Advanced Process HAZOP Training Course

Professional Development Training Course Outline

Category	Oil and Gas	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Advanced Process HAZOP Training Course is a comprehensive program designed to equip professionals with the skills and knowledge needed to master the **Hazard and Operability (HAZOP) study** methodology. This systematic and structured approach is critical for **identifying, analyzing, and mitigating potential hazards and operability issues** in complex industrial processes. By delving into advanced techniques and real-world applications, participants will enhance their **risk management capabilities**, ensuring operational excellence and a proactive safety culture within their organizations. The course goes beyond basic principles, focusing on the practical implementation and leadership aspects of HAZOP studies, which are essential for **process safety management** in today's high-risk industries.

This training program is specifically tailored to address the complexities of modern industrial systems, including those in the **chemical, petrochemical, oil and gas, and pharmaceutical sectors**. Participants will gain expertise in **advanced hazard identification techniques**, such as **Layer of Protection Analysis (LOPA)** and **Quantitative Risk Assessment (QRA)**. The curriculum is built around practical, hands-on exercises and **real-life case studies**, allowing attendees to apply their knowledge directly to simulated scenarios. The focus on **HAZOP leadership and facilitation skills** ensures that graduates are not only competent in conducting studies but are also capable of leading multidisciplinary teams to achieve optimal safety outcomes.

Programme Curriculum

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Course Duration

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Course Objectives

1. Master Process Hazard Analysis (PHA) methodologies, including HAZOP, What-If, and FMEA.
2. Lead and facilitate Advanced HAZOP studies with confidence and authority.
3. Effectively apply Layer of Protection Analysis (LOPA) to determine the adequacy of safeguards.
4. Conduct Quantitative Risk Assessment (QRA) to evaluate and prioritize risks.
5. Implement inherently safer design principles in new and modified processes.
6. Integrate human factors and human reliability analysis into HAZOP studies.
7. Utilize HAZOP software tools for efficient data analysis and documentation.
8. Develop a risk matrix and risk ranking system tailored to organizational needs.
9. Conduct HAZOP revalidations and manage the Management of Change (MOC) process.
10. Apply Bow-Tie Analysis to visualize and communicate risk scenarios.
11. Interpret and apply international standards and regulatory compliance guidelines for HAZOP.
12. Establish a culture of proactive risk management and continuous improvement.
13. Effectively document and communicate HAZOP findings and recommendations to stakeholders.

Organizational Benefits

- Drastically reduces the likelihood of accidents, injuries, and environmental incidents by proactively identifying and mitigating hazards.
- Prevents costly unplanned shutdowns, equipment damage, and legal liabilities associated with major industrial incidents.
- Streamlines processes by identifying and resolving operability issues, leading to more reliable and efficient operations.
- Ensures the organization meets and exceeds stringent international safety standards and regulatory requirements.
- Demonstrates a strong commitment to safety and risk management, boosting confidence among investors, regulators, and the public.
- Equips employees with the skills to identify and manage risks, fostering a strong safety culture from the ground up.

Target Audience

1. Process and Chemical Engineers
2. HSE (Health, Safety, and Environment) Professionals
3. Operations Managers and Supervisors
4. Project Engineers and Managers
5. Risk Management and Safety Compliance Specialists
6. Instrumentation and Control Engineers
7. Maintenance and Reliability Engineers
8. Senior Technical and Management Personnel

Course Outline

Module 1: Foundational Principles and Advanced Concepts of HAZOP

- Review of HAZOP basics: guide words, process parameters, deviations, causes, consequences, and safeguards.
- Advanced application of HAZOP in different stages of a project life cycle
- Introduction to other Process Hazard Analysis (PHA) techniques: What-If, Checklists, FMEA, and their strategic use.
- Understanding the role of HAZOP within a comprehensive **Process Safety Management (PSM)** framework.
- **Case Study**: **Bhopal Gas Tragedy (India, 1984)**. Analysis of how a lack of proper HAZOP and MOC led to a catastrophic release of methyl isocyanate.

Module 2: Advanced Hazard Identification and Risk Analysis

- Deep dive into **human factors and human error analysis** in HAZOP studies.
- Methodology for conducting a **Structured What-If (SWIFT)** analysis.
- Introduction to **Layers of Protection Analysis (LOPA)**: determining the independence and integrity of safeguards.
- Application of **risk matrices** and **risk ranking** to prioritize high-risk scenarios.
- **Case Study**: **Texas City Refinery Explosion (USA, 2005)**. Using LOPA to evaluate the effectiveness of administrative and engineering controls that failed during the startup of the isomerization unit.

Module 3: Leadership and Facilitation of HAZOP Studies

- Mastering the role of the **HAZOP team leader**: planning, preparation, and team selection.
- Techniques for effective facilitation, managing team dynamics, and achieving consensus.
- Strategies for maintaining focus and efficiency during long HAZOP sessions.
- Effective communication of HAZOP findings and recommendations to the team and management.
- **Case Study**: **A simulated HAZOP session for a new pharmaceutical mixing process.** Participants will take turns leading a team through a hypothetical study, addressing issues like team conflict and incomplete data.

Module 4: Advanced Risk Mitigation and Safeguards

- Designing and evaluating the effectiveness of engineering controls and safeguards.
- Implementing the **Hierarchy of Controls** principle in the HAZOP process.
- Detailed analysis of **Safety Instrumented Systems (SIS)** and **Safety Integrity Levels (SIL)** determination.
- Developing robust **contingency plans and emergency response procedures**.

- **Case Study**: **Fukushima Daiichi Nuclear Disaster (Japan, 2011)**. Analysis of how a lack of robust layers of protection against external events led to a major nuclear meltdown.

Module 5: Management of Change (MOC) and HAZOP Revalidation

- Understanding the critical link between **MOC and HAZOP**.
- Methodology for performing **HAZOP revalidations** for existing processes.
- Developing and implementing a robust system for tracking and closing out HAZOP action items.
- Identifying "creeping change" and its potential for creating new hazards.
- **Case Study**: **The Deepwater Horizon oil spill (Gulf of Mexico, 2010)**. Examination of how multiple small changes and a series of missed warnings contributed to a catastrophic well blowout.

Module 6: Quantitative Risk Assessment (QRA) and Consequence Analysis

- Introduction to **QRA** as a tool for quantifying risk and making informed decisions.
- Conducting **consequence modeling** for fire, explosion, and toxic dispersion.
- Utilizing **fault tree analysis (FTA)** and **event tree analysis (ETA)** for scenario development.
- Applying QRA results to demonstrate risk is **As Low As Reasonably Practicable (ALARP)**.
- **Case Study**: **A pipeline rupture scenario**. Participants will use QRA principles to calculate the potential for harm and demonstrate how different safeguards impact the risk profile.

Module 7: Advanced Software and Documentation

- Hands-on training with industry-standard HAZOP and PHA software.
- Best practices for creating clear, concise, and defensible HAZOP reports.
- Developing a digital system for managing HAZOP data and recommendations.
- Strategies for integrating HAZOP reports with other organizational databases and safety systems.
- **Case Study**: **Using HAZOP software to analyze a complex chemical reactor system**. Participants will practice entering data, applying guide words, and generating a professional report.

Module 8: Application and Certification

- A capstone project where participants apply their skills to a comprehensive real-world scenario.
- Review of international standards (**IEC 61882**) and industry best practices.
- Discussion on career paths and professional development in process safety.
- Preparation for and completion of the course certification exam.
- **Case Study**: **An open-ended final project** where teams must conduct a full HAZOP study on a provided process design and present their findings and recommendations to a panel of "management."

Training Methodology

- Instructor-led presentations covering theoretical concepts and methodologies.
- Interactive workshops and group exercises to apply learned techniques.
- Case studies and simulations based on real-world industrial incidents.
- Hands-on practice with leading HAZOP software tools.
- Role-playing scenarios to develop and refine facilitation skills.
- Team-based projects to foster collaborative problem-solving.
- Q&A sessions with experienced industry professionals.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

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