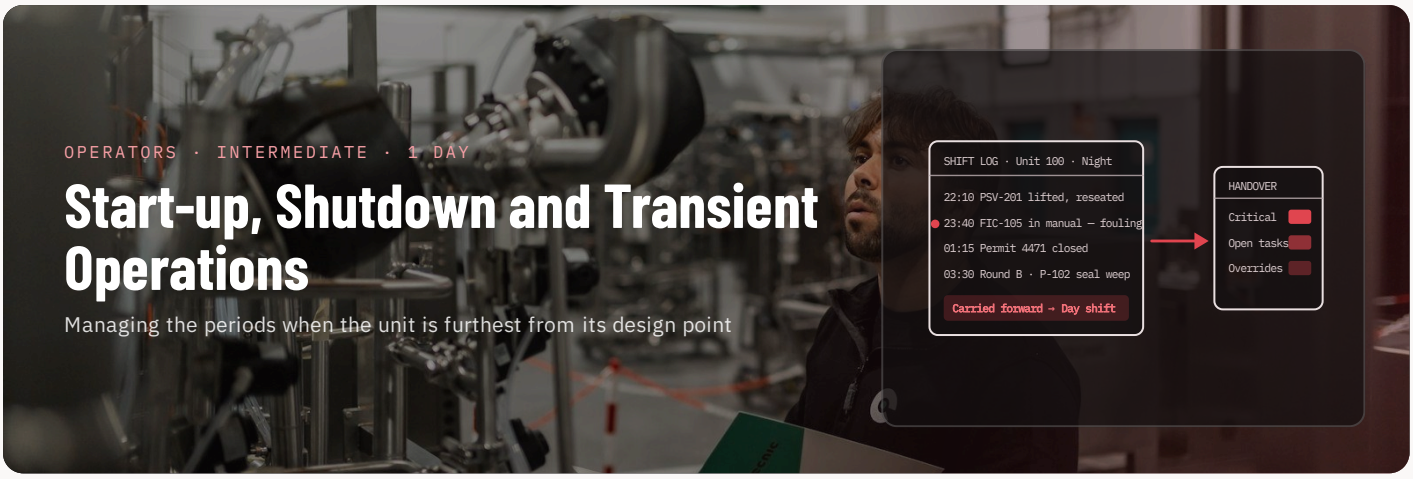

OPERATORS · INTERMEDIATE · 1 DAY

Start-up, Shutdown and Transient Operations

Managing the periods when the unit is furthest from its design point

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
1 day	Intermediate	On-site classroom · virtual instructor-led	English	16

3 transient scenarios walked through

1 start-up procedure reviewed line by line

PSSR checklist template

Overview

Transient operations account for a small fraction of running hours and a large share of serious incidents. This course looks at what is physically different about a unit at start-up, shutdown, rate change and emergency depressuring: thermal stress, water and air ingress, level control at low rates, trips that behave differently, and procedures written for a plant that has since changed. Participants review one of their own start-up procedures step by step and work through three transient scenarios on the site's own trends.

Learning outcomes

- Identify the hazards specific to start-up, shutdown and rate changes on their unit
- Apply purging, leak testing, warm-up and cool-down limits correctly
- Recognise where trips, alarms and controllers behave differently outside normal operation
- Use the pre-start-up safety review as a genuine check, not a signature exercise
- Handle emergency shutdown and depressuring with the intended sequence
- Feed back procedure deviations and near-misses so the procedure improves

Who should attend

Panel operators, shift supervisors, operations engineers and turnaround coordinators involved in unit start-up, shutdown and rate changes

Course outline

MORNING

Transient-operation incidents and their common causes · start-up sequence: air-freeing, purging, leak testing, inventory and warm-up · thermal and mechanical limits on equipment · trip and override management during start-up · procedure review of a participants' start-up procedure

AFTERNOON

Planned shutdown, decontamination and hand-over to maintenance · emergency shutdown and depressuring · rate changes, feed changes and turndown · pre-start-up safety review and restart after a trip · three transient scenarios on the site's trends · quiz and certificate

Standards referenced

OSHA 29 CFR 1910.119(f) / (g) · CCPS Guidelines for Safe Process Operations and Maintenance · CCPS Conduct of Operations · ISA-18.2 · API 521 (depressuring)

Tools & exercises

Scenario walk-throughs on the site's own historian trends and CeraShift shift logs

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Operating experience on a process unit; TR-G01 recommended

CERTIFICATION
Certificate of completion; competency record for the training matrix

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

CATEGORY H

Software Product Training

Hands-on half-day courses for users and administrators of every Cerasus application, from installation to a completed study, log or report.

9 COURSES

4.5 TRAINING DAYS

Practitioner-led training for the process industry

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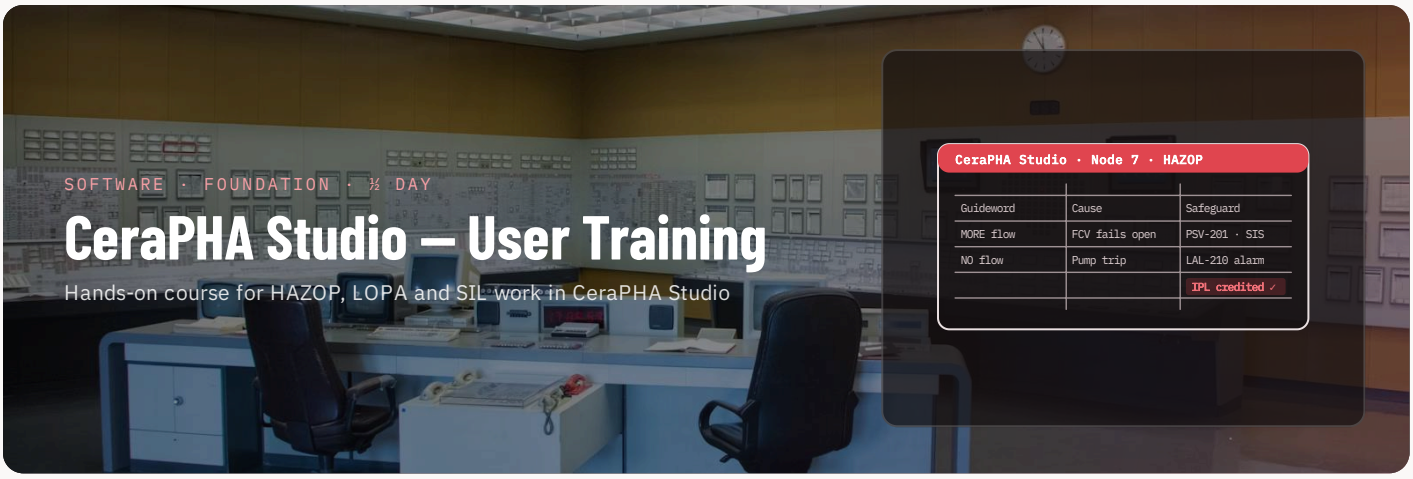

SOFTWARE · FOUNDATION · ½ DAY

CeraPHA Studio — User Training

Hands-on course for HAZOP, LOPA and SIL work in CeraPHA Studio

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
½ day	Foundation	On-site classroom · virtual instructor-led	English	16

½ day hands-on

1 complete study built

Admin module for IT owners

Overview

A short, hands-on course that takes a team from installation to a completed study: setting up nodes and teams, recording a HAZOP, crediting IPLs in LOPA, running SIL determination and producing the report and action register. Administrators cover user roles, libraries and backups.

Learning outcomes

- Create a project, define nodes and load P&IDs
- Record a HAZOP with guideword templates and the safeguard library
- Perform LOPA with IPL credit rules and SIL determination
- Generate reports, action registers and revalidation packs
- Administer users, libraries and client/server settings

Who should attend

PHA leaders, scribes, safety engineers and administrators who will use or manage CeraPHA Studio

Course outline

SESSION 1

Installation and editions · project set-up · nodes, teams and templates · HAZOP recording · safeguard library

SESSION 2

LOPA and SIL determination · reports and actions · import/export · administration · Q&A on participants' own study

Standards referenced

IEC 61882 · IEC 61511 · CCPS LOPA

Tools & exercises

CeraPHA Studio (web or Windows edition), participants' own licence

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Basic PHA knowledge

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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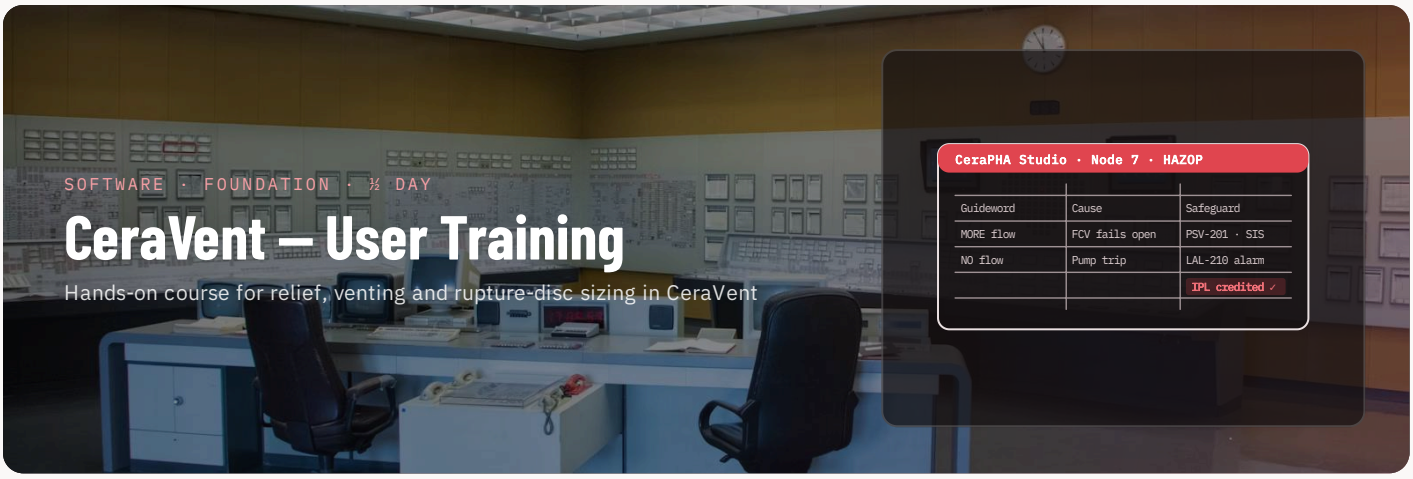

SOFTWARE · FOUNDATION · ½ DAY

CeraVent — User Training

Hands-on course for relief, venting and rupture-disc sizing in CeraVent

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
½ day	Foundation	On-site classroom · virtual instructor-led	English	16

½ day hands-on

6 sizing cases completed

Admin module for IT owners

Overview

A short, hands-on course that takes an engineer from installation to a documented relief calculation: setting up a unit and its protected equipment, defining overpressure scenarios, sizing valves and rupture discs for vapour, liquid, two-phase and fire cases, checking inlet and outlet constraints, and producing calculation sheets and the relief register. Administrators cover fluid libraries, valve catalogues and client/server settings.

Learning outcomes

- Create a project, define equipment and set design conditions
- Build overpressure scenarios and calculate relief loads per API 521
- Size PSVs, pilot-operated valves and rupture discs, and check inlet/outlet losses
- Run two-phase and tank-venting cases with the DIERS and API 2000 methods
- Generate calculation sheets, datasheets and the relief register
- Administer users, libraries and client/server settings

Who should attend

Process and relief-systems engineers, inspection engineers and administrators who will use or manage CeraVent

Course outline

SESSION 1

Installation and editions · project set-up and unit conventions · equipment and fluid definition · scenario builder and load calculation · vapour, liquid and fire sizing

SESSION 2

Two-phase and API 2000 tank venting · installation checks and back pressure · reports, datasheets and relief register export · administration and libraries · Q&A on participants' own cases

Standards referenced

API 520 Part I & II · API 521 · API 526 · API 2000 · ISO 4126

Tools & exercises

CeraVent (Windows, web or client/server edition), participants' own licence

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Basic relief-systems knowledge; TR-C01 recommended

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

Book this course or build a custom curriculum

On-site at your plant or virtual · in-house groups · competency assessment included

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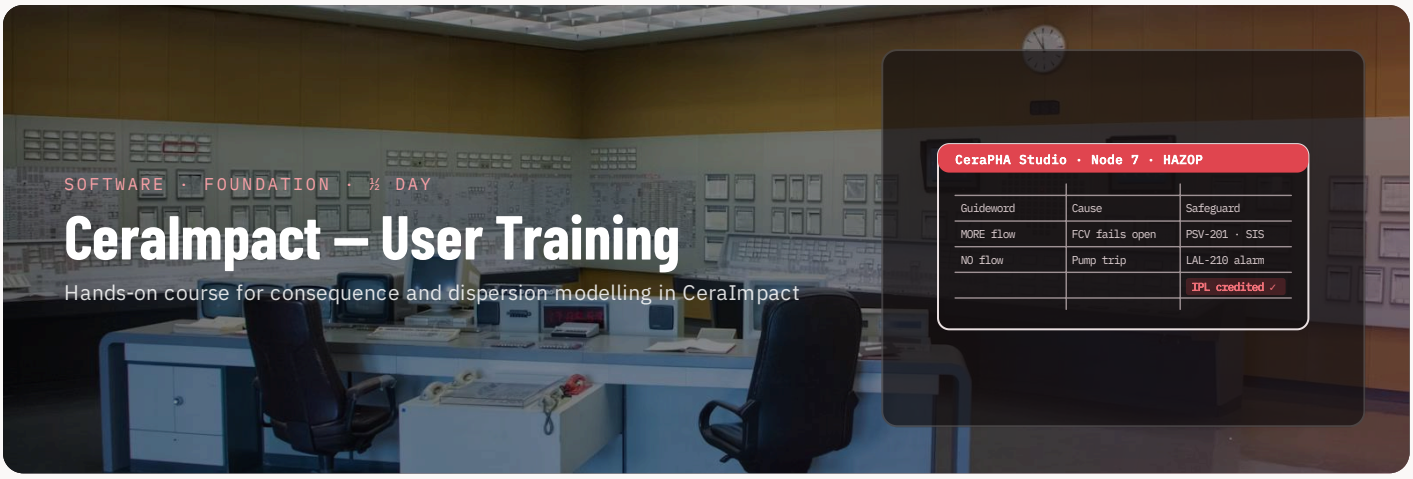

SOFTWARE · FOUNDATION · ½ DAY

CeraImpact — User Training

Hands-on course for consequence and dispersion modelling in CeraImpact

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
½ day	Foundation	On-site classroom · virtual instructor-led	English	16

½ day hands-on

1 plot plan modelled end to end

Admin module for IT owners

Overview

A short, hands-on course that takes a user from installation to a set of consequence contours on their own site map: importing and georeferencing the plot plan, defining release scenarios and weather sets, running dispersion, fire and explosion models, and mapping the results against occupied buildings and escape routes for API 752/753 work. Administrators cover material databases, weather libraries and client/server settings.

Learning outcomes

- Create a project and georeference a plot plan or satellite image
- Define source terms, hole sizes and weather sets
- Run dispersion, pool fire, jet fire, flash fire and explosion cases
- Overlay harm criteria on buildings and evaluate siting per API 752/753
- Produce contour maps, tables and study reports for PHA and ERP use
- Administer users, material and weather libraries and client/server settings

Who should attend

Process safety and loss-prevention engineers, plant layout engineers, emergency planners and administrators who will use or manage CeraImpact

Course outline

SESSION 1

Installation and editions · project set-up and map import · materials, source terms and weather · dispersion runs and toxic/flammable contours · fire models and radiation levels

SESSION 2

Explosion methods and overpressure contours · building and population overlay · reports, images and export to PHA tools · administration and libraries · Q&A on participants' own site

Standards referenced

API RP 752 / 753 · CCPS Guidelines for Consequence Analysis · TNO Yellow Book · API 521

Tools & exercises

CeraImpact (Windows, web or client/server edition), participants' own licence

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Basic consequence-modelling knowledge; TR-B01 recommended

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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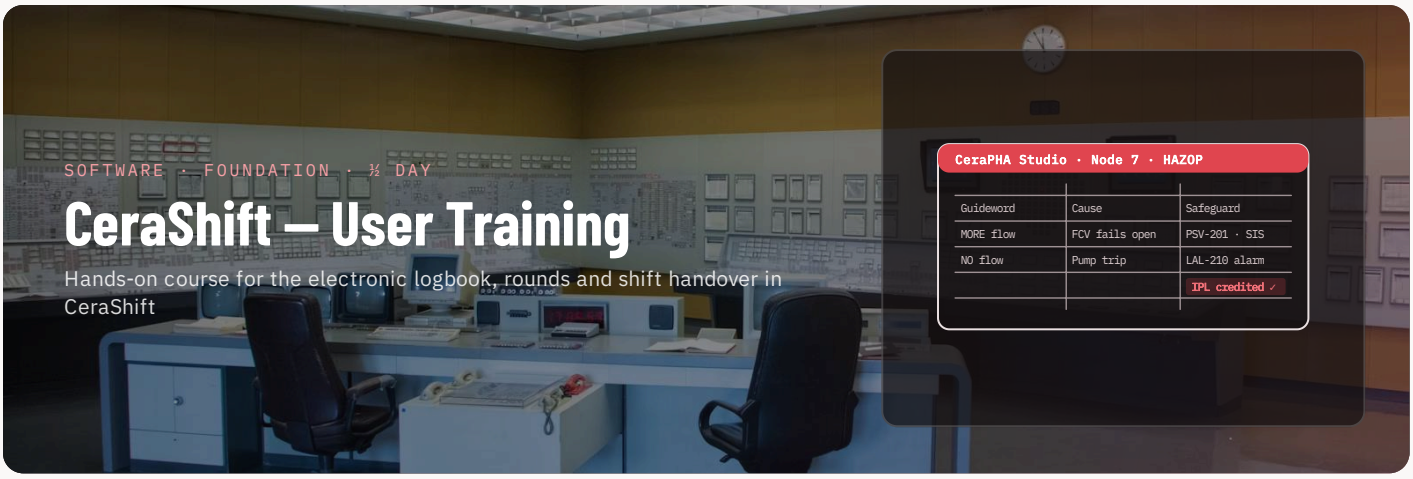

SOFTWARE · FOUNDATION · ½ DAY

CeraShift — User Training

Hands-on course for the electronic logbook, rounds and shift handover in CeraShift

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
½ day	Foundation	On-site classroom · virtual instructor-led	English	16

½ day hands-on

1 shift handover run live

Admin module for IT owners

Overview

A short, hands-on course that takes a shift team from installation to a live handover: configuring the unit structure and logbook categories, writing and tagging log entries, running tablet rounds with exception reporting, capturing DCS and PI values into the log, tracking preventive-maintenance tasks and completing a structured e-handover. Administrators cover user roles, templates, historian connections and backups.

Learning outcomes

- Configure units, areas and logbook categories
- Write, tag and search log entries and link them to equipment and work orders
- Build round templates and complete a tablet round with exceptions
- Capture DCS/PI values and trends into the shift log automatically
- Run a structured e-shift handover and sign it off
- Administer users, templates, historian connections and backups

Who should attend

Panel and field operators, shift supervisors, operations engineers and administrators who will use or manage CeraShift

Course outline

SESSION 1

Installation and editions · site and unit structure · logbook entries, tags and search · round templates and tablet rounds · exception reporting

SESSION 2

DCS/PI capture and trend snapshots · PM task tracking · e-shift handover workflow and sign-off · reports and exports · administration · Q&A on participants' own logbook

Standards referenced

`CCPS Conduct of Operations` `OSHA 29 CFR 1910.119(f)` `EI Human Factors Briefing Note 3 (Shift Handover)`

Tools & exercises

CeraShift (web, tablet or client/server edition), participants' own licence

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
None; TR-D06 recommended for supervisors

CERTIFICATION
Certificate of completion

INSTRUCTORS
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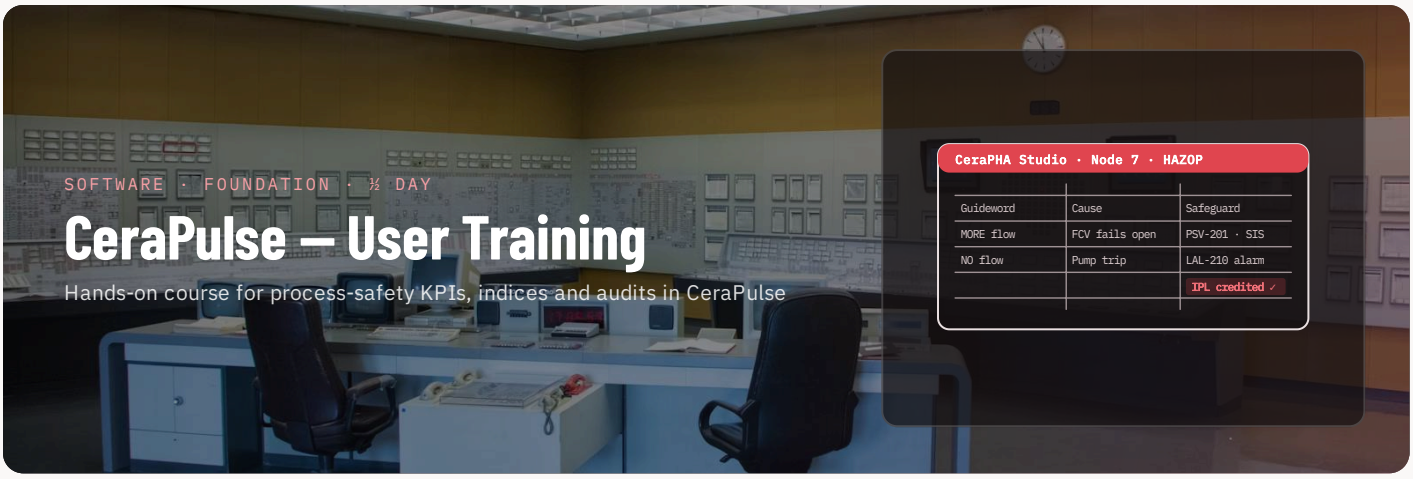

SOFTWARE · FOUNDATION · ½ DAY

CeraPulse — User Training

Hands-on course for process-safety KPIs, indices and audits in CeraPulse

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
½ day	Foundation	On-site classroom · virtual instructor-led	English	16

½ day hands-on

4 API 754 tiers configured

Admin module for IT owners

Overview

A short, hands-on course that takes a PSM team from installation to a live dashboard: defining the site and unit hierarchy, configuring API RP 754 Tier 1 to 4 indicators and site-specific leading indicators, entering and importing events, building the Safety Performance Index, scheduling audits and producing monthly reports. Administrators cover user roles, indicator libraries and data connections.

Learning outcomes

- Set up the organisation hierarchy and reporting periods
- Configure Tier 1-4 indicators and site leading indicators with thresholds
- Record and classify events and import data from incident and maintenance systems
- Build and interpret the Safety Performance Index and dashboards
- Plan, execute and close out audits with findings and actions
- Administer users, indicator libraries and data connections

Who should attend

PSM coordinators, HSE engineers, element owners, site managers and administrators who will use or manage CeraPulse

Course outline

SESSION 1

Installation and editions · organisation set-up · API RP 754 tiers and indicator definitions · event entry and classification · leading indicators and thresholds

SESSION 2

Safety Performance Index and dashboards · audit module and action tracking · monthly and board reports, export · administration · Q&A on participants' own indicators

Standards referenced

API RP 754 · CCPS Process Safety Leading and Lagging Metrics · OSHA 29 CFR 1910.119 · IOGP Report 456

Tools & exercises

CeraPulse (web or client/server edition), participants' own licence

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Basic PSM knowledge; TR-D08 recommended

CERTIFICATION
Certificate of completion

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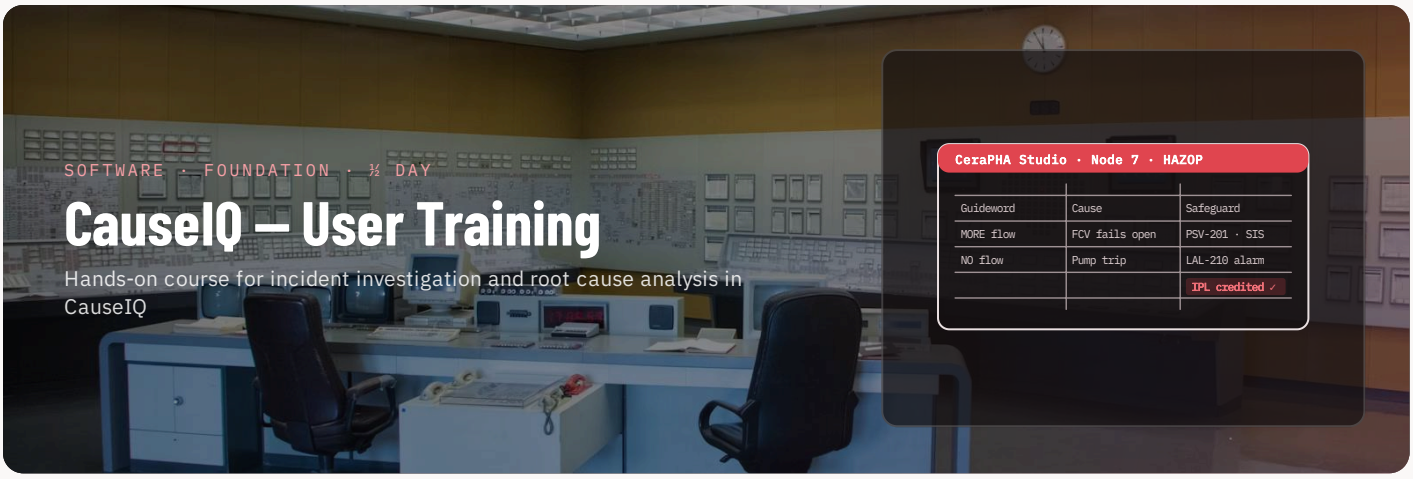

SOFTWARE · FOUNDATION · ½ DAY

CauseIQ — User Training

Hands-on course for incident investigation and root cause analysis in CauseIQ

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
½ day	Foundation	On-site classroom · virtual instructor-led	English	16

½ day hands-on

1 investigation completed

Admin module for IT owners

Overview

A short, hands-on course that takes an investigation team from installation to a closed report: opening an incident, building the timeline from evidence, running 5-Whys, fault tree and barrier analysis, linking causes to the PHA and its safeguards, and issuing recommendations with tracked actions. Administrators cover user roles, taxonomies and integration with the PHA and action systems.

Learning outcomes

- Register an incident, classify it and attach evidence
- Build an event timeline and identify conditions and deviations
- Apply 5-Whys, fault tree and barrier analysis to reach root causes
- Link failed barriers to the PHA safeguards and IPLs they represent
- Write recommendations, assign actions and produce the investigation report
- Administer users, cause taxonomies and system links

Who should attend

Incident investigators, HSE and process safety engineers, supervisors and administrators who will use or manage CauseIQ

Course outline

SESSION 1

Installation and editions · incident registration and classification · evidence and interview records · timeline builder · 5-Whys and causal factor charting

SESSION 2

Fault tree and barrier analysis · PHA link and safeguard failure mapping · recommendations, actions and reports · lessons-learned export · administration · Q&A on participants' own incident

Standards referenced

CCPS Guidelines for Investigating Process Safety Incidents
OSHA 29 CFR 1910.119(m)
API RP 754
IEC 61025 (Fault Tree Analysis)

Tools & exercises

CauseIQ (web or client/server edition), participants' own licence

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Basic incident-investigation knowledge; TR-D09 recommended

CERTIFICATION
Certificate of completion

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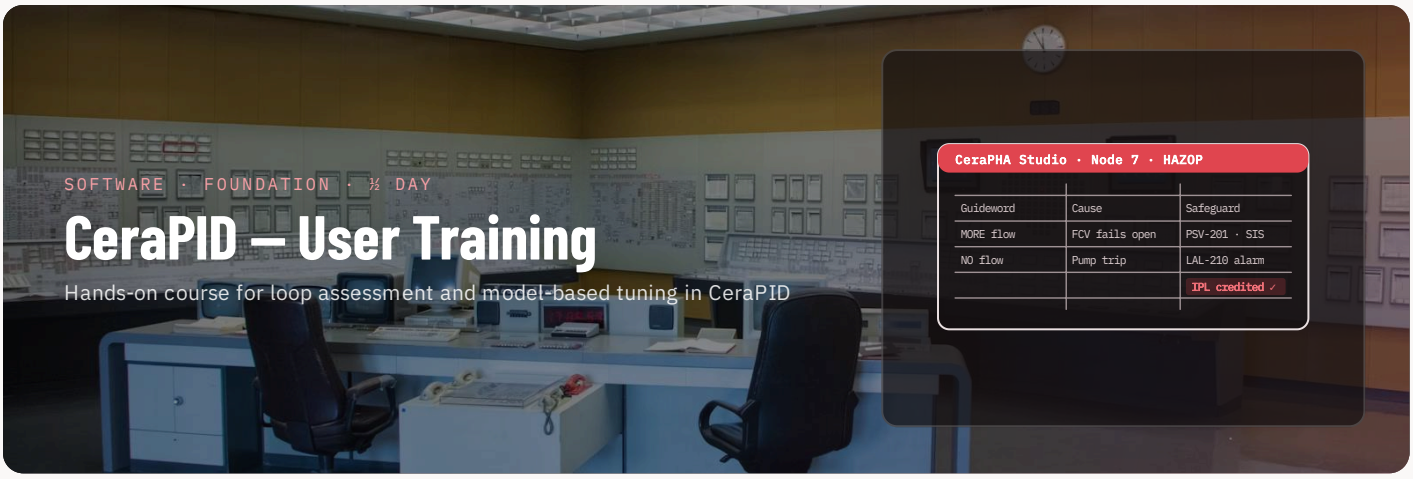

SOFTWARE · FOUNDATION · ½ DAY

CeraPID — User Training

Hands-on course for loop assessment and model-based tuning in CeraPID

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
½ day	Foundation	On-site classroom · virtual instructor-led	English	16

½ day hands-on

3 loops assessed and retuned

Admin module for IT owners

Overview

A short, hands-on course that takes a control engineer from installation to a retuned loop: connecting to the historian, importing the loop inventory, running the plant-wide loop assessment, reading the KPIs and valve diagnostics, identifying a process model from step or closed-loop data and calculating IMC/lambda tuning with a documented change record. Administrators cover historian connections, DCS tag mapping and user roles.

Learning outcomes

- Configure historian and DCS connections and import the loop inventory
- Run the plant-wide loop assessment and rank loops by performance and impact
- Interpret loop KPIs: oscillation, variability, saturation and stiction
- Identify a process model from historical or step-test data
- Calculate and document IMC/lambda tuning and simulate the response
- Administer users, tag mapping and assessment schedules

Who should attend

Control and instrument engineers, process control specialists, console supervisors and administrators who will use or manage CeraPID

Course outline

SESSION 1

Installation and editions · historian and DCS connections · loop inventory and tag mapping · plant-wide assessment and KPI dashboard · valve diagnostics and stiction detection

SESSION 2

Model identification from step and closed-loop data · IMC/lambda tuning and simulation · tuning reports and change records · export to MOC · administration · Q&A on participants' own loops

Standards referenced

ISA-5.1 · ANSI/ISA-75.25.01 (Control Valve Response) · ISA-TR75.25.02 · IEC 61131-3

Tools & exercises

CeraPID (Windows or client/server edition) connected to the participants' historian where available

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Basic control knowledge; TR-E02 recommended

CERTIFICATION
Certificate of completion

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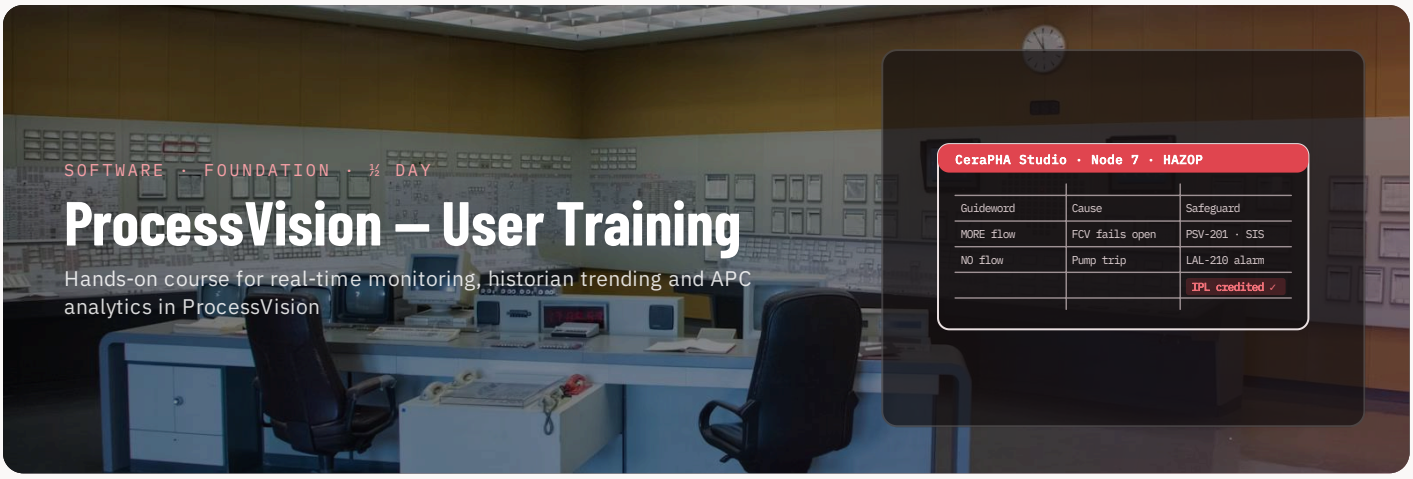

SOFTWARE · FOUNDATION · ½ DAY

ProcessVision — User Training

Hands-on course for real-time monitoring, historian trending and APC analytics in ProcessVision

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
½ day	Foundation	On-site classroom · virtual instructor-led	English	16

½ day
hands-on

2
modules: CeraControl and CeraTrace

Admin
module for IT owners

Overview

A short, hands-on course covering both halves of ProcessVision: CeraTrace for historian trending, early-warning limits and event annotation, and CeraControl for APC analytics, model discovery and step-test planning. Participants build a monitoring view for their own unit, set early-warning limits on key variables, review controller utilisation and plan a step test. Administrators cover historian and APC connections, user roles and displays.

Learning outcomes

- Connect historians and build trend displays and monitoring views
- Set early-warning limits and soft-sensor calculations on key variables
- Annotate events and share views across the shift team
- Review APC controller utilisation, constraint activity and model quality
- Run model discovery and plan a step test in CeraControl
- Administer users, connections, displays and alert routing

Who should attend

Process and control engineers, APC engineers, console supervisors and administrators who will use or manage ProcessVision

Course outline

SESSION 1

Installation and editions · historian connections and tag browsing · CeraTrace trending, calculations and early-warning limits · event annotation and sharing · alert routing

SESSION 2

CeraControl: controller KPIs and utilisation · model discovery and quality assessment · step-test planning · reports and exports · administration · Q&A on participants' own unit

Standards referenced

ISA-18.2 · ISA-101 · ISA-95 / IEC 62264 · OPC UA (IEC 62541)

Tools & exercises

ProcessVision (web or client/server edition) connected to the participants' historian where available

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Basic process control knowledge; TR-E05 recommended

CERTIFICATION
Certificate of completion

INSTRUCTORS
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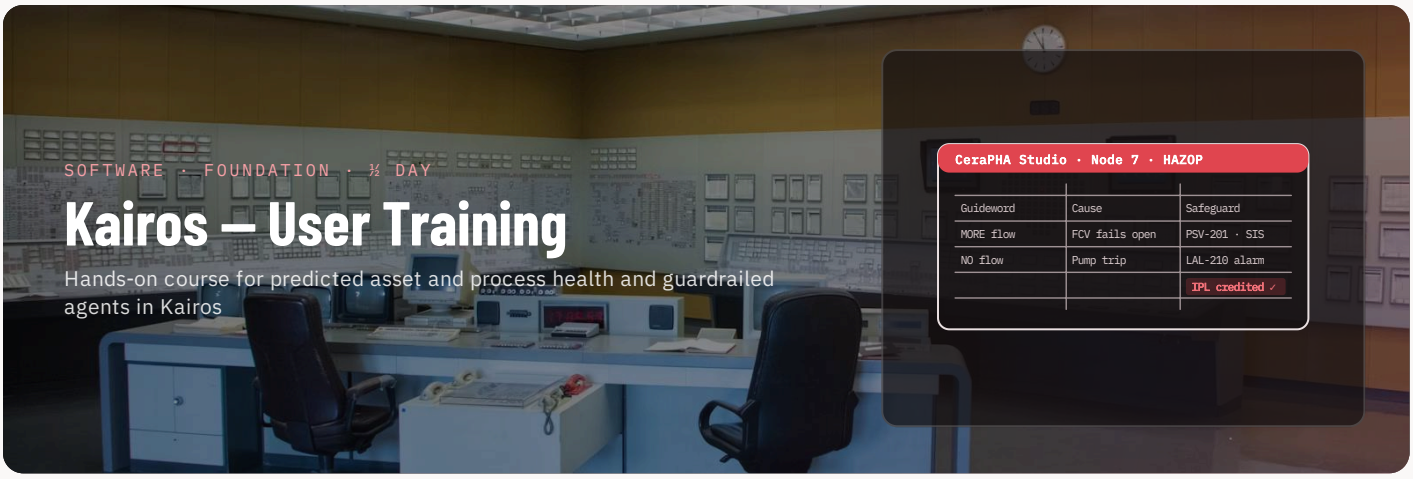

SOFTWARE · FOUNDATION · ½ DAY

Kairos — User Training

Hands-on course for predicted asset and process health and guardrailed agents in Kairos

DURATION	LEVEL	FORMAT	LANGUAGE	MAX. PARTICIPANTS
½ day	Foundation	On-site classroom · virtual instructor-led	English	16

½ day — hands-on

1 — asset-health model deployed

Admin — module for IT and OT owners

Overview

A short, hands-on course that takes a team from installation to a working health model: connecting data sources over OPC UA and historian interfaces, defining assets and process units, training and deploying a predicted-health model, reading explained alerts and configuring a guardrailed agent with approval steps. Administrators cover the IEC 62443 security zones, user roles, model governance and audit logs.

Learning outcomes

- Connect OPC UA, historian and CMMS data sources and define the asset model
- Train, validate and deploy an asset or process health model
- Read explained alerts and trace them back to contributing variables
- Configure a guardrailed agent with permitted actions and human approval
- Review model performance and manage retraining and versioning
- Administer security zones, users, model governance and audit logs

Who should attend

Reliability, process and control engineers, data analysts, OT/IT administrators who will use or manage Kairos

Course outline

SESSION 1

Installation and editions · data connections and asset model · health-model training and validation · explained alerts and root-variable view · alert routing to CeraShift and CMMS

SESSION 2

Guardrailed agents: scope, actions and approvals · model monitoring and retraining · reports and exports · administration and IEC 62443 zones · Q&A on participants' own assets

Standards referenced

ISO 13374 · ISO 17359 · IEC 62443 · OPC UA (IEC 62541)

Tools & exercises

Kairos (web or client/server edition) connected to a sandbox or the participants' data sources

What's included

- ✓ Course manual and slide pack
- ✓ Software access for the course
- ✓ Post-course Q&A with the instructor
- ✓ Exercise and case-study pack
- ✓ Competency quiz and certificate
- ✓ Templates used in the exercises

PREREQUISITES
Basic reliability or process-data knowledge; TR-E06 recommended

CERTIFICATION
Certificate of completion

INSTRUCTORS
Practising engineers — TÜV HAZOP Leader, CCPSC and IEC 61511 Functional Safety certified — with 200+ years of cumulative plant experience.

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