TÜV Rheinland Develops Functional Safety Program For High Hazard Industries

Functional Safety Program: Process Hazard and Risk Analysis
Equipping enterprises to manage process safety risks

Best Practices in Developing Safety Cases
A vital asset that provides a natural focal point for key safety, design and operations
Worldwide Market Access, One-Stop Full Service

With a presence on every continent, we provide testing, certification and inspection services for industrial equipment and components all over the world. Our experts are well versed in a variety of approval requirements, offering a one-stop solution to get your equipment to conform with national regulations in almost any country.
Dear Readers,

We are on the cusp of an industrial revolution that will literally transform the way we live, work, and interact. But it’s not the first.

The original industrial revolution took place in the late 1700s, and was driven by the technological miracle of steam power. Then came the second, which was based on electric power, and the third, which saw the combination of electronics and information technology to automate production.

The current revolution is actually the fourth. It promises to fuse the purely physical with the digital and, increasingly, the biological, to create an era unlike anything mankind has ever seen. However, its success will be underpinned by comprehensive industrial services that ensure efficiency, quality and safety!

For example, controlling risks within any industry requires a robust risk management system and competent people to implement it. TÜV Rheinland has developed a Functional Safety Program. As you will see in this newsletter, it allows for a consistent approach towards developing the competence of personnel via a common syllabus, and where knowledge and understanding is assessed by independent third parties.

You will also hear from Risktec Solutions – an independent third party partner – which has put together a brief introduction to safety cases for different high hazard industries and highlighted some best practices.

You can also read about the role of inspectors and auditors in the industry, as well as the usual regulatory updates, upcoming events, certifications and awards.

As always, I hope you will find our newsletter informative and educational.
TÜV Rheinland Korea Art Gallery – Allegory of Memory
TÜV Rheinland Korea Art Gallery located at its Seoul Headquarters is currently showing artworks from Mr. JeaHong Eom. The exhibition is entitled “Allegory of Memory”. He wants to communicate with the audience and hopes they will enjoy happiness through his work. His most recent works are abstract and untitled, so the audience can see the painting differently depending on their experience and memories.
Exhibition: 4 October 2016 – 3 January 2017

Exhibition of Student Posters on Preserving Our Environment and Society
For the fifth time, TÜV Rheinland Japan has staged a poster exhibition in cooperation with the Yokohama College of Art and Design. This year the main topic is symbiosis and students are encouraged to express their thoughts about the importance of preserving our environment and our social milieu. They also deal with the very important topic of protecting and cherishing human beings, using their works of art as the medium of expression.
Exhibition: 5 September to 28 November 2016

Forest & Agriculture Sustainability – Tree Planting in Indonesia
As part of TÜV Rheinland's CSR activities, TÜV Rheinland Indonesia participated in planting trees at Karangsong Beach, Indramayu on 5 May 2016. Organized by Fahutan IPB, five TÜV Rheinland employees from the Bogor office (all IPB Forestry Faculty alumni) joined the planting event. “It was a great event and we were delighted to be part of an event that is aligned with our mission to support environmental sustainability,” said Ms. Dian Soeminta, General Manager (Forestry Agriculture) for TÜV Rheinland Indonesia.

TÜV Rheinland Vietnam Boosts Apparel and Textiles Testing Capabilities with New Gas Fume Chamber
TÜV Rheinland Vietnam has installed a new state-of-the-art gas fume chamber at its laboratory in Ho Chi Minh City. It supports customers in the textiles and apparel – providing one-stop testing for exporters that want to meet the needs of international buyers. The laboratory provides materials testing according to the ISO 105 – G02, AATCC 23 and GB/T 11039 standards, essential for customers interested in the EU, US and Asia Pacific markets.
As well as the moral obligation to save lives and protect the environment, the cost of a major accident should provide sufficient incentive for companies to assure themselves that they are effectively managing their process safety risks. Fortunately, there is an established risk management approach to help them, set out in ISO 31000:2009 (illustrated in Figure 1).

At the core of this risk management process is risk assessment, which comprises three steps:

1. **Risk Identification** – What are the possible accidents?

2. **Risk Analysis** – What are the frequencies and consequences of the events? How are they controlled?

3. **Risk Evaluation** – Are the risks acceptable? Could, should, anything further be done?

TÜV Rheinland has developed a Functional Safety Program. It allows for a consistent approach to developing the competence of personnel via a common syllabus, and where knowledge and understanding is assessed by independent third parties.

The Functional Safety Program covers specific disciplines, including Safety Instrumented Systems (SIS) and Process Hazard and Risk Analysis (PH&RA). The PH&RA program is aimed at equipping people to manage process safety risks in high hazard industries, such as oil and gas, refining and chemicals.

**Process safety**

Process safety may be defined as preventing catastrophic accidents, such as fires, explosions and toxic releases, arising from the use of hazardous chemicals and hydrocarbons. For owners and operators, the costs of a major accident can be huge. For example, BP recently revised the total cost of the 2010 Deepwater Horizon disaster to a staggering US$61.6 billion.

Controlling risks within any industry requires a robust risk management system and competent people to implement it.
The most important thing is that risk management is implemented effectively by the right people, at the right time and in the right place.

**The PH&RA training course**

The PH&RA course, delivered by Risktec, lasts three days and covers the fundamental aspects of process safety management. There are many techniques available to support risk assessment and enable informed, risk-based decisions to ensure that process safety risks have been reduced to acceptable levels. The course focuses on principal areas, such as:

- Identifying process risk scenarios using, for example, Hazard Identification (HAZID), Hazard and Operability (HAZOP), Failure Modes and Effects Analysis (FMEA) and What If? techniques.

![Figure 1 – The ISO 31000:2009 risk management process](image-url)
The course demonstrates how to apply all these approaches in practice, using simple and more complex examples to illustrate key points. At the end of the course there is a 3½ hour exam that tests understanding of all areas, and requires a 75% pass mark. Delegates who successfully complete the course are awarded the title of ‘Functional Safety Engineer’ and placed on the TÜV Rheinland global register.

Competency in Process Safety
For many engineering disciplines, such as mechanical or chemical engineering for example, the professional skills and competencies that need to be met and maintained are generally well defined and governed. However, for those engineers and scientists working in the field of process safety, the required competencies are less well established.

- Conducting scenario analysis, from simple techniques such as the risk assessment matrix, through to bowtie analysis, fault and event tree analysis. It can extend to physical effects modelling where estimations are made of the possible impacts of fires, explosions and toxic gas releases, as well as Layer of Protection Analysis (LOPA) and Quantitative Risk Assessment (QRA).

- How to evaluate and understand the risks, allowing for informed decisions about whether the risks are acceptable to a company or society, and whether it is practicable to further reduce the risk levels.

- Practical topics, such as setting up a risk analysis program, how to chair a meeting and what data is needed, as well as communicating the results and monitoring process safety performance.
The TÜV Rheinland functional safety program is a very important contribution to addressing this gap.

Not surprisingly, more punitive legislation, use of novel technology and major high profile accidents ensure that process safety is a growing profession. There is a global shortage of skilled process safety professionals, so a formal certificate, from an established institution such as TÜV Rheinland, which demonstrates expertise can improve career prospects. Successful candidates can be rightly proud of their achievement, knowing that the PH&RA Functional Safety Engineer qualification has been well-earned and is highly regarded in many industries.

Furthermore, gaining the certificate demonstrates a commitment to learning, with the ability to think creatively in order to solve complex process safety and risk problems and face the current and future challenges of the industry.

**Conclusion**

Process safety is all about preventing catastrophic accidents in high hazard sectors. The last 40 years have shown that a declining oil price, such as that experienced over the last two years, leads to a spike in large losses due to accidents in the years that follow. To buck that trend, process safety practitioners need to step up to ensure that any decisions impacting asset integrity are thoroughly risk assessed. The TÜV Rheinland Functional Safety Program PH&RA training course, delivered by Risktec, provides the opportunity for practitioners to fill any gaps in their knowledge and demonstrate their competence through examination.

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Andy Lidstone helped found Risktec in September 2001. He has over 25 years’ experience of risk management across several industries and holds the title of Functional Safety Expert (Process Hazards and Risk Assessment).
What is a safety case?
A safety case is a formal statement of how an operator intends to manage its facilities and operations safely.

It is used to demonstrate to numerous stakeholders (e.g. management, employees, investors, contractors, the regulator and/or the public), that major safety risks arising from a particular facility or operation are known and have been assessed to be both tolerable and reduced to as low as reasonably practicable (ALARP).

ALARP is the point at which the time, effort and cost of implementing further risk reduction measures is objectively assessed as being grossly disproportionate to the risk reduction. It is a balance that is unique to every facility and operation. And no two safety cases are alike!

History of safety cases
Safety cases arose in the nuclear industry in the 1970s to provide a thorough, documented review of a facility’s operations. They have spread to many other industries, such as oil & gas, chemical, aviation and transportation.

This has usually been a response to major accidents (e.g. Piper Alpha in the offshore oil & gas sector and Seveso for onshore chemical facilities), but also driven from proactive desire to provide better and more transparent risk assurance processes.

Safety case regimes have been implemented in a number of countries, including the UK, the Netherlands, Malaysia and Australia.

Myths and realities
There are many misconceptions about safety cases. Some have arisen from past difficulties but, with decades of practice, industry itself has created the best practice realities of today.

Below we debunk three common myths by showcasing the reality of a good safety case.
Myth #1 – A safety case has to be a huge and expensive tome

Reality #1 – A safety case is a succinct, value for money report

Quantity does not signify quality! A good safety case should be a concise, fit-for-purpose report with a clear audit trail to supporting information. It should be easy to understand and proportionate to the level of risk, utilising existing studies and selecting the appropriate tools and techniques carefully. Focus should be on real safety rather than paper safety.

Myth #2 – The safety case is for the regulator, written by a consultant

Reality #2 – The safety case is developed by the operator for the operator

Whilst a safety case may be demanded by a regulator, it should be produced, owned and used by the operator. It is the working document to improve safety. The process should involve the workforce as much as possible as they have the most knowledge and experience of equipment and procedures. This allows personnel to appreciate their role in managing risks. Consultants can provide independent facilitation, specialist technical studies or transfer best practices between operators, but they should not own the process.

Myth #3 – The safety case is a tick-in-the-box, one-off event which can be consigned to the shelf

Reality #3 – The safety case is a living document, ensuring the process of continuous improvement

The safety case is about the process of ensuring continuous improvement in safety performance. A major benefit of the safety case comes from the process of preparing it, rather than the document itself. Once completed, it should be a living document, readily accessible to the workforce and kept up to date with any changes that may impact the risk profile (e.g. in technology, knowledge, the organization or procedures).
What are the attributes of a good safety case?
A well-written safety case is an asset and provides a natural focal point for key safety, design and operations information relating to the facility. Figure 1 presents some of the key attributes of a good safety case.

Done well, the benefits of the process are such that some organizations choose to implement safety cases as a best practice even when there is no legislative requirement.

Risktec’s Safety Case Support
There are plenty of areas where help can be offered to companies starting the safety case process for the first time.

Risktec’s services to clients have ranged from co-ordination and planning of the process, through to preparation and technical support for all aspects of the case and even roll-out, communication and training.

The focus is to provide a pragmatic solution to help clients get the most out of the safety case process, ensuring that it is carried out in a cost effective and timely manner, adds value and that the safety case continues to be a useable document.
Best Practices in Developing Safety Cases

Joanne Hill
Principal Engineer
Risktec Solutions

Joanne joined Risktec Solutions’ Dubai office in 2007. She provides technical safety, risk assessment and risk management consulting services in the Middle East, Canada and most recently, Australia. Joanne holds an MSc in Security and Organizational Risk Management.
iESM from Start through Operations, Korea

TÜV Rheinland Korea and KORSA (Korea Railroad Safety Association) jointly organized the 4th iESM Conference in Seoul on 18 May 2016. Entitled “iESM from Start through Operations,” it attracted over 70 participants and covered a host of topics:

- What is iESM and the iESM Working Group?
- Strategy for railway safety management
- Lessons for safety management learned from railway accidents
- iESM, 2016 Work Program moving into O&M
- Development of switch machine for rubber-tired LRT based on IEC 62278 and best practice

A training session, entitled “iESM Overview & Practical course,” was held between 16-18 May to bring participants up to date with the latest developments in ESM (as published in the new iESM guidance).

ICSS Cyber Security Summit 2016, Singapore

Representatives of TÜV Rheinland Singapore and over 80 participants from various backgrounds contributed to the success of the ICSS Cyber Security Summit 2016 on 8 April 2016.

Cyber security related to Integrated Control and Safety Systems (ICSS) has never been so complex or important. The summit catered to the energy, utility, chemical, transportation, manufacturing sectors. It enabled stakeholders to discuss the latest industrial cyber incidents & threats and cooperate on solutions.

Product and Environmental Compliance Update: EU REACH and RoHS RECAST, Vietnam

Over 80 participants joined “Product and environmental compliance update: EU REACH and RoHS recast” seminar organized by TÜV Rheinland Vietnam on 19 August 2016. The phrase, “increasingly complex,” describes perfectly the state of chemical regulations around the world today. Among those, EU REACH regulation (1907/2006/EU) and EU RoHS (2011/65/EU) make the most impact on global supply chains, especially in terms of electrical and electronic equipment (EEE).

The seminar covered key concepts in REACH and RoHS, which orient production control for compliance and sustainable development.
IMEA and ASEAN Countries Energy Efficiency Requirements Overview, Thailand

24 air-conditioner and refrigerator manufacturers visited TÜV Rheinland Thailand’s Global Technology Assessment Centre (GTAC) on 25 August 2016 for a seminar dubbed “IMEA and ASEAN Countries Energy Efficiency Requirements Overview.”

Consumers are now paying attention to efficient energy use in their daily life. Manufacturers also need to develop their products to meet this demand as well as the requirements of import markets. The seminar participants were very interested in a host of topics, including the requirements for countries, such as Saudi Arabia, United Arab Emirates (UAE), Kuwait and Indonesia. TÜV Rheinland experts explained the Energy Efficiency application process and new market support.

Parex Group Certificate Awards Ceremony

Date: 20 May 2016
Name of Organization: Parex Group
Country: Philippines
Scope: Construction chemicals manufacturing

About the Organization: Founded in 1978 by the French group Lafarge, Parex Group is a leading provider of specialty drymix solutions for the construction industry. It is strong in Western Europe, Asia Pacific, South and North America, North Africa and the Middle East. It was the first to introduce dustless drymix technology in 2006 and more recently has pioneered cement-free powder technology.

PT Pupuk Kaltim Certificate Awards Ceremony

Date: 25 May 2016
Name of Organization: PT Pupuk Kaltim
Country: Indonesia
Scope: Fertilizer manufacturing

About the Organization: PT Pupuk Kalimantan Timur (Pupuk Kaltim) was officially established on 7 December 1977 and is located in Bontang, East Kalimantan. It operates an integrated business that includes trade and distribution as well as services in the fields of fertilisers, petrochemicals and other chemicals.
Enabling Clients to Meet the Mark

Pressure Equipment and Plant Audit and Inspection

Companies can’t afford to take chances with pressure equipment. Audits, conducted according to the Pressure Equipment Directive (PED 2014/68/EU), Transportable Pressure Equipment Directive (TPED 2010/35/EU), Construction Products Regulation (CPR EU No 305/2011) for CE Mark and inspections according to European Standards (EN) and American Society of Mechanical Engineers (ASME) can help. They ensure that product and quality management systems are compliant with applied regulations, standards, and existing systems as well as the end user’s requirements.

These audits and inspections are applicable for vessels, piping systems, pressure equipment such as valves, safety equipment and safety devices. Mandatory licenses and ample knowledge of related regulations and standards are required when performing them.

Basic Processes and Challenges
The basic process includes checking client requirements and obtaining an application for the type of audit or inspection. Then reviewing the client information and performing the audit/inspection.

Ensuring that the quality management system is running well is a major audit challenge. Clients are advised to hold regular training for employees while continuously addressing past audit findings and minimising potential future risks.

Lack of space is also a common problem, ensuring the factory layout is well configured and provides ample space can help.

Welding Procedure Inspection and Welding Procedure Qualification

Helping customers ensure their products are compliant with international standards is the main objective of the review of Welding Procedure Specification (WPS) and the Welding Procedure Qualification. Both inspections are applicable to the oil and gas, power plants, cosmetic industrials and related industries, ensuring that the Inspection Test Plan is performed by the fabricator.

Basic Processes and Challenges
WPS is performed to warrant that the welding product is compliant with the requirements of the customer and international standards.

During one of the audits, the client did not follow the Inspection Test Plan and the requirements of the standards, which caused a delay. It also posed a challenge for the auditors because vital steps were missed. Welding Procedure Qualification is performed to ensure the welding product is compliant with the specified European Standards and the role of the inspector is to make sure that the fabricator fulfilled the standards requirements.

Also, when the results of mechanical tests performed by internationally accredited laboratories aren’t available during the inspection, this delays the process.

Meeting client requirements and satisfaction is top priority in every audit and inspection TÜV Rheinland conducts. Experts are trained to have a holistic knowledge of requirements of the standards they audit and the essential competence to successfully carry out the technical processes.
Regulatory Updates

6 Oct
California Energy Commission (CEC) Updates Test Method for Battery Chargers
To be included in CEC’s active database, manufacturers must re-test and re-certify their products on or after November 16, 2016, using the new federal testing method.

3 Oct
Singapore: Update Information about Safety Case Regime for MHIs
With effect from September 2017, Major Hazard Installations (MHIs) will be covered under the Workplace Safety and Health Regulations.

3 Oct
Natural Resources Canada (NRCan) updates Energy Efficiency Standards for External Power Supplies & Battery chargers
Battery chargers will be added to Canada’s Energy Efficiency Regulations as an energy-using product in alignment with standards in the United States.

3 Oct
New Publication of French DGCCRF
In June, the French DGCCRF (General Directorate for Competition Policy, Consumer Affairs and Fraud Control) published new and updated standards for food contact materials.

19 Apr
ISO/TS 15066:2016, Robots and robotic devices – Collaborative robots is now available
ISO/TS 15066 provides guidelines for the design and implementation of a collaborative workspace that reduces risks to people.

19 Apr
Improvement of Energy Consumption Performance of Buildings Act in Japan
Under Japanese regulatory measures, buildings exceeding a certain scale that are constructed, extended or renovated are required to undergo a compliance assessment and submit notices.

Upcoming Events

Plan your calendar with our upcoming exhibitions and trainings. Visit our exhibitions and get advice on compliance with the latest industry standards from our experts.

18 - 20 January
EV Japan
Japan
EV JAPAN gathers all kinds of core technologies for EV & HEV; Motors, Inverters, Rechargeable Batteries, and Chargers.

15 - 17 February
ENEX 2017
Japan
ENEX is a comprehensive exhibition in the field of energy industry, attended by a large number of people from energy saving/conservation, energy usage management, and electricity industries and gas retailers.

1 - 3 March
Battery Japan
Japan
A leading international exhibition showcasing various components, materials, devices, finished rechargeable batteries for rechargeable battery R&D and manufacturing.

Seminars / Training

ISO 9001:2015 Quality Management System - Understanding & Implementation
Jakarta, Indonesia, 9-10 Jan - Bandung, Indonesia, 19-20 Jan

ISO 22000:2010 Food Safety Management System - Internal Audit
Bali, Indonesia, 21-22 February

Jakarta, Indonesia, 27 Mar
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