Chilworth Technology
the experts in process safety

PROCESS Safety News

2005
Issue 1

Welcome **to issue 1 of the Chilworth Technology 2005 newsletter. In this issue we cover:- Common Delays in Risk Assessment ● Mechanical Equipment Ignition Risk Assessment (MEIRA) ● The Right Safety Data (Buyers Beware!) ● Feedback on COMAH / Seveso II Submissions ● Getting to Grips with IEC 61508/11.**

News Bites

DustScreen Halves the Cost of Large Inventory Powder Screening

Implementation of DSEAR 2002 or ATEX 137 can be a major headache if you have a large number of powdered solids in your inventory particularly if you have little or no safety data. DustScreen from Chilworth Technology is designed to provide a cost-effective screening method for determining the worst case dust explosion parameters from a large product portfolio.

PreVent - The Rapid Assessment of Chemical Process Hazards

If you need to demonstrate that an existing vent is adequately sized to cope with runaway scenarios and you need to do it quickly and cost effectively, PreVent is your solution. Launched in 2005 this new reaction hazard assessment tool provides a novel screening procedure which can build into an established three stage assessment process to confirm the suitability of existing or new processes.

New! NONS, REACH Testing Service

Chilworth has joined the pan-European C3-B Alliance for Safety; an organisation which has been formed to respond to the complex challenges of regulatory compliance.

Regulatory compliance such as NONS and REACH often requires test data from dedicated laboratories covering physico-chemical analysis, toxicology, eco-toxicology as well as specialist services such as dossier preparation/project management. C3-B will do all this for you whilst allowing you to choose a single regional point of contact with any of the member companies. Compliance services from a single point of contact is both cost-effective and a time saving benefit. See the C3-B website at www.c3-b.com for more information.

See www.chilworth.co.uk for further information on any of these services, or return the faxback form on the back page.

DSEAR / ATEX: Don't Wait Until the Dust Settles!

The final deadline for compliance with ATEX 137 and DSEAR is fast approaching. By the end of **June 2006**, all facilities will need to be fully compliant.

Where are you on the path to compliance? By now you should have completed and documented all risk assessments on your plant. This will ensure that during the first months of 2006 you will be in a position for someone "competent" to undertake both the verification and consolidation of all risk assessment documents into a report and the validation audit for final compliance.

Chilworth Technology has participated in numerous ATEX and DSEAR compliance programmes and is only too aware of volumes of work this can generate. Problems are often compounded and hazard assessments delayed by such issues as a lack of adequate safety data on the material being processed, particularly for dusts or powders.

Frequently we hear clients state:-

- Requested data from suppliers who also have a duty of care is not available.
- We are using literature data for our products but don't know how this affects blends or mixtures.
- We've assumed the worst case properties and are designing our safety systems and allocating Hazardous Area Classifications accordingly.
- We've thoroughly tested what we believe is our most hazardous material and are now using this data to cover the rest of our products.

There are occasions when these comments may be justified. However, there are also occasions when these comments show potentially dangerous negligence. So, what's wrong with these approaches?

- Suppliers do have a duty of care – but they normally absolve themselves of any further responsibility by providing an MSDS. The MSDS may state "this product may explode if ignited when dispersed as a cloud". However it does not have to provide process safety data such as explosion severity, MIE, MIT, LIT which may be essential for adequate risk assessment on the processes you are running. Ultimately, it is the company's responsibility to ensure that they can operate their plant safely.
- Literature data, whilst valuable as a guide, is rarely suitable for risk assessment. Test methods evolve but, more importantly, the specific characteristics of your powder are unlikely to be identical to that presented by the literature. Moisture content, particle size, particle morphology, etc., all impact on dust explosion properties.
- If you design for the worst case, you may be building in considerable extra expense, and complexity, by over-designing (over zoning). It is usually more cost effective to design for reality.
- Chemically close analogues (provided they are in the same particle form) will often give data in the same ballpark. However, this is not always the case. Coal, for example, can be very ignition sensitive (< 10 mJ) and very insensitive (> 500 mJ).

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If some of these points are causing you concern or preventing an adequate risk assessment, talk to us at Chilworth Technology. We offer a FREE advisory service to assist customers in selecting the most cost-effective solution to powder testing.

Chilworth's testing service offers a range of techniques for testing the properties of flammable dusts. Our range caters for detailed, comprehensive testing of individual powders through to large volume screening designed to identify and evaluate the worst case material from a large inventory.

Our data is supported by a team of process safety specialists with thousands of man-hours experience in providing safety solutions to the process industry. So if your need is for data or verification and validation by a "competent" specialist, we can help.

Further information is available from our website at www.chilworth.co.uk or by completing the faxback form on the back page.

Assessing the Ignition Risk of Mechanical Equipment: A Case Study

One of the requirements for ATEX compliance is the completion of a Hazardous Area Classification exercise. Companies must now satisfy themselves that both electrical and non-electrical equipment used within hazardous areas meets the requirements of ATEX/DSEAR regarding potential ignition sources. Getting this wrong has the capability to significantly increase operating costs by necessitating equipment replacement.

Under DSEAR / ATEX companies have formal responsibilities to design, select, install, maintain and inspect equipment to ensure that it maintains its safety performance during its operating life. This applies not only to new equipment, but also existing equipment, prior to June 2003.

To avoid unnecessary equipment replacement Chilworth's Process Safety Specialists have developed an effective methodology for assessing ignition risks associated with mechanical equipment used within hazardous zones. This provides a means of justifying the continued use of equipment (if appropriate) without expensive re-build or replacement.

As a recent example, we were asked by a Fine Chemicals manufacturer based in the North of the UK to undertake risk assessments for mechanical equipment. This required the identification of all possible ignition sources that would or could arise in, normal operation, expected malfunction or rare malfunction. This was cross referenced to the equivalent equipment category definitions for any hazardous zones using Chilworth's bespoke assessment templates.

The category ratings of the equipment in the inventory were addressed, whilst considering a number of factors: -

a. Process chemistry

b. Layout and operating environment

c. The hazards and risks associated with the operating plant itself

d. What fault conditions could reasonably occur in Normal, Expected and Rare Malfunctions

e. Where fault conditions could foreseeably occur, how ignition sources could arise and if so, what mitigation measures already existed to deal with such situations?

This review was carried out in conjunction with the client's engineering personnel to enable the efficient identification of equipment with inherent ignition sources and the current level of risk. The exercise was broken down into three phases, focusing on Category 1,2 and 3 equipment. After the review we were able to make recommendations for safe operation including modifications and minimal replacements as appropriate.

The identification of equipment categories within their plant allowed the company to create new or modified inspection needs within their maintenance management system. We also provided mechanical equipment risk assessment templates which were devised to link the operating plant conditions to the zone classification and the level of risk associated with their equipment. As a result of this process they were able to demonstrate that ignition sources were adequately controlled in terms of acceptable tolerable safety limits and the consequences of an ignition were reduced to an acceptable level.

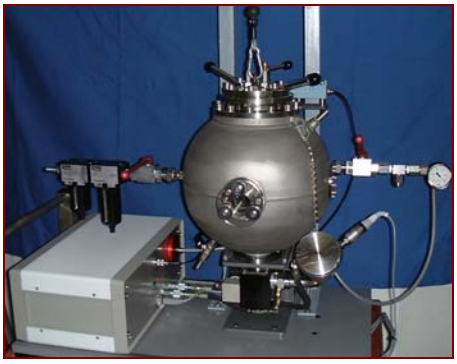
This fully documented approach provided both a pragmatic and auditable risk assessment in support of the company's overall explosion protection philosophy, justifying the continued use of safe equipment without the need for unnecessary and costly replacement.

Further information is available from our website at www.chilworth.co.uk or by completing the faxback form on the back page.

Dust Explosion Testing – Buyers Beware!

When you ask for process safety test data, you – rightly – expect that it should fulfil the criteria and method prescribed by the appropriate national or international standard, so that it can be used for your specific application with absolute confidence. However, if the data you are receiving is generated by a reduced or short-form test method (not strictly in compliance with the standard), then you may have a problem. Subject to how you intend to use this data the safety of your staff, your plant or your customers could be compromised.

Our dust explosion hazards laboratory is fully equipped to provide a very wide range of test data – all under the quality umbrella of GLP. All of our common tests are undertaken to national and more often, international standard methods. Most standards are reasonably prescriptive in detailing precise test methods and criteria. At Chilworth we rigidly apply the prescription of the standard to generate data for our customers that is truly compliant.



From our experience of reviewing customer data, examples of data which could be viewed as compromised include:

- 20L sphere explosion severity analysis performed using a single test series rather than the prescribed triplicate test series

(to comply with the Kuhner operating manual and EN 14034 part 1)

- Electrostatic properties data obtained at a single ambient relative humidity rather than at ambient (50% RH) and low (12% RH) relative humidity. The impact of this can be several orders of magnitude on results
- Layer ignition temperatures based on a screening test only rather than a minimum of three supplementary isothermal experiments (EN 50281-2-1)
- Thermal stability tests performed in apparatus not correctly matched to the specific application
- Minimum ignition energy measured at wide rather than narrowly defined ranges (e.g. 3 – 30 mJ could in reality be 3 – 5 mJ).

The clear message to customers is understand what you are buying! If you need test data to a Standard make sure that is what you are getting. At Chilworth we try to understand our clients specific data needs and data application, so we can advise whether data to a Standard is required or material property estimation would be sufficient.

COMAH / Seveso II - Review Focuses on Vent Sizing and Occupied Buildings

Most sites originally in compliance with COMAH (Seveso II) in 2000 are now required to re-submit their compliance documentation as part of the Regulations' mandatory 5-year review.

A number of our clients have commented that in the 2005 review of submissions, Safety Inspectors have been taking particular interest in two specific safety related areas. These are:

- The assessment of Chemical Reaction Hazards and the design of emergency pressure relief vents
- That Occupied Building Risk Assessments are conducted in line with new guidance.

Specifically they have been reinforcing the fact that companies must demonstrate that they have a robust assessment procedure which effectively defends the chosen Basis of Safety.

With chemical manufacturing and storage operations adequate assessment of reaction hazards requires a methodical procedure to evaluate the process and operating plant conditions. It will require information relating to the: -

- Characterisation and understanding of the normal process and identification of thermal limits for process materials
- Hazard identification exercise to evaluate potential failure scenarios and the potential consequences of such failures
- Safety system design, specification and the development of a robust basis of safety. If emergency relief is to be employed, that the design is to best practice, including DIERS.

Chilworth Technology has developed a methodology for reaction hazards assessment based on this three step procedure. PreVent (Process Reaction Evaluation and Venting assessment) is a highly cost effective tool for assessing reaction hazards and can be applied to new or existing processes operated in new or existing plant.

Further guidance on the technical measures required in the assessment of reaction hazards can be found on the HSE website (http://www.hse.gov.uk/comah/sragtech/techmeasreaction.htm).

The other current area of inspectors' interest with regard to COMAH / Seveso II compliance is Occupied Building Risk Assessment (OBRA). Operators of chemical process plant have for sometime had a legal obligation under various Regulatory requirements, the Seveso II Directive being one of them, to demonstrate that people occupying buildings on their sites are adequately protected from process hazards such as explosions, fires, chemical reaction hazards and toxic releases.

Chemical reaction fire, courtesy of The Cork Examiner

Although guidance on this subject has been available since the late 90's this particular area of risk assessment has been the subject of much discussion and study. As a consequence the Chemical Industries Association released updated guidance in 2004 that provides further practical instruction on assessing the risk to building occupants from toxic hazards and the specification of safe havens.

This updated guidance has re-focused regulatory pressure on those operating companies who either don't have a documented risk assessment or who have been asked to re-submit existing risk assessments. The publication has also resulted in the need to review the number and location of safe havens.

The key areas that need to be considered as part of the assessment are: -

- Which buildings are defined as occupied and their occupancy levels
- What are the major hazards e.g. fire, explosion and toxic release
- Have the hazard levels been quantified and their likely frequency been identified
- The degree of personnel vulnerability inside each building as a result of the hazard levels
- The individual risk to personnel
- Have reasonably practicable risk reduction measures been implemented and shown to have reduced the risks to ALARP (As Low As Reasonably Practicable)
- Are toxic refuge requirements appropriate
- Is there an appropriate level of documentation to satisfy the Regulatory authority?

If you are concerned that your existing assessment of reaction hazards or your occupied buildings risk assessment may not be adequate for regulatory compliance, Chilworth would be pleased to review your installations, processes and data and tailor a cost-effective package of work to bring you fully into compliance. Further information on these two areas of safety compliance is available on our website at www.chilworth.co.uk or by completing the faxback form on the back page.

Getting to Grips with IEC 61508/11: Training

IEC 61508 and the process sector variant IEC 61511, are now widely accepted as 'best practice' for risk assessment and specification of safety systems on plant, e.g. Relief Valves, Instrumented Trips, etc.

On first inspection, the contents of the standard can be quite daunting in terms of getting to grips with the level of technical detail on offer and identifying the requirements for the 'Functional Safety Lifecycle', which is at the heart of the standard. To help with this Chilworth has developed a training programme comprising of three modules, designed to explain the requirements of the standard from a process risk management and design standpoint.

The training programme provides engineers and technical management with an in-depth analysis of IEC 61508/11; ensuring they have the appropriate knowledge and understanding of the Standard. On completion of the training they will be able to fully implement its requirements enabling a company to demonstrate that it can meet both internal safety requirements and regulatory expectations.

Module 1 is normally undertaken as a half day general awareness and appreciation workshop, designed to provide a practical overview of the contents of the standard. It covers the essential methodologies contained within each of the Standard's relevant sections. This provides engineers wishing to understand the importance of the Standard with the fundamental requirements for undertaking the initial or 'front end' process safety hazard identification processes including the subsequent detailed trip system design requirements.

Module 2 is a one day Safety Integrity Level (SIL) Determination course. This is one of the corner stones of the methodology and is described in Part 1of the Standard. It sets out how process safety analysis techniques are used to identify a target performance and reliability level of any intended layers of protection for the process.

The SIL module shows how semi-quantified risk assessment techniques, including the use of Risk Graphs and Layers of Protection Analysis Tables (LOPA) are used in determining Safety Integrity Levels for a particular process. Extensive worked examples are used to allow delegates who are responsible for SIL determination (safety engineers, process engineers, instrument engineers, plant operations management) to be able to contribute to future SIL studies within their own workplaces. This module also emphasises the team aspect of IEC 61508/11 compliance, requiring input from all stake holders in the process.

Module 3 completes the picture with a one day Instrumented Systems Module focusing on the practical design requirements of the Standard. It demonstrates how the hardware architecture and associated software elements of the dedicated instrumented trip loops are developed.

As well as providing the design rationale for the instrument engineer, this module will enable process safety and operational staff to understand the importance of proof testing. The module describes how different approaches are taken in the design stage, depending on Safety Integrity Level rating . It also shows what documentation should be generated to support the analysis and design, together with hints and tips for standard design requirements. Finally the implications for ongoing operations and maintenance are discussed; helping the user to demonstrate that any instrumented trip systems are providing the correct level of risk reduction.

Consultancy: Even with professional training, input from process safety specialists can be invaluable in taking your project forward.

Chilworth have experts in SIL determination and instrumented systems design and would be pleased to offer specialist advice.

Further information is available from our website at www.chilworth.co.uk or by completing the faxback form below.

faxback

Please faxback to Marketing on +44 (0)23 8076 7866

Name: ..... Job Title: .....

Company Name: .....

Address: .....

..... Postcode: ..... Country: .....

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My particular interests are:-

- Mech. Equip. Ignition Risk Assessment ☐
- COMAH / Seveso II ☐
- DustScreen ☐
- Dust/Gas/Vapour Explosion Testing ☐
- Hazardous Area Classification ☐
- Occupied Building Risk Assessment ☐
- PreVent ☐
- DSEAR / ATEX audits ☐
- Regulatory (C3-B) ☐
- IEC 61508/11 Functional Safety ☐
- Training ☐

I would like a FREE and confidential telephone call with a consultant about a process safety matter... ☐

I would like a FREE visit from a consultant next time one is in my area..... ☐

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