04 Study identifies silo working, within process industries
07 Decommissioning and demolition governance framework for SSE
09 Non-Intrusive Inspection (NII) could deliver major benefit to the UKCS
Editorial

Peter Hunt,
Business Development Director,
UK Oil, Gas and Chemicals Service

Welcome to the first edition of Solutions to be published in the new format. The redesign of Solutions is taking place within the context of a broad and comprehensive transformation of ABB branding.

In this edition we explore the issues the process industry face when organisations work within silos, impacting the PSM process. We also discover some major benefits that non-intrusive inspection techniques could bring to the UKCS market. From a personal safety perspective, we focus on human factors that affect us all on an everyday basis, and remind about how important safety is, in and out of the working environment.

To assist inspection and maintenance managers, our integrity management team has produced an article highlighting some of the myths, challenges and good practice that aid cost effective piping management. Plus the decommissioning and demolition team has successfully completed a D&D governance framework for SSE, bringing experience and a pivotal understanding of procedural documentation to the framework agreement.

We have also selected a round-up of our social media activity, conferences and key industry events. We hope you enjoy the newsletter and if you have feedback or comments we would love to hear from you.

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Safety case decommissioning guidance for offshore duty holders

A major project which enables offshore duty holders to better plan and manage offshore safety cases and major accident hazards in the decommissioning and dismantling of platforms has been overseen by ABB’s engineering and consulting group.

The Joint Industry Project (JIP) brought together operators and trade bodies to develop safety case guidance and technology solutions during End of Life (EoL), decommissioning and dismantling of offshore installations. Technical exchanges during the JIP allowed offshore operators to share ideas and learn from each other as they prepare to decommission their platforms. The resulting document offers guidance to duty holders in maintaining compliance with the Safety Case Regulations (SCR 2015) during EoL, decommissioning and dismantling.

Meanwhile, the JIP will continue to investigate opportunities to develop technology aimed at reducing facility running costs with a target of between 30 and 50 per cent.

Operators and industry trade bodies contributed to the new guidance, which is based on experience from current and recently completed decommissioning projects.

Decom North Sea, Chief Executive, Roger Esson said: “The resulting report has been borne out of a co-operative environment, demonstrating that industry has come together to provide a solution to an identified problem. The more we can encourage this type of engagement within decommissioning, the more we will see sector cost reductions over the coming decades.”

The document covers a range of important insights, including the benefits of making an early start to preparation and the value of maintaining a strong working relationship with regulators and verifiers. ABB oversaw the JIP in collaboration with Genesis Oil and Gas, a number of operators and suppliers, Oil & Gas UK and ITF.

Since its launch it has been awarded ‘Highly Commended’ in the ‘Team’ category of the IChemE Global Awards 2017, which celebrate excellence and achievement in the chemical, biochemical and process engineering sectors.

The document can be viewed on the following link: http://bit.ly/JIPSafetyCase

“For more information on decommissioning and demolition please contact Steve Andrew, Decommissioning, Demolition and Remediation Manager, ABB on: +44 (0)1642 372025 or email: steve.andrew@gb.abb.com

“The UK oil and gas industry is beginning to see an increase in the number of installations moving towards decommissioning and final dismantlement. A fresh look at the identification and management of the hazards is required during this phase; as is the recording of this information in the installation’s safety case as required by the UK regulations.”

Trish Sentance, Health and Safety Manager, Oil & Gas UK
ABB's global engineering and consultancy group, has launched a white paper which raises concerns of an increased risk of MAHs due to significant levels of silo working in the process industries.

The ‘silo factor’ was the key theme identified in a study based on 500 recommendations from 16 in-depth process safety risk assessments carried out by ABB in recent years.

According to the white paper, process safety performance within the high hazard industry is being threatened by the silo factor - an inability within Process Safety Management (PSM) circles to collaborate and be consistent across all departments in an organization.

ABB has identified five common areas of weakness within PSM, all in some way a result of silo approaches to PSM:

1. Inadequate testing of safeguards
2. Inadequate Process Hazard Analysis (PHA) records
3. Inadequate safeguards in place when compared to the risk reduction claimed as part of process safety risk assessments
4. Poor understanding of the worst case major accident hazard scenarios on site
5. Lack of clarity about the basis of safe operation and a lack of alignment between emergency response plans and the PHA

“We have identified a worrying pattern across the process industries that without urgent attention could be lowering our defenses against major accidents.

Having an agreed and consistent approach to PSM is critical for safe performance. This can only be achieved through integrated and collaborative thinking and processes that encourage a constant focus on MAHs.

We want to encourage industry debate that will help to raise awareness of the issue within the high hazard sector with a view to agreeing an industry standard approach to PSM.”

Paul Alton, Operations Manager, ABB

The full white paper can be accessed on the ABB website by visiting: http://bit.ly/ABBProcessSafety
The piping integrity management challenge

Myths, challenges, and good practices related to process piping integrity management activities that help inspection and maintenance managers make the right decisions to develop cost-effective piping inspection plans.

The mechanical integrity of process piping is critical to effectively manage process safety, environmental hazards, and business risks in the oil & gas, chemical, petrochemical and power industries. Operating companies seek to achieve cost-effective risk management and stay in compliance with state and federal regulations.

So, how does one determine the optimum levels of inspection and maintenance for piping? The scale and complexity of the facility (thousands of feet of process piping in a typical refinery), significant costs related to inspection (insulation removal, provision of access,) variety of inspection techniques, and other factors present significant challenges in establishing a mechanical integrity strategy for piping.

These challenges are compounded by piping and process complexities, misunderstandings and underestimating the importance of piping. The reality is that many asset integrity management programs focus on pressure vessels, heat exchangers, and fired heaters without considering the piping systems as an important asset.

A process piping system failure or leakage could have a significant impact on the business due to interruptions in production, or a catastrophic effect if an explosion or fire occurs or a hazardous fluid is released.

The piping inspection plan should be designed with the following philosophy: plan to inspect; inspect to detect; detect to assess; and correct or repair to keep the piping operating in a safe and reliable way.

All piping should receive a certain level of attention throughout its life cycle. Using the approaches described in the full article can help develop a proactive and risk-based piping integrity strategy.

This article highlights some of the myths, the challenges, and the good practices related to piping integrity management activities in order to help inspection and maintenance managers make the right decisions to develop cost-effective piping inspection plans without compromising the asset’s reliability or performance.

The full article can be viewed by visiting: http://bit.ly/pipingIMchallenge

Article written by Laza Krstin, Principal Consultant and Fernando Vicente, Asset Integrity & Reliability Management Consultant, ABB. For more information on piping integrity please contact Fernando: +44 (0)1224 579498 or email: fernando.vicente@gb.abb.com
Decommissioning and Demolition (D&D) governance framework

ABB’s engineering and consultancy group has successfully completed a D&D governance framework for SSE.

With a framework already in place for managing the delivery of Large Capital Projects (LCP), SSE identified that the governance to manage D&D required a modified process.

The first phase of the project involved a review of the existing LCP process against ABB’s D&D methodology that has been developed from experience gained from managing D&D projects over the last 35 years. This identified a number of gaps and modifications required. In addition to this there were also a number of areas where the process could be simplified or activities eliminated.

The second phase involved identifying the documentation required at each stage of the process. Once this was agreed, the documentation itself was developed in accordance with SSE documentation standards. In line with SSE’s request, existing documents were retained where possible and necessary, revised D&D specific versions were either created from scratch or adapted from existing documents.

The framework, which was completed this month, will be used on all future major SSE D&D projects, including power stations, gas storage and wind energy (onshore and offshore).

Matthew Capstick, Account Manager for ABB’s engineering and consultancy group said: “Having delivered a range of engineering consultancy support across SSE’s power generation and gas storage assets, we have a long-standing relationship with the organisation. The new D&D governance framework will provide SSE with a robust method for managing these projects that is aligned with their project requirements. This will improve the efficiency and effectiveness of project delivery, while maintaining an overall structure that SSE is familiar with.”

“ABB was able to bring both experience of decommissioning and demolition projects and an understanding of procedural documentation that integrated well with SSE’s established framework for major capital projects. We are now implementing the D&D framework for the Ferrybridge C coal fired power station in order to manage this critical work as safely and efficiently as possible.”

Simon Smith, Director for Decommissioning and Demolition, SSE Generation Development
Operational improvement through loop performance management

Control loop performance is a key factor in maximising production quality and efficiency as well as ensuring the smooth operation of a process, minimising downtime and maximising profit. Increasingly, there are fewer personnel devoting their time and effort to maintaining plant automation systems to the level needed for continuous, optimal, performance.

Loop performance fingerprint is non-invasive software that can be coupled to any manufacturing process, applying industrially proven tools and methodologies to diagnose control performance. It typically assesses the process and control performance of >200 control loops and uses proven mathematical techniques to analyse process control data against a series of Key Performance Indicators (KPIs).

Control loop performance fingerprinting will pave the way to operational improvement by highlighting control loops requiring attention and identifying a core improvement plan. Plant profitability can be increased through reduced downtime, improved efficiency, lower maintenance costs and increased throughput. Some of the issues that a loop performance fingerprint will highlight are:

- Controllers operated in manual
- Valve sizing issues
- Process disturbances
- Oscillations
- Over / slow control
- Excessive noise
- Signal problems

Tailored to fit your specific needs and to make the best use of your internal resources, the complete performance management service offers clear value by ensuring that ultimately, beyond a fingerprint, a focussed implementation plan will provide financial gains to your business.

Manage human error and improve reliability

According to the HSE, human failures are responsible for up to 80% of accidents, and feature in almost all major accidents. It is therefore important that companies do as much as they can to consider ‘human factors’, in order to prevent major accidents occurring.

PEL-Human Reliability Analysis (HRA) software provides a tool based on recognised methodologies which improves the understanding of tasks, sources of human error, and ways to improve human reliability.

The COMAH regulations 2015 aim to prevent major accidents and to limit the consequences to people and the environment if accidents do occur. Under the regulations, sites with quantities of dangerous substances above the threshold must describe their prevention and control measures in a safety report which is submitted to the Competent Authority (CA).

One of the requirements of the safety report is to provide information on safe operating procedures to prevent major accidents. PEL-HRA provides tools for applying human factors methods to the analysis of operating, maintenance and testing procedures as part of the safety review.

PEL-HRA takes you through the process of:

- Listing and assessing critical tasks
- Performing Hierarchical Task Analysis (HTA)
- Performing Human Reliability Analysis (HRA)
- Evaluating Performance Influencing Factors (PIFs)
Non-Intrusive Inspection (NII) could deliver major benefit to the UKCS

Most North Sea operators utilise intrusive inspection techniques to assess the condition of process vessels and tanks, which requires a shutdown and personnel entering the vessel.

This normally involves taking pressure vessels out of service, preparing them for inspection and carrying out an internal visual examination, sometimes supplemented by Non-Destructive Testing (NDT). Recent advances in NII technology mean it is now possible, in many instances, to carry out effective inspections without taking the vessels out of service.

An industry survey by the Oil & Gas Technology Centre (OGTC) and ABB has found that adopting non-intrusive technology could deliver increased production and lower maintenance costs worth up to £242 million per year to the United Kingdom Continental Shelf (UKCS). The key findings from the survey include:

- Improved safety with up to 80% fewer confined space entries required, with a corresponding reduction in the number of line breaks and subsequent leak tests
- Adopting NII could deliver increased production and lower maintenance costs worth circa £242 million per year to the UKCS
- The use of NII on the UKCS is limited, with some operators currently making no use of the available technology
- Potentially, up to 80% of vessels could be examined non-intrusively, without requiring a shutdown
- A 33% reduction in turnaround durations have been achieved
- Overall cost savings of up to 80% compared to inspections that involve entry into a vessel

Taking the survey into account the OGTC has collaborated with Total E&P UK to conduct field trials of NII technologies on North Sea assets. The aim of the project is to identify ways to reduce confined space entries, reduce OPEX and maximise economic recovery.

“One of our key objectives is to eliminate vessel entry for inspection by 2026 and NII is critical to delivering this. We’re working with industry partners to demonstrate that the significant safety and costs benefits outlined in the survey, can be achieved. We hope this survey and recent field trials will help break down the barriers to implementing NII and spark a technology transformation in offshore inspection techniques.”

Rebecca Allison, Asset Integrity Solution Centre Manager, The Oil & Gas Technology Centre

The full article can be viewed by visiting: http://ow.ly/HTuk30i8I9Q
Why is a Thai Amulet like a Volvo?

Human factors

Why is a Thai Amulet like a Volvo?
In Thailand, as in many parts of the world, people are connected to the spiritual world in a fundamental and meaningful way that impacts their lives on many levels. One way that this connection and belief manifests itself is in the use of amulets to provide spiritual and earthly protection for everyday activities. These amulets have a fascinating history and they range in style and price based on materials and craftsmanship, and (of course) on their effectiveness as protective talismans.

Western religions also have a long tradition of protective talismans and amulets, stretching back to ancient Rome and beyond. Perhaps the most obvious examples are figures or medallions of Christian saints common across the Catholic faith.

Anyway, back to Thailand. A common use for amulets is to provide spiritual protection for drivers. Most taxis have an amulet or two on display and many other cars also sport amulets as an essential ‘layer of protection’ against Bangkok’s sometimes crazy traffic. Belief in these amulets is profound and pervasive and many Thais will tell you that they are safer because of their protective powers.

It can sometimes be too easy to dismiss people’s beliefs about what keeps them safe both in and out of the work environment, but our beliefs about how safe we are and what it is that protects us has a profound effect on our behaviours. Staying with the theme of our cars and driving beliefs, most people will feel significantly safer in cars equipped with a driver and passenger frontal airbag, or with ABS. This is despite the fact that the airbags are of much less use than people believe if seat belts are worn correctly, and ABS is only useful in certain circumstances and only to provide steering control, not necessarily reduced stopping distance.

Of course, these and many other innovations do have a real and measurable effect on our safety in the right circumstance. However, our beliefs regarding the effectiveness of these systems are important, and some manufacturers such as Volvo cultivate an image for leading edge safety systems in their vehicles.

So, to answer the question at the top of the piece, ‘why is a Thai Amulet like a Volvo?’ It’s because they both make us feel safer.

But why is that important? What’s so wrong with feeling safer? Well, the answer to that is with something called risk compensation (or more controversially, risk homeostasis), which says the safer you feel, the more risks you tend to run.

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For more information on human factors please contact Tony Atkinson, Human Factors Lead Consultant, ABB on: +44 (0)1642 372 280 or email: tony.atkinson@gb.abb.com
The risk compensation effect has been known for some time and there are an extensive number of studies that illustrate the effect.

Risk compensation also appears to extend beyond personal risk, to the risk we seem to be prepared to directly expose others to. Some of you may remember a small study published in 2007 regarding bicycle helmet use, widely reported in the media. The study looked not at the risk that the cyclist runs when wearing a helmet or not, but at how close drivers drove to cyclists wearing helmets.

As you might guess by now, drivers drive closer to cyclists when the cyclist is wearing a helmet, exposing them to more risk. This study prompted a debate on the value of cycling helmets, despite their proven efficacy in the event of an accident. Of course, cycling helmets are a form of PPE, and we can expect the risk compensation behaviour to apply to PPE at work in the same way as it applies to other areas of life.

There is a reason that we have evolved to compensate for perceived risk. When you look at the inverse of what we are discussing, an increase in perceived risk rather than a decrease, you’d expect people to compensate increased perceived risk with decreased risk taking behaviours. We are more reluctant to go near a cliff or rooftop edge in the absence of a protective barrier. In a very real sense, all this is saying is that we’ve evolved as a species to actively manage risk. That all sounds good, and highly appropriate, so is there really a problem?

The problem comes when our perception of risk doesn’t reflect the real level of risk involved in activity, or in a protective system or device. In those circumstances we may increase our risk taking behaviours on the misplaced assumption that we have a protection in place that does not in fact exist or isn’t as effective as we think it is. Our risk compensation behaviour makes us less safe, rather than more.

Unfortunately there is a lot of evidence that people are not as good at assessing risk as we would like to think, especially when it comes to assessing our competence in managing and avoiding hazards. Risk can be complex, emotive and personal; and our experience, knowledge, education and beliefs all colour our perceptions in this area.

Education and communication regarding the level of protection and the limitations from new and innovative protective devices, PPE, and systems are therefore essential if the inevitable compensation behaviour is going to be appropriate. In particular, we must ensure that the benefits of any change are not overstated, therefore provoking an inappropriate compensation in behaviours. Hopefully we will improve this area over time, but in the meantime we can all contribute by looking at how this communication operates in our workplace.

At the end of the day though, as long as we don’t change our behaviours to compensate, a little spiritual protection can’t hurt, can it?

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**Safety news**

**Speeding penalties update**

New rules for speeding fines came into effect in April 2017. The fines and penalties for exceeding speed limits in the UK have changed significantly to try and change driver attitudes. They are now related to weekly income and the circumstances in which you were caught speeding.

For further information please visit: [https://www.sentencingcouncil.org.uk/offences/item/speeding-revised-2017/](https://www.sentencingcouncil.org.uk/offences/item/speeding-revised-2017/)

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**Drive safe, not sorry...**

ABB along with the HSE and other road safety authorities promotes a strong stance on safety first for everyone on the roads.

It has been proven that the concentration of a driver using a hands-free mobile phone is significantly reduced thereby increasing the risk of an accident.

ABB advises to keep mobile phones in the glove box until you are in a safe place to check it. Your calls and text messages can always wait!
ABB’s global electrical safety champions workshop
Cordoba, Spain

ABB is a global company of more than 135,000 people working in manufacturing, service and research. The worldwide ABB organisation often reaches out for the specialist expertise and competency available from within the consultancy team. Tony Atkinson, Human Factors Lead Consultant, ABB, delivered a human factors workshop to ABB’s Global Electrical Safety Team in Cordoba, Spain. During the workshop incidents from ABB’s high and medium voltage businesses were reviewed for human error and influencing factors. The one day workshop was well received and as a result, the principles and insights from a human factors approach will become an integral part of ABB’s worldwide process for investigating incidents. ABB also offers a ‘Human factors in the workplace’ training course in the UK. Please see our web page for further details.
http://www.abb.com/uk/consulting/training

Human reliability
St. Neots, UK

ABB has successfully run the first human factors interactive workshop in Human Reliability Analysis (HRA) at the ABB office in St. Neots.

The workshop was the first of its kind to be held by the team and featured the new ABB HRA software, PEL-HRA. It was attended by delegates from a range of companies working in the chemicals, oil & gas and power sectors.

The workshop is aligned with the HSE roadmap for management of human factors topics at high-hazard sites and followed the approach that would be used by companies. Industry-standard guidance, such as that from the Energy Institute, was also discussed.

Uniquely, the workshop not only addresses the analysis of human error in a single task but deals with the identification of safety critical tasks from the hazard study outputs, and the demonstration that the task is ALARP.

Feedback from the day was very positive:

- “Practical application of week’s training, very well constructed and executed”
- “Practical session was really helpful, and it was really good to get some hands-on experience”

We plan to run the workshop again, as a follow-up to the 3 day course, and enquiries have already been received for in-house workshops for individual clients.

Shutdowsns, turnarounds and outages conference
Edinburgh, UK

ABB ran a 2 day conference which provided an insight into best performance of shutdowns and turnarounds in the process industries, utilising operator focused case studies and sharing the lessons learnt. The event provided a mechanism for sharing good and bad practice, tools utilised and performance in turnarounds across a range of process industry sectors. Included in this event for the first time was a spotlight on technology that is being used to improve turnaround performance. The event was well attended with 45 delegates participating in the workshop and conference. The conference included speakers from BP, Chevron, EDF Energy, INEOS, Oil & Gas UK and ABB.
Hazards 27
Birmingham, UK

Hazards 27 brought process safety professionals together to review best practice, the latest research, share experiences and lessons learned, and network with experts and peers. Over 100 leading experts shared their experience, including industry practitioners, researchers and industry regulators. ABB had a number of speakers at the event with presentations including: ‘The silo factor - why tackling silos can improve process safety performance’, ‘Making your retrospective HAZOP reviews smarter and more efficient’ and ‘Practical experience with deep dive assessments to identify key Major Accident Hazard (MAH) risk factors’.

IMTOF 2017
London, UK

International Methanol Technology Operators Forum (IMTOF 2017) is dedicated to operational and technical aspects of the methanol flowsheet for both coal and gas based methanol production, including: Projects, plant operations and new developments in methanol production. ABB exhibited at the event and Chris Loveridge, Principal Consultant, ABB, spoke about ‘Applying best practice process safety and emissions technology to existing fired equipment’.

Process Safety Management (PSM)
London, UK

ABB ran their annual PSM conference in London in November, organised in conjunction with the Chemical Industries Association (CIA). Speakers, who presented views on the sectors challenges and their experiences included: HSE; BP Upstream; Ineos; Lucite International; Energy Institute; Marsh Energy UK; Innospec and Sherwin Williams. The event attracted over 50 delegates and feedback from the event was excellent. The topic was ‘keeping safe whilst losing corporate memory’ and some great thought-provoking discussions were had both during the leadership summit workshop on day one and also during the conference networking time on day two.

Sustainable integrity and reliability
Manchester, UK

In November ABB ran their annual sustainable integrity and reliability conference in Manchester. The main focus of the event was reducing maintenance costs, whilst sustaining reliability and integrity. It was run in conjunction with the CIA and speakers included: Petroineos; Centrica Storage Ltd; BP Chemicals; Tracerco; SABIC UK; Thornton Facilities Management Ltd; CIA and Andy Hollins, ABB. The event attracted over 45 delegates and feedback throughout the day was extremely positive.
PEL software

ABB’s Process Engineering Library (PEL) software is an established set of process engineering tools which are designed to be easy to learn and effective in their use.

Simple interfaces allow access to powerful tools for performing engineering calculations, investigating physical properties, preparing and managing datasheets and associated documentation, and creating fault tree diagrams.

A shallow learning curve with extensive documentation means that your engineers can quickly be up to speed while shared tools and comprehensive unit conversion further reduce time wasted by interrupting calculations.

Features and benefits
- Users can have complete confidence in their results
- Reduces risk of human errors in calculations - essential when working with safety critical equipment
- Allows engineers to be more efficient and productive
- Provides a documented record of calculations for audit
- Improves QA and standardises procedures by everyone using the same set of data and calculations

30 day free, no obligation evaluation. See the benefits of PEL for yourself.

We offer a 30 day free trial of the PEL software. Simply download your evaluation copy from our website at www.pelsoftware.com

For more information on PEL, please contact: Dermot McGinnis, Business Development Manager - PEL on +44 (0)7720 342414 or email: dermot.mcginnis@gb.abb.com

In the news

ABB / Exxonmobil demolition and remediation projects pick up prestigious RoSPA award

Together, ABB / Exxonmobil demolition and remediation projects have been awarded the RoSPA Presidents Award for their 10th RoSPA Gold Award in a row. President’s awards and orders of distinction are presented to organisations sustaining the high standards of the gold level over consecutive years.

Steve Andrew, ABB Demolition and Remediation Manager said, “Receiving individual gold awards is always positive but receiving the President’s Award is recognition of the strength of partnership between ABB and Exxonmobil that has stood the test of time.” This is a fantastic achievement for the team and recognition for all their hard work over the last 14 years.

Sam Lane-Ryan, ABB (right), being presented with the RoSPA Presidents Award.

Social media

At ABB we are always pleased to engage with our clients, customers and employees. So please connect with us and join our conversation on ABB’s social media platforms:

@ABBConsultingUK
@ABBoilandgas

@ABBConsultingUK
ABB Oil, Gas and Chemicals

ABB Consulting Group

For more information, please visit www.pelsoftware.com
# Forthcoming events

## February

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<tbody>
<tr>
<td>20th-22nd</td>
<td>Effective alarm management - the practitioners course*</td>
<td>Leeds</td>
<td>Training course</td>
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<tr>
<td>21st</td>
<td>Understanding pipe supports</td>
<td>Internet</td>
<td>Webinar</td>
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<tr>
<td>22nd</td>
<td>Construction (Design and Management) (CDM) awareness</td>
<td>Teesside</td>
<td>Training course</td>
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<tr>
<td>23rd</td>
<td>The Preventative Maintenance (PM) challenge - reviewing and upgrading your PM routines</td>
<td>Daresbury</td>
<td>Lunchtime forum</td>
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<td>27th</td>
<td>Alarm insight</td>
<td>Aberdeen</td>
<td>Hot topic forum</td>
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## March

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<td>1st</td>
<td>Layers of Protection Analysis (LOPA)</td>
<td>Daresbury</td>
<td>Training course</td>
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<td>Putting the human element into your procedures</td>
<td>Grangemouth</td>
<td>Lunchtime forum</td>
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<td>2nd</td>
<td>Project risk management</td>
<td>Teesside</td>
<td>Training course</td>
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<td>6th</td>
<td>IEC 61511 Edition 2.0</td>
<td>South Wales</td>
<td>Breakfast briefing</td>
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<td>6th-7th</td>
<td>Design and operation of piping systems*</td>
<td>Edinburgh</td>
<td>Training course</td>
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<td>7th</td>
<td>An engineers guide to DSEAR</td>
<td>Daresbury</td>
<td>Training course</td>
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<td>7th</td>
<td>Benchmarking your FEED</td>
<td>Internet</td>
<td>Webinar</td>
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<td>9th</td>
<td>Readiness and worklists for turnarounds</td>
<td>Hull</td>
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<td>13th-15th</td>
<td>Human factors in the workplace***</td>
<td>Daresbury</td>
<td>Training course</td>
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<td>Simulation</td>
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<td>Management of Change (MoC)</td>
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<td>Non-Destructive Testing (NDT)</td>
<td>Internet</td>
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<tr>
<td>23rd</td>
<td>Improving the efficiency of RHRs**, the challenges of cost and resource</td>
<td>Daresbury</td>
<td>Lunchtime forum</td>
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<td>Technical Due Diligence (TDD)</td>
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<td>16th-20th</td>
<td>Hazard study leaders</td>
<td>Edinburgh</td>
<td>Training course</td>
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<td>Mechanical integrity - lessons from process industry incidents*</td>
<td>Teesside</td>
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<td>Webinar</td>
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<td>PEL</td>
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## May

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*ICChemE accredited courses **Retrospective Hazard Reviews (RHRs) ***CIEHF (Chartered Institute of Ergonomics and Human Factors) recognised course

For more information on:

Training courses please contact: Jackie Kendall on +44 (0)1642 372 121 or jackie.kendall@gb.abb.com

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