FPC RISK

Trends

The FPC Risk newsletter

n° 27
March 2016

Edito

The name of the game

FPC was founded more than 40 years ago. 1973 it was, when H.J. New and Ed Bruyninckx started this very company in Antwerp Belgium as 'Fire Protection Consultants', hence FPC.

The company grew steadily, the contracts became bigger an complexer and the world became smaller. Soon Fire Protection Consultants was active all over Europe, in the Middle East and in Africa.

Airports, shopping malls, industrial and private complexes, high rise, chemical plants: the assignments long since exceed mere fire protection consultancy in the oil & gas industry.

And we are proud of this evolution. FPC has become an esteemed brand in the industry. In fact FPC has become a brand name, an acronym in which the real meaning of the original abbreviation has evaporated. Like anybody can tell you what IBM is, but little people know what seperate characters stand for. Unfortunately other than IBM, to an outsider it may not be clear what's behind the FPC brand name, at first sight.

Specifics beat generals: John Caples, the legendary godfather of marketing, already had this premise chiseled in stone since the beginning of times. So we decided to ad 'RISK' to the FPC brand name, specifying our field of expertise. our profession, our passion.

FPC Risk. That's who we are. That's what we've become. That's what we do.

For years to come.

Thank you for being with us.

Ralf Bruyninckx

Fire Safety Engineering

A natural ally of the knowledge economy

There's a lot cooking in Fire Safety Engineering these days. No surprise here, since by applying engineering insights, a higher level of fire safety can be created at a lower cost.

But there is a lot more to it. A thorough application of Fire Safety Engineering (FSE) in an environment of PBD (Performance-Based Design) also creates real value, either social (less victims), environmental (less environmental damage) or socio-economic (more and larger investments and/or a higher business continuity). It makes FSE a natural and valuable ally of the knowledge economy.

This tendency is particularly initiated from within the 'Triple (even Quadruple) Helix', being the Industry, the Fire Department, the Government and the Academic World, which awards it an important basis.

How FSE creates real economic value

The net asset value of FSE should and could be measured by 'Key Performance Indicators' (KPI). But damage and casualties should not be the only KPI's taken in account. Let's take a closer look at the following 6 angles.

Continued page 2 >

1. Investments

Some countries are still missing out on some substantial investments and employment, due to restrictive and delaying regulations regarding Fire Safety. This frequently results in sheer impossible requirements for complex buildings or large industrial installations, all too often deterring major investors. FSE can shorten these delays, by creating PBD's through risk analysis. This also will directly lead to extra job creation.

2. Business continuity

The loss of Business continuity due to (fire) incidents is often underestimated. While it's mostly SMB's that take the heat, also the large organisations have everything to win by resuming their activities as soon as possible after an incident, or even during an ongoing crisis. FSE can map the risks of business continuity exposure and its costs, versus the investment in additional security measures.

3. Improved and accelerated execution of fireproof designs

Fire Department officers in Sweden systematically get a FSE training, making them capable of thinking along with the Fire Safety Engineers responsible for the PBD, resulting in a considerable decrease of casualties and important costs.

4. Social value

Social value is achieved by reducing casualties through FSE, in the public sphere as well as in private buildings, not subjected to the regulations. Due to the energy efficient architecture and massive use of synthetic materials in modern buildings, the behaviour of material has drastically changed. Scientific research on fire development and adequate firefighting techniques, recognises FSE as a major added value.

5. Environment

No fire without risks to health and possible environmental pollution, not the least by fire extinguishing medium. FSE ensures more efficiency and reduces long term consequences.

6. Reputation

Damage to image and reputation is hard to measure, but may result in complete failure if the world cannot be convinced that the latest, most adequate means and techniques were deployed to control and restrict consequential damages. FSE is widely acknowledged as a means to this end: it makes buildings and installations safer, and in time it will prove an excellent tool to measure consequential damage.

Training

A mere implementation of regulations requires far less knowledge than creating a Performance-Based Design, which requires engineering skills. Therefore, application of FSE can only be possible through appropriate training. Three academic trainings that enjoy worldwide fame are already being taught at the universities of Ghent (Belgium), Edinburgh (Scotland) and Lund (Sweden):

- Postgraduate Studies in Fire Safety Engineering (since 2007)
- International Master of Science in Fire Safety Engineering (since 2010)
- Master of Science in Fire Safety Engineering (since 2015)

Applied firefighting science research needs qualified Fire Safety Engineers. Only they can bring the scientific research information towards actual projects.

Recognition of the Fire Safety Engineer

All of the above may create the impression that FSE is an engineer-level discipline. However, in a lot of European countries the title of Fire Safety Engineer is not yet recognized. FPC Risk is teaming up with the major stakeholders (e.g. government, fire departments, industry, engineers, universities) to obtain official and professional recognition in the near future.

Conclusion

A thorough application of FSE can deliver a vast contribution to the knowledge economy, through added economic and social value. It's a distinct innovative value chain that can be held accountable by means of clearly defined KPI's.

This article was developed by representatives of the academic and private industry in Belgian and adapted for this Trends magazine.

FPC Risk Center of Expertise

The innovation challenge: walk the talk

Active innovation is the only way to stay on track and issue FSE as an essential means for fire risk and emergency management. That's the tenor of our vision/strategy for the years to come. It's also the reason why the FPC Risk Center of Expertise was conceived and will be launched in the spring of 2016.

The purpose of this think tank is to stay on top of the latest developments in the field of fire & risk protection and to develop valuable ideas and concepts that keep us ahead of the game. Simultaneously we establish an aspiring company esprit, a living culture of innovation.

The FPC Risk Center of Expertise will be a breeding ground for innovative inspiration on life and fire safety. A versatile platform thriving on joined efforts of different stakeholders on a wide variety of topics, fields and disciplines as:

■ Client Relationschip

We rethink the way we interact with our clients. So we organise Web based knowledge sharing sessions. In addition a one stop question shop is available where questions are addressed. We also meet with our clients in different and inspiring environments such as cultural events we sponsor.

■ Design Engineering

In our analysis's we use the most advanced fire, smoke and evacuation models; an in-house technical database provides us with the newest information on life and fire safety.

■ Academic Reciprocity

We provide yearly scholarships to FPE students in the International FSE Master Program. Innovative thesis topics are developed together with students and universities, and our senior staff advises on the graduates' career path to become successful professionals.

■ Research and Technology

In the field of emergency management we developed the decision support system NoKeos Incident management. We also enroll in several European research programs to develop innovative safety solutions.

■ Human Capital Approach

We recruit young potentials in an attractive and creative way. With a rewarding, attractive and multicultural environment we protect our human capital. We strongly believe in continuous professional development of our staff.

■ Innovation

A focused innovation cell hosted by FPC Risk with client representatives and experts from within the academic world, insurance industry, fire officials and equipment manufactures, will work on identifying market trends and develop readily applicable, innovative solutions.

A yearly award will be granted to the most creative and valuable idea.

FPC Risk Center of Expertise will ensure a sustained focus on the road ahead, continuously reinventing the obvious and developing innovative ways for better fire & risk protection.

Corporate Life & Fire Safety Philosophies

One of the FPC Risk activities is to develop corporate life and fire standards & philosophies for different clients and industries. In the past we have done this for the hotel, oil and gas, pharmaceutical and nuclear waste treatment industry. Currently we are working on two projects that we would like to inform you about.

Wintershall - Oil production platforms

Wintershall is Germany's largest internationally active crude oil and natural gas producer, exploring and producing oil and gas in Europe, North Africa, South America, Russia, the Caspian Sea region, and the Middle East. Wintershall is a subsidiary of BASF.

FPC Risk has been an advisor to Wintershall for the past 10 years. Our advise has been mainly focused on developing fire safety concepts for new and existing offshore platforms on the North sea. We also assist with the engineering and revamp of firefighting systems on the platforms.

Wintershall has planned further developments in the oil production business. To ensure that for these platforms the fire safety level will meet both Wintershall and legal requirements, a corporate fire safety philosophy needs to be developed. This also to guarantee a standardisation of fire detection, alarm and protection systems on the various platforms.

This corporate fire safety philosophy will be handed-over to engineering companies and EPC contractors at the beginning of each project.

IFC - Occupancy Based Life and Fire Safety Guidelines

The International Finance Corporation (IFC) is an international financial institution that offers investment, advisory, and asset management services to encourage private sector development in developing countries. IFC is a member of the World Bank Group located in Washington D.C., United States.

FPC Risk has been advising IFC and its clientele for 20 years during different types of investments in several business sectors and regions throughout the world. The role of FPC Risk is helping both IFC and its business partners to achieve an acceptable level of life and fire safety in line with local and international standards for the asset.

Since IFC is active in a lot of different industries with each having specific challenges, it was decided to develop occupancy based life and fire safety guidelines for a number of sectors.

The purpose of developing these guidelines is :

- To better inform clients about IFC's expectations in the specific industry sector in terms of technical L&FS requirements, required documentation and approval process;
- To create more awareness by transferring knowledge about specific fire risks and applicable fire safety strategies for the occupancy;
- To support local design teams to achieve compliance with good international practices in design and construction.

The guidelines will provide ample flexibility to allow for application of prescribed and performance based fire safety standards and approaches, as long as an acceptable level of life and fire safety can be demonstrated, utilizing both the local country standards and the international standards specified in the IFC's existing EHS guidelines.

Nuclear facilitiy fire incidents: 6 main focus points

Nuclear facilities are characterized by a radiological risk that cannot be observed by our senses. Therefore, it is of the highest importance to contain contamination and radiation within predefined zones.

Focus on the following aspects is required to meet this objective in case of a fire:

■ Prevention

As in every other facility, the best method to increase the fire safety level is to decrease the probability of a fire. Fire load and ignition sources should be reduced to what is necessary. A risk analysis should determine to what level these measures should be implemented. During the facility's lifetime, these prevention measures should be respected by good housekeeping.

■ Dynamic containment

Nuclear facilities are often fit with dedicated ventilation systems that keep the facility at a lower pressure than the environment. This system prevents that radiological contamination is released into the environment. The systems are fitted with very fine air filters that prevent any particle to escape to the open air. In case of fire, these filters might be blocked by the smoke or might disintegrate due to the high temperatures. This might lead to an unwanted spread of contamination. It is therefore of utmost importance to implement a strategy to safeguard the ventilation system in case of a fire.

■ Fire growth

Due to the leak tight construction of compartments, a fire will behave differently than in other enclosures. Fires in nuclear processing cells are mainly air-controlled. As a consequence, combustion will be incomplete and will be characterized by sooty smoke. Due to the pressure rise that results from the higher temperatures, the pressure balance in the facility will change. Overpressures in contaminated areas might lead to an unwanted release of contaminated smoke.

■ Suppression

Fire suppression systems will control or extinguish fires in an early stage. One should however consider how to control the 'side-effects' of the extinguishment in order to contain the radiological material: can possible overpressures of a gas suppression system be vented safely? Are means provided to contain fire water that might be contaminated?

■ Management of change

Afire strategy will only function correctly if it is reconsidered after every change of operation in the facility: new equipment or other methodologies might lead to other fire risks that need to be addressed by a risk analysis.

■ Emergency response

The incident response by on-site incident response team and public incident response services is performed under continuous surveillance of a radio protection agent.

Furthermore, each incident responder must wear a personal dose meter with preset alarm levels: incident response is only allowed where radiation is below safety levels, evacuation of the hot zone with radiation levels above max., is mandatory.

The main focus should be on prevention of spread of contamination by the creating containment (set up water curtain as a barrier for gaseous radioactive pollutants or the use of plastic sheets to isolate the radioactive source as quickly as possible).

Protection of National Heritage

Fire safety in historical buildings

One of the more interesting challenges a fire risk engineer faces has to do with protection of historical buildings.

Over the past years FPC Risk has been involved in different projects concerning national heritage, going from theatre and city halls to historical court houses. At this very moment we are also supporting International Masters student in Fire Safety Engineering *Carlos Aguiar* with his thesis about this subject.

The main challenges is : how can we protect historical buildings, their often invaluable and irreplaceable content, and of course their countless visitors and many occupants?

Prescriptive design can only offer a general set of rules for the protection of buildings; implement compartmentation, use only non-combustible materials and make sure there are enough escape routes for a safe egress. It is clear that none of these measures are easily implemented in historical buildings without seriously altering their appearance and that prescriptive design does not always offer an adequate fire safety solution for the largest part of our historical patrimony.

Performance based design seems to offer an alternative, but still an engineer is confronted with the decrease in the historical value of the building, when for example a sprinkler-installation of a smoke and heat control system is installed. Who would want to see the Sistine Chapel if there would be bright red sprinkler-pipes on the ceiling?

An undervalued aspect of the performance based design however, is the operational aspect. Far too often only 'passive and active systems' are taken into account to achieve equivalence with the building codes, because they can be calculated and quantified. It is a lot harder to put an estimate on the efficiency of a first intervention.

And yet, this can be a very important element of a fire safety management plan, especially in buildings where other systems cannot be installed due to the technical and aesthetical limitations.

The real challenge here, lies in the development of an effective fire protection program, with a good organisational response strategy. This strategy includes all layers of the stake-

holder hierarchy, from the janitor who could be trained for first intervention, up to the management who can install a single point of contact for emergency communication and the fire department which can, if communicated properly, execute a well-directed attack in case of an emergency.

Some other organisational components of the fire safety management plan can be:

- Staff training in both first intervention and occupant evacuation.
- Arrangements with regard to fire safety during renovations and other works.
- Extra precautions during events (increased fireloads, larger populations).
- A decent emergency response plan, with well-defined tasks for the people responsible and clear communication between all involved parties.

These are just a few examples of how the operational aspect can contribute to a decent fire plan, without affecting the architectural and historical value of the building.

How can we protect historical buildings, their invaluable and irreplaceable content, and of course their many visitors and occupants?

Master of Science in Fire Safety Engineering

The future has started

For the past couple of years FPC Risk has been an active sponsor and participant in the International Master of Science in Fire Safety Engineering programme. The IMFSE programme is jointly offered by 3 Full Partner Universities: Ghent University (Belgium), Lund University (Sweden) and the University of Edinburgh (UK). In this context we also provide thesis topics and work together with the students to develop quality work.

CARLOS AGUIAR

The integration of fire organisational response in performance-based design for cultural heritage buildings

Currently there is a great demand for rehabilitation and re-occupation of cultural heritage buildings as a mechanism to preserve them and bring back to life. In contrast the fire protection rules and legislation set minimum requirements for obtaining safety levels in buildings which cultural heritage properties often cannot meet.

The purpose of the master thesis is to introduce an alternative for fire protection of cultural heritage buildings through establishment of a method that quantifies organisational response into a performance-based design.

This will take into account the following aspects: risks analysis, readiness and effectiveness of first response team, emergency management plan, response evaluation of local Fire Brigade, maintenance and conservation of the building and occupancy control.

(see also p 6 - 7)

ANDRES FORERO JIMENEZ

Bund fire protection in the petrochemical industry: is it economically justifiable?

After the Buncefield fire, a major conflagration caused by a series of explosions at the Hertfordshire Oil Storage Terminal (UK, 2005), the concerns increased: fire protection demands for new tank farms became more stringent.

Often the presence of a fixed foam extinguishing system is requested and required by fire officials. This significantly increases the fire protection costs of the terminal as the required foam and water quantities are well above those of any other governing scenario.

The thesis will focus on causes of previous bund fires and the frequency at which they occur, to investigate the effectiveness and the economic justification of a fixed foam system. Alternatives such as preventive measures (additional overfill protection, gas detection, …) and mobile bund foam extinguishing teams equipped to handle such incidents are evaluated.

MERT ABDULLAH

A thorough study on evaluating the cost of Fire Safety for large companies

The benefit of investing in fire safety is not always obvious to companies. In many cases companies do not have a good idea of the total CAPEX and OPEX spend on fire safety.

One of the main reasons is that the cost of fire safety is scattered throughout different company departments such as HSE, Engineering, Fire Services, Maintenance, etc…

The objective of this study is to develop a method that allows companies to make this cost more transparent.

The scope of this thesis is to prepare an organisational model and inventory of all fire safety related CAPEX and Opex items and to undertake a case study at one of the multinational companies located in the Port of Antwerp.

Pharmaceutical resilience

From fire safety engineering to business continuity management

Janssen is part of the Johnson & Johnson pharmaceutical companies and has R&D, Supply Chain and administrative sites in Belgium and abroad. Whether it comes to assuring life-safety of co-workers or resilience of it's operations, fire safety, incident management & business continuity need to be embedded in every business process. As a longstanding fire safety engineering partner to the company, Janssen requested FPC Risk support in the organisational aspects of safety and business continuity management.

At Janssen business continuity, crisis management and emergency response are tightly coupled. Although fires are a serious threat to any organisation there are other external hazards that can also cause serious damage such as power failure. Energy is a critical infrastructure to any company. When the Belgian government announced an electricity shutdown plan to pro-actively deal with potential power supply shortage in winter, Janssen took action and updated its Business Continuity Plan (BCP) with procedures for outage scenario's. FPC Risk conducted a Business Impact Analysis (BIA) for 6 sites in Belgium which included planned an unplanned, microsecond and multiple hour long outages.

Backing up entire sites with power generators is highly expensive and not a one-size-fits all solution. Based on the BIA, additional investments for short and long term solutions for power resilience were substantiated and could be balanced against the cost of an outage. It turned out that the most complicated part of a power outage plan is having a good recovery plan for power restoration. Equipment and building safety needs verification and the safety of thousands of people needs to be assured. The balance between the cost of downtime and life safety was designed into the BCP through a proper planning process with all stakeholders. This results in practical instruments for the business continuity and emergency management teams, leading to higher resilience and downtime cost reduction. Proper Information Management between the operational, tactical and strategic levels of the crisis organisation is key. FPC Risk designed a toolkit which leads to better shared situational awareness, harmonised decisions and reduced outage time & costs.

HADES

Fire safety 200 meters below ground level

EIG EURIDICE contributes to the RD&D programme to assess the safety and feasibility of geological disposal of high-level and/or long-lived radioactive waste in a deep clay formation in Belgium.

The name "EURIDICE" stands for "European Underground Research Infrastructure for Disposal of nuclear waste in a Clay Environment".

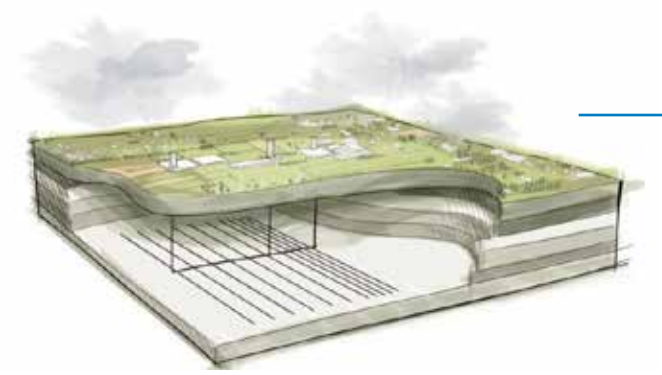
EURIDICE manages and operates the underground research laboratory known as HADES (High Activity Disposal Experimental Site), where experts develop and test industrial technologies for building, operating and sealing a waste repository in deep clay.

Scientists conduct large-scale experiments under realistic conditions in the deep clay formation over a long period of time to assess the safety and feasibility of geological disposal in poorly indurated (i.e. hardened) clay. HADES is a research facility and will never be used as a final repository for radioactive waste.

Needless to mention that this facility is a very a-typical construction that requires a specific approach towards fire safety. In order to increase the level of fire safety, EURIDICE has asked FPC Risk to conduct a fire risk analysis and to advice on further fire safety improvements.

FPC Risk proposed to conduct the risk analysis with a 'performance-based' approach. In the analysis, all relevant aspects will be taken into account: the structural and technical fire safety measures will be evaluated against the fire hazard, which consists of fire load and potential ignition sources. Based on these factors, governing scenarios are developed and further discussed.

As a result of this risk analysis, EURIDICE will have a better understanding on the most probable fire scenarios. Based on this info and on our recommendations, fire response and intervention strategies can be further enhanced to obtain a higher level of fire safety 200 m below ground level.



If you want to know more about the activities of EIG EURIDICE, please take a look at www.euridice.be

Life and Fire Safety

How to face Life & Fire Safety Challenges as an investment bank

The services of investment banks usually combine financing, that helps companies grow quickly and sustainably, with advice that helps to mitigate risks and raise environmental, health and fire safety standards.

For the past decades investment banks have been investing heavily in schools and health care facilities, along with the traditional areas of investment such as hotels.

Investments in construction or renovation of buildings with public access are vulnerable in the area of Life and Fire Safety (L&FS).

This is mainly because of potential gaps in the quality of minimum requirements of host countries, versus international requirements that are taken by main international investment banks as a reference.

Given the high visibility and public accountability, L&FS aspects also bear a significant reputation risk.

Hence, from an investment perspective the prime challenges are:

- Developing a common understanding between the interest of investors, authorities, project developers, insurers and architects in terms of L&FS;
- Defining a common risk philosophy and uniform level of L&FS across the investment portfolio;
- Achieving a proper balance between the investment risk and the level of technical involvement;
- Maintaining an acceptable level of L&FS during the life cycle of the investment(s).

Typical challenges to be dealt with during design, construction and operation of buildings accessible to the public are:

- The often open building structures with extensive use of glass and large compartments, including atria can cause for rapid fire and smoke spread horizontally and vertically throughout the building;
- The fact that occupants of schools and hospitals require assistance during evacuation;
- Guests being unfamiliar with the building and evacuation possibilities and procedures;
- The a-typical construction of many buildings, rendering standard code compliance very difficult;
- Multi-occupancy use with integration of commercial and residential buildings;
- Budget and scope limitations.

Building and Fire Safety Codes alone cannot always address the complex design issues associated with unique building and occupancies. Joint application of a risk based approach, in conjunction with the established prescriptive codes are required to determine and provide acceptable levels of Life and Fire Safety .

Cornelie van Hunnik, Emergency Management Analyst • Bart Joostens, Fire Risk Engineer

The added value of multidisciplinary educated Safety Scientists

Master in Safety Sciences

All over the world (industrial) safety is becoming more important. For this reason the University of Antwerp started the Master in Safety Sciences in 2013 in cooperation with key companies such as BASF, Mensura and the Port of Antwerp.

With this educational program the university aims to train young safety experts with a broad knowledge on safety. During this education the students acquire knowledge of different safety aspects (law, psychology, economy, chemistry, technology etc.) and domains (environment & ecology, safety & wellbeing at work, quality & sustainability etc.).

With this multidisciplinary and integrated view on safety graduates are capable to understand and apply the interdependence of these disciplines. Hence the Master in Safety Sciences provides a response to the industrial driven need for more scientific support and research with regard to safety.

Safety Scientists have a comprehensive overview of a specific safety problem from a broader perspective.

The multidisciplinary background of the students allows them to take a step back and draw connections to other fields. Safety Scientists are capable to look at a safety problem from a technical, chemical, psychological and legislative perspective and therefore are able to develop a holistic approach tailored to the clients needs.

Safety Scientist at FPC Risk

FPC Risk has recruited two of these Safety Scientists, one as a Junior Fire Risk Engineer, the other as an Emergency Management Analyst.

As a Fire Risk Engineer the principle task is to assist companies and project leaders in fire safety matters. Such projects range from revising building plans with regard to specific building regulations, to performing specific calculations for input in pre-incident plans and designing and testing sprinkler, smoke and heat extraction systems.

Emergency Management Analyst

As an Emergency Management Analyst the focus lies on supporting crisis management teams for the public and private sector from an organizational perspective. This includes development of Emergency Response Plans, preparation of pre-incident plans and training and exercise plans for the tactical and strategical levels of an organisation.

Preparation of pre-incident plans for example combines the work of the Fire Risk Engineer and the Emergency Management Analyst. Both work together to support companies in determining the chemical and environmental risks of governing scenarios.

Fire Risk Engineer

The Fire Risk Engineer produces the required calculations for heat radiation and dispersion. These calculations are used by the Emergency Management Analyst to develop practical pre–incident plans which determine the incident response strategy and the required capacity.

Such pre-incident plans contribute to the optimisation of environmental protection, deployment of firemen, security measures, protective equipment for employees etc. Based on the governing scenarios a company is not only better equipped to determine the required capacity but also to substantiate investments a company makes and to prepare for all the risks within a company.

The shared multidisciplinary background of the Fire Risk Engineer and the Emergency Management Analyst contributes to a better understanding of the purpose and underlying importance of these plans and ensures a smooth co-operation between both functions.