eMARINA
The quarterly newsletter of
The Hong Kong Joint Branch of The Royal Institution of Naval Architects
and The Institute of Marine Engineering, Science and Technology,
and The Hong Kong Institute of Marine Technology
皇家造船師學會暨輪機工程及海事科技學會香港聯合分會
及香港海事科技學會季刊
Vol. 4 Dec. 2018

HKJB & HKIMT Activities

PAAMES AMEC 2018 Conference – Pusan & Technical Visits

HKJB/HKIMT/HKIE-MMNC delegates participated in the Pan Asian Association of Maritime Engineering Societies' (PAAMES) Advanced Maritime Engineering Conference (AMEC) between 9 – 12 October 2018. Technical visits were also made to the Pusan National University – Global Core Research Centre for Ships and Offshore Plants (GCRC) on 10 October 2018, Daewoo Shipbuilding and Marine Engineering (DSME) and KOGAS Tongyeong LNG Terminal on 11 October 2018 and the Korea Research Institute of Ships & Ocean Engineering (KRISO) on 12 October 2018.

Visit to Pusan National University, Korea

The Global Core Research Centre (GCRC) of Pusan National University is one of the two universities conducting research and development (R&D) for vessels and naval installations in South Korea. GCRC specialises in the areas of naval architecture and offshore engineering, mechanical engineering, material engineering and chemistry. Its operation is supported by the National Research Foundation of the Korean Government. It also co-operates with domestic and overseas research institutions and industries to conduct research programs on request.

In the past years, GCRC had concentrated its efforts in ship design improvements such as hull form optimisation to improve hull efficiency and carrying capacity maximisation to improve transportation efficiency. Today, it has expanded its scope of research to the new requirements on environment to the shipping industry such as fuel and carbon dioxide emission saving, emission reduction, operation efficiency enhancement and reduction of maintenance etc.

GCRC's 100m long, 8m wide and 3.5m deep towing tank was constructed in 2002. It is a particular endowment compared to its other 46 R&D facilities. The tow can travel along the length of the towing tank at a maximum speed of 5 m/s to simulate the passage of different types of vessel. The wave maker in the tank can also generate different wave types encountered by the ships during their voyages. The towing tank is also equipped with a six degree of freedom sloshing platform and a wet drop test rig which are specifically built for the testing of tanks installed on ships for the carriage of liquefied natural gas (LNG).

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LNG is natural gas (predominantly methane CH_4 with some mixture of ethane C_2H). Natural gas will become liquid at atmospheric pressure when it is cooled down to a temperature approximately below -162ºC. LNG takes up only 1/600th by volume of its gaseous form and is thus most suitable for sea transportation by LNG carriers. These carriers normally have their tanks either empty or full during transit. Partially loaded tanks with liquefied gas sloshing around may cause the vessel to capsize in severe conditions. This restriction has imposed great difficulties to the shipping companies in dealing with the orders and the discharging of LNG in terminals. Therefore, LNG carriers can only visit terminals that have the capacities to fill or hold full tanks of LNG in one go. The other problem is the excessive boil off rate of LNG during transportation. To alleviate these inherent problems, Samsung Heavy Industries worked with BASF and has developed an anti-sloshing and anti-boil-off solution (Basotect blanket) to permit the partial loading and discharging of LNG in terminals while maintaining the safety of LNG carriers at sea. Octagonal shape LNG tank is used to reduce the sloshing impact load on the walls of the tank. GCRC was entrusted with the assignment to test this solution and confirm the efficiency of the setting.

To test the performance and efficiency of the Basotect blanket, GCRC had constructed a six degree of freedom sloshing platform to simulate the possible movements of LNG inside an octagonal cross-section LNG tank and ascertain the sloshing effect of LNG in an LNG carrier during voyage. The wet drop test rig can allow an object to free-fall from 4m high at a temperature of zero (0) to 20 degrees. The test specimen at the bottom of the rig can be frozen to minimum -200°C by liquid nitrogen for mimicking the test material in contact with or carriage of LNG. This is a test to confirm the strength of tank membrane materials used in building LNG tanks under the sloshing condition.

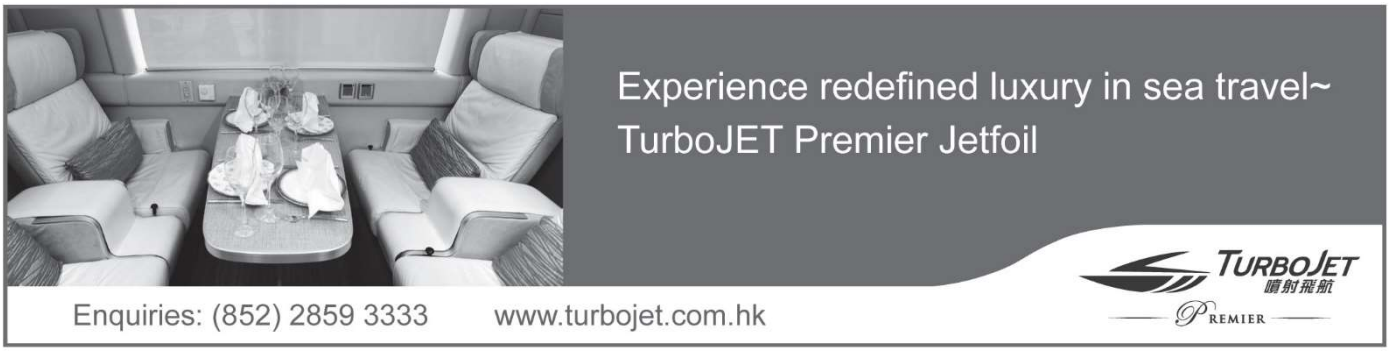
Undoubtedly, GCRC is the leading maritime engineering R&D establishment in South Korea. Its supportive role upholds the country's leadership in the construction of LNG carriers and continues to offer new technologies and innovative engineering solutions to the industry.

The opportunity was taken to thank Prof. Moon-Chan Kim, Prof. Sun-Hong Kown and their colleagues for their hospitality in receiving us and showing us the achievements of GCRC.

Visit to Daewoo Shipbuilding and Marine Engineering Co., Ltd. Korea

Daewoo Shipbuilding and Marine Engineering Co., Ltd. Okpo Shipyard (DSME) has two dry docks, four floating docks, two heavy zones, four 900 tons Goliath cranes, two 3,600 tons floating cranes and an 8,746m long quay for the construction of commercial ships, military vessels and various marine engineering platforms such as offshore drilling platforms, offshore production platforms and floating process, storage and off-loading vessels etc. No. 1 dry dock is the largest dry dock in DSME. It is 535m long, 135m wide and 14m deep.

DSME is the world leading shipbuilder for liquefied natural gas (LNG) carriers. At present, it has 19 LNG carriers



waiting to be built in the pipeline. The current vessel under construction is a 174,000m^3 LNG carrier which is built to the GTT NO 96 standards for containment and insulation to minimise LNG boil-off. The primary and secondary membranes are made of a GTT-proprietary 36% nickel-steel alloy, 0.7mm thick (Invar). The primary membrane contains the LNG cargo, and the secondary membrane which is identical to the primary, ensures a 100% redundancy for LNG cargo containment in case of a leak. 95% of the Invar plates are welded together by automated welding machines. Manual welding on the membrane accounts for only 5% of the total welding.

Insulating five LNG cargo tanks with a total capacity of 174,000m^3 requires about 58,000 pre-fabricated plywood boxes from Finland. These boxes are filled with expanded perlite in standard size of 1m by 1.2m to form the primary and secondary insulation layers in thicknesses of 230mm and 300mm respectively. A load bearing system is built between the insulation layers to transmit the load of the cargo and structure to the hull. The primary layer is secured by means of the primary couplers which themselves fixed to the secondary coupler assembly. The secondary layer is laid and evenly supported by the inner hull through load-bearing resin ropes, and fixed by means of the secondary couplers anchored to the inner hull. The majority of the hull is made from Korea-produced steel.

Looking at the inner construction of an LNG carrier was a mind broadening experience. We thanked Mr. Du-Seon Park of DSME, Executive Vice President and his DSME colleagues for their hospitality. We were also very grateful to Mr. Ernest Chan for organising this memorable visit for the delegation from Hong Kong.

Visit to KOGAS Tongyeong Terminal, Korea

Korea lacks natural energy resources and all its gas for power generation, industrial production and domestic consumption is imported in the form of liquefied natural gas (LNG). KOGAS is the energy enterprise responsible for the import and storage of LNG and the transmission of the re-gasified LNG across Korea. KOGAS has four LNG terminals in Korea. Tongyeong Terminal is one of these terminals located at the southern tip of the Korea peninsula.

KOGAS secures LNG supplies to Korea by involving in both upstream and downstream of the LNG supply chain. It invests into natural gas fields and liquefaction plants as well as the operation of LNG receiving terminals and the laying of the natural gas pipeline network. Located in Jinhae Bay, KOGAS Tongyeong Terminal receives LNG cargo from eight countries under long term contracts. Its double-sided unloading jetty can accommodate a 75,000 ton and a 127,000 ton LNG carrier (LNGC) respectively. On average, each LNGC can be fully unloaded within 12 hours and Tongyeong Terminal receives about one (1) LNG shipment in every three days.

The unloaded LNG at -162°C and atmospheric pressure can either be stored in one of the four LNG 200,000 m^3 tanks or discharged into thirteen (13) 140,000 m^3 LNG tanks located at 500m from the jetty. The 140,000m^3 LNG tanks all have a primary and a secondary containment tank. The primary containment is for operation

and the secondary containment is to contain the leak from the primary system. The primary tank has an outer diameter of 80m and a height of 31.6m and is placed inside a secondary tank which has an outer diameter of 82.4m and a height of 46.4m. The secondary tank wall is 2.4m thick and is made from ASTM A240 Grade 304 stainless steel plates and the primary tank wall is made from ASTM A553 Type I 9 % nickel alloy plates to contain the cryogenic LNG. The boiled-off gas from these tanks is re-liquefied and returned to the LNG tanks to reduce wastage. LNG is turned into natural gas by heating it up in heat exchangers using sea water as the heating source. The natural gas is compressed to a pressure of 70kg/cm^2 by the electric motor driven compressors before delivering it to the KOGAS DN750 natural gas pipeline network for distribution.

We were very impressed by the development of South Korea in the storage and handling of LNG. They have acquired the full know-how from the design, construction and operation of LNG terminals as demonstrated in the Tongyeong Terminal. Hong Kong has nothing to compare with Tongyeong Terminal. We are still very much in an infancy in front of the sheer scale of LNG storage and usage in South Korea.

Visit to Korea Research Institute of Ships & Ocean Engineering

The Korea Research Institute of Ships & Ocean Engineering (KRISO) was established by the Korean government in 1976. Today, KRISO concentrates its efforts in the research of ocean and deep-sea exploration and ship designs.

KRISO has a towing tank of 200m long, 16m wide and 7m deep. The towing tank is also equipped with a wave generator which can generate waves up to 6m/s for the modelling of sea conditions to aid the design of the hull, propeller, seakeeping and maneuverability of vessels. A total of 1,800 fibre-reinforced plastic (FRP) ship models and 1,400 aluminium alloy model propellers were constructed in its workshop and all of them had been tested in the towing tank. The ship models were made to an accuracy of length +/- 2mm and breadth/depth +/- 1mm to the real ship dimensions. The propeller models were made to an accuracy of diameter +/- 0.02mm to the real propeller dimensions. The ship models are usually scaled down to 6m to 12m in length for static tests, and 3m to 7m for dynamic tests.

KRISO has an Ice Tank of 42m long, 32 wide and 25m deep. It is only one of its kind in Asia. Six chillers installed on the ceiling of the area can chilled the entire indoor area down to -20°C. It is used to produce 30mm thick ice on the surface of the tank. A carriage mounted on top of the Ice Tank can tow a model vessel at the maximum speed of 3m/s over ice. The Ice Tank has assisted in the development of the first arctic liquefied natural gas carrier in the world which breaks the ice and travels in the ice-locked Arctic Ocean.

The Cavitation Tunnel is the largest of its type for researching the effectiveness of propellers used in commercial vessels. The cavitation tunnel can hold 2,370 tons of water. It has a length of 60m, width of 6.5m and height of 22.5m. Water in the tunnel is propelled by a 7m diameter impeller powered by a 3,690kW electric

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motor at 70 r.p.m. The maximum water speed in the tunnel can reach 16.5m/s. The behaviours of the model propeller and the hull model can be observed through an acrylic window of 1.3m by 1m and the thickness of the acrylic window is 0.1m. The water velocity in the tunnel is measured using the Laser Doppler Velocimetry.

We thanked Dr Tae-Hwan Joung, Principal Researcher of Policy Research and Co-operation Department in KRISO Global Co-operation Centre and his colleagues for their hospitality during our visit.

(Reported by Wing-Hay Tsang)

2018 HKIMT/HKJB Annual Ball

The annual ball was held at the Grand Ballroom, Kowloon Shangri-La Hotel, Kowloon on 16 November 2018. The popularity of this wonderful and enjoyable event continued this year. A total of 37 tables and 365 guests attended this event. The age-old tradition of the Annual Ball was followed. Piper led the VIPs into the banquet hall at 7:30 p.m. and the ceremonial whisky presentation to the piper marked the officially opening of the Annual Ball. At the beginning of the event, the Chairman of HKJB- Ir Ben LAU, Chairman of HKIMT- Ir M.C. CHAN and Chairman of Hong Kong Shipowners Association – MR. Jack Hsu delivered three short speeches to welcome all the guests who had participated in the the 2018 Annual Ball. The Ball Organizing Chairman - Dr. Nelson YU presented the Souvenir to the six activity & cash sponsors.

After the committee members of two institutes made a toast to the guests, dinner was served. The liveband, Philip & Star Band started to fill the ball room with popular dancing music. J. Motion Dance Academy warmup the floor by performing a Latin Dance by professional performers – Mr. Dimitry Arsiriy & Miss Serena. A Star Singer – Willy heat up the atmosphere by presenting the legendary songs. Flamenco Dance from Spain by Clara Ramona Danza Flamenca brought us to another stage of fervor, guests were invited to join the dances while they were still dancing. The dance and singing performance were superb and everyone had a wonderful and enjoyable night.

(Reported by Warners Suen)

Note of Thanks To Supporters

The 2018 Annual Ball Organizing Committee expressed their sincere and heartfelt thanks to the following Activity, Table and Gift Sponsors for their generosity and unfailing sponsorship, donations and gifts in this year's annual ball.

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Speech by Guest Honour- Mr. Jack HSU – Chairman of HKSOA

"Honourable Chairmen, Ladies and Gentlemen, Members and Distinguished Guests,

It is indeed my honour and privilege to be the Key Note Speaker at this "2018 Annual Ball", jointly organized by the HK Joint Branch of the Royal Institute of Naval Architects and Institute of Marine Engineering, Science and Technology with the Hong Kong Institute of Marine Technology.

Beyond doubt, these three societies (by way of their professional membership), represent the best minds in the field of maritime technology and the maritime industry in general. I feel heartened to see that we have in the industry, societies and organisations like yours, being at the frontline, providing solutions to the challenges that face our industry.

We, at the Hong Kong Shipowners Association, have also always been at the forefront of tackling such demands of the industry. While our respective organisations have collaborated in the past, I am sure you would agree that the sheer scope and size of what lies in front of us makes it all the more important that we increase our mutual cooperation.

The Hong Kong Shipowners Association is a compelling industry stakeholder organization, which actively participates in various industry forum. We recently made our annual delegation visit to Beijing, where we conducted working meetings and visited to various government authorities and shipping-related organisations. Furthermore, we are most pleased to that several proposals and ideas put forward by the HKSOA were adopted by the HKSAR Government, as was recently announced in the Chief Executive's Policy Address.

Whether as individuals being members of your respective societies or individuals being employees or principles of your respective companies, the HKSOA welcomes all forms of professional cooperation, so as the buildup Hong Kong's maritime cluster and maritime heritage, to continue to endow the authority of Hong Kong's Asian voice in international maritime matters.

To switch gears, and on a lighter note, tonight, as we are amongst the company of like-minded industry colleagues, it gives me great relief and ability to share with you more candidly, than how I normally would.

We have all heard about the 2020 Sulphur Cap, Ballast Water Management System, Scrubbers, etc… so I do not intend to bore you with more noise and confusion about these issues (as we probably all have had just about enough already for this year).

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But please allow me to say, that these highly technical matters, are all manifestations of an underlying phenomenon, of how our industry, is at the throws of a deep revolution, and at the cusp of entering a new era.

In the past, innovation drove change,

Now, regulation is driving change.

Let me repeat, in the past, innovation drove change (as that has always been the natural order of things about innovation).

For example, the invention of steam power moved us away from sailing-by-wind power.

Now, regulation is driving change.

The problems we as industry see for the latter, when regulation drives change, is that:

the pathway to such change may be driven by somebody else's agenda and not so much the industry's cost efficiency agenda;

the pathway usually looks murky, unclear, but industry is still forced to comply;

sometimes the key objectives (of the regulation), may not be attainable, but not because of our own fault or doing;

but the industry is still blamed for it anyway;

and lastly, the pathway is paid by the industry's money (so the regulation is completely detached from personal costs of those who created the regulation in the first place);

That said, I would also like to add that the past example (that is: innovation driving change as the natural order of things), actually hasn't really gone away.

In order words, innovation driving changes is still alive and kicking very much to this day and beyond!

For example, Data Management System is an innovation that helps open the door to improved risk management and to attain higher efficiencies.

When technology or innovation produces a solution for companies to improve the bottom line, the stakeholder principals are usually incentivized to invest, because there will be relative certainty of a return on such investment.

This link between innovation and financial viability is so very crucial, especially in our industry that consistently suffers from more bad years than good years. So when we stand back and look from a higher level, what is happening to our industry is nothing short of astonishing.

There are these powerful and disruptive DUAL forces of change: one originating naturally (through innovation) and the other originating artificially (through regulation). The combined effect is akin to a traffic term, called

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"whiplash". Imagine reading the headline news which shouts out: "Shipping Industry Whiplashed by Innovation and Regulation!"

So ladies and gentlemen, make no mistake, the reality of this new era, is that we are being whiplashed in both directions, I dare say, this is an unprecedented development of epic proportions, since the invention of sea born commerce, dating back to the beginning of human history.

Well, …at least in the annuls of maritime history we ALL can be OFFICIALLY credited for BRAVING this unprecedented industry-storm!! So on this light-hearted note, I would like to conclude my speech, and wish you all a wonderfully relaxed and enjoyable evening of good food and good company!

Thank you!"

INMEX China 2018

Invited by the Guangdong Society of Naval Architecture and Marine Engineering (GDSNAME), representatives of HKJB, HKIMT and HKIE-MMNC including HKIMT Chairman Ir M C Chan, HKJB Past Chairmen Ir Alan Tsang, Ir Ernest Chan and Ir K S Szeto together with other delegates from Hong Kong attended the International Maritime Engineering Exhibition (INMEX China) held from 5th to 7th December 2018 at Guangzhou, China.

The delegation participated the Welcome Reception and Grand Opening Ceremony of INMEX China hosted by the GDSNAME. This year, INMEX China was held at the Poly World Trade Center Guangzhou, China. There were exhibitions from the overseas and local maritime industries occupying two exhibition halls. Technical forums and seminars were held concurrently in parallel sessions. There were many interesting topics inter-alia:

- The 2nd China Shipbuilding Industry Transformation, Upgrading and Quality Development;
- Global Cruise Ships Design, Construction and Repair;
- Green Technology in Ship Repair - Application of Laser Technology.

It was a fruitful event allowing knowledge exchange and relationship building among members and engineers in the discipline of Marine Engineering and Naval Architecture. We look forward to participating more of such events in the near future.

(Reported by Leslie Lee)

Photo Gallery

2018 HKIMT/HKJB Annual Ball

Reception

Opening

Joint Committee Members Toasting to Guests

Appreciation to the Great Supporters

Entertainment

Lucky Draw

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Kowloon Shangri-La

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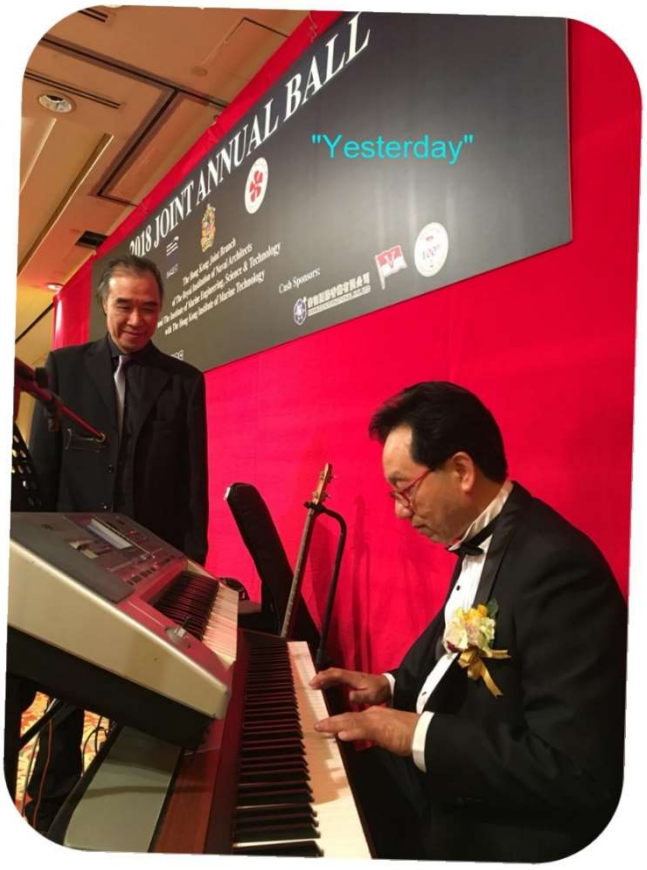
2018 JOINT ANNUAL BALL
"Yesterday"

"You are always on my mind"

The Bill...hmmm

HKJB & HKIMT Coming Activities

Date	Event
22 January 2019	HKJB AGM at Chinese Recreation Club, Causeway Bay
9 March 2019	Technical Visit to Hong Kong United Dockyards, Tsing Yi

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