

Solutions



Contents

Getting pressure relief right	p2
Total Plant Reliability®	p3
In brief	p4
Conferences	p5
Events / training	p6
Conferences / seminars / training	p7
RoSPA Gold award to ABB	p8



Chris Flower,
Senior Process Engineer,
ABB Engineering Services

Getting pressure relief right

Why are pressure relief systems installed?

The answer to this might be:

- To protect equipment from the consequences of under and overpressure
- It is required by the design codes
- Relief devices are always fitted to a pressure vessel or storage tank

However, these answers are not likely to justify expenditure in today's climate of pressures on business performance. Also, thankfully, relief streams are rarely required to operate so any inadequacies are rarely noticed.

However the answer to the question above should be:

- It's part of the site's licence to operate
- They mitigate business and financial risk
- Pressure relief protects the environment
- It's the last line of defence when all other layers of protection fail

Looking at pressure relief in this light makes justifying the expenditure easier. An example of what can happen when pressure relief goes wrong is the accident at Bhopal, which killed thousands. The design and operation of the pressure relief system was found to be a significant factor in the accident.

Some people assume that because there is a relief system installed, that part of the process is adequately protected, no matter how long ago the relief stream was designed or installed. This assumes that nothing has changed in the process, sometimes developed more than 20 years earlier. This attitude is evident by the statistics below.



Getting pressure relief right (continued)

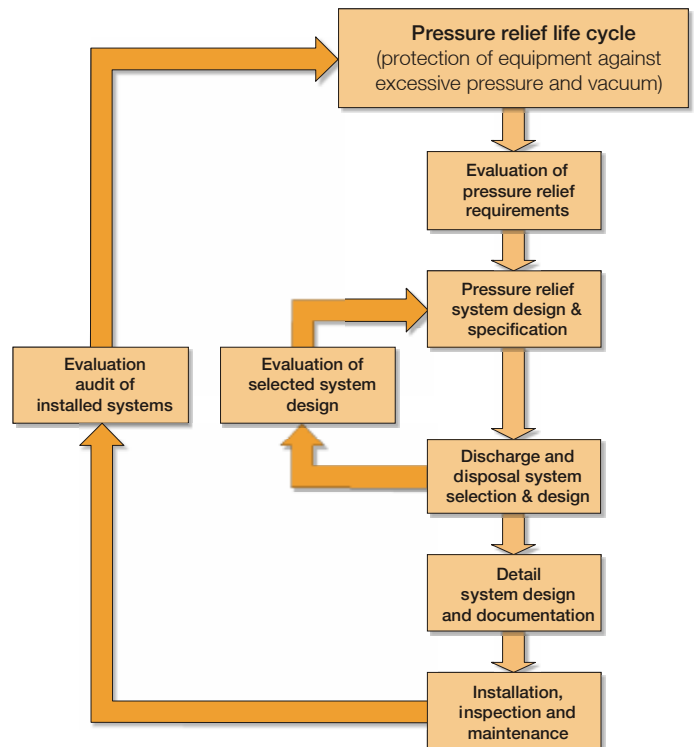
Statistics

A recent site survey by ABB Engineering Services compared the valve set pressure against the pressure at which they actually operated. Of the 341 valves tested, 68 (20%) failed to lift within 10% of the cold set pressure, and 13 valves (4%) failed to lift at 1.3 times the cold set pressure. The 2 tables below show further concerning statistics.

These statistics are cause for concern. They suggest that a significant percentage of relief devices are simply not designed or installed correctly and will provide little or no protection when they are called upon.

These statistics can be attributed to three root causes:

- Failure to provide relief
- Incorrect design
- Poor installation, inspection and / or maintenance



Cause of incident	% of total
Failure to provide relief	38.5%
Incorrect set pressure	32.5%
Seized or blocked	14.9%
Design of installation	8.8%
Inadequate relief capacity	5.3%

Table 1: Reasons for incidents relating to pressure relief in the UK. Source: Health and Safety Executive (HSE), UK

Status	% of total	% of failed streams
Meets standards	59%	
No relief device	15%	37%
Undersized device	7%	17%
Improper installation	17%	41%
Undersized and improperly installed device	2%	5%

Table 2: Statistics from audits on operation plant in the US show that two fifths of the equipment in the oil, gas and chemical industries lacked adequate overpressure protection

Conclusions

Pressure relief systems appear to have been neglected over recent years. This situation is improving with more and more companies realising their vulnerability and starting to remedy the situation. Also regulatory bodies are focusing more on relief stream design, maintenance and verification.

However it is pointless for companies to spend money now documenting and recording the basis for their relief system if these are not kept up to date. There is one final challenge to the reader. Go out on site and find a relief device.

Ask yourself the following questions:

- What are the credible relief scenarios for this item of equipment?
- Can I find the sizing basis for this valve?
- Does the sizing basis reflect the current operating conditions and configuration?
- Can I find the inspection and maintenance history of the relief system (not just the device)?
- Am I confident that the system is protected from under and overpressure?
- Do I feel safe?



Reverse acting bursting discs

This is an abstract from a paper published in the chemical engineer (tce) entitled 'Getting pressure relief right', by Chris Flower in July 2007. For a full copy please contact Sarah Janes on sarah.janes@gb.abb.com

Total Plant Reliability® (TPR)

Paul Everard, Group Manager Operations Improvement, extols the virtues of Total Plant Reliability. Many organisations think of reliability as a subset of maintenance and it therefore sits well down the list of priorities. However, reliability can be applied across a whole plant or business to look at the overall supply chain and ensure a reliable supply to the customer. In this situation reliability takes on a much higher priority.

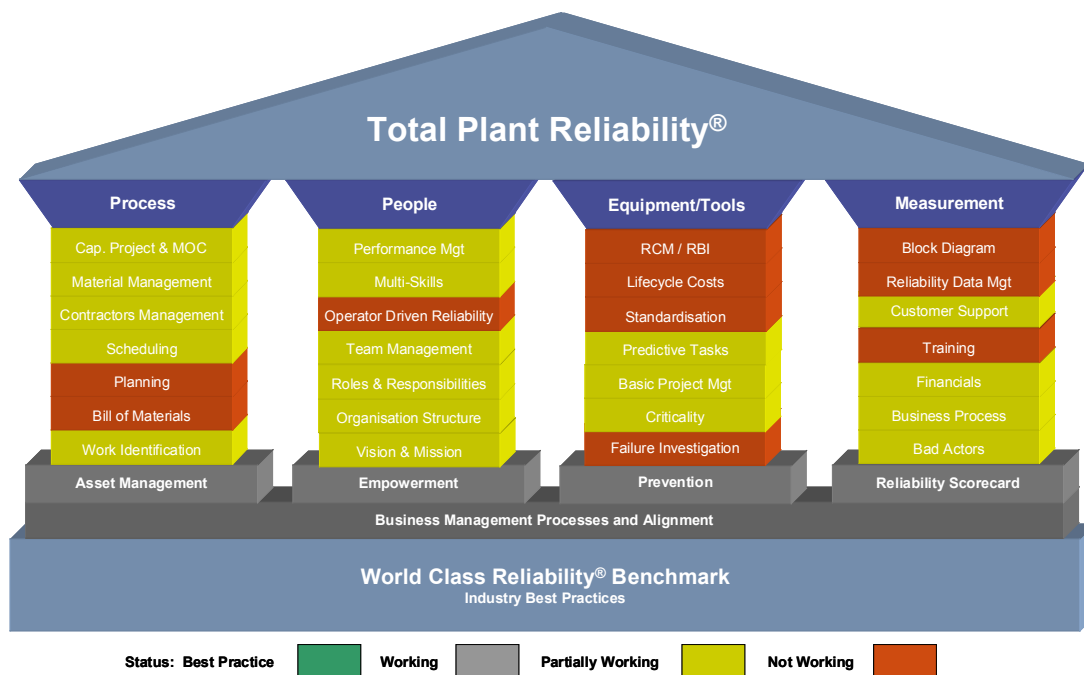


Paul Everard, Operations Improvement Manager, ABB Engineering Services

Total Plant Reliability is a different way of looking at the performance of a plant or organisation and whilst it focuses on how equipment is operated and maintained, it also looks at all of the aspects that make up the reliability chain. The pillars that make up a totally reliable operation include the equipment and assets, the processes that support the operation, the people that use the processes to deliver the necessary performance and the measures that are used to ensure compliance and to drive continuous improvement.

It is typical to view maintenance spend as a cost that must be reduced to benefit the business rather than as an investment that, done effectively, can deliver huge returns. Take a typical business generating \$157 million of revenue with a maintenance spend of \$9.5 million. Cutting the maintenance costs might increase the Return on Capital Employed (ROCE) from say 6.5% to 8%. Definitely a benefit worth having, but if that original maintenance budget was more effectively spent and the overall reliability of the business improved to increase Operational Equipment Effectiveness (OEE) by 10%, then the ROCE could nearly double.

Any process is only as good as its weakest link and it is therefore important to take a holistic view of reliability, to ensure that all the necessary building blocks are not just in place, but working effectively.



Summary presentation of the status of each element of reliability benchmarked

“Where to start?” a question that is asked many times, but there is no escape from the adage that if you don’t measure something then it won’t improve. Benchmarking was the buzz word of 10 or 20 years ago, but many people engaged the process without the commitment to truly do anything with the results. It is still however, the place to start. For an organisation to be committed to delivering a benefit, it needs to understand both the size of the prize and the likelihood of being able to deliver.

Benchmarking done well, not only sets out to identify the gaps, but delivers a cost justified programme, based upon what has been achieved elsewhere and is therefore realistic in its deliverables. The findings and deliverables must also be analysed in the context of the specific business to ensure that there is real benefit in investing in an improvement programme. Benefits are most obvious where increased capacity can be sold, but it can also be used to defer capital spend or to allow rationalisation of a business, and let us not forget that reducing overall spend is also worth having.

For example, our experience indicates that there has been an enormous investment in Computerised Maintenance Management Systems (CMMS), but very few organisations use them effectively and tap into the benefits they can bring. ■

Process Hazard Review (PHR) helps BG Group improve process safety on gas plants

BG Group is implementing a programme of process safety reviews on its worldwide gas extraction and processing assets. The objective is to prevent and mitigate major accident hazards and to implement risk prioritised improvements.



Gas pipes in the North Sea

ABB is working with BG Group providing leadership of multi-functional teams on the assets. The methodology is based on ABB's unique Process Hazard Review technique with HAZOP studies for complex parts of the process, such as the HP / LP interfaces. The findings of the reviews are providing valuable insights into where further risk reduction is required.

Reviews have been carried out on assets in the North Sea, India and Egypt during 2008, with further reviews planned in Egypt, Trinidad & Tobago and Tunisia to complete all the main assets before year end.

Strategy for assuring integrity of National Grid LNG sites



National Grid is one of the worlds largest utilities, focusing on the safe and reliable delivery of energy. National Grids' four UK LNG storage sites are top tier sites under COMAH Regulations. The operational assets need to be operated safely, reliably and in a flexible manner to meet both legal and business requirements. In addition, the assets need to have their condition maintained so that they can meet future customer expectations in regard to availability and reliability.

The maintenance policy used to meet these objectives uses reliability-centred, risk-based inspection techniques.

A range of performance and assessment tools are used to establish the ongoing fitness for purpose, including an independent condition assessment in the form of a 'spot-check', designed to provide assurance and establish condition against wider industry standards. This assessment was used to feed into a wider review of the prevailing maintenance inspection regime and ongoing asset replacement programme.

The asset condition assessment, performed by ABB Engineering Services, was a structured review of those aspects where the asset condition had a potentially large impact in terms of major HSE consequences. The review confirmed that most equipment on all sites was in satisfactory condition, though there were a number of areas of concern, including certain bellows expansion joints and some pipework.

After being subjected to a robust challenge and review process to ensure that the findings were put into the operational context, the results of the condition assessment were used to prioritise future maintenance and investment requirements. Strategic recommendations include: maintenance policy, spares, process improvements and asset modification and replacement.

The success to date has been achieved through:

- Appropriate asset maintenance / modification / replacement policy
- Effective scheduling of inspections
- Ongoing internal asset condition processes
- Use of skilled, external resources to undertake independent condition assessment
- Using the results of the asset health review to set longer-term strategy

This article appeared in Gas Processors Association Europe newsletter in August 2008. ▶



National Grid LNG storage tanks

Major safety conference, Hazards XX UK

ABB Engineering Services was the main sponsor of this year's IChemE Hazards XX conference and also presented several papers. The conference attracted over 300 delegates from all over the world. Proceeding the main conference, ABB hosted workshops on 'Practical Safety Integrity Level (SIL) Determination.



IChemE Hazards XX conference

Shutdowns and Turnarounds

Alan D'Ambrogio chaired the Global Shutdowns and Turnarounds conference in London. At the event ABB hosted a workshop on 'Using Risk Based Inspection to Reduce Shutdown Workload', with excellent feedback. We also presented a paper entitled 'Turnarounds - Reinventing Success' which was extremely well received by delegates from companies such as ConocoPhillips, BP, Centrica, BG and Dow Corning.

ERTC Asset Maximisation, Lisbon

Representatives from ABB Engineering Services recently attended the ERTC Asset Maximisation Conference held in Lisbon. The conference covered many aspects of asset integrity and was well supported with over 100 delegates from around the world from companies including Sabic, Petrobras, Hellenic Petroleum, ENI, Repsol, and Galp.



Exhibition stand at the ABB sponsored evening reception

The ABB presentation given by Jonathan Cook was entitled 'Evaluating the Condition of Equipment at Process Chemical Plants'. The paper covered ABB's 'top down' approach to asset integrity. This helps customers with asset life cycle issues, identify future reliability issues and concerns, plan for replacement or repair and understand likely expenditure needs in the coming years.

Automation World

ABB Engineering Services attended the recent ABB Automation World annual customer event in Houston, Texas. Some 3,500 delegates attended the 3-day event and our involvement provided an ideal platform to raise the profile / awareness of our products and services as part of the overall ABB life cycle customer offering.



ABB exhibition stand at the Automation World event

Launch of GAMP® 5 in Copenhagen

The latest incarnation of the famous GAMP guide for computer systems validation (GAMP 5: A risk-based approach to compliant GxP computerised systems issued by ISPE 2008) has at last been published. It was launched to record audiences in the USA, Denmark and Turkey this spring.

ABB Engineering Services was well represented at the Copenhagen launch. In the 2-day conference, the GAMP principles were explained to 400 life science professionals. These principles have been reworked to take into account the latest regulatory developments, and in particular the FDA's risk-based initiative and the application of the 'Quality by Design' concept.

The use of risk assessments for determining the validation focus and effort is rapidly becoming the norm for regulated systems. The GAMP guide explains the Failure Mode Effect Analysis, or FMEA, but equally other methods may also be gainfully used.

The GAMP guide is now applicable to the full range of regulated computerised systems, and it is bound to have an impact for years to come as it is widely referenced by the regulatory authorities. ▀



Delegates at the GAMP® 5 launch

Humber Chemical Focus (HCF) dinner

ABB sponsored this year's HCF dinner and the awards for 'Commitment to Improving Process Safety'. Through HCF's Major Hazards Group, Humber companies were invited to submit examples of process safety improvement programmes and an independent panel assessed four completed applications from BP Chemicals, Centrica Storage, Corus and Novartis.



Glenn Sibbick, Operations Director, Centrica Storage Ltd (right) receiving his award from Peter Hunt, ABB

This year the award was given to Centrica Storage Ltd for their outstanding commitment to process safety communications following their work on the Rough Platform.

Inspection workshops

As part of our drive to share best practice in inspection and meet new customers, ABB Engineering Services held inspection workshops at Manchester Airport and the Wynyard Rooms on Teesside. The workshops were led by Paul Jackson and Stuart Hewardine and included an excellent presentation by guest speaker David Glass of the HSE on current regulatory issues and regulator requirements. ABB presentations were in three key areas of interest; Tank Inspection, Risk Based Inspection and Pipework Integrity. Both events were well attended (customers included Total, SRM Ltd, Celanese Acetates, ConocoPhillips and Baker Petrolite) and generated lively discussions and positive feedback. We are now looking to run a similar event on Humberside.

Energy Institute training

The Energy Institute's EI Oil and Gas Training department asked ABB Engineering Services to provide technical training for oil and gas industry engineers and other support personnel. "We have, for a number of years, had a proactive approach to meeting the training needs of the industry's personnel and have expanded our portfolio of courses accordingly," says Nick Wilkinson, Energy Institute Training Manager, "We sought to strengthen further our technical-offering and are delighted to be partnering with ABB Engineering Services."



Peter Hunt, ABB, equally welcomes the new partnership, stating that "...the newly forged relationship will be of mutual benefit to ABB and the Energy Institute as well as being a win-win for the industry." Available training courses cover a wide variety of topics from piping and machines, electrical and civil, safety and environmental, through to reliability and project management.

Continuous processing in secondary manufacturing

Jennifer Thompson presented a paper on 'Validation for Continuous Processing' at the ISPE Seminar 'Continuous Processing in Secondary Manufacturing.' This one day seminar was attended by 80 delegates from the pharmaceutical industry and supplier organisations. Jennifer's talk was focused on the new ASTM guideline on "Application of Continuous Quality Verification to Pharmaceutical and Biopharmaceutical Manufacturing" and the changes to roles in Quality, Analytics and Engineering which will result from implementation of the current regulatory hot topics of PAT and Quality-by-Design.

Energy Efficiency Masterclasses

ABB Engineering Services is running a series of Energy Efficiency Masterclasses throughout 2008 / 2009, demonstrating practical ways to reduce a company's carbon footprint and how to save money on energy bills. High energy prices, uncertainty over future carbon prices and growing stakeholder expectations for sustainable manufacturing require a strategic response to energy efficiency and carbon management. There are four modules in the series, each covering a different aspect of energy management in industrial plant:

- Energy Strategy
- Organising for Energy Management
- Effective Energy Auditing
- Renewables and Combined Heat & Power (CHP)

ABB Engineering Services' first lunchtime forum in Holland

As part of growing the business on an international basis, ABB held the first of three Lunchtime Forums in Middelburg, Holland. The event was attended by 30 guests from companies such as Dow, DuPont and Borealis Polymers who were all keen to hear Rob Turner talking about alarm management. Further forums will be held in Holland later in the year covering subjects such as asset integrity, and energy & environmental issues. ■



Rob Turner of ABB giving his presentation

Conferences are major industry forums focusing on key topic areas

Conferences - January 2009 to May 2009		
11th - 12th February	Shutdowns and Turnarounds	London
26th February	Manufacturing and Process Excellence	Leeds
6th May	Pressure Relief	Manchester
13th May	Safety Integrity Levels (SIL) & Process Safety	London



Seminars

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

Seminars - January 2009 to May 2009		
27th January	Energy Masterclass - Effective Energy Auditing	Billingham
10th February	Business Systems Migration Management	London
12th February	IEC 61508-61511 & Safety Integrity Level (SIL)	Cardiff
17th February	Alarm Management in Practice	Edinburgh
24th February	Energy Masterclass - Effective Energy Auditing	Warrington
4th March	Maintenance & Reliability in Practice	Grimsby
17th March	Demolition & Remediation	Cardiff
18th March	Energy Masterclass - CHP & Renewables	Billingham
24th March	Site Based Projects & Modifications	Grangemouth
26th March	Integrity Management in Practice	Leeds
31st March	Human Factors in Practice	Grimsby
1st April	Risk Based Inspection	Edinburgh
23rd April	Energy Masterclass - CHP & Renewables	Warrington
12th May	Briefing on Complying with ATEX offshore	Aberdeen
14th May	Environmental Permitting Regulations	Grimsby
19th May	IEC 61508-61511 & Safety Integrity Level (SIL)	Aberdeen
20th May	Energy Masterclass - Energy Strategy	Grangemouth



Technical training

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

Technical training courses - January 2009 to March 2009		
28th January	An Understanding of Process Safety Management	Leeds
4th February	SIL Awareness Training for C / E Technicians	Warrington
10th February	Legislation Awareness Training - PUWER	Warrington
19th February	Changeover Excellence Workshop	Warrington
24th February	Root Cause Analysis	Grangemouth
25th February	Criticality Analysis & FMECA	Grangemouth
3rd - 4th March	Essentials of Pressure Systems *	Leeds
4th - 5th March	IEC 61508-61511 SIL Determination *	Frodsham
5th March	Legislation Awareness Training - Environmental	Warrington
10th - 12th March	Pressure Relief *	Chester
12th March	ATEX / DSEAR for Mechanical Technicians	Billingham
12th March	The Organisation Workshop	Edinburgh
17th - 18th March	Design & Operation of Piping Systems *	Edinburgh
19th March	SIL Awareness Training for C / E Technicians	Preston
31st March	Working with CDM Regulations	Warrington
31st March - 1st April	Managing Deterioration of Plant Equipment *	Leeds



* 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' team wins health and safety prize in the UK

An ABB team in the UK has won a top safety certificate awarded by the country's Royal Society for the Prevention of Accidents (RoSPA) for the rigorous standards applied in 2007 on a project for ExxonMobil, one of our largest customers. The team has been working since 2003 on demolishing 450 petrol stations in the UK and Ireland, and clearing the sites of any environmentally harmful material. It won a health and safety Merit award from RoSPA in 2004 and Silver awards in the following two years, before achieving Gold in 2007.



Ongoing demolition work

"The RoSPA Gold award is recognition for all involved in the project for their continued hard work and commitment in helping achieve an excellent safety performance working in the potentially hazardous environment of demolition and land remediation." said Steve Andrew, leader of the project team.



ABB regards occupational health and safety as a top priority and aims to eliminate work-related incidents in which employees are hurt. The criteria for the RoSPA Gold award include that no fatalities or major injuries occurred on a project. ABB has overall responsibility for decommissioning selected ExxonMobil petrol stations. These are predominantly in city centres, where reducing petrol retail margins and rising land prices have made the sale of land financially attractive. To enable the land to be sold, it needs to be remediated to eliminate any environmental issues.

Most of the on-site work is carried out by subcontractors. ABB seeks to involve everyone – from site operatives to directors – in developing and implementing the health and safety practices in order to increase commitment to the objectives. Every person working on the project receives regular health and safety training and participates in workshops that give them the opportunity to influence how the work is carried out. In addition, each individual is empowered to stop the job if it seems unsafe to continue. ■



Engineering Services

Daresbury Park Business Centre
Daresbury
Warrington
Cheshire WA4 4BT
United Kingdom
Tel: +44 (0)1925 741111
Fax: +44 (0)1925 741212
E-mail: contact@gb.abb.com

©Copyright ABB Ltd 2008.

