

## Edito

### The risk of being too compliance driven

Investing in fire safety does not directly impact the profitability of a company, but failing to do so, may ruin its reputation forever.

Far too often the main reason for investing in fire safety is compliance driven. This way large amounts of money are spent without truly understanding the contribution and impact on the company's overall risk profile. So once the investment is made and an operating permit granted, the levels of fire safety tend to drop dramatically and the risk exposures skyrocket.

In addition, complying with legal and/or insurance requirements is in no way a guarantee for safe exploitation and operation. It is perfectly possible to operate an unsafe facility and still comply!

The only way to define the appropriate level of safety is to start thinking **risk based** and integrate the needs and requirements of all stakeholders into a solid fire risk concept.

Most of all, it's important to be in the driver's seat. If not, chances are that rules and regulations that don't bring any sustainable risk value, will be enforced.

Now more than ever, it's our objective to help clients to get into that driver's seat and obtain the most possible value from their fire safety investment.

With **FPC Risk**, the new FPC company, we have added thorough and profound risk insurance knowledge to our FPC team, to offer even better support to our clients on insurance company's demands.

**Ralf Bruyninckx**



## FPC Risk

### Taking Risk Engineering to the next level

With the new FPC RISK subsidiary, we have added further expertise to our organisation. Besides their fire safety and asset protection expertise, the new colleagues of FPC RISK have their background in the international insurance industry.

The focus points of the insurance market on risk control is quite specific and geared towards prevention and reduction of financial losses, caused by material damage in the broadest sense. Within the insurance industry, loss control is an important topic and insurance risk engineering is a specialisation in the risk engineering profession.

Insuring against property damage and business interruption is in fact a delayed investment request that may or may not be referred to in the future. Like banks and other financial stakeholders of a company, insurance companies examine insurance requests before accepting them. Through this process insurance companies try to select the clients that have a good risk profile. Because of the relation of risk quality and loss potential before "reserving" funds for a potential payment of claims, they will ask their potential clients to provide basic information on their company, such as location and type

*Continued page 2 >*



of construction, activities and manufacturing processes, and various value statements. Depending on the information received, the insurer may decide to inspect the company either before the possible acceptance of the insurance, immediately afterwards, or if required during the term of the insurance.

The basic technical data, collected during such an inspection, is the so-called COPE (Construction, Occupancy, Protection, Exposure) data. The decision to inspect and the moment of the inspection itself depend on a specific risk assessment made on the basic information as received by the insurer. This also applies to possible re-inspections during the term of the insurance.

Risk inspections are however only a part of the complex process in determining if an insurer is willing to accept a risk and against which terms and conditions. Many other primarily financial conditions also play an important role in the acceptance process of an insurer.

As most insurance companies are typically commercially driven organisations, the need for risk information for underwriting purposes is depending on their appetite and need for business. It is also driven by a variety of

other elements related to the financial position of the insurance company as a whole, re-insurance contracts, etc... Although the premium is the primary source of income for an insurance company, a secondary and oft forgotten flow of income plays a key role in the financial well-being of an insurer. This is the income flow, which is generated from the investments done by the insurer using the premium they receive. The financial results from these investments are very much dependent on world wide economic factors.

This means that not only the “quality” of a risk but also the ability to generate investment income with the premiums collected are important in creating the appetite of an insurance company to “write” a risk. These economic elements also determine how the insurance market is perceived by its clients: hard (a sellers market) or soft (a buyers market).

Although currently the insurance market is still soft (a buyers market) the requirements for underwriting information and risk improvement are continuously increasing and more and more inspections are requested by insurers. Several of the large global insurers are further developing their own risk inspection practices to position themselves better with their clients and differentiate from others.

Also from a direct underwriting perspective the demand for high quality risk surveys and risk improvement is increasing.

From an insurance placement perspective for companies it is also crucial to have adequate and reliable data available. Only then companies are able to make well founded risk financing decisions on, for instance, retention and risk transfer levels, but also on the program structure. Companies also will have a competitive advantage in the insurance market when well presented risk information is available for the insurers quoting. Underwriting competition increases in combination with cost for the client.

With Property Risk Engineering specialists now embedded in the FPC organisation we also will better be able to assist our clients in the insurance placement process:

- by assuring that the risk control information in clients's submissions is complete, and accurately portrays the client's risks
- by allowing your broker/risk manager to effectively and accurately present your company to the market as a quality risk
- by assuring accuracy of insurers advice to the client on risk control priorities, focused on their business objectives, while understanding both the technical engineering and the insurance/underwriting issues
- by ensuring that cover is purchased, based on a decent risk profile
- by giving you more ownership of its property program, and therefore more control and less dependency.

Also, the unique combination of resources allows us even better now to offer an integrated risk solution. A solution with a focus on legislative compliance, but also on the clients own needs from a protection point of view —and now also from a risk financing/insurance point of view.

**Please contact Ron de Bruijn,  
managing partner of FPC RISK**

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# Blast Protection of Central Control Rooms is a real challenge!

## Background

Process plants in the petrochemical industry handle hydrocarbons and other fuels, which can lead to accidental explosions. Plants are designed to minimize the occurrence of such incidents.

Although such incidents may be relatively rare, when they do occur the consequences can be extremely severe involving personnel casualty, financial loss, and potentially public safety. In some instances the consequences have involved the plants' building. For example, the collapse of a control building in the 1974 Flixborough (UK) explosion incident caused 18 fatalities.

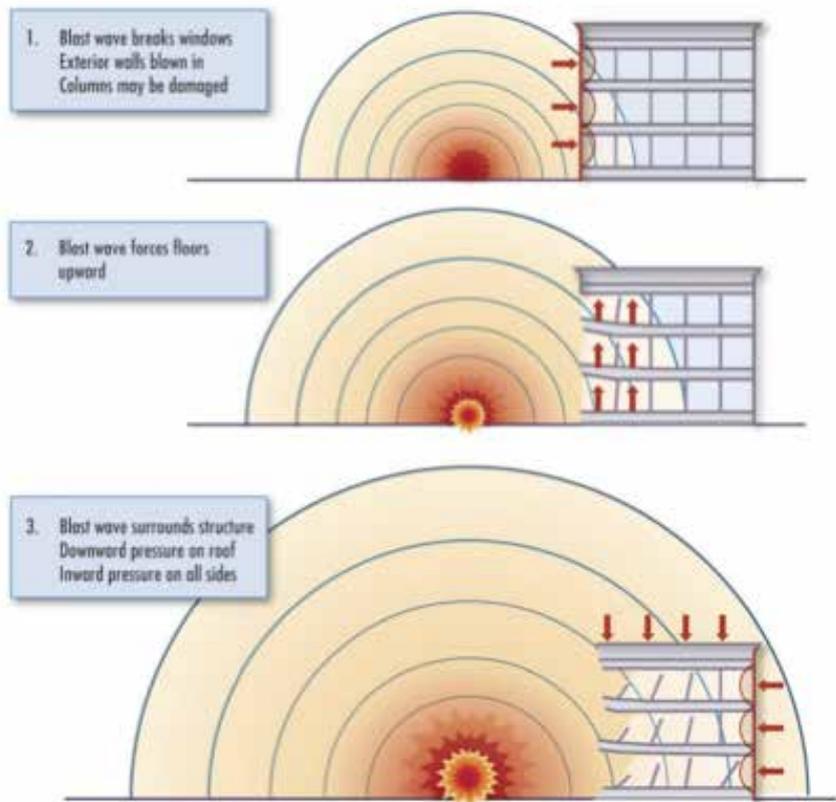
To make things worse, the central control rooms (CCR) used to be constructed quite central in a process plant due to the convenience of a central location. Such configurations make the CCR's more vulnerable to potential explosion incidents.

Nowadays more questions arise if plant buildings can withstand explosion effects in order to protect the people inside so that, at least, the building in itself does not pose an added hazard to the occupants. In addition to personnel safety, some companies in the industry also consider blast resistance to minimize the impact of accidental explosions on plant operations.

## Effect of explosions

For CCR, usually the overpressure from the blast wave is the most damaging feature of an accidental explosion in a process plant. The blast wave breaks windows, blows down exterior walls and may even damage columns. As the blast wave propagates, it enters the building, pushing both upward and downward on the floors. The roof and backside of the building which does not face the explosion source directly, are also susceptible to the effect of the blast wave.

The extent and severity of damage and injuries in an explosive event cannot be predicted with perfect certainty. A guideline is given in the table based on past experience.



*Blast pressure effects on a building (Source : FEMA 426, Reference manual to mitigate potential terrorist attacks against buildings)*

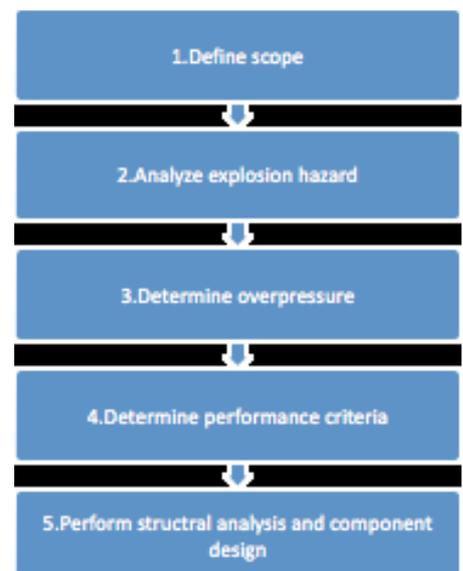
## Damage Criteria (Barg)

- Typical window glass breakage  
0.01-0.02
- Minor damage to some buildings  
0.04-0.08
- Failure of concrete block walls  
0.12-0.2
- Severe damage to reinforced concrete structures 0.4-0.6
- Probable total destruction of most buildings 0.7-0.8

However, in addition to the air blast effect, such incidents can result in fire, projectiles and ground transmitted shocks that also can be damaging to buildings and their contents.

## Blast resistant design

The overall process involved in the evaluation and design of petrochemical plant CCR's for explosion hazards shows five basic steps, as in the figure below:



## 1. Define scope

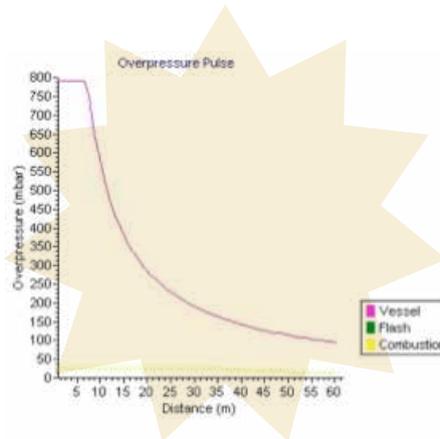
The first step is to define the scope, which varies depending on the owner's specific requirements and needs. For example, one of FPC's clients planned to construct a new LPG train loading station, which would be located close to the CCR. The client was concerned about the additional explosion hazard the CCR would be exposed to, due to the new train loading. Other FPC clients, however, are concerned about the overall explosion hazard for the CCR in the entire plant. Their scope is to protect the CCR against any explosion hazards having a frequency higher than  $1 \times 10^{-4}$  / year.

## 2. Analyze explosion hazard

Based on the scope, explosion scenarios need to be identified in the second step. Common explosion hazards within a process plant include vapor cloud explosions (VCE), boiling liquid expanding vapor explosions (BLEVE) and dust explosions. A risk assessment is generally required to identify potential explosion scenarios.

## 3. Determine overpressure

The third step is to determine the overpressure from the identified explosion scenarios. Consequence Modelling Software such as Shell FRED or PHAST can be used for event simulation. An example is given for the calculation result for a LPG train wagon BLEVE scenario. The further the CCR is from the origin of explosion, the lower the overpressure will be.



**Overpressure for BLEVE from a LPG train wagon**

## 4. Determine performance criteria

The fourth step is to choose the structural materials and systems for the CCR and the associated structural properties and response limits consistent with the performance requirements for the building.

Reinforced concrete is generally considered the most suitable and economical construction material for blast resistant buildings, especially for those close in to a potential blast source, where they are likely to be subjected to relatively high overpressure in the event of an explosion.

However, pre-engineered metal buildings, properly enhanced, can also be used if sited at appropriate distances from hazards.

## 5. Structural analysis and component design

The final step is to select and perform the level of structural calculations appropriate for the particular situation.

**Conclusion: The blast protection of central control rooms is a real challenge. The overall design process requires close co-operation of the plant owner, risk analysts, process engineers and structural engineers. In return, a properly designed blast-resistant CCR can be very rewarding: the personnel safety and the business continuity can be guaranteed should an explosion happen!**

## FPC now rolling in Central Africa

FPC is appointed by JP Kenny Ltd (Abu Dhabi) (a Wood Group Kenny Business) to prepare the Fire Safety PRE-FEED Report for two oil terminals located in the Central African region.



### Our scope of work covers the following:

1. Developing a Fire Protection Philosophy including, Basic Fire Water demand Calculations, sizing of Equipment (Fire Water Pumps, Fire Water Tank, and fire protection systems) and development of preliminary P&ID's and Basic Fire Fighting Piping Layout drawing
2. Developing a Fire & Gas Philosophy including Basic Design of Fire & Gas Systems, Preliminary schemes and
3. Budgetary Cost Estimate

Our approach is based on risk reduction/mitigation by provision of active/passive fire safety systems at the terminals. Credible fire scenario analysis was identified and exposure cooling requirements were determined using consequence modelling analysis.



## Crisis & Emergency Management improves resilience at Oiltanking Stolthaven Antwerp

Oiltanking Stolthaven Antwerp (OTSA) is a joint venture between Oiltanking GmbH and Stolthaven Terminals BV. As a part of the world's second largest independent storage terminal company, its site in the Port of Antwerp has a total storage capacity of 1,3 million m<sup>3</sup> for chemicals, gases and petroleum products. Products are transported by ship, train, pipelines and trucks. The facility has up to 230 people on site during daytime.

The crisis management team of this SEVESO site was facing challenges when dealing with emergencies and crisis situations when they called upon our subsidiary SCE for help. In the course of a year we assisted OTSA to turn around its crisis organisation into a resilient operation.



**An interview with the OTSA Managing Director Mr. Yvan Tavernier:**

***Mr. Tavernier, what was the issue you were facing when you arrived at OTSA and looked at the crisis organisation?***

In my previous role as MD at other large industrial plants in Europe and the US I learned that you can't manage a crisis with 2-3 people. OTSA's crisis team was very focussed at the incident response, losing sight of more

strategic tasks such as the media, the needs of the local authorities, our corporate HQ and business continuity.

One of the challenges for any crisis management team is to get out of the reactive chaos mode and start thinking 12 hours ahead. If you don't you'll create a crisis within a crisis. It's not because those crises are rare, that you don't need to prepare. By preparing for the worst, you will also be able to deal with smaller incidents. The other way around is not easy.

***What type of incidents is OTSA prepared for?***

Just as many other organisations we were mainly focussed on internal risks, such as fire and emissions. Today we have a tactical and strategic team that consist of 6 people, managed by a common Incident Commander. In total 30 people were trained for their role to deal with both internal incidents, strikes, ICT related incidents and external risks such as incidents from our neighbours, subversive activities and natural hazards, all using the same crisis organisation model. This creates a more sustainable system and gives the teams more practice. So when a real incident happens, they have acquired the proper reflexes and are familiar with the right tools to do a better job.

***Is crisis management high on the agenda of the Oiltanking management worldwide?***

Proper risk management is part of our corporate governance and company culture. Having zero casualties is part of the objectives of every managing director. In fact one casualty means we get no bonus. I think that is a strong message. We take crisis management seriously.

***Were there any side benefits from going through this change process?***

Without any doubt the main benefit was that awareness about risks associated with our business and everyone's responsibility in crisis situations has been achieved throughout the organisation. We tried to do this in many different ways in the past years. But now people see the value of a reliable crisis team, take ownership and feel we are better prepared than ever.

***What advice would you like to give to your colleagues?***

Don't forget you're legally liable when things go wrong. Make sure to engage your team, set the example and exercise regularly. Introducing effective crisis management is an organisational challenge that can best be guided by external experts with a broad industry experience who understand the technicalities and organisational challenges. ■

# The Adventures of Tintin

Every year, our colleagues travel to exotic places for international projects. It is time to bring Tintin AND an old habit back to the FPC Trends pages: the travel stories of our colleagues to exotic business locations...



## Tintin reports from the Kingdom of Elephants

Gabon, where elephants and man live happily together, is an Equatorial country in Western Central Africa. Gabon has roughly the same land area as Italy with around 80 percent of its area covered by rainforest. Oil and mineral reserves have helped Gabon with its small population of 1.6 million people to become one of Africa's wealthier countries.

The Gamba area in south-western Gabon hosts the oilfields of the global energy group Shell. These fields, located along the coast, are surrounded by rainforest, making the region one of the most isolated and pristine ones in the country. Continuous efforts have been taken to ensure that biodiversity thrives amid oil exploration activities.

FPC was hired by Shell Global Solutions to conduct a GAP assessment of Gamba Oil Terminal against a recently developed Fire Protection Philosophy (FPP). FPC's scope of work also included the development of an upgrading program to bring Gamba Oil



Terminal in compliance with the FPP.

This project forms part of Shell's Gamba Terminal Rejuvenation program, which is aimed to maintain the functionality of the terminal over the next 25 years.

In July 2013, the FPC team spent one week on the oil terminal assessing systems conditions, collection data and undertaking field measurement. During the stay, the FPC team have witnessed the abundance of biodiversity in this area: elephants here have picked up the skill to stride over the pipe racks. The

palm trees in the guardhouse garden are so loaded with bird nests that the branches bow down to the ground. The amazingly beautiful lake near the residence camp should be kept at a distance at night, when the crocodiles are most active. One evening after dinner, the team members were heading back to their rooms and suddenly they heard something: an inquisitive wild elephant was strolling through the camp! ■



# Tintin reports from the Friendly Island

The tiny French-Dutch island of Saint Martin, covering just 87km<sup>2</sup>, is nestled between the Atlantic Ocean and the Caribbean Sea. The island is divided roughly 60/40 between France and the Kingdom of the Netherlands. A total of about 78.000 inhabitants live in Saint Martin. The inhabitants enjoy a reputation of being exceptionally friendly, hence the nickname 'the Friendly Island'.

Much more than being a beach-lover's paradise, the island of Saint Martin is teeming with natural, cultural and human riches. Thanks to its climate and untouched natural heritage, the island offers unparalleled year-round watersports and outdoor activities.

## One island, two countries

Two countries on one tiny island makes Saint Martin a place filled with culture-diversity. Saint Martin's Dutch side is known for its festive nightlife, beaches, jewellery, exotic drinks made with native rum-based guava berry liquors, and plentiful casinos. The island's French side is known for its nude beaches, clothes, shopping, and rich French and Indian Caribbean cuisine.

Most of these wonderings happening in this island wouldn't be possible without the power supply from **GEBE** (Gemeenschappelijk



*A rainbow span over the Caribbean sea*

Elektriciteitsbedrijf Bovenwindse Eilanden), the sole utility company producing and distributing electricity on Saint Martin.

GEBE appointed FPC to re-evaluate the Fire Safety Concept of their power plant located in Saint Martin. The power plant features multiple parallel generators that generate electricity by burning up crude oil. Via substations, the electricity is distributed to the residents of St. Maarten as well the nearby islands Saba and St. Eustatius.

During FPC's site visit to Saint Martin in 2013, the team members conducted a risk assessment of the entire power plant. Based on risk analysis, FPC proposed an upgrading program with long term vision.

The installation of foam-water sprinkler systems for several huge indoor generator

rooms is a highlight of this project. The detailed design and tender documents for the foam-water sprinkler systems were performed in FPC's Belgian office.

The project is still ongoing. FPC is currently providing consultancy services on the fire water supply network and fire detection/ alarm systems for the power plant.

If necessary, FPC team members would not mind visting Saint Martin again... ■



*The island nicknamed 'The Friendly Island'*



*Overview of the GEBE power plant*



## The game's on!

For the past 40 years FPC has worked on a project by project basis in the Asia Pacific region. We now believe that with a couple of projects secured and others in the pipeline, both in Singapore and Malaysia, the time is right to establish a local business unit to serve our customers directly in the region. Within this context and also to create further awareness, FPC organised an important and widely attended seminar in Singapore on ***Crisis and Emergency Management for Large Industrial Sites.***

About 50+ industrial company representatives showed up to learn more about FPC's approach and capabilities. The response towards moving from a compliance driven to a more risk based approach is also in this region of the world very positive.

We are currently establishing our team and will report on further developments in the next issue of Trends. ■



Since independence in 1965, the Singapore economy has experienced a spectacular economic growth, following an open and outward-oriented development strategy which obviously has been extremely successful.

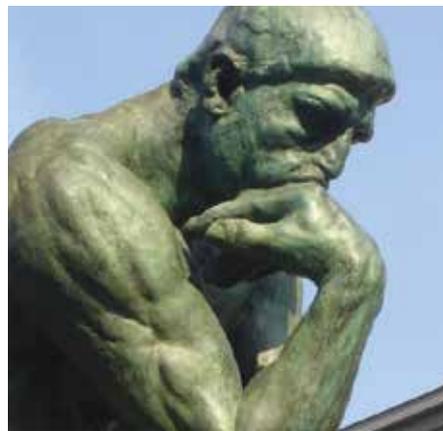
Singapore is ranked as the third most com-

petitive economy in the world and the most competitive economy in Asia. In this context Singapore decided that the next phase of growth should be energy and chemical industry, including a gasification plant and an LPG terminal.

## Thesis announcement 'An evaluation of fire safety legislation for high-rise buildings in BRIC countries'

Since January 2014, Eron Desloover has been working on his master thesis 'An evaluation of fire safety legislation for high-rise buildings in BRIC countries' in cooperation with FPC. The thesis is promoted by Ralf Bruyninckx (CEO, FPC) and supervised by Professor Bart Merci (Ghent University, Belgium).

The thesis will focus on the fire safety legislations for high-rise buildings in BRIC countries



(Brazil, Russia, India and China). Due to the economic growth these countries have witnessed a booming of high-rise building constructions. The characteristics of high-rise buildings, such as prolonged vertical evacuation distance and stack effect, bring about more challenging's for fire safety engineering. How are high-rise buildings regulated by the local fire legislations? What are the differences of the fire regulations between BRIC countries? How do the regulations influence

the construction cost? What is the safety level indicated by each fire legislation? The answers to these questions and much more can be expected from this thesis results.

This research topic can be of great interest to relevant authorities, who can utilize the result as a reference for their own high-rise building regulations drafting or revising. The thesis outcome will hopefully help FPC in providing better service for its worldwide customers.

***The thesis is expected to be finished by June 2014. Upon successful defence of this thesis, Eron Desloover will receive a master degree from 'International Master of Science in Fire Safety Engineering' (IMFSE).***

***IMFSE is a two-year master program given jointly by three top European universities. FPC sponsors each year one EU student for IMFSE.***

***More information at [www.imfse.ugent.be](http://www.imfse.ugent.be)***