FPC Trends The FPC newsletter
Middle East Edition
Annex to Trends n° 25

Edito

FPC has always been an international company, with projects in Africa, Asia, Europe, CIS and in the US. Recent project acquisitions lead us to the US Virgin Islands, St. Martin, & Gabon.

For 40 years now, we undertake projects worldwide, facing cultural differences, local laws, regulations and industry practices. This provides us with a unique understanding, not only related to fire safety but also to culture, human interaction, environmental constraints, local laws and legislation.

Our multidisciplinary engineering team consists of 15 different nationalities with a broad cultural and educational diversity, well equipped to face the challenges of working internationally.

We learned to excel in delivering tailor made solutions, adapting to local requirements whilst maintaining international standards.

For over 20 years we render services to a host of international clientele in the Far East, and the horizon continues to broaden. Our new Singapore office is a hub to the Asia Pacific Region, and will further enhance our exposure to this well-established market.

This issue of Trends focuses on our local offices in the Middle East, affirming our International presence.

FPC Middle East

On the move

Thanks to the dedication and hard work of engineers, consultants and administrators, 2013 has been a significant year for FPC Middle East:

- licensing and establishment of the 1st fire risk consultancy office in KSA "FPC Middle East Engineering Consultancy" in Al Khobar
- registration of FPC Middle East Ltd – JLT Branch
- relocation of the UAE office from Abu Dhabi to Jumeirah Lake Towers in Dubai
- relocation of FPC Middle East Cyprus office to larger premises in Nicosia.

FPC Middle East's core team now comprises of Chartered Fire & Energy Engineers, MSc & BSc degree holders in fire safety engineering, as well as Graduates in Electrical and Mechanical Engineering.

Recalling our humble beginnings in 2003 in a basement room office, we are very proud of these achievements. Testimony to this is our growing and recurring client list, which includes Aramco, Qatar Petroleum, PDO, Dragon Oil, Dubai International Airport, New Doha InternationalAirport, EMAL, TASNEE, Jacobs, Mustang, and many others.

Further on, all about FPC Middle East offices in KSA and UAE, elaborating their capabilities, services, clientele, and projects.

FPC Middle East offices in Cyprus, UAE and KSA

FPC in the Kingdom of Saudi Arabia

FPC Middle East has established itself as the leading Independent Specialist Fire Engineering Consultant Company within the Kingdom of Saudi Arabia, providing conceptual and basic engineering design, front end engineering, technical support and design review, and detailed engineering on expansions, upgrades and 'grass root' projects at power generation facilities, petrochemical plants, desalination plants, oil & gas facilities and plants and industrial facilities.

Recognizing the value of having self-sufficient, in-Kingdom technical expertise and engineering capability, FPC Middle East and local partner Masoud Al Qathani, established FPC Middle East Engineering Consultancy Co. Saudi Arabia. As a Professional Engineering Company, it is registered with the Saudi Council of Engineers, the Ministry of Industry and Commence and the Saudi Civil Defense, and licensed for the provision of Fire Safety Engineering Consultancy services within KSA.

As FPC continues to grow in Saudi Arabia, our new offices located in the Al Jarbou Tower, King Abdullah Road Al Khobar provide us with a local platform to build on the success of the past, and to continue to develop strong relationships with Contractors, Operators and the regional Approval Authorities, delivering life & fire safety consultancy and engineering services in the KSA and Neighboring Countries.

FPC Offices in KSA

High Commission for industrial Security (HCIS)

For all large scale and important industrial facilities throughout Saudi Arabia, the HCIS is the ultimate authority for the administration of the physical and operational safety. For projects that are subject to the supervision of the HCIS, the Safety and Fire Protection Directives for Industrial Facilities (HCIS SAF Directives) require that owners of plants prepare a preliminary design package that details the scope of work, the main and auxiliary elements of safety and fire protection specific to the project, and detailed design submittals that provided comprehensive technical specifications and engineering design. The SAF directives mandate that all designs are undertaken by engineering and design professionals who are qualified, experienced, and specializ ed in fire protection and detection system design.

As a locally registered and licensed fire engineering Consultancy Company, with the requisite expertise in compliance with the SAF directives, FPC have undertaken a number of such projects providing:

- Preliminary Design / FEED
- 30% to 60% Design / Design Review
- 90 % Design Review
- As Built Design Review
- As Installed Design Review

Power and Water Infrastructure Projects

FPC provides Life and Fire Safety Consultancy Services on several Large Power and Water Infrastructure Projects throughout the region - with a combined capacity in excess of 8 000 MW. The projects involve expansions, upgrades and grass roots new build plants.

In Saudi Arabia we are providing Independent Fire Engineering Consultancy Services to the

- EPC Contractors at Ras Al Khair Power and Desalination Plant Phase 1 (SWCC)
- PP10 power plant extension (SEC)
- PP12 Combined Cycle Power Plant (SEC)
- Yanbu Power Plant (Marafiq).

The works provided by FPC include

- preparing design basis documents for the fire safety systems
- fire risk assessments
- heat radiation and consequence modelling studies
- review of fire protection system fire protection contractor shop drawings
- development of hazardous area classification study and plans
- building fire safety
- code compliance plans.

FPC engineers prepared a number of engineering study reports requiring the application of fire engineering principles and computer modeling techniques. In one study, FPC engineers demonstrated that by increasing the spatial separation between adjacent MV cable trays corridors, a fire incident on one cable corridor would not propagate the fire to the adjacent cable corridor. The result of this study provided our client with the technical justification to realize substantial savings on fire wall separation requirements.

For SWCC, we are preparing Tender Documents with Preliminary Design and FEED for the rehabilitation of the Fire Protection System. This over a distance of 466 km along the Dammam-Riyadh highway in accordance with HCIS SAF Directives and NFPA standards at 6 pump stations, 11 Line Valve Stations and High Point Terminal. In determining the need for fire protection and suppression for each area, FPC Fire Risk Engineer Mohamad Fouad Droubi worked closely with the SWCC Engineers to understand the consequences of loss of the unit to the operator, the vulnerability of adjacent structures and equipment to damage, and the ability to effectively respond to a fire emergency or incident.

For SWCC Jubail, we are also providing onsite technical support and supervision of the Fire Protection Contractor, replacing circa 200 Halon systems with NOVEC System, over a 24 month period.

At Marafiq Power Plant, we evaluated the design and layout of the plant. Here the fire and life safety features provided within the design were evaluated against the goals

and performance objectives in terms of Life Safety and Plant Damage and Business Interruption. This FRA (Fire Risk Assessment) was based on the methodology in NFPA codes

- NFPA 550 (Guide to the Fire Safety Concepts Tree)
- NFPA 551 (Evaluation of Fire Risk Assessments)
- NFPA 850 (Fire Protection for Electric Generation Plants...)

We used a Qualitative Method, where the evaluation of likelihood and/or consequences, focused on, and compared the design criteria of the existing system with the deterministic requirements and recommendations contained within the NFPA codes for achieving the required performance criteria, identifying any gaps and making recommendations for additional fire and life safety measures.

The FRA also required us to conduct a fire consequence analysis and heat radiation calculations for the Fuel Storage tanks. This assesses for each individual fire scenario the heat radiation and heat fluxes impact on adjacent equipment and surrounding areas. It also determines the design criteria for any required fire protection and/or exposure protection systems, based on guidance in international codes and standards and industry best practices. Each identified fire scenario was modelled as a pool fire utilising DNV PHAST.

In Qatar we have undertaken a comprehensive on assessment and gap analysis of the fire protection and detection systems installed at 2,730 MW CCPP / 63 MIGD Desalination plant. With a comprehensive desktop review we compared the as-designed systems against the applicable NFPA design standards, and the updated recommendations in NFPA 850. The scope included for site survey to verify that the systems were installed in accordance with the relevant standards.

Oil & Gas Projects

In the Oil & Gas sectors, FPC have in the recent past provided engineering consultancy services for the Hout Onshore Crude Facilities upgrade project at KJO Al Khafji,

Fire Water Systems Hydraulic Analysis Study for SUG Facility in the JOA Saudi Arabian Chevron / KSC.

This year FPC has provided engineering consultancy services to SNC Lavalin Fayez Engineering (SLFE) for Master Planning of Fire Protection System upgrade at 106 Gas Processing Facilities throughout KSA. As part of the project, we visited 11 of the major Gas Processing Plants located through the Kingdom. From Yanbu (on the red sea coast) it went to Marjan (offshore in the Arabian Gulf) and in-between including at Riyadh, Berri (one of the first five major gas treatment plants completed by Aramco), and several facilities on the Ghawar oil field, which produces approximately 2 billion cubic feet (57,000,000 m3) of natural gas per day.

Other recent project awards include the undertaking of Fire Water Systems Hydraulic Analysis Study as part of a project to improve the coverage and reliability of the fire water system, to safeguard the oil storage and conveyance at Juyamah Crude Oil Tank Farm in the eastern province. FPC provided technical support to the Contractor for site survey and field testing of the existing fire water system, and undertook hydraulic analysis using PIPENET hydraulic modelling software to evaluate system performance and identify areas of concern in regard to buried pipelines.

Petrochemicals Projects

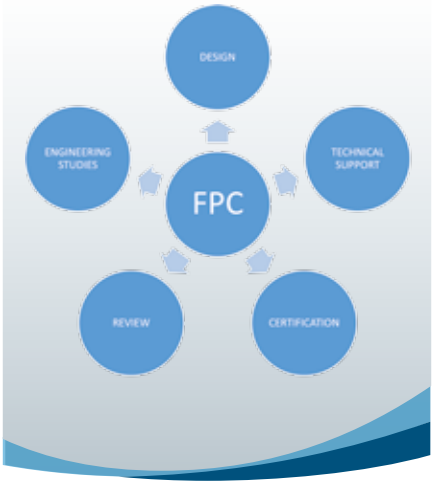
In 2012 FPC KSA were awarded a contract to develop Fire Preplans (FPP) for TASNEE Petrochemical Industrial Facility within Jubail.

To develop the FPP reports we adopted the NFPA 1620 Standard for Pre-Incident. This involved both comprehensive desktop and onsite review of the facility. We consulted with the operations personnel as with the fire department chief, to identify specific fire hazards related to equipment, structures and buildings within the facility. It also allowed us to identify critical scenarios to be exercised (Drilled) by the organizations ERT.

As a Fire Pre-plan act as an aide-memoire in crisis situations it should be presented on easy-reference A3 size documents. We used a standard layout for the plant with a level of detail and information that allowed the Emergency Response Team (ERT) to quickly assess equipment, structure and facility fires, and initiate response with minimal delays.

Due to the successful completion of this project, FPC was selected for repeat business with TASNEE and contracted to conduct a comprehensive audit and study of the Fire and Gas Protection systems installed throughout the facility.

For the Petrochemical Conversion Plant PCC) project in Jubail, FPC provided review and technical engineering support services to Jacobs Engineering for the fire detection and protection systems preliminary design.



Design Review and Certification Services (DRC) for Aramco / HCIS Projects

All our engineering and design professionals are qualified, experienced, and specialised in fire protection and detection system design. They provide our Contractors with independent supervision and oversight of fire safety design. FPC engineers review design submittals and work with Client engineers to provide them with technical support and guidance to ensure that the fire designs are provided in compliance with project objectives, fire and life safety strategies, codes and standards.

Some recently completed projects include

- Fire protection/detection systems at SAFCO / IBB Jubail
- Fire Protection / detection Systems at KAPSARC and KAUST
- Fire Water System Hydraulic Analysis Study at Jubail Export Refinery Package 5C
- FM200 Systems at Jubail Export Refinery Package 5C and Package 6
- Schools / Community Centers / Clinics at Aramco Dhahran
- Fire protection/detection systems Schools / Mosques / Clinics in Thuwal
- Fire protection/detection systems at Waste Water Treatment Plant in Thuwal

For HCIS projects, FPC engineers prepare SAF Directive Compliance Reports and where required by Aramco, certification of designs is provided by FPC Chartered Fire Engineer approved by Saudi Aramco LPD / FrPD.

Aluminum smelting is a booming business in the Middle East

The first aluminium smelter in the Middle East was built in Bahrain in 1971 to meet the country's need to diversify its industry and economy, create jobs for its growing population, and improve the utilisation of its energy resources. In 1979, DUBAL started the second smelter in the Gulf. Then, almost 30 years later in 2008, the Sohar smelter started production in Oman, followed by Qatalum in Qatar and Emal in Abu Dhabi in 2010. Currently Emal has embarked on an expansion project (Phase II) to double its production capacity. This will be completed in 2014. During the last 40 years primary aluminium production in the region increased, contributing 8% of the total world production. By 2014, four of the ten top primary aluminium producers in the world will be from the GCC. The aluminum market is booming in the (GCC) countries, thanks to energy cost advantages, capacity increases, and government support.

The GCC aluminum smelters have three main advantages over competitors in other region: Cheap energy, they enjoy modern world-class port infrastructures, a major cost and time-to-delivery advantage. GCC smelters have developed some of the latest smelting technology improving productivity and increasing output per cell and therefore overall capacity while reducing metal consumption levels and emissions.

Fire safety and fire protection in aluminum smelting plants is unique and has its potential fire hazards depending upon the processes and/or products involved. Millions of pounds of aluminum are melted and cast safely everyday in cast shops, foundries, recycling and reclamation plants all over the world. However there are inherent fire hazards in handling molten aluminum, just as casting aluminum can be dangerous. Contact with molten aluminum can set materials on fire. Mixing water and many chemical substances or contaminants with molten aluminum can cause explosions. These explosions range widely in violence and can result in injury as well as destruction of equipment and plant facilities.

EMAL - Potline

In the case of aluminum, explosions can result if ignition occurs while particles are suspended in the air as a dust cloud, as the burning extends from one particle to another with extreme speed. Potential sources of ignition include open flames, welding equipment, cutting torches, matches, cigarettes, faulty electrical equipment and static electrical charges. Other fire hazards at aluminum smelting plants are associated with oil leakage from the hydraulic and lubrication oil systems and with conveyor systems. As a result of dust deposits in the conveyer drives, heat due to friction can cause ignition and fire.

Aluminum smelting requires a large and very reliable power source to continually supply electricity. In this aspect most of the Aluminum smelting is combined with a power plant providing the necessary power supply. The power plant has to meet some very high requirements for power supply regularity, since a power supply interruption of more than a few hours may result in severe damage to the aluminum production process. Power generating plants are comprised of many different areas, each with distinct equipment that has unique hazards. Implementing a broad range of fire protection system that includes alarm, detection and suppression can be a complex challenge that requires relevant vast experience. Cable fires in underground cable ducts and tunnels, short circuits in the transformers and rectifiers likewise represent fire hazards at the power plant.

FPC is currently involved in two main projects related to the Aluminum smelting business in the region.

EMAL - Potline

View of EMAL

Emirates Aluminium Company Limited EMAL (a joint venture between Dubai Aluminium Company Limited and Mubadala Development Company PJSC), is presently building an expansion to the new world class Aluminium Smelter Complex which targets an ultimate production capacity of approximately 1.3 million tonnes of aluminium per year. The expansion project (Phase II) will double its production. It will be finished in 2014 and have the longest single potline in the world and include a gas fired power plant and port facilities.

SNC-Lavalin International Inc. (SLII), has been contracted by EMAL as EPCM Contractor for the Abu Dhabi EMAL Smelter Complex Phase 2. SNC-Lavalin International Inc appointed FPC to support them for the Fire Safety Engineering and Consultancy Services for the Phase 2 project.

The services provided by FPC cover:

- Basic & detailed engineering design of fire detection & protection systems
- Specific fire safety studies, eg. cooling towers protection, transformers protection, etc.
- Materials submittal approval
- Review and approval of contractors shop drawings
- Field inspection
- Testing & Commissioning
- Review and approval of as built drawings

Qatalum plant is one of the most competitive primary aluminium plants in the world, with a production capacity of 585,000 MT per year. The Plant is an equal joint venture between Qatar Petroleum and Hydro Aluminium of Norway and produces high-quality primary aluminium products from twin 1.2 kilometre potlines. The complex facilities include a carbon plant, port and storage facilities, as well as a captive power plant. The Qatalum plant is located in the Mesaieed industrial City area, south of Doha.

FPC has been appointed to evaluate and verify if the existing provisions and installations are still in compliance with the NFPA and Qatar Civil Defense requirements. An essential job, considering the number of modifications done in most parts of the plant. Another important part of the project is to verify if there are existing structures which do not have the systems yet, that are required by the standards.

Also, part of the checking and verification is to determine if the current installation and location of fire detection and suppression devices and systems are accessible for maintenance activities.

The result of the survey will also establish a guideline that will serve as design criteria of future installations and/or modifications on the Fire and Gas Detection and Suppression System or on other works that will affect the existing Fire & Gas Detection and Suppression System.

The Fire safety study will include the following:

- A desktop review and assessment of the existing fire and life safety systems / standards.
- A Visual inspection of the existing fire protection / fire detection system installation.
- Preparation of a GAP Analysis Report
- Develop guideline that will serve as design criteria of future installations

FPC moved on in the United Arab Emirates

In 2008, FPC decided to have permanent presence in the UAE and establish an office in Abu Dhabi. Five Years on, and due to the expansion of our activities and growing client base, we are pleased to announce that on August 31st FPC Middle East ltd moved to its new premises in Jumeriah Lakes Towers - Free Zone Dubai.

JLT Free Zone is one of the largest free zone developments in Dubai. It is situated in the heart of Dubai and only 45 minutes away from Abu Dhabi. Both Dubai International Airport and the New Maktoum International Airport can be reached within 30 minutes. Logistic wise an ideal location to serve the UAE, Oman and Qatar.

Our new coordinates in Dubai are:

FPC Middle East Ltd. – JLT Branch

Unit No. 1204 • Jumeirah Bay Tower • Plot X3
• Jumeirah Lake Towers • Dubai • UAE
P.O. Box 214965 • Dubai • UAE

T +971 (04) 456 0616

F +971 (04) 456 0644

Contact: Luc Feremans CEng, Manager UAE

Email: lferemans@fpcme.com

Petroleum Development Oman (PDO) – Yibal & Budour Fields

Petroleum Development Oman (PDO) is planning to invest and expand over the next 10 years to maintain its current levels of oil production. The state-backed oil company is planning to invest in onshore megaprojects Integrated, Yibal Khuff and Budour, which will help maintain PDO's capacity at about 550,000 barrels a day (b/d). The project will implement groundbreaking enhanced oil recovery (EOR) techniques. These include steam injection, chemical injection and sour gas injection.

The Budour gas fields are located in South Oman, in the Greater Birba area. The Budour oil field has two separate producing reservoirs, and is located approximately

process vessel

16 km north east of the Birba Gathering Station and approximately 32km north of the Marmul Main Production Station.

The Budour project implements water injection to produce oil from the reservoirs and depletion to produce gas and condensate from the Budour reservoirs.

The Yibal Khuff Project allows to safely develop the Yibal Khuff/Sudair reservoirs to realize synergy oil rim depletion and its associated gas, and Khuff-5 and proximal non associated gas reservoirs. This development will add to PDO's future oil production potential through direct oil production, and through benefits that may be realised from utilising the associated gas for power generation and EOR developments. The sweet export gas from gas-in-place will go to supporting Oman's mid to long term gas supply requirements.

The Yibal field area is located approximately 50 km south west of the Fahud field and 350 km south west of Muscat, in the PDO concession area. The project includes development of wellheads, RMS, flowlines/ trunk lines, a Central Process Facility (CPF) and a Power Plant.

FPC Middle East has been appointed to support the PDO FEED HSE Office in the development of the Front End Engineering Design (FEED) for the Fire Safety Engineering activities of the above mentioned new projects Yibal Khuff and Budour.

The main objectives of the Fire Safety Study are:

- To identify all potential fire and explosion events, including un-ignited releases, which may occur at the facility and to assess the consequences and likelihood of these events?
- To assess planned or existing barriers for incident prevention and protection measures in terms of accidental releases and presence of ignition sources, design and operation controls and recovery measures and identified deficiencies.
- To develop justified recommendations for improving or enhancing prevention and protection levels at a facility such that they are commensurate with the FES and that risks are As Low As Reasonably Practicable (ALARP).
- Participate in Fire Safety Design Review to verify the aspects of the Fire Safety Analysis have been properly mitigated in accordance with PDO and Shell standards.
- To contribute to HSE Case Hazards and Effects Register development and updating.

The fire protection design will be conducted in accordance with the PDO Standard SP-1075 and the Shell DEP 80.47.10.30. The target to complete the study is first quarter of 2014.

storage tank

Ayla Oasis, a fine and prestigeous project

Ayla Oasis, located on the Gulf of Aqaba in Jordan, is a waterfront development project with 430 hectares of land that consists of Lagoons, a yacht club, a shopping mall, hotels, apartments, town houses, a golf club, villas, and commercial areas. Aqaba is considered as part of Jordan's golden tourist triangle, which includes the famed sites of petra and wadi Rum.

Aerial view of Ayla Oasis

Marina Village Aerial View

Arabian Venice

Having provided services to the owning company on previous projects, FPC was appointed as the project's life and fire safety consultant with involvement, at the master planning, conceptual, schematic, Detailed Design (DD) and Construction Phases.

At master planning phase, it was essential to define and address fire water supply (fire water main) and fire brigade access routes requirements for the development, thus ensuring availability of fire water for specific areas and access for firefighting purposes.

During concept design, FPC supported the development architectural teams in outlining the fire safety requirements for each area (Marina village, Fortress hotel, commercial areas, etc) focusing on the passive firesafety requirements, such as fire load and ignition control, structural fire resistance, compartmentation, egress requirements and fire brigade access. Active fire safety was addressed at the schematic phase (Fire Strategy Report).

Parts of the development (Marina Village) have now progressed to the DD phase, where FPC is undertaking review of life safety systems design dwgs prepared by project MEP consultant.

During the construction phase, FPC engineers will periodically inspect the installation of the life and fire safety systems and equipment, confirming the fulfilment of the contractor works with the Codes and Designs. The inspections will be followed by FPC witnessing systems testing and commissioning.

This year we are proudly participating in the ***IFSEC & OSH Arabia*** *in Riyadh KSA between 24 and 26 Nov 2103. Come and visit us at* ***stand B20****. www.ifsec-osh-arabia.com*

FPC HQ
Noorderlaan 133
2030 Antwerp • Belgium
T +32 3 542 62 45
F +32 3 542 11 90
info@fpc.be
www.fpc.be

FPC Middle East
P.O.Box 20742
1663 Nicosia • Cyprus
T +357 22 31 96 86
F +357 22 31 96 87
info@fpcme.com
www.fpc.be