Technical training
To request our current list of our open courses or for any other training query, please email: contact@gb.abb.com and we will be happy to help you.
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An introduction to ABB

ABB has a worldwide reputation as a leader in process safety, integrity management and technical engineering services.

We provide technical consulting and engineering services to improve performance in the areas of compliance, operations and engineering to customers in the chemical, petrochemical, oil & gas, power, pharmaceutical and other process industries worldwide.

ABB’s approach to improving business effectiveness through sound personal competence is born of a real need for technical training of professional engineers within high hazard industries. We continue to adapt our training approach to incorporate changes in both legislation and industry good practices.

In high hazard industries, assuring the safety, integrity, reliability and efficiency of operating assets requires effective management of risk. In order to make robust risk-based decisions, there is a need for an appropriate level of competence relating to design features, modes of deterioration, operation and maintenance procedures, fitness for service and human factors. Increasingly therefore, professional engineers need to understand such aspects.

ABB’s technical training for professional engineers embodies the above and encompasses a wide variety of topics from piping and machines, to electrical and civil, from safety and environmental, to reliability and project management.

“We have found ABB to be a company offering very high quality services in a timely, cost effective and professional manner. We look forward to a long term relationship.”

EHS Manager, BP
Our approach to technical training

All our courses are prepared and run by experienced practicing engineers and consultants, with many years experience.

Some courses are accredited / recognised by professional bodies such as:

- The Institution of Chemical Engineers (IChemE) and members will receive a discount on all accredited courses
- The Chartered Institute of Ergonomics and Human Factors (CIEHF)
- Cogent Skills, ABB is an assured provider

The courses are presented in an interactive manner by presentation and discussion of the key issues. Case studies based on actual events and exercises are included to allow delegates to put the new ideas they have learned into practice.

We believe in being flexible and sensitive to specific customer needs. As such, if these cannot be met by existing course content we would be pleased to adapt these courses to suit individual or company needs.

For example:

- In-house courses delivered at client sites present an opportunity for problem-solving workshop sessions, where specific issues from within the work place can be worked through
- Courses can be specifically developed using a range of topic modules, to suit client needs
- One-to-one coaching is also available, tailored to suit the needs of the individual
- In-house courses can be tailored to include customer specific procedures etc.

These courses have been successfully delivered for many years across all industry sectors including chemical, petrochemical, oil & gas, power, pharmaceutical and other process industries.
In-company courses or open dates

If you have a specific team that you wish to train at a given time, our trainers can come to your premises, or any other venue you wish to use.

Our in-company courses are ready to be delivered off-the-shelf, or can be tailor-made to your organisation’s particular needs, policies or even installations, to ensure that the right message is communicated to your people.

We understand that not all companies operate in the same way, so we can work with you to identify your particular competency needs, then customise courses or even combine multiple courses into a structured sequence, i.e. to be part of your graduate development programme or your on-going engineering development programme.

We also run regular open courses scheduled frequently across the year, in locations all over the UK. These courses also offer the opportunity for delegates to temporarily get away from their busy office and network with industry peers.

Our up-to-date course schedule is available online at: www.abb.com/uk/consulting/training
ABBreviations

- **FMECA**
  Failure Modes Effects and Criticality Analysis

- **RCA**
  Root Cause Analysis

- **SIL**
  Safety Integrity Levels

- **LOPA**
  Layer of Protection Analysis

- **ATEX**
  ATmospheres EXplosives

- **HAZOP**
  HAZard and OPerability study

- **DSEAR**
  Dangerous Substances and Explosive Atmospheres Regulations

- **SIF**
  Safety Instrumented Functions

- **PSM**
  Process Safety Management
Booking and contacts

Our team is happy to work with you to understand your individual needs and find the best training solution for your people.

For course enquiries, contact our training administrator:

Jackie Kendall
+44 (0)1642 372 121
jackie.kendall@gb.abb.com

Alternatively you can visit our website: www.abb.com/uk/consulting/training where you can see further details, dates and locations of all of our courses along with links to book your place online.
**Reduced terms and conditions**

For full terms and conditions follow this link: [www.abb.com/uk/consulting/training](http://www.abb.com/uk/consulting/training) and select the booking and contacts link.

Cancellations made up to 28 days prior to the event will be subject to an administration fee of £50. Cancellations made 27-14 days prior to the event will be subject to a cancellation fee of 50%. Cancellations made thereafter will be subject to the full event fee, however a substitute delegate can be named at any time.

Prices apply to bookings made prior to 31st December 2018. Payment is due at the end of the month following the date of the training course. Accommodation is not included in the prices.

It may be necessary for reasons beyond the control of the organisers to cancel the event, alter the content, change the timing of the programme, or the listed speaker(s).

Please note: For courses held in hotel venues: If you request overnight accommodation at the hotel and then choose to cancel less than 2 weeks prior to the event, then it is your responsibility to pay any cancellation fees. Any event fee already settled will be refunded if the event is cancelled by ABB. Travel expenses will not be covered.

For courses held in ABB locations: ABB withholds the right to cancel the event up to one week before the event. Therefore, we recommend any accommodation and travel bookings are flexible.
Meet some of our tutors

Graeme Ellis
Specialist Safety Consultant

Graeme has over 33 years experience in the process industry, originally training as a chemical engineer and now a Fellow of the IChemE and member of the Energy Institute Process Safety committee. He started training on ICI’s well recognised hazard study awareness course in the mid 1990’s, and has since been involved in training for hazard study leaders, static hazards and process safety in design.

More recently Graeme was involved on the ‘expert panel’ developing training standards for process safety, and has since delivered training to senior executives and site based staff through the National Skills Academy.

—I derive great pleasure from the opportunity to pass on best practices and experiences gained across all sectors of the process industry, hopefully playing a part in making our industry a safer place to work.”

—

“Each group of delegates presents new challenges, trying to understand their level of experience and adapting the delivery to best meet their needs and to make the course as interesting and interactive as possible.”
Chris Flower
Chemical Engineering Specialist

Chris has over 15 years of process engineering experience. Throughout his career he has been involved in pressure relief be it, designing new systems, reviewing existing systems or validating systems designed by others across the whole range of process industry sectors.

Chris has led the pressure relief course for more than 10 years training over a 100 delegates a year.

“Training is a vital part of our industry, passing on good practice as well as the real life experiences that cannot be captured in guides and standards.”

“Training is a rewarding experience and we try to have as much fun as possible while spending three intensive days.”
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### New for 2019

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Process safety
Achieved Safety Integrity Level (SIL)

Process Industries rely upon the performance of Safety Instrumented Functions (SIFs) to protect and maintain operating assets. Engineers and designers are required to calculate the probability of failure of these SIFs to be able to express this performance as a SIL.

ABB has created this two day course for engineers or designers who require more detailed training in the concepts and principles that underpin the IEC 61511 functional safety standard and its use for calculating the SIL of a proposed or existing SIF.

What the course will cover?
The training course is structured around instruction and workshops that initially explain the underlying concepts of SIL calculation demonstrated on simple SIFs, then progress through more complicated designs and techniques that are required for higher Safety Integrity Levels.

Who will benefit and what will they gain?
The course is aimed at engineers and designers involved in calculating or verifying the performance of new or existing safety instrumented functions. The course has plenty of workshops to enable delegates to practice using the formulae on ever increasing complex examples.

Following the course you will be able to:

- Understand the concepts underpinning SIL calculation
- Identify what information is essential before starting the SIL calculation

In-company / open course: Yes / Yes
Duration: 2 days

- Apply correct formulae for serial or parallel instrument configurations
- Derive instrument failure rates from commonly available sources
- The benefits and disadvantages of manufacturers certificates
- Appreciate the complexities of a 'human in the loop'
- What checking and approval is needed for different Safety Integrity Levels
- Calculate the SIL

Course leader
Paul Lucas is a principal safety consultant at ABB with over 35 years' experience of real-time computing and instrumented safety in the process chemical, oil & gas and pharmaceutical sectors. He designs and delivers ABB’s training courses and seminars on the practical implications for end users, system integrators and instrument technicians in the use of the IEC61511 functional safety standard, on managing Functional Safety and detailed design of safety instrumented functions. In recent years, Paul has completed a Master’s degree in Ergonomics and Human Factors to gain theoretic background in support of many years operational experience in the assessment and analysis of Human Factors in Safety Critical tasks, including Task analysis and Human Error Analysis (HEA).
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*ABB reserve the right to amend the course agenda.
Advanced hazard assessment techniques for SIL determination

Management of risk and the demonstration of appropriate risk reduction measures are becoming increasingly important in industry today. This can be relevant to compliance with aspects of legislation, such as COMAH, and in the application of standards such as IEC 61508 and IEC 61511.

This course is designed for those who need to understand the causes and sequence of failure that can lead to significant hazardous events occurring and be able to identify the key contributors to the level of risk - to people, business or the environment.

Topics include:

- Calculation of hazardous event frequencies
- Assessment of risk reduction from protective systems and Safety Integrity Levels (SIL)
- Criteria for tolerable levels of risk
- Assessment of demand frequency on protective systems

What the course will cover?
On completion of the course you should be able to demonstrate a working knowledge of SIL and hazard assessment including:

- Logical analysis, using fault tree techniques of scenarios leading to hazardous events
- Use of data and its application to predict the likelihood of a hazardous event
- Development of practical hazard criteria
- Handling of dependent or common mode failures

In-company / open course
Yes / Yes
Duration
5 days

- Basic human error assessment
- Applying basic SIL and hazard assessment in a variety of situations to help in making more effective and cost effective decisions

This course is also suitable as a basic qualification for those wanting to become hazard and reliability analysts.

Who will benefit and what will they gain?
The effective use of the techniques allows questions to be answered in the areas of safety, health and environment; asset management and maintenance; loss prevention; new investment. Typical attendees would be:

- Process design engineers
- Electrical, control and instrument engineers
- Safety managers and advisors
- Works or technical managers with responsibility for managing risk
- Leaders of HAZOP studies

Typical attendees would probably have:
- Some experience of design and plant operation
- An analytical and structured approach to problem solving

NOTE: This course was previously titled SIL determination and hazard assessment.
### Syndicate topics
- Working with logic gates
- Use of the basic techniques to assess the potential frequency of hazardous events
- Logic diagram development and effect of proof testing
- Logic diagram development and effect of elements common to control and protective systems
- Logic development and use of data
- Use of event trees
- Failure rate for multiple plant items - development of logic
- Use of truth tables in analysing different plant arrangements
- Cost effective decision taking in controlling hazards
- Logic diagram development and the relative merits of shared elements and independent control and protective systems

### Course leader
**Gaynor Woodford-Phillips** is a safety specialist for ABB and specialises in technical process safety which includes carrying out target SIL assessments, quantified risk assessments (QRA) and consequence modelling. Gaynor is a Fellow of the Institute of Chemical Engineers with over 25 years’ experience in project design, operations support and line management in the petrochemical and chemical industries.

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*ABB reserve the right to amend the course agenda.

IChemE members receive discount.
Advanced HAZOP for HAZOP leaders

Are you looking to improve your skills as a HAZOP leader?

Do you want to become a more competent HAZOP leader?

Are you looking for some refresher training on the HAZOP methodology?

Are you looking to continuously improve the way you conduct HAZOP studies?

Do you want HAZOP studies to be more effective?

Are you interested in how best to apply the HAZOP technique to an existing process and keep the HAZOP evergreen through the re-validation process?

The HAZOP methodology is a well established technique used throughout industry for hazard identification and risk assessment. The technique was originally developed in the 1960’s by ICI and guidance on its use was first published in the 1970’s following the Flixborough disaster where an inadequately designed modification led to a large vapour cloud explosion killing 28 people. The technique is formally recognised by many regulators in many parts of the world and details of the HAZOP methodology are outlined in the internationally recognised standard (IEC: 61882 - Hazard and operability studies [HAZOP studies] - application guide).

ABB has provided training in the HAZOP technique for more than 20 years and trained hundreds of personnel.

ABB has also conducted thousands of HAZOP studies for many clients across many industrial sectors. They have a large pool of experienced HAZOP leaders.

What the course will cover?
This course has been developed by ABB’s experienced leaders by reflecting upon those years of experience. ABB have identified both good and best practice techniques to further enhance the methodology and develop advanced HAZOP techniques. Employing advanced HAZOP techniques ensures a greater depth of review is achieved, links to LOPA studies are built, good action specification is implemented, links to alarm management and integrity management. Traditionally the HAZOP technique has been applied during the detailed design stage of a project. This course will show how the advanced HAZOP technique can be applied retrospectively to an existing process and how the HAZOP study can be re-validated and kept evergreen.

Who will benefit and what will they gain?
The course is aimed at reflecting upon existing guidance and providing new improved guidance for experienced leaders. The course is also aimed at providing refresher training for experienced leaders. Note that this course builds upon ABB’s existing four day hazard study leader’s course. The 4 day course or suitable alternative is a precursor to the advanced HAZOP training course.
Benefits
– Detailed guidance on good / best practice techniques
– Opportunity to evaluate good / best practice techniques through workshops
– Refresher training for experienced HAZOP leaders
– Improved consistency of approach to HAZOP studies
– Improved competency of HAZOP leaders
– Improved quality and output from HAZOP studies

Course leader
Graeme Laughland is a safety specialist for ABB and specialises in hazard identification and risk assessment and PSM auditing. Graeme is a chemical engineer with 30 years’ industrial experience gained in design, operations and process safety consultancy. In addition to consultancy assignments he tutors on a range of process safety courses and has presented papers at a number of international conferences.

Agenda*

Introduction
The need for HAZOP studies and improvement - initial project, retrospective, re-validation

Planning and preparation
– Terms of reference workshop
– HAZOP node definition and selection
– HAZOP node workshop

Conducting the HAZOP
– How to fill out the HAZOP table
– Risk ranking

Recommendations
– How to write effective recommendations - workshop

Retrospective and re-validation HAZOPs

Human factors and the human HAZOP
– Human HAZOP workshop

HAZOP and link to SIL determination (e.g. FTA, LOPA) studies

HAZOP nodes for complex systems such as flares, drainage and distribution systems

Report writing

HAZOP studies and the link to asset / mechanical integrity

HAZOP studies and the link to alarm management

Review of the course

*ABB reserve the right to amend the course agenda.
An engineers guide to DSEAR

Employers have now been living with the Dangerous Substances and Explosive Atmospheres Regulations (DSEAR) since 2002. However, there remain a number of questions regarding the best route to compliance in a pragmatic and cost effective way.

ABB have helped a large number of customers with DSEAR issues across a number of sectors including oil and gas, printing, pharmaceutical API production, pharmaceutical research and development, cement, power, steel making and chemicals.

This course provides an overview of different aspects of DSEAR required to operate a safe process and comply with the requirements of the legislation. It will be presented by an experienced safety consultant with input from a leading manufacturer of certified equipment in the UK and an operator of a complex and potentially hazardous flammable process.

You will learn the fundamentals of DSEAR and take away an action plan to check your facilities against the requirements of the legislation and be able to identify potential improvements in your current compliance strategy.

In-company / open course: Yes / Yes
Duration: 1 day

What the course will cover?
– Properties of flammable materials
– DSEAR risk assessment
– Area classification
– Hazardous area equipment
– Certification and retrospective assessment of mechanical equipment

Who will benefit and what will they gain?
Industry engineers and managers with responsibility for any element of the management of areas where there could be flammable or explosive atmospheres.

Course leader
Peter Hodgson is a safety specialist with over 10 years of experience in the ATEX and DSEAR field, including hazardous area classification, DSEAR compliance, and mechanical equipment risk assessment, in many industries including oil & gas, chemicals, paints and coatings, material handling, pharmaceuticals and offshore.
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<th>Course agenda*</th>
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<tr>
<td>Registration and coffee</td>
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<tr>
<td>Introduction and overview of legislation</td>
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<td>Properties of flammable materials</td>
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<td>Hierarchy of control and area classification</td>
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<tr>
<td>Area classification exercise</td>
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<td>Overview of certified equipment</td>
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<td>Coffee / tea</td>
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<tr>
<td>ATEX certification for fans</td>
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<td>Retrospective certification for mechanical equipment</td>
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*ABB reserve the right to amend the course agenda.
Area classification

What is your process? Can you have combustible / flammable atmospheres?

Have you identified the likelihood of a combustible or flammable atmosphere occurring?

As part of the overall assessment have you a documented area classification?

The classification of hazardous areas is an integral part of the overall risk assessment process required under Regulation 7 of the Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR) and Regulation 9 of the Prevention of Fire and Explosion and Emergency Response Regulations 1995 (PFEER).

Its purpose is to define the extent, frequency and duration of an explosive atmosphere (the zone). The zone in turn defines the requirements for the selection of equipment and protective systems so as to control sources of ignition.

Compliance with DSEAR is mandatory for any onshore operator handling dangerous substances and PFEER for any operator of fixed offshore installations.

What the course will cover?

– Introduction to DSEAR (2002) and in particular the requirements for area classification and selection of equipment to avoid ignition sources
– The flammability of gases, vapours and dusts and how they relate to area classification

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– Introduction to BS EN 60079-10-1:2015 the British Standard for area classification relating to gases and vapours. The scope of this standard is addressed, in particular the grading of releases and the effect of ventilation
– The course provides an overview of two widely used codes, EI15 edition 4 and SR25 edition 2 including syndicate exercises
– Introduction to BS EN 60079-10-2:2015 the British Standard for area classification relating to dusts. The scope and use of this standard is addressed, complete with a syndicate exercise

Who will benefit and what will they gain?

The course should suit recent graduates and experienced staff with operations, process, engineering and safety responsibilities.

On completion you should be able to:

– Understand why area classification is carried out
– Understand the principles of area classification
– Understand the steps in the area classification procedure
– Identify the grades of release and how they relate to zoning
– Appreciate the industry codes available that can be used to establish the extent of zones
– Understand the requirements for selection of equipment to be installed in potentially explosive atmospheres
– Join an area classification meeting and work under the direction of an experienced practitioner

**The training method**
Lecture presentations are supplemented with case studies and syndicate exercises.

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**Day one agenda***

Introduction to DSEAR (2002) and how area classification plays an integral part in assessing the risk to personnel

The flammability of gases, vapours and dusts and how they relate to area classification equipment for use in hazardous areas
– New equipment
– Existing installed equipment

BS EN 60079-10-1:2015 (Gases & Vapours) - British Standard ‘Classification of hazardous areas’.
– Introduction to this standard
– Scope and use
– Procedure

Use of an 'Industry Code' (1).
– The institution of Gas Engineers (IGE/SR/25) edition 2 ‘Hazardous area classification of natural gas installations’
– Scope and use

**Day two agenda***

Use of an 'Industry Code' (2)
– Overview
– Structure

BS EN 60079-10-2:2015 (Dusts) - British Standard ‘Classification of areas where combustible dusts are or may be present’
– Introduction to this standard
– Procedure
– Syndicate exercise using BS EN 60079-10:2

Forum and close

*ABB reserve the right to amend the course agenda.

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**Course leader**
Peter Hodgson is a safety specialist with over 10 years of experience in the ATEX and DSEAR field, including hazardous area classification, DSEAR compliance, and mechanical equipment risk assessment, in many industries including oil & gas, chemicals, paints and coatings, material handling, pharmaceuticals and offshore.

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IChemE members receive discount.
ATEX / DSEAR for mechanical technicians

Are your mechanical engineering teams aware of the requirements of ATEX / DSEAR compliance for the equipment installed within your asset?

With the advent of the ATEX directives there are new requirements for the specification, installation, inspection, maintenance and repair of mechanical equipment installed in hazardous areas. ABB is working for operators in the process industries to achieve and maintain compliance for their assets. Providing a practical perspective based on real life experience comes naturally.

What the course will cover?
As part of its overall Dangerous Substances and Explosive Atmospheres Regulations (DSEAR) compliance programme, an end user operator will be required to provide the facility mechanical technicians with awareness training in the ATEX directives and the DSEAR regulations. This short course is designed to give you an appreciation of the following:

- A brief introduction to the ATEX 95 and 137 directives, DSEAR and the equipment supply regulations
- An introduction to hazardous area classification
- The risk assessment requirements for existing mechanical equipment
- Mechanical equipment certification and marking
- The purchase of new mechanical equipment
- The maintenance and inspection of mechanical equipment located in hazardous areas

Who will benefit and what will they gain?
The course will provide a clear understanding of the best practice requirements for mechanical equipment operating in potentially flammable atmospheres. The course has been designed to be of benefit to mechanical technicians and supervisory staff. It will also provide other engineering disciplines with an overview of the requirements for mechanical equipment compliance.

Course leader
Peter Hodgson is a safety specialist with over 10 years of experience in the ATEX and DSEAR field, including hazardous area classification, DSEAR compliance, and mechanical equipment risk assessment, in many industries including oil & gas, chemicals, paints and coatings, material handling, pharmaceuticals and offshore.

In-company / open course  Yes / No
Duration  ½ day
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### Introduction
- ATEX Directives, DSEAR and EPS Regulations
- General requirements and duties
- Introduction to hazardous area classification
- Risk assessment of existing mechanical equipment
- Mechanical equipment certification and marking

### Coffee
- Purchasing new mechanical equipment
- Maintenance and inspection of mechanical equipment located in hazardous areas
- Quiz (clarification of learning)
- Questions and discussion of mechanical equipment compliance issues

### Close

*ABB reserve the right to amend the course agenda.*
Deep dive audits and assessments

A practical one day training course for personnel who want to conduct deep dive audits and assessments of Major Accident Hazards (MAHs).

Over recent years the process industries have experienced many major accidents which have led to higher technical standards and tighter legislative controls. Many companies have conducted Process Safety Management (PSM) systems type audits and may believe that all is under control. However, incidents continue to occur and this suggests that more needs to be done. A growing number of organisations are becoming increasingly aware that process safety issues need to be managed in a risk-based way linked to their business needs, but also cost effectively. Good PSM must embrace the way in which people, plant and systems all inter-relate:

– Plant and equipment must be of an appropriate design standard / integrity and be adequately maintained
– Systems / procedures must be fit for purpose and practicable
– People must be adequately competent and work within a positive cultural framework that encourages safe behaviour and a belief that any injury, harm or damage can be avoided

Deep dive audits and assessments provide a thorough streamlined review of the robustness of barriers protecting against major accident hazards and so the technique differs from a more commonly conducted PSM systems audit. Findings provide a clear tangible link to an asset’s key major accident hazard risks.

This technique is a novel tool which can be used to help rapidly assess the adequacy of controls for major accident hazards. The technique focuses on reviewing a facilities key risks by asking the following 3 questions:

– Do we understand what could go wrong?
– Do we know what our systems are to prevent this from happening?
– Do we have information to assure us that they are working effectively?

The deep dive audit and assessment tool can help to ensure that a company:

– Has control of the key process safety aspects of the business
– Achieves the process safety performance improvements needed
– Spends money on process safety management and improvement in the most effective way
– Has a consistent commitment to process safety throughout the business
– Has access to the skills, resources and expertise required

What the course will cover?
The course uses a lively mix of interactive presentations, case study examples and typical findings from ABB’s experience of using this technique, exercises and videos. A workshop is included to help delegates develop a plan for integrating deep dive audits and assessments into their PSM system assurance program.
Who will benefit and what will they gain?
The course will be of benefit to personnel who want to obtain assurance with regards to the controls of their MAHs using the deep dive audit and assessment methodology. The course is of benefit to personnel who have responsibilities under the COMAH regulations for the control of MAHs. ABB’s experience is that personnel with responsibilities for PSM and integrity management have the right skill sets and are well placed to conduct deep dive audits and assessments. On completion of this course you will have an understanding of how to:

– Conduct a deep dive audit and assessment using ABB’s proven techniques and methodology
– How to plan and prepare for a deep dive audit and assessment
– How to carry out effective interviews with site personnel
– What plant records to check and things to look out for on plant tours
– How to write a deep dive audit and assessment report
– How to establish a deep dive audit and assessment program into a company’s PSM system

Course leader
Graeme Laughland is a safety specialist for ABB and specialises in hazard identification and risk assessment and PSM auditing. Graeme is a chemical engineer with 30 years’ industrial experience gained in design, operations and process safety consultancy. In addition to consultancy assignments he tutors on a range of process safety courses and has presented papers at a number of international conferences.

Course agenda*

| Registration and coffee |
| Introductions and objectives of the day |
| Buncefield incident |
| Process safety barriers - their importance and their nature re: verification |
| Identifying and defining barriers and exercise |
| Scoping the barrier verification requirements |
| Planning a deep dive barrier verification study |
| Conducting a deep dive barrier verification |
| Exercise scoping barrier verification requirements |
| Interviewing |
| Barrier verification as an integral part of monitoring and reviewing PSM arrangements |
| Path forward workshop |
| Course review |

*ABB reserve the right to amend the course agenda.
Effective alarm management
The practitioners course

Edition 3 of EEMUA 191 - Are you up to speed with the latest changes and improved guidance?

Are you confident that your alarm system is effective?

Do you know if your operators are burdened with too many alarms and how this might be improved?

Could you miss key safety or environmental alarms during an incident?

Alarm systems themselves need to be managed; the alarm system needs to be configured in a consistent manner so that the operator is in a position to take the most appropriate action. ABB’s practical approach to alarm management takes you through the full alarm lifecycle covering the Projects, Operations and Maintenance phases. As well as offering guidance for alarm specification and design, we will help you to identify and solve problems with existing systems such as nuisance alarms. While reduced legislative risk continues to be a major driver, significant financial savings can be achieved from a well designed and maintained alarm system which provides operators with an effective tool to deliver operational benefits including increased up time, higher OEE, improved maintenance and tighter product quality.

What the course will cover?
– Standards and guidance; ASM, ISA, HSE, NAMUR. The course is based on the requirements of ISA 18.2, and IEC 62682, supplemented as appropriate by the good practice guidance contained in EEMUA 191
– The alarm management lifecycle; requirements, recommendations and good practice for alarm identification, specification, design and implementation. Including human factors and HMI design
– Alarm system documentation; alarm philosophy, alarm system requirements specification and master alarm database
– Setting of performance targets
– Managing your alarm system for continuous improvement; the role of performance measurement, monitoring and review. Alarm monitoring and logging tools. Alarm analysis techniques
– Advanced alarm management, tools and techniques, risk / benefit considerations
– Drivers and benefits for prospective and retrospective alarm rationalisation

Who will benefit and what will they gain?
This course is suitable for anybody involved in the specification, design, operation and maintenance of control systems or anyone who has an interest in improving their current alarm system.

On completion you should be able to:

– Understand why your alarm system should be managed
– Identify and evaluate the associated benefits
– Have a good awareness of ISA 18.2 and the latest standard IEC 62682 requirements

In-company / open course | Yes / Yes
Duration | 3 days
and recommendations and the guidance contained in EEMUA 191
- Better understand the value and role of alarms
- Develop an alarm philosophy and design and implement an alarm schedule / database
- Apply requirements and good practice to the identification, specification and design of new alarms
- Have an understanding of the need and benefits of performance measurement and what tools are available
- Have an understanding of the continuous improvement cycle for alarm management
- Identify nuisance alarms and assemble a toolkit that helps reduce them
- Understand the process, inputs and deliverables from an effective alarm rationalisation exercise

The training method
This is a highly interactive course in which lecture presentations are supplemented with practical examples, case studies, and individual & group exercises to reinforce the formal learning.

Course leader
Colin Bartliff is a senior safety specialist for ABB. He has over 35 years of industry experience in a variety of roles covering process, maintenance, project management, plant commissioning, start-up, technical plant / process troubleshooting and latterly holding a leading positon with a leading chemical company. Colin has held a senior position within ABB, leading several alarm management projects in the UK and abroad. Colin is Hazardous Area (COMPEX) certified and a qualified Functional Safety TUV Engineer.

Day one agenda*
- Alarm management today
- Operating envelopes
- What is an alarm?
- Highly Managed Alarms (HMAs) / protective layer
- Standards and guidelines
- Responding to alarms
- Roles and responsibilities
- Alarm system performance targets
- Alarm system documentation
- Alarm management benefits

Day two agenda*
- Alarm identification
- HMI auditable annunciation prioritisation
- Rationalisation
- Enhanced and advanced alarm methods
- Design considerations (including worked examples)
- Management of Change (MoC)

Day three agenda*
- Alarm logging and analysis tools
- Nuisance alarm review
- Performance monitoring
- Alarm shelving
- Continuous improvement
- Bulk rationalisation
- Alarm analysis

*ABB reserve the right to amend the course agenda.

IChemE members receive discount.
Electrostatic ignition hazards - assessment and control

A practical one day training course on the assessment and control of electrostatic hazards in industry.

Electrostatic hazards are common in all sectors of the process industries during the handling and processing of flammable powders and liquids. Electrostatic sparks are capable of ignition of flammable vapours, gases and powders resulting in potential fire and explosion. On average, one incident relating to static electricity occurs every day throughout the chemical industry in Europe.

The Dangerous Substances and Explosive Atmospheres Regulations (DSEAR) came into force in July 2003. One important requirement for compliance is to carry out an assessment of potential ignition sources including electrostatic hazards.

What the course will cover?
– How static can be generated on your plant
– How to identify which operations on your site are most at risk from electrostatic hazards
– Options for risk reduction and management of the hazard

Who will benefit and what will they gain?
The course will benefit delegates from all industry sectors handling flammable gases, vapours or powders.

Course leader
Graeme Ellis is a specialist safety consultant providing PSM related services within the high hazard process industry. He specialises in risk assessment for new processes and existing plants, inherent safety, fault tree analysis, consequence assessment, basis of safety development, electrostatic hazards, fires and explosions. Graeme is a Fellow of the IChemE and member of the Energy Institute Process Safety committee with over 33 years experience in the process industry in design, operational and consultancy roles.
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<tr>
<td>Introduction</td>
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<td>Exercise: Petrol station incident</td>
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<td>Overview of flammability hazards</td>
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<td>Generation of electrostatic charge</td>
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<td>Charge accumulation</td>
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<td>Exercise: Electrostatic hazard identification</td>
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<td>Electrostatic discharges</td>
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<td>– Avoiding flammable atmospheres</td>
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<td>– Preventing charge generation</td>
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<td>– Earthing and bonding</td>
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<td>– Explosion protection</td>
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<tr>
<td>Exercise: Road tanker loading</td>
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<td>Incident case studies</td>
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*ABB reserve the right to amend the course agenda.
Hazard study awareness

A practical one day training course to provide improved awareness for hazard study team participants.

In addition to catastrophes such as the accidents at Flixborough, Bhopal, Seveso and more recently at Toulouse, major accidents occur almost daily in the chemical process industry. ICI invented the hazard and operability (HAZOP) study in the 1960s to anticipate hazardous events and ensure that suitable protective measures were included in the process by design. HAZOP has become firmly established as an essential safety tool during the design stage of new processes and significant modifications. Many companies have a suite of hazard studies carried out throughout the project process. Those coming under the COMAH Regulations in the UK use their hazard study process to demonstrate that the risks of their operations continue to be as low as reasonably practicable.

A hazard study is a team-based exercise and the quality of the result is highly dependent on the standard of leadership and the contribution of the study team members. Whilst the need for the study leader to be suitably trained and experienced is well recognised, the study will be greatly enhanced by team members who are fully aware of their role and contribution. The regulatory authorities are increasingly questioning the competence of those involved in safety related activities.

This course is aimed at providing a demonstration that suitable training is being provided, to be backed up by on-the-job experience.

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<td>Duration</td>
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What the course will cover?
The course has modules on the suite of hazard studies throughout a project cycle plus related process safety topics. It uses a lively mix of interactive presentations, worked examples, exercises and videos for both batch and continuous processes.

Who will benefit and what will they gain?
The course will be of benefit to engineering and operations staff likely to be actively involved in hazard study teams for new processes or significant modifications.

On completion of the course you should have greater awareness of:

- A range of hazard study techniques and how these fit into a typical project programme
- Key assumptions and limitations of hazard studies
- Their role in the hazard study process
- Problems that can arise during hazard studies and how the team can help to resolve them
- Related topics such as inherent safety, risk assessment, instrumented protective systems and human factors
Course leader
Graeme Ellis is a specialist safety consultant providing PSM related services within the high hazard process industry. He specialises in risk assessment for new processes and existing plants, inherent safety, fault tree analysis, consequence assessment, basis of safety development, electrostatic hazards, fires and explosions.

Graeme is a Fellow of the IChemE and member of the Energy Institute Process Safety committee with over 33 years experience in the process industry in design, operational and consultancy roles.

Day one agenda*

Registration and coffee

Learning from accidents:
- Notable accidents in the process industry
- Common causes of accidents
- The changing legislative environment

Introduction to hazard studies:
- Brief history of hazard studies
- Legislation and published guidance
- The 6-stage hazard study process
- Timing of studies in the project lifecycle
- When can hazards be identified - syndicate exercise

Early hazard studies:
- Checklist - Hazard study 1 method
- Applying inherent safety effectively
- What if - Hazard study 2 method
- Worked example of top-down study method
- Risk assessment methods and when to apply
- Example of the use of risk matrices

The HAZOP study:
- HAZOP study method, timing and team composition
- Continuous and batch plant HAZOP - syndicate exercises
- Recording HAZOPs and resolving actions
- Team leading skills and pitfalls
- Awareness of safety instrumented system design
- Taking account of human factors

Control of change:
- Examples of changes that have gone wrong
- Good industry practice for change control
- The importance of a suitable assessment
- When are full hazard studies required?
- Handling temporary modifications

Pre start-up safety review:
- Hazard studies during commissioning
- Case studies of faults during construction
- Use of checklists for hazard studies 4 and 5
- The benefits and procedure for hazard study 6

*ABB reserve the right to amend the course agenda.
Hazard study leaders

Hazard studies (including HAZID and HAZOP) are an essential element in managing the Process Safety impact of new projects and the ongoing operation of existing plants.

The techniques covered in this course are directly applicable to all industry sectors including chemicals, petrochemicals, oil & gas, pharmaceuticals, fine chemicals and utilities. They are well proven and highly effective for identifying hazards, assessing risks and developing improvement plans. This course will train you in the ABB techniques of the 8 stage hazard process and will develop the necessary skills to lead a team in carrying out hazard studies.

**ABB’s 8 stage hazard study stage**
The 8 stage hazard study process covers the full lifecycle of a project. It starts at the feasibility stage of a project with a study of the inherent safety of the project concept. The 8 stage hazard study process then mirrors the development phases of the project through detailed design, construction, commissioning, and ongoing operation. At each stage there is a hazard study technique which aligns with the needs and level of development of the project.

The 8 stage hazard study process has been developed by ABB over many years following the invention of HAZOP studies, to include HAZID studies to identify major accident hazards in early process design.

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This phased approach to process safety assessments during the life of the project reduces the likelihood of discovering significant safety or environmental problems in the later stages of the project and ensures cost effective risk management. The ABB hazard study process can be applied to continuous and batch processes, non-chemical systems and PLC control systems, new projects, modifications, and existing plants.

**What the course will cover?**
The course consists of a series of training modules that deal with the 8 hazard study stages, plus sessions on related topics designed to improve the capability of hazard study leaders. Presentations are interactive with some video illustrations. A series of team exercises are used for the process design stage hazard studies (including HAZID and HAZOP), to give the attendees a chance to put into practice what they have learnt during the lecture presentations.

**Who will benefit and what will they gain?**
Typical attendees would be process design engineers, safety managers, advisors, engineers and works or business technical personnel who are likely to lead Hazard Studies on a regular basis.
**Course leader**

Stephen Beedle is a safety specialist working in the areas of risk assessment, fire and explosions, fault tree analysis, process hazard review and COMAH safety reports.

Stephen is a senior hazard study leader and has been a course tutor on the ABB hazard study leaders course for several years.

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<td>- Hazard Study 1 - early identification of hazards</td>
<td>- Guided exercise - development of fault trees to assess hazards</td>
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<td>- The phased 8 stage hazard study system</td>
<td>- Tolerability of risk, what risks are acceptable</td>
<td>- Syndicate Exercises</td>
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<td>- Fires and explosions hazards</td>
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<td>- Hazard Study 2 / HAZID - establish the basis of safety</td>
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<td>- Reliability of instrumented protective systems</td>
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<tr>
<td>- Hazard Study 3 / HAZOP</td>
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<td>- Team leadership, how to lead an effective hazard study</td>
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<tr>
<td>- Hazard Studies 4 &amp; 5 - pre commissioning studies</td>
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<td>- Hazard Study 6 - feedback from an operating plant</td>
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<td>- Process control computers and programmable systems</td>
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*ABB reserve the right to amend the course agenda.

IChemE members receive discount.
Human factors and incident investigation

This training course will equip delegates with a toolkit to enable them to carry out incident investigations using real case studies from the process industries.

The course focuses on human error as a cause of incidents, how human factors can be addressed during incident investigation and the cause tree analysis technique.

What the course will cover?
Session 1 - Incident causation
The benefits of good incident investigation are reviewed and the domino theory of incident investigation is explained as the basis for structured cause analysis.

Session 2 - Human error and incident investigation
The SRK human error model is developed from practical process industry examples and then an exercise is used to test understanding and consider the difficulties of addressing human error using a real process incident. This is followed by consideration of the way that corrective actions can be developed according to the types of errors that are encountered.

Session 3 - The incident investigation process
The basic investigation process - from evidence collection to corrective action development - is reviewed, including good practice for evidence collection and witness interviews.

Session 4 - Cause tree analysis
The technique of cause tree analysis is explained and a number of real examples, of increasing complexity, are reviewed to point out the key facets and good practice.

Session 5 - Cause tree analysis exercise
A syndicate exercise, based on a real incident, is used to enable delegates to work in teams constructing a cause tree. A significant amount of time is allocated to enable delegates to explore the challenges of using the technique. Learning from delegates’ experiences is then shared.

Who will benefit and what will they gain?
This course has a high practical input of tools and techniques and is aimed at those required to conduct or participate in incident investigations, including safety professionals, supervisors and plant managers. The course is applicable to all types of industrial incident.

Course leader
Robert Fogg is a safety specialist and a chartered chemical engineer with over 20 years of industrial experience. Rob provides PSM services including: hazard studies, Safety Integrity Level (SIL) determination studies, COMAH safety reports, and PSM support. Rob’s experience includes management of change, project planning and coordination, hazard management and operator training.
**Agenda**

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*ABB reserve the right to amend the course agenda.*
Human factors in the workplace

Most process industry companies acknowledge their workforce as their most important asset. Human ‘assets’ are both flexible and adaptable, making them unique and valuable in a variety of situations.

Unfortunately the very attributes that make people valuable to the production organisation leaves them prone to error, which itself leads to the potential for safety incidents and unplanned outage. Managing and reducing human error potential brings benefits to both safety performance and efficiency, reducing both incidents and outages.

The practical application of human factors principles (sometimes known as ergonomics) is a current industry ‘hot topic’, with increased attention being shown in the subject by production management, safety professionals, insurance inspectors / assessors and national regulators.

What the course will cover?
The course runs for three days; day one is an introduction to human factors in the workplace; day two covers tangible measures to assess and improve human performance in operations, with day three bringing in human factors in design.

The course utilises case studies from the process industries and from other industries such as nuclear, aerospace, and transport in order to illustrate key points and learning from the widest possible experience base. Learning will be reinforced with group and individual exercises building on the course materials presented.

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<th>In-company / open course</th>
<th>Yes / Yes</th>
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<tr>
<td>Duration</td>
<td>3 days</td>
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Who will benefit and what will they gain

The course is suitable for production management personnel, safety professionals and engineers in the process industries, requiring a practical introduction to this broad subject area.

Delegates will return to the workplace equipped with a practical questionnaire allowing them to assess their operating unit against current best practice, and to identify areas of weakness or opportunities for improvement in safety and operating culture.

Alternatively the course can be run at your location - price on application.

Course leader

Tony Atkinson is a safety specialist who specialises in human factors and process safety. Tony has over 30 years experience in the process industries, both within operating companies and as a consultant. He is a TUV certified functional safety engineer and has an MSc in ergonomics (human factors).
**Agenda***

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*ABB reserve the right to amend the course agenda.*
Human reliability analysis workshop

A one day interactive workshop for people leading or participating in human reliability analysis at high hazard sites.

What the workshop will cover?
The workshop uses real world hazard studies, process descriptions, equipment photos and operating procedures. The delegates take these through the steps of:

- Identification and management of safety critical tasks
- Hierarchical task analysis
- Human reliability analysis
- Consideration of performance influencing factors
- Key competency identification
- Hierarchy of control review
- Demonstration of ‘ALARP’

The roles of operators and managers are played by ABB personnel allowing delegates the experience of eliciting ‘real world’ operating history and practice. Specimen answers are discussed and critiqued by the group. The process is software driven and PCs and software will be provided for the duration of the workshop.

Who will benefit and what will they gain?
- Those attending the ‘ABB 3 day Human Factors in the Workplace course’, for whom it will provide an ideal opportunity to apply and consolidate the knowledge gained on the course
- Previous attendees of the above course, or any other similar course, wishing to develop their knowledge
- Those working in the field of human factors and human reliability, especially in the process and related industries, and wishing to gain further insights and CPD
- The workshop assumes that all delegates have some basic knowledge of the topics covered as the focus is on application of practical techniques to an example situation

Workshop facilitators
Sarah Harrison is a specialist safety consultant with ABB. She has worked for ABB for 6 years, in both process engineering and process safety. Previously, she has a wide range of technical and operations experience in the chemical and petrochemical industries on high-hazard and complex plant.

Johanna Smith is a safety specialist with ABB. She has worked for ABB for 6 years, both in the UK and in the US, gaining experience in a wide range of process safety areas, specifically safety critical task analysis. She has a master’s degree in chemical engineering.
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<td>ALARP</td>
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*ABB reserve the right to amend the agenda.*
IEC 61508 / 61511 SIL determination

A practical training course in the appreciation of SIL determination to the technical requirements of IEC 61508 / 61511.

Industry today relies upon safety systems to maintain and protect operating assets. Businesses seek to maintain operating effectiveness and reduce spurious trips whilst achieving a safety target appropriate to the circumstances. Fundamental to this process is the determination and implementation of the safety requirements for the safety system.

From the IEC 61508 / 61511 standards, the Safety Integrity Level (SIL) is fundamental in ensuring a safety related system satisfactorily performs the required safety functions under all stated conditions within a defined time period.

It is an assessment of the risk reduction required to give a tolerable level of risk. Inappropriate SIL determination can affect the safety integrity of the asset protection envelope and may in some cases place the asset integrity under threat. In addition to this, unnecessary spend in capital and operational budgets can be incurred. In contrast, properly defined SILs allow for significant cost improvements to be achieved in both Greenfield and Brownfield operating environments.

Asset operational effectiveness is ensured by periodic testing of safety instrumented functions to maintain SIL performance and optimise the cost of ownership.

### In-company / open course

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<th>Yes / Yes</th>
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<tr>
<td>Duration</td>
<td>2 days</td>
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### What the course will cover?

- Understanding the concepts of SIL determination and the principles of IEC 61508 / 61511
- Explaining the key terms and concepts which underpin a systematic consideration process for safety and protective systems in respect to SIL
- Understanding the importance of SIL determination
- Determine where present practice is in line with the requirements of these standards and identify where improvements are necessary
- Implementing the SIL determination methodology

### Who will benefit and what will they gain?

The course will be of benefit to all managers and engineers with a responsibility for the management and technical requirements of Safety, Health and Environmental protective programmes.

**Course leader**

Gaynor Woodford-Phillips is a safety specialist for ABB and specialises in technical process safety which includes carrying out target SIL assessments, quantified risk assessments (QRA) and consequence modelling. Gaynor is a Fellow of the Institute of Chemical Engineers with over 25 years’ experience in project design, operations support and line management in the petrochemical and chemical industries.
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<tr>
<td>Review and feedback</td>
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*ABB reserve the right to amend the course agenda.
Layer of Protection Analysis (LOPA)

A practical one day training course to provide an awareness and basic understanding of LOPA.

Regulations today ask industry to manage risk by assessing the risk and taking appropriate action.

LOPA is a method of risk assessment which is used to carry out SIL determination to comply with the IEC 61508 / 61511 functional safety standards, but is increasingly used in early in design to assess whether further risk reduction is required.

LOPA is a tool that can be calibrated at the time of use to allow assessment of the risk reduction required to give a tolerable level of risk. Inappropriate use and application of LOPA can adversely affect the integrity of layers of protection specified. Either resulting in insufficient risk reduction or over specification leading to unnecessary spend in capital and operational budgets.

What the course will cover?
- Basic risk assessment concepts and criteria, risk aversion, tolerability including an exercise
- Hazard identification, assessing frequency and consequence
- Identifying initiating causes and independent layers of protection (IPLs)
- LOPA use with several practical exercise examples
- The impact of humans in the equation
- Selection and application of data within a LOPA
- Illustration of importance of independent layers or protection

Who will benefit and what will they gain?
This course will be of benefit to managers and engineers who need to use LOPA as a method of risk assessment.

On completion of the course, you should be able to:
- Carry out a risk assessment using LOPA and appreciate the potential pitfalls
- Understand its application in SIL determination

Course leader
Gaynor Woodford-Phillips is a safety specialist for ABB and specialises in technical process safety which includes carrying out target SIL assessments, quantified risk assessments (QRA) and consequence modelling. Gaynor is a Fellow of the Institute of Chemical Engineers with over 25 years’ experience in project design, operations support and line management in the petrochemical and chemical industries.
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*ABB reserve the right to amend the course agenda.*
Management of Change (MoC)

A practical one day training course for personnel who are responsible for and/or who are involved in the topic of MoC at Major Accident Hazard (MAH) sites.

All COMAH and Offshore Safety Case (OSC) regulated establishments are required to have a Process Safety Management (PSM) system, and within such a system, the topic of MoC must be addressed. MoC is one of the most important elements of a PSM system as it helps to ensure that safety is maintained on a day to day basis. Industry continues to suffer from loss of containment events associated with poor MoC, so what are the essential features of a good MoC system and how does the MoC system link with other elements of process safety?

ABB’s experience is that there is no commonly adopted industry standard covering the topic of MoC and as such companies have developed bespoke systems over many years. Has the system changed so much that the focus on the essential features been lost, thereby increasing the risk of a MAH? Are users of the MoC system fully aware of what is key to effectively manage change?

In-company / open course

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<tr>
<th>Duration</th>
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<td>1 day</td>
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What will the course cover?

This training course will explain the principles and essential features of a MoC system and will discuss the practical application of such systems to changes to Process Safety Information (PSI) and organisational change. The course includes incident case studies where MoC contributed to a major incident.

A workshop is included to help delegates develop a plan for improving their existing MoC system.

Who will benefit and what will they gain?

This course will be of benefit to personnel who want to gain an understanding of industry good and best practice approaches to the topic of MoC. This is both in relation to equipment / process and material changes and organisational changes.

This course will be of benefit to personnel who have responsibilities under the COMAH regulations for the topic of MoC. The course will assist delegates to:

– Identify and correct deficiencies in their MoC system
– Determine ways to continuously improve MoC effectiveness

Having a rigorous and robust MoC system can help companies avoid major incidents and significant business interruption.
Course leader
Graeme Laughland is a safety specialist for ABB and specialises in hazard identification and risk assessment and PSM auditing. Graeme is a chemical engineer with 30 years' industrial experience gained in design, operations and process safety consultancy.

In addition to consultancy assignments he tutors on a range of process safety courses and has presented papers at a number of international conferences.

Course agenda*

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<td>- Links to Process Safety Information (PSI)</td>
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<tr>
<td>MoC – personnel / organisation</td>
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<td>- Principles and essential features</td>
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<td>- Regulatory requirements</td>
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<td>- Key elements of site procedures</td>
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<tr>
<td>- Incident case studies</td>
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<tr>
<td>- Best practice approaches to MoC</td>
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Workshop - What next?

*ABB reserve the right to amend the course agenda.
Pressure relief

Are you equipped to deal with the challenges presented by pressure relief?

There is no doubt that engineers are faced with the ever increasing challenges that pressure relief is imposing on our industry today. Without the correct design methods and tools, overcoming these challenges would be virtually impossible.

ABB has designed a course specifically to enhance the skills that you need for sound pressure relief design. With ABB’s extensive experience of pressure relief system design and operation, providing a practical perspective based on real life experience comes naturally.

What will the course cover?
Days 1 and 2 of the course provide a practical approach to all of the key steps needed to design and maintain relief systems. The 3rd day covers some more complex and advanced topics.

Who will benefit and what will they gain?
The course is aimed at everyone involved in the design and operation of relief systems. Following the course you will be able to:

- Improve your company’s overall business safety and environmental performance
- Get pressure relief design right first time and avoid costly mistakes
- Discover the potential cost effective alternatives to pressure relief
- Master a structured approach to pressure relief

In-company / open course: Yes / Yes
Duration: 3 days

Course leader
Chris Flower is a chemical engineering specialist with over 15 years of process engineering experience. Throughout his career Chris has been involved in pressure relief be it, designing new systems, reviewing existing systems or validating systems designed by others across the whole range of process industry sectors. Chris has lead the pressure relief course for more than 7 years training over 100 delegates a year.
### Day one agenda*

**Background to pressure relief**
- What is pressure relief and why use it?
- Approach to pressure relief design
- Pressure relief and the design process

**Identification of relief events**
- Identification of events leading to excessive pressure and vacuum

**Calculation of the required relief rate**
- External fire
- Flow from high pressure source
- Heat and energy input from associated equipment

**Discharge and disposal**
- Discharge and disposal of vented material

### Day two agenda*

**Relief device hardware**
- Anatomy of a safety valve
- Bursting disc hardware

**Relief system sizing**
- Safety valve sizing
- Design criteria for relief systems

**Installation, inspection and maintenance**
- Relief system documentation
- Installation of pressure relief devices

**Pressure relief codes and legislation**
- Pressure relief codes and legislation

### Day three agenda*

**Chemical reaction hazards**
- Developing a basis of safety for chemical reaction hazards

**Blowdown and flares**
- Blowdown and flares

**Two phase flow**
- Two phase flow design principles
- Two phase flow and DIERS method

**Low pressure tanks**
- Venting of low pressure tanks
- Low pressure tank relief devices

*ABB reserve the right to amend the agenda.
Pressure relief
The practitioners course

Pressure relief is an important layer of protection for process plant and equipment.

Like many technical areas there are grey areas within the standards and pitfalls to catch out the unwary. This course has been designed as a follow on to the ABB pressure relief - a proven approach course. It builds upon the themes discussed and expands these into more complex areas of the subject and into areas which require engineering judgement or as the standards put it “might not be appropriate”. The Practitioners course is designed such that engineers have time to develop their engineering skills doing practical pressure problems. As this is a practitioners course it is recommended that delegates have been on the ABB pressure relief - a proven approach course or have experience with pressure relief through their work.

The course will use ABB PEL software during some of the tasks. Delegates will be provided with the software and licence before the course. They can bring their own laptop, but if this is not practicable then ABB can provide a training laptop.

What will course will cover?
The course will cover the following topics:

– Pressure relief philosophies
– Pressure relief scenarios
– Calculation of relief rates including:
  • Determination of alternative relief routes
  • Multicomponent fire
  • Distillation columns

In-company / open course
Duration
Yes / Yes
3 days

– Device sizing including:
  • Supercritical relief
  • Direct integral sizing methods
  • Liquid none certified relief valves
– Pressure drop calculations
  • Beyond 3%
– Low pressure storage tanks including
  • Liquid overflows
  • Inbreathing with condensation
– Discharge and disposal including
  • Header design
  • Venting / flaring scenarios
  • KO drum sizing
  • Vibration
– Case study

Who will benefit and what will they gain?
This course is aimed at engineers who wish to develop their skills and understanding of pressure relief through guided practical work.

Course leader
Chris Flower is a chemical engineering specialist with over 15 years of process engineering experience. Throughout his career Chris has been involved in pressure relief be it, designing new systems, reviewing existing systems or validating systems designed by others across the whole range of process industry sectors. Chris has lead the pressure relief course for more than 7 years training over 100 delegates a year.
### Day one agenda*

**Background to pressure relief**
- What is pressure relief and why use it?
- Approach to pressure relief design
- Pressure relief and the design process
- Design team and responsibilities
- Inherent safety in pressure relief
- Alternatives to pressure relief

**Identification of relief events**
- Identification of events leading to excessive pressure and vacuum

**Calculation of the required relief rate**
- External fire
- Flow from high pressure source
- Heat and energy input from associated equipment
- Pumps and compressors
- Ambient heat transfer
- Liquid expansion in pipes

**Discharge and disposal**
- Discharge and disposal of vented material

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### Day two agenda*

**Relief device hardware**
- Anatomy of a safety valve
- Bursting disc hardware
- Devices for special applications
- Selection and types of relief devices

**Relief system sizing**
- Safety valve sizing
- Design criteria for relief systems
- Computer software and pressure relief

**Installation, inspection and maintenance**
- Relief system documentation
- Installation of pressure relief devices
- Relief systems inspection, maintenance and operation

**Pressure relief codes and legislation**
- Pressure relief codes and legislation

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### Day three agenda*

**Chemical reaction hazards**
- Developing a basis of safety for chemical reaction hazards

**Blowdown and flares**
- Blowdown and flares

**Two phase flow**
- Two phase flow design principles
- Two phase flow and DIERS method

**Low pressure tanks**
- Venting of low pressure tanks
- Low pressure tank relief devices

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*ABB reserve the right to amend the agenda.

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Please note that this course will not be available till late 2019.
Process Safety Management (PSM) best practice

Process safety has hit the headlines in recent years following the major explosions and fires at BP’s Texas City refinery and the Buncefield storage depot in the UK.

The Baker panel review in the USA and the Health and Safety Executive’s ‘Leading from the top - avoiding major accidents’ programme in the UK has amplified the importance of effective Process Safety Management (PSM). An essential part of effective PSM is an integrated and comprehensive PSM system. The PSM system needs to include both technical and organisational elements as specified in the OSHA CFR 1910 for PSM, and the UK HSE’s HSG 65 successful Health and Safety management. The latter is used as the framework for demonstrating that UK COMAH sites comply with the requirements of the Seveso III directive.

The diagram above shows how process safety generally deals with high severity and low likelihood major accidents, whereas personal or occupational safety deals with more routine ‘slips, trips and falls’. Both aspects of safety are equally important but process safety has not always received the attention it deserves and requires a different approach to be adopted.

This training course is based on the PSM framework provided by OSHA in the USA and by the HSE in the UK. It also includes the practical experience of ABB process safety consultants in the design and operation of high hazard process plants.

What the course will cover?
The course consists of presentations, interactive case studies and practical exercises. It combines an understanding of the theoretical requirements with practical implementation.

Who will benefit and what will they gain?
This course is aimed at operations managers, senior process engineers and safety specialists within an organisation responsible for leading process safety, monitoring the performance of PSM arrangements and implementing improvements to achieve high levels of process safety performance. The course will assist delegates to:

- Understand the key elements of a PSM system
- Understand of relevant good practice within each element
- Identify ways of improving your company’s PSM system
- Network with other process safety specialists
- Discuss specific issues with ABB’s specialist consultants
- Receive ABB’s detailed course manual with key references
Course leader

Graeme Laughland is a safety specialist for ABB and specialises in hazard identification and risk assessment and PSM auditing. Graeme is a chemical engineer with 30 years’ industrial experience gained in design, operations and process safety consultancy.

In addition to consultancy assignments he tutors on a range of process safety courses and has presented papers at a number of international conferences.

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*ABB reserve the right to amend the agenda.
SIL awareness for control / electrical technicians

Are your control / electrical engineering teams aware of the requirements of IEC 61508 / 61511 compliance for the trips and alarms installed within your asset?

With the advent of the IEC 61508 / 61511 standards there are best practice requirements for the specification, installation, inspection, maintenance and repair of Safety Instrumented Systems (SIS) installed within the workplace. ABB will help you to achieve and maintain compliance for your assets. Providing a practical perspective based on real life experience comes naturally.

What the course will cover?
The course will provide you with a clear understanding of the best practice requirements for SIS operating as part of your plant’s layers of protection.

Who will benefit and what will they gain?
The course has been designed to be of benefit to control / electrical technicians and supervisory staff. It will also provide other engineering disciplines with an overview of the requirements for managing SIS.

As part of your overall basis of safety management requirements, an end user operator will be required to provide the facility control / electrical technicians with awareness training in the requirements of SIS maintenance.

In-company / open course | Yes / Yes
Duration | ½ day

This short course is designed to give you an appreciation of the following:

– A brief introduction to the IEC 61508 / 61511 standards and the guidance for operating, maintaining and managing SIS
– An introduction to risk and the concept of Safety Integrity Level (SIL)
– An overview of designing a Safety Instrumented Function (SIF)
– The importance of testing and maintaining SIF
– The need for documentation and records to support the operational basis of safety

Course leader
Paul Lucas is a principal safety consultant at ABB with over 35 years’ experience of real-time computing and instrumented safety in the process chemical, oil & gas and pharmaceutical sectors. He designs and delivers ABB’s training courses and seminars on the practical implications for end users, system integrators and instrument technicians in the use of the IEC61511 functional safety standard, on managing Functional Safety and detailed design of safety instrumented functions. In recent years, Paul has completed a Master’s degree in Ergonomics and Human Factors to gain theoretic background in support of many years operational experience in the assessment and analysis of Human Factors in Safety Critical tasks, including Task analysis and Human Error Analysis (HEA).
### Agenda*

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*ABB reserve the right to amend the agenda.*
Asset integrity
Design and operation of piping systems

This 2 day course explains why it is necessary to pay attention to piping systems at all stages throughout their life to prevent loss of containment and maintain a licence to operate.

What the course will cover?
The main topics relating to design and safe operation of piping systems which include:

- Code compliance
- Layout
- Routing
- Flexibility analysis
- Supporting
- Testing
- Commissioning

Topics are covered by discussion, case studies of real incidents and syndicate exercises. It is expected that participants of this course will have gained some knowledge of the subject, either by experience or by attendance on the appropriate courses.

Who will benefit and what will they gain?
This course will identify the principles and methods of piping design together with the considerations to be taken into account for layout and routing, testing, commissioning and safe operation of piping systems. You will gain an increased understanding of the causes of piping failures and how to resolve the problems that can occur.

The course is beneficial to anyone who is involved in design, construction, inspection, operation or maintenance who needs a design appreciation or to be aware of safer piping practices.

In-company / open course: Yes / Yes
Duration: 2 days

On completion you should be able to:

- Manage the safe operation, maintenance and commissioning of piping systems
- Improve business productivity by reduced maintenance and capital costs
- Recognise the need for, and the importance of, design codes and registration of critical piping systems
- Have an awareness of the technical aspects of piping that must be considered when designing, constructing, modifying or maintaining piping systems, highlighting the need to control modifications
- Identify the modes of failure of piping systems due to inadequate design, flexibility, supporting or routing

Course leader
Graham Harvey is an asset integrity specialist responsible for delivery of integrity management studies and strategies, including asset life extension studies at on and off-shore oil and gas facilities, chemical and pharmaceutical plants. This includes conducting due diligence studies on high hazard processes, development of integrity management procedures and audit protocols. Graham has 37 years of operational experience gained in oil and gas, petrochemicals & plastics, and food processing industries, many of which were high hazard top-tier COMAH facilities.
Day one agenda*

Registration and coffee
Introduction
Overview of design codes
Information required for design
Pressure design
Thermal design
Expansion joints - bellows
Layout and routing
Pipe supporting
Close

Day two agenda*

Review of day one
Layout and routing exercise
Special considerations (small-bore piping, dead legs, injection points)
Piping in-service inspection
NDT and pressure testing
Commissioning
Operation and maintenance
Dynamics
Review and feedback
Close

*ABB reserve the right to amend the course agenda.
Essentials of pressure systems

This 2 day course aims to provide the basic understanding of the essential elements of pressure systems, some of the problems encountered and how to avoid them.

The course covers the typical causes of failure of pressure equipment and provides an overview of the UK legislative framework relating to pressure systems.

What will the course cover?
An introduction to the main topics relating to Pressure Systems, which include:

- Legislation
- Pressure systems’ management
- Vessels and low pressure storage tanks
- Piping components
- Valves and steam trapping
- Supports
- Quality control
- Pressure testing
- Pressure relief
- Deterioration mechanisms

Topics are covered by discussion, case studies of real incidents and syndicate exercises. An emphasis is on practical issues relating to pressure systems which improves retention and interest by delegates.

Who will benefit and what will they gain?
This course is aimed at participants of all backgrounds who require an introduction to or refresher of the essential elements of pressure systems. The course would be particularly beneficial to engineers and managers in design, construction, operations and maintenance seeking an appreciation of pressure systems.

On completion you should have:

- An understanding of the statutory requirements and industry good practice for safe and reliable design and operation of pressurised equipment
- An awareness of the problems that can occur with pressure systems and how to prevent them
- An understanding of the typical causes of failure of pressure equipment

Course leader
Graham Harvey is an asset integrity specialist responsible for delivery of integrity management studies and strategies, including asset life extension studies at on and off-shore oil and gas facilities, chemical and pharmaceutical plants. This includes conducting due diligence studies on high hazard processes, development of integrity management procedures and audit protocols. Graham has 37 years of operational experience gained in oil and gas, petrochemicals & plastics, and food processing industries, many of which were high hazard top-tier COMAH facilities.
### Day one agenda*

- Registration and coffee
- Introduction
- Pressure systems overview
- Pressure systems management including legislation
- Pipes and components
- Quality control and testing
- Pipe joints
- Vessels and heat exchangers
- Low pressure storage tanks
- Deterioration mechanisms
- Close

### Day two agenda*

- Review of day one
- Valves
- Stream trapping
- Pipe protection
- Pressure relief
- Pipe supports
- Review and feedback
- Close

*ABB reserve the right to amend the course agenda.*

IChemE members receive discount until 31st December 2018.
# Mechanical integrity

## Lessons from process industry incidents

According to incident data, failure of pressure equipment is the greatest contributor to major losses of containment in the process industries.

By better understanding how plant equipment can fail, all personnel in the process industries can improve equipment integrity. Whether they are involved in the design or operational phases, managers, engineers and operators need to be aware of the risks of loss of containment, poor reliability and inadequate plant performance.

### What will the course cover?

This two-day course uses the findings from process industry incidents to illustrate how potential threats to asset integrity can arise throughout the asset life cycle. The course will cover:

- Overview of design standards
- How material properties can affect selection of materials of construction
- Equipment design limitations
- Equipment failure modes
- Forms of deterioration
- Inspection options and their limitations
- The impact of modifications to equipment

The course will focus on preventing loss of containment from pressure equipment including pressure vessels, piping, and storage tanks.

### In-company / open course

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<th>In-company / open course</th>
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<tr>
<td>Duration</td>
<td>2 days</td>
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### Who will benefit and what will they gain?

The course is aimed at participants of all backgrounds who require an understanding of the threats to the integrity of equipment. This will enable them to make better contributions to risk management processes throughout the asset life cycle, including hazard studies, management of change, and operational and maintenance procedures. The course will also benefit anyone who is involved in the operation and integrity management of ageing plant.

On completion you should be able to:

- Appreciate the basic design requirements for pressure equipment
- Understand the main forms of deterioration and best ways to manage them
- Understand the key elements of an integrity management system
- Identify sources of good practice guidance for mechanical integrity
- Improve management of change
- Identify the key issues associated with ageing plant
Course leader

Kev Senior is the Machines Functional Leader and Design Verification Engineer for rotating equipment. He specialises in root cause analysis, fault-finding, asset health checks, life extension studies, design verification and recommending reliability & maintenance improvements.

Kev is a Chartered Engineer and Fellow of the IMechE in addition to his being a Chartered Manager and a Fellow of the CMI. During the majority of his 30+ years professional engineering career he has been principally responsible for managing the technical and logistic support of gas turbines.

Day one agenda*

<table>
<thead>
<tr>
<th>Registration and coffee</th>
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<tr>
<td>Introduction</td>
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<td>Overview of material properties and material selection criteria - metal and non-metallics</td>
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<td>Case study 2 - construction and commissioning</td>
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<td>Forms of deterioration based on API 571 &amp; API 581</td>
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<td>Case study 3 - mechanical deterioration</td>
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<td>Case study 4 - operation</td>
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Day two agenda*

| Coffee / review of day 1 |  |
| Case study 5 - maintenance |  |
| Case study 6 - inspection |  |
| Sources of good practice in integrity management |  |
| Case study 7 - Management of Change (MoC) |  |
| Organisational implications - organising for integrity |  |
| Case study 8 - asset life cycle |  |
| Review and course feedback |  |
| Close                  |  |

*ABB reserve the right to amend the course agenda.

IChemE members receive discount until 31st December 2018.
Mechanical legislation awareness

Two modules covering PSSR / PED and PUWER. Keeping track of legislation that impacts on engineering activities.

Many companies are sinking under wave after wave of legislation and compliance requirements. Whilst larger organisations have people who are specifically employed to keep track and help their company comply, many companies cannot afford this expensive resource or solution.

For these companies it is a major challenge to keep abreast and comply with the legislation without running foul of Regulators, whilst at the same time keeping spending in proportion. Many are therefore looking for cost effective solutions.

ABB has a number of people who on a daily basis are emerged in understanding, interpreting, and applying UK legislation. It is routinely engaged by organisations, large and small, to help with their understanding and compliance issues. Getting matters into perspective is a first important step.

To that end ABB has pooled its extensive knowledge and pulled together a one day awareness course, to provide an understanding of the various aspects of legislation. Working through the legislation can be daunting but ABB follows a simple hierarchy which allows the important messages to be understood and applied.

In-company / open course    Yes / Yes  
Duration                    1 day

PSSR / PED
The session will cover:

- Pressure Systems Safety Regulations (PSSR)
- The pressure equipment regulations - scope of regulations
- Purchase of equipment
- Registration of equipment
- Inspection
- Schemes of examination
- Examination and deferments
- Responsibilities of user

PUWER
Provision and Use of Work Equipment Regulations (PUWER). There are few specific legal requirements relating to mechanical engineering practices. However, the requirements of the health and safety at work act, the machinery directive and the PUWER regulations mean that the hazards associated with equipment must be identified and systems such as training, supervision, information and instructions shall be used to control the hazards. The session will consider:

- Suitability
- Inspections
- Maintenance policy and practices
- Training
- Information
- Compliance with EU directives
- Responsibility of user
Course leader

**Kev Senior** is the Machines Functional Leader and Design Verification Engineer for rotating equipment. He specialises in root cause analysis, fault-finding, asset health checks, life extension studies, design verification and recommending reliability & maintenance improvements.

Kev is a Chartered Engineer and Fellow of the IMechE in addition to his being a Chartered Manager and a Fellow of the CMI. During the majority of his 30+ years professional engineering career he has been principally responsible for managing the technical and logistic support of gas turbines.

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**Course agenda***

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<td>Registration and coffee</td>
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<td></td>
<td>Introduction</td>
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<td>Presentation (1st module)</td>
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<td>Coffee and tea</td>
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<td>Presentation (1st module)</td>
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<td>Lunch</td>
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<td>Presentation (2nd module)</td>
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*ABB reserve the right to amend the course agenda.*
Risk Based Inspection (RBI) and Non-Intrusive Inspection (NII)

A practical two day training course to give an understanding of the RBI process and how to implement it.

Asset integrity is key to ensuring operations are safe, profitable and productive. Maintaining integrity whilst minimising downtime leads to a difficult balance. Inspection of assets provides vital information on the condition of the asset but can include intrusive examinations involving expensive preparation of equipment and down time but giving little information on the remnant life of the equipment. Prescriptive practises do not take account of the risk and consequence of failure of specific equipment. They neither focus inspection on the areas of greatest concern nor take into account the knowledge of the actual operating conditions.

Risk Based Inspection (RBI) offers significant benefits over conventional inspection. As well as improved risk management, typical benefits include more uptime and reduced costs. In the UK the Pressure System Safety Regulations 2000 (PSSR) have increased the opportunity to move from prescriptive intervals and schemes to a RBI approach.

The RBI approach ensures that the optimum interval and scheme of examination is implemented, concentrating on specific deterioration mechanisms and focusing on the areas of greatest concern. RBI allows operating conditions and the results from previous examinations to be used to optimise the inspection undertaken.

The journey through this risk process is diversely knowledge based. The rigour applied often reveals risks that have not been considered previously.

The challenge is to use this understanding of deterioration mechanisms, failure modes and associated risks to focus attention and prioritise on critical or ‘real risks’. The implementation of remedial measures, in these identified cases, can yield significant returns in terms of risk improvements. The level of detail and precision explored and the approach can range from general to complex and can be qualitative or quantitative. The approach is governed by risks associated with the items under study.

What will the course cover?

- The steps involved in a qualitative (team based) RBI study, meeting the requirements of API 580.
- The methodology within each step of an RBI
- How individuals can contribute to RBIs most effectively
- The information and commitment required
- The benefits of RBI

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<tr>
<th>In-company / open course</th>
<th>Yes / Yes</th>
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<tr>
<td>Duration</td>
<td>2 days</td>
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Who will benefit and what will they gain?
This course will appeal to asset engineers and operators wishing to understand the RBI process, the commitment required and the resultant benefit.

On completion you should be able to:

- Understand the RBI process
- Understand how to establish a RBI programme within your business
- Understand some of the key technical issues involved in RBI studies
- Understand the benefits of RBI

Course leader
Paul Jackson is an inspection specialist and has over 30 years experience of the design and inspection of pressure equipment. He is a Fellow of the Institution of Mechanical Engineers and Chairman of its Pressure Systems Group Committee.

Day one agenda*

Registration and coffee
RBI overview and benefits
Syndicate task data gathering
An overview of deterioration mechanisms
Non-Destructive Testing (NDT) methods and their limitations
Review
Close

Day two agenda*

NDT quiz
Risk and risk ranking
Non Invasive Inspection (NII) - is it appropriate
Complete syndicate task on RBI of air receiver
Implementing RBI
Workshop discussion on delegate issues, demo of RBI database
Summary
Close

*ABB reserve the right to amend the course agenda.
Maintenance and reliability
Failure Modes & Effects and Criticality Analysis (FMECA)

Today UK industry must be as efficient as possible to compete in the global marketplace. A key driver for this is the reliability of the plant assets.

What will the course cover?
The criticality analysis methodology and its application in prioritising equipment and focusing reliability work.

Failure Modes Effects and Criticality Analysis (FMECA) as a method for analysing, prioritising and avoiding potential equipment failures by developing effective maintenance policies.

The practical application of these tools to real-life examples.

Who will benefit and what will they gain?
All plant personnel involved in improving equipment reliability and plant uptime—particularly engineers, supervisors, technicians and plant operators.

On completion delegates will be able to:

– Play an active part in an equipment criticality analysis
– Select the appropriate criteria to apply
– Evaluate and use the results of the analysis
– Understand the FMECA process and how it reveals and prioritises potential failure modes and the effects of those failures
– Define equipment functions and functional failures
– Appreciate FMEA and when to use it as distinct from FMECA

In-company / open course | Yes / Yes
Duration | 1 day

– Produce generic FMEA data to apply across an equipment group e.g. pumps
– Apply the results of both processes to the generation of effective equipment maintenance policies

Course leaders

Martin Brown is a consultant and experienced practitioner involved in improving maintenance, reliability and integrity management for a wide range of companies across the chemical, oil & gas, power and pharmaceutical industries.

Laurence Plant is a consultant with a maintenance and engineering background in pharmaceuticals, chemicals FMCG and plastics. Laurence has been involved in a wide range of reliability improvement projects.
**Agenda***

Registration and coffee

Criticality analysis:
- Basic principles
- Criteria selection
- Rating systems
- Using the results
- Risk prioritisation

FMEA / FMECA:
- Basic principles
- Structure and application

Lunch

Functions:
- Functional analysis
- Function tree exercise

Failure modes:
- Potential modes of failure
- Potential causes and effects
- Failure mode criticality in FMECA
- Failure modes exercise

FMECA output
- Using the results to develop effective maintenance policies

Close

*ABB reserve the right to amend the course agenda.
Introduction to reliability workshop

Today, UK industry needs to be as safe and efficient as possible in order to compete in the global market place. A key factor in ensuring these requirements is the reliability of the plant assets.

Set against a background of ageing plant, tighter legislation, the continuous drive for increased production at the same time as cost reduction, engineers are expected to improve the up-time and reliability of plant equipment. This workshop will outline a number of processes and methods that you can use to identify your reliability issues and begin to tackle them.

You will hear from ABB reliability consultants who as well as being acknowledged as experts in their field also have a background in front-line maintenance management. You will have the opportunity to learn from them and incorporate their experiences into your improvement plans.

What will the workshop will cover?
For a number of years ABB has worked with clients in the oil and gas, pharmaceutical, food, chemical, paper and metals industries, helping them to improve the reliability of their assets. This improvement work has ranged from delivering tailored training packages to developing full site maintenance policies.

In addition to a practical introduction to a number of reliability improvement techniques, the workshop will give you the opportunity to share your experience and to pick up examples of good practice from the tutors and the other attendees.

In-company / open course

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<tr>
<td>Duration</td>
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The workshop will consist of a number of practical interactive sessions to cover the following techniques and topics:

- **Criticality analysis**
  The vital starting point which allows you to prioritise your assets to make best use of limited resources

- **Loss analysis and reporting**
  Key processes for analysing and losses and for focusing resources on specific problems

- **Root Cause Analysis (RCA)**
  A technique for identifying the fundamental cause of an issue such as an accident or an equipment failure

- **Failure Modes and Effects Analysis (FMEA)**
  A method for identifying potential failures and developing appropriate maintenance strategies to prevent them or to mitigate their effects

- **Spares management**
  The lack of correct spares is often a fundamental cause of poor reliability. This session looks at simple techniques to identify required spares

- **KPIs and benchmarking**
  Covers key measures of maintenance and reliability and suggests what level these would have to reach to be called ‘World Class’

- **What is your reliability performance?**
  This interactive session uses another problem solving technique called CEDAC to look at those issues faced in their workplace by the delegates themselves
Who will benefit and what will they gain? Representatives from all businesses and organisations involved in the reliability and maintenance of assets would benefit from attending this workshop. It would be of particular interest to site managers; maintenance and engineering managers; plant engineers and reliability engineers; plant / operations managers and health, safety & environmental managers. The workshop will provide an excellent opportunity for networking with other professionals who share an interest in asset reliability.

Workshop facilitators

Martin Brown is a consultant and experienced practitioner involved in improving maintenance, reliability and integrity management for a wide range of companies across the chemical, oil & gas, power and pharmaceutical industries.

Laurence Plant is a consultant with a maintenance and engineering background in pharmaceuticals, chemicals FMCG and plastics. Laurence has been involved in a wide range of reliability improvement projects.

### Agenda*

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<td>Coffee and networking</td>
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<td>Loss analysis and reporting</td>
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<td>Root Cause Analysis (RCA)</td>
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<td>Lunch and networking</td>
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<td>Failure Modes &amp; Effects Analysis (FMEA)</td>
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<td>Coffee and networking</td>
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<td>Spares management</td>
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<td>Key Performance Indicators (KPIs) and benchmarking</td>
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<td>Maintenance and reliability issues - CEDAC</td>
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<tr>
<td>Closing comments</td>
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*ABB reserve the right to amend the agenda.
Root Cause Analysis (RCA)

Today UK industry must be as efficient as possible to compete in the global marketplace. A key driver for this is the reliability of the plant assets.

What will the course cover?
The use of a structured Root Cause Analysis method to find the fundamental cause of a problem.

The practical application of the technique to real-life examples.

Who will benefit and what will they gain?
Anybody who would value a structured approach to identifying the root cause of a problem.

Organisations who want to give their staff tools to help solve work related problems.

On completion delegates will be able to

- Clearly define a problem
- Apply the “5 Whys” root cause analysis process
- Create a cause tree diagram to document the RCA process
- Eliminate potential but incorrect causes
- Identify the primary or Root Cause of a problem

In-company / open course  Yes / Yes
Duration  1 day

Course leaders

Martin Brown is a consultant and experienced practitioner involved in improving maintenance, reliability and integrity management for a wide range of companies across the chemical, oil & gas, power and pharmaceutical industries.

Laurence Plant is a consultant with a maintenance and engineering background in pharmaceuticals, chemicals FMCG and plastics. Laurence has been involved in a wide range of reliability improvement projects.
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<tr>
<td>Registration and coffee</td>
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<tr>
<td>Introduction</td>
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<tr>
<td>Why do we want to get to the root cause?</td>
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<td>Problem definition</td>
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<tr>
<td>How to define a problem clearly and accurately</td>
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<td>RCA process</td>
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<td>The ‘5 whys method</td>
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<td>Lunch</td>
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<td>Recording an RCA</td>
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<td>The cause tree diagram</td>
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<td>Finding the primary cause</td>
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<td>How to eliminate incorrect causes</td>
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<td>RCA group exercise</td>
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<td>The ‘Nail bed’ problem</td>
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*ABB reserve the right to amend the course agenda.
Shutdown, turnaround and outage management

Are you equipped to manage an event that may have a significant impact on your business’s financial performance and the reliability and integrity of its assets?

There is no doubt that engineers are faced with ever increasing challenges when managing shutdowns, turnarounds and outages. They are highly complex events with significant pressure to succeed against tight timescales, constrained budgets and resources and a need to achieve the highest possible HSE standards. Without an understanding of a structured approach to shutdown management achieving the goals of a successful event would be virtually impossible.

ABB has designed a course specifically to enhance the skills that you will need to manage a successful shutdown. It is based upon ABB’s shutdown, turnaround and outage model of excellence and our consultants’ extensive practical experience of shutdown management.

What will the course will cover?
The course will provide a practical approach to managing a successful shutdown, turnaround or outage. Over the two days the main areas of shutdown, turnaround or outage planning and execution will be reviewed together with a number of interactive group exercises. A course dinner will be held on the first night to enable you to network effectively with other course participants.

In-company / open course  Yes / No
Duration  1 day

Who will benefit and what will they gain?
Anybody from the oil & gas, chemicals, petrochemicals, power, pharmaceuticals and other process industries who are involved in or impacted by the execution of shutdowns, turnarounds and outages on their facilities.

It will be of particular interest to:
– Current or potential future shutdown, turnaround or outage managers
– Project engineers and managers
– Plant maintenance engineers and reliability engineers
– Plant / operations managers
– Shutdown, turnaround or outage planners and coordinators

Course leaders
Martin Brown is a consultant and experienced practitioner involved in improving maintenance, reliability and integrity management for a wide range of companies across the chemical, oil & gas, power and pharmaceutical industries.

Laurence Plant is a consultant with a maintenance and engineering background in pharmaceuticals, chemicals FMCG and plastics. Laurence has been involved in a wide range of reliability improvement projects.
Day one agenda*
Registration and coffee
Introduction and overview
- Identifying critical elements of the turnaround
- How these elements interact
Group exercise
- What issues have you encountered with turnarounds in your organisation?
The model of excellence
- The framework for turnaround excellence
- How this can be used
- Outline and detailed models of excellence
Turnaround safety
- Hazards
- Safe systems of work
- Safety plan
- Permit to work
- Audits
- Group exercise
- Turnaround safety plan
Turnaround quality
- The need for quality
- Quality assurance issues
- Quality control and issues
Turnaround organisation
- Factors affecting organisation
- Different kinds of organisation
- Competency and skills
- Team building
- Group exercise
- Organisation design
Close

Day two agenda*
Planning
- Phases of planning
- Work listing
- Work scope
Group exercise
- Generating a cost-effective workscope
- Planning levels and norms
- Planning sequences
Group exercise
- Planning a hazardous task
Contractors
- Limits of outsourcing
- Upside and downside of contracting
- Commercial awareness and contractor engagement
Cost control and estimation
- Business plan and impact of turnaround
- Cost control and reporting
- Cost estimation models
- Where money is spent
Group exercise
- Costs and assumptions
Logistics
- Defining and handling site logistics
- Organising stores
- Marshaling bulk work
Group exercise
- Strategic issues
Execution
- Stages of the turnaround
- Meetings and routines
- Controlling the event
- Performance review
Close

*ABB reserve the right to amend the course agenda.
Other
Construction, Design and Management (CDM) awareness

This half day course aims to raise awareness and give an overview of the background, objectives and requirements of the CDM Regulations with an emphasis on the changes to the Regulations introduced in 2015.

The course provides information on the legal duties under current legislation for individuals and organisations involved in construction activities.

What will the course cover?
- Overview of CDM legislation, including background, when does it apply, objectives and history
- Main changes introduced under CDM 2015
- Summary of Roles & Responsibilities and legal requirements of all parties
- Summary of CDM requirements at each project stage

Typical documentation
- CDM requirements relating to Maintenance works

Who will benefit and what will they gain?
The course provides information on the legal duties under current legislation for individuals and organisations involved in construction activities.

On completion you should have:
- Understanding of the legislation and the roles and responsibilities of the various duty holders
- An understanding of the changes made in 2015 and the reasons behind these changes
- An understanding of the requirements at each stage of a project and associated documentation

Course leader
Charles Dent is an experienced project manager with over 20 years’ experience of managing engineering projects in the power, oil & gas and pharmaceutical industries. Charles is a member of the project management Institute and has worked with CDM since its inception in 1994
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*ABB reserve the right to amend the course agenda.
Project management in the process industries

“How much does poor project delivery cost your business; and what would it be worth to make a step change in performance?”

“Doing the wrong projects well is not much help”

Good project management needs to address both:

– How to identify and define the best project to meet the business objectives
– How to deliver that project in a safe, cost effective way

ABB has good experience of providing project management training to operating companies in the process industry. We understand the particular challenges that are faced by companies in the chemical, oil & gas and power sectors when delivering complex and potentially hazardous projects in a highly regulated environment. Our trainers all have strong backgrounds in projects, engineering and operations in the process industry and are able to bring their own experiences to the training courses that we run.

What will the course will cover?
– A generic project process and the key elements of a successful project
– The role and skills of the project manager
– Managing key interactions, stakeholders and the project team
– Key tools for use through the project lifecycle - planning, scheduling, risk management and option analysis

Who will benefit and what will they gain?
The training is aimed at people newly appointed into project positions including:

– Project managers
– Project engineers
– Project participants

On completion you should be able to:

– Define project objectives that align with business objectives
– Know the features of and see the benefits of a well managed project
– Understand how to identify and manage key stakeholders
– Understand and have practised the core tools and techniques required as a project participant or manager
– Understand the key skills required as a project participant or manager

Course leader
John Weston is an experienced project manager and project control consultant, with particular expertise in managing multifunctional project teams and consultancy assignments in various industry sectors.

In-company / open course  Yes / No
Duration  2 days

In-company / open course  Yes / No
Duration  2 days
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