

Promat Technology Trends

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Busan, South Korea Immersed Tunnel Project Features Promat Safety Systems



2,000 tonnes of Cafco FENDOLITE® MII were provided to protect the structure in the main tunnel.



In the smoke tower gallery, more than 7,700m² of 20mm thick PROMATECT®-H board were employed.

See article on page 3

PTTT



China currently has 11 nuclear powered generating plants contributing to the national power grid. More are currently being built. To meet the soaring demand for electrical energy and reduce reliance on fossil fuels, some 20 additional plants are expected to join the nationwide network by 2030.

Promat Systems Part of China's Nuclear Network

When the late Deng Xiaoping noted in the mid 1970s that "it doesn't matter if the cat is black or white, so long as it catches mice", he was thinking more in terms of pragmatic solutions to kick start China's then stagnant economy.

The economic liberalisation that followed saw the doors of the planet's most populous nation re-open to the outside world, effectively bringing to an end decades of isolation and launching a wave of development unprecedented in China's long, sometimes checkered history.

Today, the People's Republic is known for very good reason as "the factory of world" and it is the world's largest consumer of raw resources. GDP has soared and per capita incomes have improved dramatically. Aspirations are being met although some inequalities remain.

China now claims to be the world's sixth largest economy and it is clearly destined for higher levels of achievement.

Not surprisingly, energy production has had to cope with steadily increasing industrial and domestic demands. These look set to multiply exponentially in the years ahead.

More than 80% of China's energy is still provided by fossil fuels — mainly coal — in which the People's Republic is abundantly endowed.

Understanding the downstream environmental, social, political and financial impact of continuing such policies, the government launched in the 1980s a programme of nuclear power generation to meet the country's energy needs, and to fuel future growth.

China's now has eleven nuclear generators in commercial operations, contributing to the national power grid.

Most of these ultra modern plants are located close to large industrial and densely populated urban centres, on the coast or in the south, China's engines of growth.

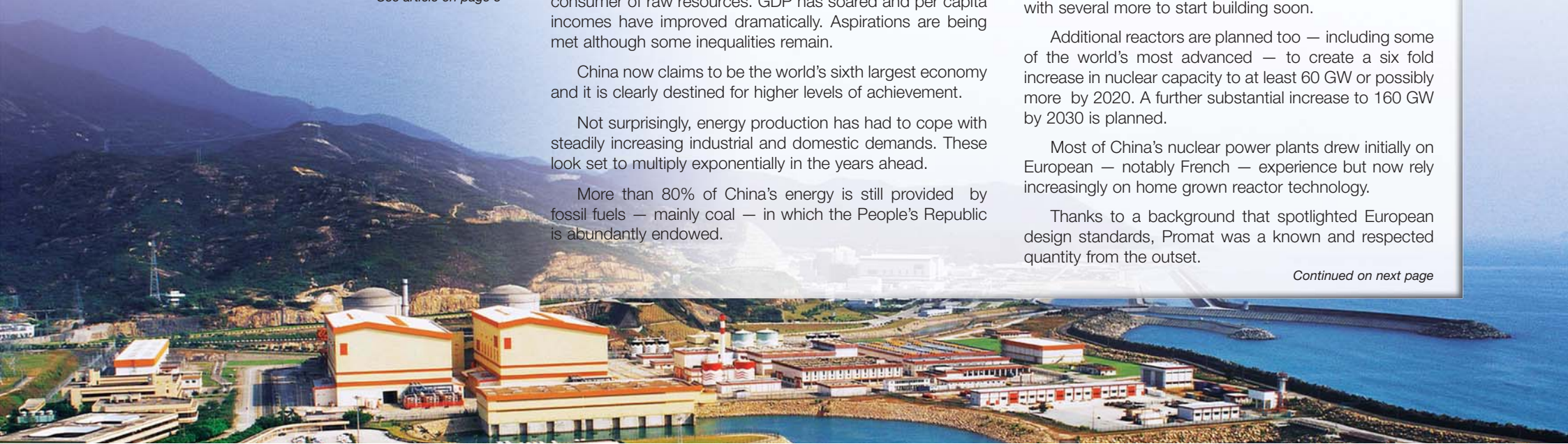
Another 20 plants are currently under construction, with several more to start building soon.

Additional reactors are planned too — including some of the world's most advanced — to create a six fold increase in nuclear capacity to at least 60 GW or possibly more by 2020. A further substantial increase to 160 GW by 2030 is planned.

Most of China's nuclear power plants drew initially on European — notably French — experience but now rely increasingly on home grown reactor technology.

Thanks to a background that spotlighted European design standards, Promat was a known and respected quantity from the outset.

Continued on next page



Continued from front page



Ling'ao Nuclear Power Plant is located on the Dapeng Peninsula in the Longgang District of Shenzhen, Guangdong province, about 60km north of Hong Kong. The generator plant currently has two nuclear reactors and employs PROMATECT®-L500 self supporting ducts (above) among other proactive fire protection systems.



(Clockwise from above right) Geographic location of the Qinshan Nuclear Power Plant, Phases 1 and 3 of the project.

Promat's Contribution Clearly Noted by Strategically Important Industry

PROMATECT® boards were specified for the ducting and ceiling systems for the first two generator power plant projects in Qinshan and Ling'ao. These were commissioned in 1991 and 1994 respectively.

Less than a decade later, unable to meet expanded energy needs, these two plants are scheduled to now have their generation capacity increased.

Through past experience and ongoing involvement in timely seminars and technical exchanges, Promat China has been able to sustain its favourable relationship with relevant specifiers in the energy system.

As such, fire resistant ducting and ceiling systems, as well as partition and fire stopping applications, were recommended and installed in the second phase of the Qinshan and Ling'ao projects, doing much to optimise fire protection and at the same time cementing Promat's iconic status as a leader of proactive fire protection.

However, the real nuclear boom followed five years later — earlier in the present decade — largely as the result of a new national energy strategy targeting nuclear power as the premier source of energy for China over the next 20 years.

Promat China continues to work closely with all related parties — including design departments, construction companies and developers — in order to keep to keep pace with ongoing developments.

In doing so, Promat brand building is enhanced, particularly by integrating fire awareness education with superior fire protection characteristics.

As a result, PROMATECT®-L500 was installed in Qinshan and Ling'ao upgrading projects in 2007 and 2008.

In 2009, Promat China also won contracts for fire protection systems to be installed at the new Hongyanhe and Ningde nuclear power stations.

Assessing the optimism positive created by government's national report address by Premier Minister Wen Jiabao in March 2009, "nuclear, wind and solar energy will be the only types of [renewable power generation] to be promoted", there is obviously plenty of potential in the market.

Furthermore, as noted in "China's midterm and long term nuclear development (2005-2009)" report, it is estimated by the National Resources Bureau that by 2020, nuclear energy capacity will make a significant contribution to this dynamic country's clean and renewable energy needs.

Through past performance, good reputation, a proven track record in the advanced fire sciences industry and high visibility as a supplier of sophisticated fire protection systems — all tested, tried and proven to meet international standards and specific nuclear power generation plant needs — Promat China is indeed well-positioned to service the needs of the People's Republic nuclear power generation strategy in the future. □

Available now upon request



The revised and updated 2009 edition of this guide provides a comprehensive overview of effective smoke management and control strategies. Available in Promat offices now, the guide contains numerous worked examples and abundant, scientific information related to all aspects of smoke control in buildings of all types, from high rise to underground structures.

The manual is designed as a source of pragmatic, useful information for anyone concerned with modern smoke control and extraction principles, how to design and use them to increase fire safety levels in the modern built environment.



PROMATECT® 50: HOTELS A Guide to Lightweight Construction



This new guide to the use of Promat's new technology Cement Bound Matrix (CBM) board, PROMATECT® 50 within the construction of hotels, the guide offers in-depth examples for the construction of walls including doorways and glazed elements.

Details of shafts, fire doors etc. how to construct water resistant wet areas, details of installation of cables and services, hanging heavy items etc. detailed explanations and colourful sectional drawings make this very comprehensive guide an easy read for all those involved in specifying or installing dry lining works in the hospitality industry.

Recently, shopping at one of my favourite 24/7 department stores in Asia was ignominiously but temporarily banned by local fire authorities. The competitive prices and entrepreneurial philosophy of this hugely popular Aladdin's Cave of Consumerism created overcrowding, and a number of fire and building code problems.

In the same time frame, a visiting business guru commented that the same country's very successful Command-and-Control economy left little room for entrepreneurial innovation! He said little about Asia Pacific's ability to bounce back quicker than most from the last, crippling recession?!? It occurred to me that somewhere between these two diametrically opposed concepts is the middle way of international business and economic prosperity.

Promat's successful business model is predicated on working with numerous statutory regulations. These are, after all, what inspires and delivers the promise of effective fire science technologies that make the built environment a safer and better place.

Similarly, Promat is part of a worldwide business organism working in a dynamic and competitive marketplace. Structural ideas about management have to be placed in a global context as they underscore successful and ongoing conservative risk management strategies.

Our products and systems are recognised universally as market and industry leaders, and a very high percentage of our staff also make it their business of lifelong careers. Promat does make a difference to safety and security. This is reassuring and deeply satisfying.

Indeed, this issue of PTT reflects some of our core corporate and individual value systems at work in a highly diversified and competitive marketplace.

Our cover story about Promat contribution to China's expanding programme of nuclear power generation neatly segues to an immersed tunnel project deep under Busan harbour in South Korea (opposite page), and also features a brief but fascinating note on an unusual HTI application.

Our brilliant new PROMATECT® 50 systems, their EHS worthiness and a prominent application in Hong Kong are featured on page 4, which also reviews PROMARINE®-640 usage in Singapore. Page 5 reports on Promat in a global sports event in New Delhi and regional design education in Hong Kong.

This, our fourth issue of PTT, closes with an overview of "Do and Don't" observations on the installation for successful fire stopping systems. Such fire collars are fast gaining international popularity so it is important we don't jeopardise their benefits by ensuring basic installation is absolutely correct!

Success in life is clearly a matter of balance in all things. At Promat we have the products, systems and expertise to make the world much more secure... so we must continue to persuade more people that it is essential and sensible to balance risk with optimum safety, by specifying Promat advanced fire science technologies!

Enjoy the read, use the information in PTT wisely to the benefit of our environment, and spread the Promat safety word...after all, it's just a question of balance.

Erik D. van Diffelen
Managing Director

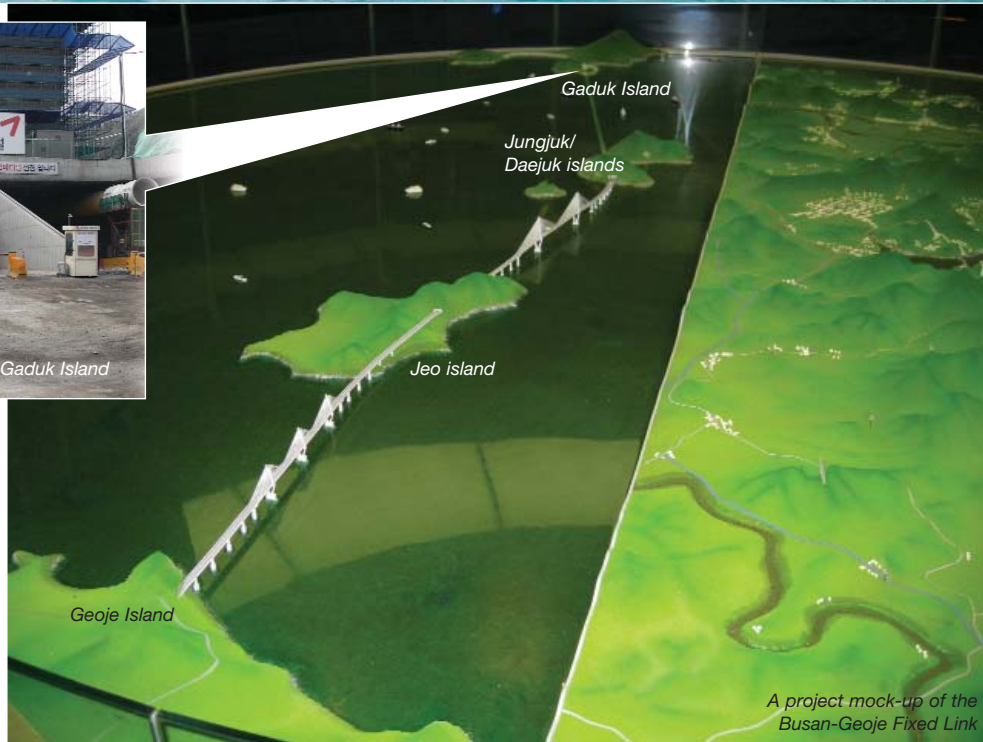
Promat International Asia Pacific

May 2010

World's Deepest Immersed Tunnel Project Employs Promat Expertise For Overall Fire Resistant Safety Performance



Phase 1 of the immersed tunnel at Gaduk Island



A project mock-up of the Busan-Geoje Fixed Link

Busan's population of almost 4 million makes it South Korea's second largest city, after capital Seoul. It is the country's biggest and strategically most important port. Located on the south eastern tip of the Korean peninsula, Busan is an energetic, thriving centre for media, the arts and advanced education. Busan is also the world's fifth busiest port, handling in 2009 total cargo volume in excess of 250 million tonnes.

In the early 1990s, a high level decision was made to redevelop Busan port and the surrounding area to make it a more competitive regional centre for shipping, transportation and communications. In early 2004, construction began on an 8.2km motorway project linking Busan and its surrounding areas with Geoje, one of several off shore islands.

Prior to the tunnel-bridge-highway link, the journey from the city of Busan to Geoje took over three and a half hours driving time along circuitous route of more 140km. The old, inconvenient way also included the use of a vehicular ferry. The new link slashes journey time significantly to just one hour and 60km.

Total cost of the Busan integrated tunnel-bridge-highway project is estimated at around US\$1.974 billion. The fixed link project consists of three construction phases:

- Phase 1 links Geoje Island and Jeo Island and includes a cable-stayed bridge, approach bridges, and a bored tunnel section;
- Phase 2 links Jeo Island and Jungjuk Island and includes a cable-stayed bridge and approach bridge section;
- Phase 3 links Jungjuk Island and Gaduk Island and includes immersed and bored tunnel sections.

Thus this mammoth and very challenging project includes a section of bored tunnel, a 3.7km long immersed tunnel and two 2km cable-stayed bridges.

In addition to numerous geographic and geological challenges, the area is susceptible to significant seismic activity. The total 3.7km length of tunnel connects the bridge section to Geoje Island. It is designed for two-lane traffic with emergency/crawler lane hard shoulder. Running between the two carriageways is a service lane/escape route. The immersed tunnel is constructed at a maximum water depth of 50m, apparently the deepest road tunnel ever constructed. A total of 18 precast tunnel elements — known as caissons, fabricated by Daewoo and weighing in at a total of 50,000 tonnes — make up the immersed tunnel proper. These are floated into position, sunk into a pre-dredged trench and then connected.

Some of the engineering and structural challenges included ensuring water-tightness of the joints, preparing the tunnel supports and the actual placing of the sections — a mammoth task by any reckoning. The client/tunnel operators required a concrete, or mortar, to fill gaps in the course of settling and to fix the caissons and precast-concrete tunnel sections. A grout system, suitable for filling gaps between the caisson units and the seabed sections as they were sunk into position was also specified. The grout had to be tough enough for pumping conditions and underwater placement.

The original 2003 specifications required a performance of 120 minute resistance to fire applying

the RWS Time/Temperature curve from the Netherlands. This curve is based on a worst case scenario of a tanker of 55,000 litres of petrol spilling onto a roadway and catching alight. After much discussion concerning the type of traffic that would be using the tunnel, a final specification was arrived at which utilised the Enhanced Hydrocarbon (HCM) time/temperature curve, in which the tunnel would be subjected to temperatures reaching 1300°C within 5 minute of ignition. In addition there was an extended requirement for a fire resistance of 240 minutes to the ISO cellulosic curve. Although the original specification was for a Promat boards protection system, in late 2008 a decision was made to protect the structure using a cementitious spray material.

As part of the quality assurance system in place for the project, all products bidding for the project were required to be submitted to the local KICT test laboratory to undergo fire testing to both HCM and ISO Cellulosic time temperature curves for periods of 120 and 240 minutes respectively. After testing, in which competitor products significantly failed to offer the promised fire resistance performance, Caico FENDOLITE® MII was left as the sole successful survivor of these harsh fire tests and was the only remaining option in cementitious sprays for protection of the GK tunnel structure.

Promat products and the final installed systems include:

- In the smoke tower gallery, more than 7,700m² of 20mm thick PROMATECT®-H and 2,400 cartridges of PROMASEAL® AN Acrylic Sealant;
- In the main tunnel, over 2,000 tonnes of Caico FENDOLITE® MII used to protect the concrete structure and
- Approximately 2,420 metres of PROMASEAL® FyreStrip expansion joint used in conjunction with the Caico FENDOLITE® MII to protect the profiles used between the Caisson connecting joints to seal against water ingress.

Completion of the project will be towards the end of 2010 and the overall project is expected to be fully operation in late 2010. □

Location
Busan-Geoje Fixed Link,
South Korea

Builder
GK Fixed Link Corp

Main contractor
Daewoo Engineering &
Construction, Co.

Designers
COWI A/S, Halcrow Group,
Pihl & Son, Arcadis, Tunnel
Engineering Consultants,
Ben C. Gerwick

Main products
PROMATECT®-H,
Caico FENDOLITE® MII,
PROMASEAL® FyreStrip

PROMAFLEX® 1000 Soft Sealing Belt Tailored To Specific Application's HTI Needs

High temperature insulation (HTI) is frequently the unsung hero of industrial development, ensuring safe working conditions and energy security where extremely high (or low) temperatures are routinely required.

PROMAGLAF® blankets and PROMAFLEX® soft sealing belts are two very good examples of man made HTI materials. These were recently put to effective use by Promat China, sealing the gap between a catalyst bed and reactor shell. Operational temperatures here are typically in the 500°C range.

The sealing material had to have good elasticity, returning to two thirds of its original size after repeated compressions by the thermally expanded catalyst bed. These onerous conditions

caused broken insulating fibres to fall into the blanket void, drastically reducing blanket elasticity and requiring repeated replacement, an essential but productivity-costing necessity.

A long PROMAFLEX® 1000 sleeve together with a filling core of PROMAFLEX® 1000 blanket straps provides a cost effective solution.

Under the supervision of a Promat engineer, the joints of the round sealing belt were sewn on-site, using a special silica glass fibre sewing thread.

Other materials included a PROMAGLAF® 1000°C high temperature glass fibre blanket and a stainless steel woven mesh to cover the belt before installation. □

Many Environmental Benefits of PromaX® Technology

PROMATECT® 50



041-009

Turning sheets of paper over to their unused sides and running them again through the laser printer or using fewer plastic bags are noble and necessary ideas at the heart of every 3R — Reduce, Re-use and Recycle — programme for alleviating the impact of global warming and climate change.

Regrettably, these and similar measures aimed at minimising carbon footprint now appear inadequate, despite their good intentions.

While it is widely recognised that Mother Nature will always hold the ultimate key to how societies live, work and play, many individuals and organisations also realise that much more should and can be done for the environment. Promat is one such company.

Promat Committed to Environmental Concerns

As a global leader in the business of the proactive fire protection, Promat also takes a proactive approach to environmental, health and safety issues.

Promat diligently uses its own rigorous Environment, Health & Safety (EHS) policy — known throughout the company as “Promat-Towards Sustainable Growth” — to create and optimise awareness for important green issues. Promat is fully committed to this “burning issue of our times” through:

- 1 The creation of a safe working environment for all its employees and the societies in which the company works.
- 2 The control and minimise possible negative impact on the environment.
- 3 Inclusion of EHS concerns in the development of its products and systems.
- 4 Continuous improvement of its EHS performance.
- 5 Transparency and open dialogue with all its stakeholders, based on facts and figures.
- 6 The principle that EHS due diligence shall be used as standard practice for Mergers and Acquisition, Investments and Divestments.

In a recent decision inspired by environmental and other concerns, Promat management announced that “Cement Bound Matrix (CBM) by PromaX® technology” is to now be the official brand designation for PROMATECT® 50 and other products of similar composition.

ISO 14001 & OHSAS Certification

World leading Promat products and professional fire protection systems are manufactured in factories which fully comply with ISO 14001 principles, the universally recognised certification process for most environmental concerns.

The company's factories now also measure up to OHSAS certification.

Although not an international standard, OHSAS Certification — based on the Occupational Health & Safety Assessment Series — has attracted substantial recognition around the world.



It is formulated and implemented on a framework of corporate occupational health and safety policies, planning, implementation and operations, checking and corrective action, management reviews and continual improvement.

Properly employed and installed, Promat fire protection products and systems pass all environmental standards with flying colours.

As expected, EHS concerns have now become critically important factors in the decision making process. Many specifiers demand products which meet environmental concerns.

Blocks 11 & 12 of Biotech Centre 2, Hong Kong Science & Technology Park

The laboratory buildings for the Biotech Centre form the latest addition, second phase development of the Hong Kong Science and Technology Park. The project features dedicated laboratory buildings united by two energy towers, other associated support facilities and six R&D office buildings.

While these have provisions for additional laboratory facilities, they bring an all-embracing, cohesive touch to the visual aesthetics of Phase 2 development.

At the Hong Kong Science and Technology Park, the requirement for compartmentation is 60 minutes. PROMATECT® 50 partitions installed at Blocks 11 and 12 of Biotech Centre 2 are approximately five metres high. Mineral wool is required only to enhance acoustic performance, as and where necessary.

Installation was faster and more convenient than conventional, commonly used partition systems. □



Location
Tai Po, Hong Kong

Owner
ISS East Point
Property
Management Ltd

Architect
Wilton Wong
Architects Ltd

Main contractor
MP Construction &
Engineering Co

PROMARINE®-640 Protects On-Board Analyser & Staff Quarters



Designer
Bestofire &
Thermal Pte Ltd

Product
PROMARINE®-640

Container
suppliers
Tech Infinity,
Hardy House

Tough and durable multi-taskers, re-usable steel shipping containers are routinely recycled and rapidly transformed to a multiplicity of other uses as varied as temporary housing and supplementary cold storage facilities.

In space sensitive Singapore, they now act as research and living quarters on-board off shore vessels.

Recently, 19mm thick PROMARINE®-640 boards were installed in two such 20 foot shipping container to create B15 and C Class wall and ceiling linings for marine analysis facilities.

The steel containers had to be easy to transfer — as and when fluctuating need arose — from one vessel to another. PROMARINE®-640 boards are ideal for installation in such wall and ceiling linings as they can provide a slim construction profile.

Prior to actual installation, the bare board is usually laminated in the user's choice of colour with approved marine grade veneer.

The little bit of extra space provided by PROMARINE®-640 boards — every millimetre saved is crucial — provides vital spatial benefits on-board marine vessels... and especially in recycled, rigid shipping containers enjoying a new lease on life! □



Fire Safety Improvement at New Delhi's Thyagaraj 2010 Commonwealth Games Stadium

New Delhi's urban landscape is punctuated by many construction projects at the present time. Few are more important than preparations being made to ready the Indian capital for the 2010 Commonwealth Games, scheduled for kick-off on 3 October.

The ten day programme is one of the leading events on the global sporting calendar, attracting a potential worldwide audience of some 1.5 billion television viewers. Not surprisingly, the 2010 Commonwealth Games are seen as a perfect platform to promote India's numerous unique and highly attractive brands to the international community.

Relatively small by international standards — seating 8000 spectators only — the Thyagaraj Stadium is said to adequately measure up to international sporting and build standards. It is one of the few green buildings in the country, thanks to advanced water management and sewage systems, and the widespread use of environmentally friendly fly-ash bricks and specialised glass.

Thyagaraj will host the netball events of the games. It has one match court and two warm-up courts.

Spectators will be very assured to learn the fact that fire security within the re developed stadium, such as a total ceiling area of some 4,500m², are optimised with the application of two layer 9mm thick PROMATECT®-H suspended ceiling system providing 120 minutes of fire resistance, integrity and insulation. □



Owner Public Works Dpt., Government of India, New Delhi	Main contractor JMC Contracts
Architect Kapoor & Associates	Applicator M/s Hindustan Plywoods Ltd
	Product PROMATECT®-H



Fire Resistant Structural Steelwork Coating of The New Hong Kong Design Institute Building

The new campus building of Hong Kong Design Institute (HKDI) is not only an icon on the local skyscape but also a statement of intent for design education and dynamic learning generally. This purpose built HKDI campus and its integral Lee Wai Lee buildings, located in the Tiu Keng Leng/Tseung Kwan O area of east Kowloon, offer the largest and best equipped design education facility in the crowded, energetic territory.

The HKDI is 12 storey high and consists of two podiums, a sky platform of three storeys and four tower blocks. The interconnected ultra modern structure is said to not only define the aspirations of HKDI as an institute of higher learning but also symbolise the convergence and synergies between creativity and advanced technological design skills.

The podiums are a reinforced concrete structure while the construction of the tower blocks and the sky platform is a composite of structural steel and reinforced concrete.

The quantity of structural steel employed throughout is approximately 3,200 tonnes. The three-storey sky platform — located between the seventh and ninth floors — covers an area of 100m x 101m. The sky platform is supported by a pre tension structure at the ninth floor and the interconnected structures are conveniently linked by a series of utilitarian, pedestrian bridges.

It is not surprising that such notable architecture has turned to an international leader of fire resistant sprayed systems to protect its structural steelwork. An area of more than 24,000m² of painted steelwork in HKDI has been coated with Caeco SPRAYFILM® WB3 for achieving 60 minutes of fire resistance.

Given the logistics and the complexities of the construction process, application of the Caeco SPRAYFILM® WB3 water based intumescent coating systems was installed both on and off site. □



Owner Vocational Training Council, Hong Kong	Structural engineer Ove Arup Ltd
Architect P&T Architect Ltd	M&E engineer Parsons Brinckerhoff (Asia) Ltd
Main contractor Penta Ocean Construction Co Ltd	Product Caeco SPRAYFILM® WB3





What To Do & Not To Do With Fire Collar Installation,

Effective Fire Protection Can Be Jeopardised By Poor Quality Installation

Effective fire protection starts with a clear understanding of the basic principles of compartmentation. Fire resisting compartments are created to contain fire and smoke spreading within built structures.

This sound and scientifically proven concept also represents a parallel threat as few compartments can fulfill their design functionality without penetrations.

Indeed, gaps and cavities between compartments are often interlinked.

In modern construction industry terms, this inevitably means balancing theory with everyday reality...ensuring that service penetrations and gaps are sealed with tested fire resistant solutions.

In order to maintain the same level of fire performance, penetrations and gaps have to be sealed with fire resistant system that offers the same or better level of fire resistant performance as the surrounding surfaces.

The development of effective solutions to seal gaps at service penetrations has increased substantially in recent years and Promat is today recognised as a worldwide leader in providing effective solutions.

The Promat fire stopping range of penetration seals and fire collars reflects considerable R&D investment in terms of time, financial and human resources.

These robust, durable systems are generally easy to use, saving time and money in labour and installation costs, especially when compared to traditional or makeshift methods which may also increase fire risks.

While Promat does provide clear and concise instruction on product packaging and by way of purpose-designed printed brochure and website instruction — as well as hands-on training as and when required — installation of fire collars is not always consistent with Promat's core ideals.

The five examples of installation shown here illustrate problem applications and incorrect techniques that do not always square with the usual high levels demanded by quality professionalism.

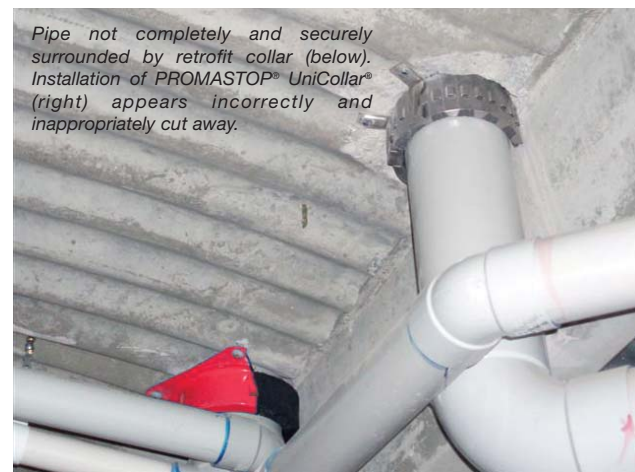
Clearly, pre and post installation site inspection by a well-qualified professional is essential and should be factored into the construction schedule of every project.

These examples are in fact useful reference points for site inspection and should be used as a benchmark, particularly when looking for specific fire collar problems that jeopardise integrity or have the potential for increasing downstream risk.

Most of these so-called problems are relatively minor, often the result of deadline pressure and can be easily rectified at the time of installation or after follow-up inspection or building/construction fitness checks. □



Retrofit collar appears altered and vital intumescent material removed. Fixing also seems to be incorrect.



Pipe not completely and securely surrounded by retrofit collar (below). Installation of PROMASTOP UniCollar (right) appears incorrectly and inappropriately cut away.



The retrofit collar is cut incorrectly. Pipe system also appears to be an untested system. Fixing also seems incorrect.



Incorrect collar size and installation! Collar seems altered and fixing appears incorrect.



Wrong collar for floor waste. Inappropriate nylon fixing employed and collar not fixed securely to flat surface. Fire will inevitably enter behind such collar installation.

DISCLAIMER

The Promat International Asia Pacific Network spans the region with innovative proactive fire protection products, systems and solutions: Australia, China, Hong Kong, India, Malaysia and Singapore, with distributors in Brunei, Indonesia, Japan, New Zealand, Philippines, South Korea, Taiwan, Thailand and Vietnam.

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