COURSE OVERVIEW HE0400
Fundamentals of Process Safety & Loss Prevention

Course Title
Fundamentals of Process Safety & Loss Prevention

Course Date/Venue
September 07-11, 2025/Oryx Meeting Room, Double Tree by Hilton Al Saad, Doha, Qatar

Course Reference
HE0400

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Description

This practical and highly-interactive course includes real-life case studies and exercises where participants will be engaged in a series of interactive small groups and class workshops.

This course is designed to provide participants with a detailed and up-to-date overview of safety and loss, major incidents have been occurring around the world for as long as hazardous materials have been processed. Loss prevention is not only concerned with incidents that cause injury to people. It covers all forms of loss, including damage to the environment and property and interruption to production caused by major failures of a plant, even when there is no injury to people or damage to the surroundings.

The escape of toxic methyl isocyanate vapour from the Union Carbide India Limited plant at Bhopal in India on December 1984 was the most serious chemical plant incident in history, causing thousands of deaths and many tens of thousands of severe injuries, many of them causing permanent incapacity. This and the explosion at the Phillips Petroleum polyethylene plant at Pasadena on 23 October 1989, which killed 23 people and injured hundreds more, alerted management and governments to the need for much more than traditional occupational safety and health programs to provide safety for those working in, or living around, process plants. However, this was not new knowledge. Major incidents have been occurring around the world for as long as hazardous materials have been processed.

Loss prevention is not only concerned with incidents that cause injury to people. It covers all forms of loss, including damage to the environment and property, and interruption to production caused by major failures of a plant, even when there is no injury to people or damage to the surroundings. Avoidance or minimization of the risks of all these types of incident is embraced by the field of process-plant risk and reliability management.

There are many reasons why organizations may be concerned with managing their risks. These range from avoidance of injury or the cost of replacing damaged equipment, to such matters as maintaining a good public image or avoiding legal claims or prosecution of senior managers for negligence.

Reliability

With ever-increasing competitive pressures worldwide, it is essential that plants operate with high reliability to maximize the return obtained for the capital investment.
When an operation provides a continuous service, such as piped supply of gas to a consumer, any interruption to supply can have severe effects, in proportion not only to the lost service but to the profitability of downstream industries, community amenities, safety, environmental performance, etc.

Risk

There is a widespread belief in the community that any major breakdown or accident in an industrial or service organization (e.g., transport, power, water) is the result of negligence by someone. The community is very sensitive to perceived "negligence" by management of large organizations. The professional institutions commonly require members to put community responsibilities first, above those of the organization or the individual. Litigation to recover damage is now normal.
There is a trend toward seeking to prosecute the person seen as most responsible. This may not be the person closest to the incident, but is increasingly someone higher in the organization with the perceived responsibility of ensuring that more junior employees are trained and supervised in such a way that breakdowns and accidents will not occur.

No longer can an individual be confident of being protected by his or her organization; an organization may undertake to pay any fine, but where criminal negligence is proved in court, an individual may face a term in jail.
The old legal principle of "no liability without fault" has long been replaced with "the injured party must be compensated by the person or organization most involved in the accident, whether a fault or not."

However, there are approaches that can be taken to reduce to a very low level, the chance of being held liable. Similarly, there is also a growing awareness that to meet an organization's commercial objectives satisfactorily, it is important to identify and to quantify as well as practicable the exposure to commercial risk. It can then be decided whether to accept the financial risk of accidents or incidents, or to transfer the risk by ensuring.

The approaches used to identify and assess risks of all kinds, and to reduce or transfer them, for the basis of *risk management.*

Handling the Situation

Unreliability can result in:

- Loss of profit for the organization operating the unreliable facility or operation;
- Loss of profit for organizations relying on supply of goods or services from the unreliable operation;
- Injury to people employed by the organization operating the unreliable facility or operation, or using the goods or services, or in the vicinity of the unreliable facility or operation or the goods or services provided by it.

In the increasingly litigious society of today, such unreliability can result in legal action, either to recover damages caused by the unreliability, or for criminal negligence which resulted in injury or environmental damage.
The best defence against a financial loss or a charge of negligence is to avoid mishaps, that is, to operate reliability.

When a mishap occurs, the best defence against a suggestion of negligence is t have taken all practicable care in the light of information available at the time.
Where there is the potential for a major mishap, it would be necessary to show that there had been proper attention to identifying the hazards, and that proper action had been taken to safeguard people, the environment, and property.

Management of the Hazards or the Potential for Mishap

The existence of hazards does not, in itself, necessitate action. A hazard is the *potential* to do harm. We are surrounded by hazards all our lives. Most of them we accept without concern.

The term “risk” implies probability, not certainty. Risk is defined by IChemE (1985) as “the likelihood of a specified period or in specified circumstances.”
If the probability of harm being done by hazard is low enough, then the risk is low, and no action is needed. If the damage is potentially very serious financially, and if the probability is sufficient, then it may be decided that it is appropriate to insure. In principle, the assessed risk assists in determining the reasonable level of premium.
Risk management is the name given to a systematic approach to identifying hazards, assessing the risks from each, and deciding what (if anything) needs to be done.

Why bother with risk management anyway?

There are many reasons why organizations may be concerned with managing their risks. These range from avoidance of injury or the cost of replacing damaged equipment, to such matters as maintaining a good public image or avoiding legal claims or prosecution of senior managers for negligence.

These reasons can all be classified as one of three main types:

- Legal
- Commercial
- Moral or ethical

The Legal Requirements

The legal reasons for risk management will depend on the particular legal framework and legislation in the particular community, but are commonly of two types: statutory obligations, and the "duty of care". If the requirement of legislation is ignored (e.g. by not putting a guard on a machine), then prosecution is expected. On the other hand, the body of historical case law has established the principle that one must take care of others, even if there's no specific legislation covering the particular matter. An employer who does not take due care of his or her employees is liable. A manager found guilty of negligence may be sent to jail.

Commercial Requirements

A mishap on a process plant may have a variety of commercial implications:

- Loss of profit from production lost due to plant downtime;
- The cost of damage to equipment, comprising replacement costs of spares, etc, labor;
- The costs resulting from injury or loss of life, including damages claims and the effect on insurance premiums;
- The cost of environmental damage, including cleanup costs and the cost of additional equipment and procedures for environmental protection;
- The costs of legal action, including damages awarded for injury, failure to honor supply contracts, damage to property, etc., legal fees, cost of the time of staff defending the cases, and the opportunity cost of staff not being able to progress toward corporate goals;
- The costs of damaged public image, including public opposition to future developments.

Moral or Ethical Requirements

The cost of accidents is broader than simply the financial costs of compensation, etc. There is the human dimension of life: the value to relatives and friends of a fit and healthy person that cannot be replaced by money. No senior manager wants to look back on his career to see a trail of human wreckage, or of destroyed environment. However, sometimes a problem arises in the middle levels of management where it is (usually erroneously) believed that senior management is really only interested in short-term profit.

In addition, most professional engineering institutions have codes of ethics requiring their members to place their responsibility for the welfare, health and safety of the wider community above sectional interests (such as those of their employer), private interests (such as their own), or the interests of other members. They may also specifically require members to take steps to inform themselves, clients, employers and the community of the social and environmental consequences of what they do.

Course Objectives

Upon the successful completion of this course, each participant will be able to:

- Apply and gain an in-depth knowledge on safety and loss prevention
- Define what risk assessments are used for and how to prepare them
- Identify frequency of risk assessments and schedule them as well as identify who should conduct risk assessments and management
- Conduct a risk assessment and management and identify risks, evaluate levels of risk and use a standardized rating process
- Use forms provided, record and report risk assessment findings
- Identify the consequences of major accidents in terms of fire, explosion, toxic releases and their costs
- Discuss and implement risk assessment techniques in oil and gas industry and explain root cause analysis and provision of examples of actual accidents
- Utilize quantified risk assessment "QRA", risk and cost-benefit analysis resource allocation for production, maintenance and safety
- Employ practical application of advanced risk management techniques to new projects and current activities
- Recognize the difference between hazard, risk and risk management
- Develop the skills of applying advanced risk assessment techniques and determine how to evaluate different types of risk
- Develop a strategy for planning and implementing risk reduction action plans
- Create a plan of action of implementation

Exclusive Smart Training Kit - H-STK®

*Participants of this course will receive the exclusive "Haward Smart Training Kit" (**H-STK®**). The **H-STK®** consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides a complete and up-to-date overview of loss prevention and safe working procedures for all safety management specialist, engineer and technical personnel who are responsible for the safety of their work force. Their responsibilities include design, training, maintenance, production and safety for production support equipment.

Course Fee

US$ 6,000 per Delegate. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations:-

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

- The International Accreditors for Continuing Education and Training (IACET - USA)

  Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

  Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

  Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:

Mr. Peter Christian is an **International Expert** in **Safety**, **Health**, **Environmental** and **Quality** with over **25 years** of practical and industrial experience in **Lifting & Rigging Equipment HAZOP**, **HAZWOPER**, **HAZMAT**, **HAZCOM**, **PHA** (**Process Hazard Analysis**), **FMEA**, **HAZID**, **ISO 14001**, **OHSAS 18001**, **ISO 9001**, Process Safety Management (**PSM**), Safety, Health, Environmental & Quality Management (**SHEQ**), **Behavioral Safety Management**, **Industrial Hygiene**, **Human Factors Engineering**, **Risk Assessment**, Fire Fighting, Rope Rescue Operations, Emergency Response within process industries. He is currently the **President** of **NKWE** and spearheads the companies major projects and business ventures, where he specializes in the areas of **SHEQ** solutions, **ISO**, **Quality Control** and **OSHA systems**. Previously, he has had much on–hand experience in the initiation and management of projects (technical as well organizational development) including involvement in **design of process plants**; **the commissioning & decommissioning** of process plants; the **operational and financial responsibility** for large process operations; **risk management**; **operational and maintenance management**, **crisis and emergency management**, **accident investigation**, **risk assessment**, **hazard identification** and **emergency preparedness & response** (oil spillage and gas explosions).

Much earlier in his career, Mr. Christian was a **HAZOP Team Leader** for numerous **HAZOP** studies and he has further managed the **Health, Safety & Environmental** and **Quality** requirements of a large process company. This included responsibilities as an auditor for compliance against **SHEQ standards**, **ISO standards** and the **Fatal Risk Control Protocols**. He then facilitated the development and implementation of the above standards as a group and at site level as part of the SHEQ council. Moreover, he established, trained and led a Rope rescue team and a high level emergency care clinic and ambulance service for many years. He still abseils recreationally and leads adventure groups during abseiling activities and serves as a rescue team member for mountain and water emergencies.

During his career life, Mr. Christian has gained his practical and field experience through his various significant positions as the **Plant Manager**, **Project Metallurgist**, **Metallurgist**, **HSE Team Leader**, **SHEC Superintendent**, **Mentor**, Instructor/Trainer, Acting **Technical Manager**, **Process Plant Superintendent**, Acting **Project Leader**, Acting **Plant Superintendent**, Appointed **Health & Safety & Environmental Superintendent**, Production Technician, Acting **Senior Shiftsman**, Foreman and Learner – Official Extraction Metallurgy from various companies such as the NKWE Consulting, SAMANCOR, Middleburg Mine Services (Pty) Ltd., Koomfontein Mines, Emelo Mine Services, Gencor Group and South African Defence Force.

Mr. Christian has a **Postgraduate Studies** in **Advanced Executive Programme** and a **National Higher Diploma** (**NHD**) & a **National Diploma** in **Extraction Metallurgy**. He is also a **Certified Auditor** in **OHSAS 18001**, **ISO 14001** & **ISO 9001**, a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**), a **Six Sigma Black Belt Coach** and holds a Certificate in Facilitate Learning Using a Variety of Given Methodologies **NQF Level 5** (**EDTP-SETA**) as a **Certified Facilitator**. He has further delivered innumerable courses, trainings, workshops and conferences globally.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Practical Workshops & Work Presentations
30% Hands-on Practical Exercises & Case Studies
20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1: ***Sunday, 07th of September 2025***

0730 - 0745	*Registration & Coffee*
0745 - 0800	*Welcome & Introduction*
0800 - 0815	***PRE-TEST***
0815 - 0930	***Introduction*** *The Situation • Handling the Situation • Management of the Hazards, or the Potential for Mishap • Why Bother with Risk Management, Anyway? • The Benefits of Risk Management • Scope of Process Risk & Reliability Management • The Risk Spectrum • Steps in Risk Management of a Process Plant • Risk Management Without Numbers • Some Illustrations of the Approach • Define the Context*
0930 - 0945	*Break*
0945 - 1215	***Hazard Identification*** *Introduction • Types of Impact • Typical Types of Incident Leading to the Impact • Types of Process Plant Incidents • Approaches to Systematic Identification of Hazards & Risks*
1215 - 1230	*Break*
1230 - 1330	***Ranking & Short-Listing of Risks*** *Introduction • The Pareto Principle • Two Classes of Risks for Attention • Ranking the Hazards & the Associated Risk Scenarios • Examples of Scoring Systems for Use in Rapid Ranking*
1330 - 1420	***Ranking & Short-Listing of Risks (cont'd)*** *Estimation of the Magnitude of the Consequences or the Frequency, of Operational Losses • Case Studies • Risk Management Without Numbers • Identifying the Questions to be Answered in the Risk Assessment*
1420 - 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2:	***Monday, 08th of September 2025***
0730 - 0930	***Risk & Reliability Criteria*** *Introduction • The Problem with "Acceptable Risk" • Some Everyday Risks • Risks to Members of the Public from New Plant • Risks to Employees • Economic Factors in Risk Criteria • Regulatory Approaches to Setting Risk Criteria • The Meaning & Uses of "As Low as Reasonably Practicable" • Calculating & Displaying the Risks of Potential Losses*
0930 - 0945	*Break*
0945 - 1215	***Assessment of the Severity of the Consequences of Hazardous Incidents*** *Introduction: Calculation Versus Estimation • Fires • BLEVEs • Vapor Cloud Explosions • Other Explosions • Toxic Gas Escapes • Environmentally Damaging Escapes • Assessment of Probability of Fatality Using Probit Mathematics*
1215 - 1230	*Break*
1230 - 1330	***Assessing the Frequency of Likelihood of Potential Hazardous Incidents or Losses*** *Analysis of Causes of Incidents Using Fault Trees • Introduction to Reliability Mathematics • Quantifying Incident Frequency on Fault Trees • Alternative Approach to Assessing the Failure Frequency of a System: The Cutset Approach*
1330 - 1420	***Assessing the Frequency of Likelihood of Potential Hazardous Incidents or Losses (cont'd)*** *Assessing the Probabilities of Various Outcomes using Event Trees • Calculation of Reliability of Units with Installed Spares • Availability & Modelling the Production Capability of a Plant • Methods of Improving Reliability of Control & Protective Systems • Sources of Failure Data*
1420 - 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3:	***Tuesday, 09th of September 2025***
0730 - 0930	***Quantitative Risk Assessment: Computer Modeling, Uses in Setting Buffer Zones, Strengths & Limitations, Uses & Abuses*** *Modeling the Risk • Separation Distances (or Buffer Zones) • Some Experiences with Quantitative Risk Assessment • Summary of the Strengths & Limitations of Quantitative Risk Assessment • Applications of Hazard Analysis & Risk Assessment • Faults in the Application of Hazard Analysis & Risk Assessment • Conclusion*
0930 - 0945	*Break*
0945 - 1215	***A Systematic Approach to Risk Reduction*** *Principles • Transferring the Risk • Reducing Fire Risks in Process Plants • Steps in Design of a New Plant to Maximize Fire Safety • Case Study: Upgrading a Firefighting Water System • Principles of Firefighting • Reducing the Risks in Warehouse Operations*
1215 - 1230	*Break*

1230 - 1330	***A Systematic Approach to Risk Reduction (cont'd)*** *Reduction of Risks in Transport of Hazardous Materials • Reduction of BLEVE Risks • Reduction of Vapour Cloud Explosion Risks • Reduction of Toxic Gas Risks • Reduction of Environmental Risks of Reduction of the Risk of Loss of Reliability • Design for Reliability of Control & Protective Systems • Equipment Design for Reliability & Safety in the Oil & Gas Industry in Particular*
1330 - 1420	***Management of Risk & Reliability of New Plants*** *Introduction • Safety, Reliability & Environmental Specification • Safety, Reliability & Environmental Review • Hazard & Operability Study (HAZOP) • Construction Quality Assurance & Audit • Precommissioning Safety Inspection • Post-Startup Hazop Studies • Special Cases*
1420 - 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4: ***Wednesday, 10th of September 2025***

0730 - 0930	***Management of Risk & Reliability of Existing Plants & Operations*** *Some Principles for Good Management of Process Safety & Reliability • Ongoing Monitoring & Auditing of Process Safety & Reliability • Some Approaches to Assurance of Effective Process Risk Management • Design of a Program for Routine Monitoring of Process Risk & Reliability*
0930 - 0945	*Break*
0945 - 1215	***Management of Risk & Reliability of Existing Plants & Operations (cont'd)*** *Auditing • Critically Important Procedures • Learning from Accidents & "Near Misses"*
1215 - 1230	*Break*
1230 - 1330	***Introduction to "Software" or the "Human Factor": Including Safety Culture, Safety Climate, & Human Error*** *Components of "Software" • Measuring the Standard Software • Effect of Software Standards on Quantitative Risk Assessments • "Safety Culture" & "Safety Climate"*
1330 - 1420	***Introduction to "Software" or the "Human Factor": Including Safety Culture, Safety Climate, & Human Error (cont'd)*** *Senior Management Role In Safety Climate & Culture • Measuring the Climate & the Culture • Human Error*
1420 - 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5: ***Thursday, 11th of September 2025***

0730 - 0830	***Role of the Risk & Reliability Manager*** *Elements of Management • Authority & Responsibility for Performance • Some Management Situations & Tactics*
0830 - 0930	***Role of the Risk & Reliability Manager (cont'd)*** *Line of Inquiry for a Risk & Reliability Manager • Dealing with the Public • The Precautionary Principle*

0930 - 0945	*Break*
0945 - 1215	***Lessons from Incidents***
1215 - 1230	*Break*
1230 - 1345	***Case Studies & Worked Examples***
1345 - 1400	***Course Conclusion***
1400 – 1415	***POST-TEST***
1415 - 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Practical Sessions

This practical and highly-interactive course includes real-life case studies and exercises:-

Course Coordinator

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