

# Solutions



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Phil Eames,  
Senior Safety Consultant,  
ABB Engineering Services

### Getting Process Safety Management (PSM) right

The explosion at BP's Texas City Refinery in March 2005 demonstrated the massive impact that a process safety incident can have...on people, on communities and on the reputation and finances of companies. The extent, depth and profile of the investigations into that incident have given it enormous importance.

The investigation reports that have been published, notably that of the BP US Refineries Independent Safety Review Panel (the Baker Report), present a major challenge to the senior managers of companies across the chemicals and oil & gas sectors.

The recommendations published in the Baker Report will provide the framework for developments in process safety in coming years. They demand nothing less than a revolution.

The key challenges of the Baker Report are to provide effective leadership to establish process safety as a core value of the organisation and to develop a strong process safety culture. No longer can PSM remain an issue limited to technical management. It must become an issue for the entire organisation, including the very highest levels of management.

The keys to success will be the development of stronger management systems that give the right emphasis on critical PSM activities, and the development of a range of metrics. These metrics must drive the right PSM behaviours from site level to the boardroom. Changing behaviours to give the right focus on process safety risks will be the starting point for the establishment of a strong process safety culture. ■

## Energy from waste – it's a gas

The SENT (South East New Territories) Landfill Gas Plant in Hong Kong will take the extraction of methane-rich gas a stage further than is usual on landfill sites. It will be energy self-sufficient and make town gas available to supplement the growing demands of the local community. ABB Engineering Services, in partnership with Johnson Matthey Catalysts, is working with Hong Kong China Gas (HKCG) to harness methane rich gas from landfill sites for the benefit of the community.



The utility plans to build a plant that will convert the landfill gas to town gas which it will make available to supplement the growing energy demands of its customers. A successful feasibility study into the proposed project was carried out by ABB and Johnson Matthey Catalysts. Following the acceptance of this study by HKCG the front-end-engineering project is under way which details the design and operation of the new plant which is scheduled for completion in 2010.



Existing landfill gas plant in North East New Territories (NENT), Hong Kong

While all landfill sites generate methane rich gas, most flare it off for safety reasons, while a growing number use it to provide engine fuel for on-site engine generators. In some cases this has been taken further and electricity has also been supplied to outside users.

ABB designed the gas production process in association with Johnson Matthey Catalysts whose speciality is the catalyst reformer at the heart of the process. ABB has recommended that the process route be divided into three distinct areas:

- Gas pre-treatment
- Gas reforming
- Utilities

As the plant will be built on a previously unused 'greenfield' site it has been designed to be completely self-sufficient, producing all the electricity it needs as well as exporting town gas to consumers. Once the gas is produced it can be collected in a dedicated system which typically consists of a series of wells dug on the site and connected by a network of plastic piping.

The landfill gas is predominantly methane and carbon dioxide with a number of other compounds in trace quantities and saturated with water. The new plant will have a design life of 25 years, matching the period over which gas is expected to be available from the site.

## ABB's targeted environmental PPC support to KemFine, Grangemouth

KemFine Limited provides World Class confidential



and exclusive custom manufacturing services to the agrochemical, pharmaceuticals and speciality chemical sectors. KemFine's operations in Grangemouth are regulated by the Scottish Environment Protection Agency (SEPA) under the Pollution Prevention and Control (PPC) regime.



KemFine plant in Grangemouth

Their PPC permit required KemFine to deliver a rigorous assessment of the environmental risks associated with the operations undertaken at the site and to review their existing control and mitigation measures. KemFine selected ABB's experienced environmental team to support them in the delivery of targeted environmental risk and impact assessment reviews to demonstrate compliance with Best Available Techniques (BAT).



Inside the KemFine plant at Grangemouth

Using the ABB Environmental Hazard Review (EHR) methodology, ABB led the review process to identify all credible environmental risk scenarios and to assess the potential frequency and environmental severity associated with each scenario. The review also considered the adequacy of the existing control and mitigation measures before identifying the overall risk ranking for each scenario which could then be assessed for compliance with BAT.

ABB presented the findings of the assessment to the regulator in a report which provided a traceable record of the risk scenarios considered and clearly demonstrated areas of compliance with BAT. ABB also provided KemFine with a clear action list of those aspects requiring additional work. ■

## Alarm management

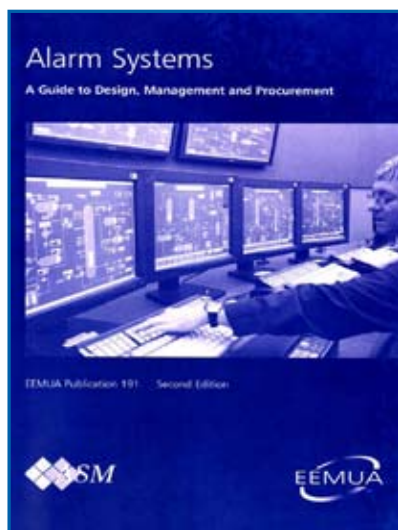
There can be no doubt that alarm management is a hot topic for many of our clients. Poor alarm management has been cited as a contributing factor in a number of serious process accidents including Milford Haven, Longford, Texas City and more recently the explosion and fires at the oil storage depot at Buncefield.

Did you know, for example, that the ARC advisory group has estimated the cost of poor alarm management as being equivalent to the annual profitability of the entire US petrochemical sector? It is hardly surprising that both health and safety and environment regulators around the world are taking an interest in good alarm management practice.



Rob Turner,  
Principal Consultant,  
ABB Engineering Services

Alarm management is a lifecycle activity, much as quality management and safety management are. It is not a one-off activity to do and then forget, nor is it as simple as fitting a piece of software and then walking away. ABB Engineering Services has known this for many years. That is why we developed a range of services to help clients implement good alarm management strategies, whatever their current situation and, more importantly, to reap the benefits of improvement.



EEMUA 191 guide for alarm systems

Many people ask us where they should start and the answer, as with most improvement initiatives, is 'at the beginning'. In practice this means some form of assessment of performance against a recognised benchmark (in this case the EEMUA 191 guide) and an assessment against the key areas of system management and design, operational effectiveness, competence, review and change control.

This is what we call the alarm management 'health check'. Just as with a medical health check this involves a skilled practitioner checking the vital signs and giving an overall assessment of health plus a series of recommendations to improve things. We haven't lost a single patient yet!

The benefits of having your personal health checked from time to time are obvious, but there are also concrete benefits from one of our alarm management programmes. But don't take my word for it. When we completed a review of the Judy platform on behalf of ConocoPhillips in Aberdeen our client commented:



Judy platform in the North Sea

*"A number of shutdowns have been avoided due to the low level of alarms the operators now have to deal with, which enables them to react to the alarms and events they do receive in a more timely and pro-active manner. Several instances of saving in the region of \$250,000 - \$500,000 in lost production have been recorded."*

In summary, effective alarm management helps to ensure assets are safer, more environmentally acceptable, better maintained and working at greater efficiency.

## ABB 'TRAC' SIL software tool - IChemE prestigious safety award - Highly Commended

We are pleased to announce that our joint ABB / BP entry titled 'The development of a comprehensive tool to achieve improved safety with regard to credible layers of protection', received the 'Highly Commended' category for the recently held IChemE 'Awards for Innovation & Excellence' under the Health & Safety Award category.



As a brief background, this particular software tool is used to assist end users with the development of appropriate Safety Integrity Levels (SIL) and capable Safety Instrumented Systems (SIS) in accordance with the requirements of the recognized international standards IEC 61508 / IEC 61511.

The TRAC (Trip Requirement and Availability Calculator) was jointly developed by ABB Engineering Services and BP UK and was based on the direct requirements for SIL determination as found within the then current version of IEC 61508.



From Left: Karl Watson ABB, Adrian Luckins, Chief Engineer BP and John Walkington ABB at the IChemE awards dinner

Through our existing close working relationships with BP, it was agreed that a collaboration of technical input and support to develop TRAC into an innovative and robust joint BP / ABB tool would be advantageous.

This arrangement would also harness the significant technical and operational history within BP to assist ABB in the corresponding user testing requirements and so endorse the key functionality as developed within the software during the delivery programme.

The TRAC functionally allows the user to determine the required Safety Integrity Levels (SIL) for a safety function. This can be done by applying either IEC risk graph or LOPA (Layer of Protective Analysis) methodologies to the hazardous scenarios that may be evident for safety, environmental or asset / production losses.

## ABB HAZCON / HAZDEM process provides real benefits

For just over a year ABB Engineering Services has been providing construction and demolition management services to Saudi Arabian company SABIC. SABIC is the Saudi Basic Industries Corporation, one of the world's leading petrochemical, fertiliser, plastics and metals manufacturers.



SABIC Teesside operations consist of a number of very large process plants and associated storage facilities. A significant business improvement programme is being carried out by SABIC to help achieve operational efficiencies and to utilise latest technology. ABB has been managing the installation of the capital programme associated with this. The work has thrown up many challenges including integration with major shutdowns, demanding construction schedules and operational interfaces. However the health and safety aspects of the work have been particularly challenging.

Consider carrying out heavy lifting, welding, piling, steel erection, scaffolding activities all surrounded by existing plant structures containing 'live' process pipe-work, cables, underground services and hazardous materials. The potential for serious incidents is high. A major success was achieved in December 2008 when 500,000 hours of intensive construction and demolition work was achieved without a recordable incident or accident.



The ABB / SABIC team at SABIC plant on Teesside

All the SABIC projects have benefited from the ABB HAZCON / HAZDEM risk assessment process. The process provides a systematic and formal method of identifying and assessing risks to site activities during construction, maintenance, modification and demolition. Hazards are identified at the planning stages when there is an opportunity to eliminate or reduce risk. This has proved to be the case. The project team believes the HAZCON / HAZDEM process is having a major influence in achieving safety success.

For more information or to arrange HAZCON / HAZDEM training of your team contact:

John Wilkinson - john.h.wilkinson@gb.abb.com

Jim Miller - jim.miller@gb.abb.com

## Responsible Energy

The CIA held the Responsible Energy conference. Delegates heard that the impact of increasing renewable targets on electricity prices will make gas fired and, particularly biomass fired Combined Heat and Power (CHP) schemes attractive, and that wind turbine and energy from waste projects offer stable longer term energy prices and Corporate Social Responsibility (CSR) benefits.



Delegates from the Responsible Energy conference

Colin Board, ABB Engineering Services reviewed best practice in relation to compressed air, cooling water, boilers and motors. The CIA gave updates on climate change and energy polices.

## ChemEng08 conference

The Institution of Chemical Engineers held the first ever ChemEng08 conference / exhibition at the Birmingham NEC.



From left: David Brown, Chief Executive, IChemE, Peter Hunt, ABB, Richard Darton, President of IChemE and Graham Lawson, IChemE Assembly Steering Group Chairman.

ABB Engineering Services played a key role in the event. Allen Ormond acted as chairman in the Health, Safety & Environment seminars and Graeme Ellis gave a presentation on 'Identification of Major Accident Hazards'. ABB also sponsored, and exhibited at the event which was attended by approximately 1,300 delegates.

## Oil and Gas UK 2008

ABB sponsored the Oil and Gas UK 2008 awards dinner in Aberdeen and hosted a table with guests from BP, Talisan, ConocoPhillips and Total.

"As sponsors, this event gave ABB Engineering Services a great profile." said Ian Herbert, Operations Manager, ABB Aberdeen.



From Left: Alan Balfour, Mechanical Technical Authority, BP, Harry Robertson, Inspection Team Leader, BP, Paul Jackson, ABB, Bruce Lawson, Operations Strategy & Sustainability Manager, Total and Ian Herbert, ABB

## HSE human factors update

ABB held a lunchtime forum on human factors, in Grangemouth.



The presentation was given to over 30 customer company attendees by Mr John Wilkinson, of the HSE's Hazardous Installations Directorate.



John Wilkinson, HSE with John Walkington, ABB

John's presentation essentially outlined the issues and corresponding management challenges for human factors that can influence people and their behaviours whilst in the workplace.

The presentation highlighted that human factors and ergonomics have a significant contribution to play in order to improve health and safety by reducing the number of accidents and cases of ill-health at work and that careful consideration of human factors i.e. the environmental, organisational and job factors, combined with associated human characteristics which influence behaviour at work should be a key element of a company's safety management system.

For more information please visit the following HSE website - [www.hse.gov.uk/humanfactors](http://www.hse.gov.uk/humanfactors)

## Construction (Design and Management) Regulations training courses

The Construction (Design and Management) (CDM) Regulations have been with us since 1994. The regulations were updated and re-launched as CDM in 2007.

The regulations when effectively followed create a solid foundation to help achieve integration of health and safety into the management of projects and to:

- Encourage everyone involved to work together
- Improve planning and management
- Identify hazards early on such that they can be eliminated or their impact reduced
- Target effort where it is of most benefit
- Discourage unnecessary bureaucracy

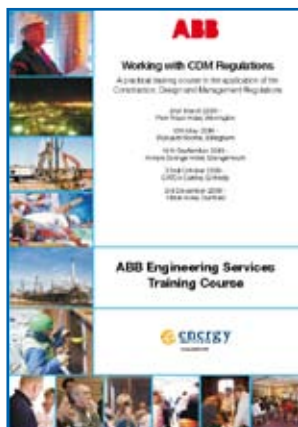


ABB Engineering Services, Working with CDM Regulations training course

Over the past 18 months ABB Engineering Services has been running a series of training courses and lunchtime talks across the UK to help clients understand the new regulations and the impact they will have on their projects. So far ABB has trained in excess of 300 delegates from a wide range of companies including, Centrica, SABIC, Diageo, Huntsman, National Grid and BOC.

Some feedback from the courses:

*"Helps to focus on what we should be doing"*

*"Tutor had good experience to share"*

*"Overall content very good"*

More courses have been planned for 2009. (see page 7 for dates)

## ABB and the Energy Institute

ABB Engineering Services is represented by Graeme Ellis on the recently formed Energy Institute Process Safety Committee. This deals with issues relevant to the oil and gas sector and includes representatives from Chevron, Total, BP, BG, ConocoPhillips, Centrica, Nexen, Scottish Power and Maersk Oil. The current focus of the committee is area classification, SIL determination and the management of petroleum storage depots following the Buncefield accident.



The objective is not to repeat guidance from other bodies involved in process safety, but to provide clear guidance to the oil and gas sector in the form of the familiar IP (Institute of Petroleum) guides. A spin off working group has been looking in detail at SIL and LOPA studies, this has involved ABB's specialist Alan King.

## IChemE Innovation and Excellence awards

This year ABB sponsored the Sustainable Technology award at the IChemE Innovation and Excellence awards ceremony, which was presented by Neil Blackhall to Faculda dade Engenharia da Universidade do Porto for their development of a sustainable process for Green Diesel Additives Synthesis. The host for the evening was Chris Barrie of Brittas Empire and Red Dwarf, fame.



Presenter Chris Barrie, Neil Blackhall (ABB) presenting award to Viviana Silva, Researcher at Faculdade de Engenharia da Universidade do Porto

## CIA Celebration of Success Day

ABB attended the prestigious CIA Celebration of Success Day. The purpose of the event was to share learning from all of the CIA award winners and to generate positive publicity for the industry. ▶



Peter Hunt, ABB (left) & Steve Elliot, Chief Executive, CIA (right) presenting the Manufacturing Award 2008 to Nick Lindop, Director and General Manager, Pentagon Fine Chemicals

Conferences are major industry forums focusing on key topic areas

Conferences - May 2009 to September 2009		
6th May	Pressure Relief	Manchester
13th May	Safety Integrity Levels (SIL) & Process Safety	London
11th June	Occupied Buildings	London
17th September	Process Safety	London



## Seminars

Seminars are focused on industry 'hot topics' and include inputs from external speakers.

Seminars - April 2009 to July 2009		
23rd April	Energy Masterclass - CHP & Renewables	Warrington
12th May	Alarm Management in Practice	Edinburgh
12th May	Briefing on Complying with PFEER Offshore	Aberdeen
14th May	Environmental Permitting Regulations	Grimsby
19th May	IEC 61508 / 61511 & Safety Integrity Levels (SIL)	Aberdeen
20th May	Energy Masterclass - Energy Strategy	Grangemouth
2nd June	Demolition & Remediation	Leeds
9th June	Business System Migration Management	Manchester
10th June	Energy Masterclass - Energy Strategy	Cardiff
24th June	Site Based Projects & Modifications	Grimsby
25th June	Human Factors in Practice	Grangemouth
7th July	IEC 61508 / 61511 & Safety Integrity Levels (SIL)	Billingham



## Technical training

Training courses provide in-depth knowledge on key subjects as part of an engineer's professional development.

Technical training courses - April 2009 to May 2009		
1st - 2nd April	Alarm Management *	Warrington
20th - 24th April	Hazard Study Leaders	Edinburgh
21st April	Legislative Awareness Training - CDM & LOLER	Dartford
21st - 22nd April	Delivering Energy Savings *	York
22nd April	SIL Awareness Training for C / E Technicians	Grimsby
28th - 29th April	Area Classification *	Edinburgh
28th April	ATEX / DSEAR for Mechanical Technicians	Cardiff
29th April	An Understanding of Process Safety Management	Grangemouth
30th April	Electrostatic Ignition Hazards *	Manchester
7th May	Changeover Excellence Workshop	Cork
11th - 15th May	SIL Determination & Hazard Assessment	Frodsham
11th May	Root Cause Analysis	Brigg
12th May	Criticality Analysis & FMECA	Brigg
13th May	Working with CDM Regulations	Billingham
20th May	Hazard Study Awareness	Warrington
21st May	Legislative Awareness Training - PSSR / PED & PUWER	Dartford



\* IChemE approved course. All training courses are in association with the Energy Institute (excl. Changeover Excellence)

All of the above events are organised and delivered by ABB Engineering Services.

For more information on: Seminars please telephone: +44 (0)1642 372029 or e-mail: seminars@gb.abb.com

Training courses please telephone: +44 (0)1642 372064 or e-mail: courses@gb.abb.com

## ABB Engineering Services work in partnership with Lucite to achieve project success

Lucite International successfully and safely commissioned their innovative Alpha 1 project in Singapore during November 2008 achieving flow sheet production levels within just a few weeks of operation. Project Alpha 1 is a first in class operation and the first commercial 120Kte plant using a new route, the 'Alpha Technology' to produce Methyl Methacrylate (MMA).



The Alpha 1 plant in Singapore

Geoff Muir, Lucite Alpha 1 project manager stated; "ABB Engineering Services expended over 20,000 man hours on Alpha 1, providing support in areas such as process safety, process engineering, functional engineering, specification approval and design verification. The support provided helped to make Alpha 1 a successful project, safely reaching flow sheet by November 2008 and to capital sanction".

ABB has been working closely with the Lucite Alpha Technology & Strategic Projects Group for many years providing engineering, project and consultancy services during all stages of this innovative project. Services included risk management to assess the suitability of potential locations, consultancy and functional engineering services during the development of the Front End Engineering Package (FEED) and auditing and verification services during the detail design stage.

ABB Engineering Services offers its congratulations to Lucite International for their successful implementation of this innovative technology and for the safe and successful delivery of this project. ▀



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