

**HEAVY INDUSTRIES,  
HAPPY INDUSTRIES**

Technology helps create the world that we dream of. Hyundai Heavy Industries pursues the happiness of the global community with its advanced technology. In the realm of heavy industries, our technology is everywhere, improving the quality of life and happiness of everyone. We are building a world of shared dreams.



# NEW HORIZONS

AUTUMN 2016 | ISSUE 66

**Cover Story** Driving Tech Supremacy | **Village** Extending Helping Arms |  
**Interview 1** An Ounce of Prevention | **Frontier** Az-Zour North Phase 1, the First IWPP Project in Kuwait







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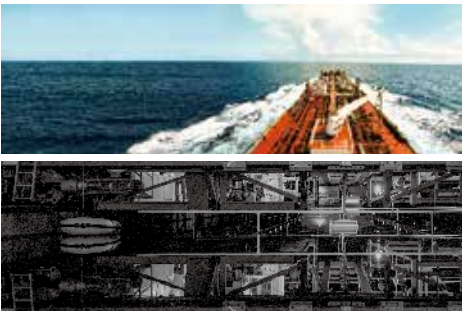
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## NEW HORIZONS AUTUMN 2016



**COVER PAGE**  
The ship sailing through  
waves was incubated at  
the towing tank in HHI's  
R&D center, the birthplace  
of HHI's Technological  
DNA.

**APP**  
Users may download  
*New Horizons* application  
from Apple Store and  
Google Play Store for  
their own personal and  
non-commercial use only.



# Setting Firm Sights on Fundamentals

Past the half way mark of the year, there are few signs of recovery in the global economy and shipbuilding/shipping industry. Despite growing concerns about the prolonged and lackluster growth, HHI managed to post 557.2 billion Korean won (hereinafter ₩) in operating profits on a consolidated basis for the 2Q this year, bringing the total operating incomes it generated for the January-June period this year to ₩882.4 billion through management rationalization measures including material cost cutting efforts and non-core asset disposition.

The profits we made for two consecutive quarters are meaningful in view of overall global economic conditions. What made the good business performance possible were the drastic and comprehensive restructuring measures put in place since 2014, strong performances of Hyundai Oilbank, our refining subsidiary, and stabilization of manufacturing processes for shipbuilding and offshore plant business combined with modularization and material cost cut endeavors of non-shipbuilding divisions including Engine & Machinery, Electro Electric Systems and Construction Equipment.

However, shrinking work volume, a daunting and unavoidable reality, is looming large. As of the end of July, our new orders achievement for this year stood at a mere 25.2%, which is a 45.6% drop over the same period last year. However, in view of the gravity of the diminishing work, we have been taking preemptive and intensive measures.

Firstly, we are making cost cutting efforts such as introducing salary cuts by eliminating mandatory extra working hours and urging employees to use their paid leaves. Our executives rolled

up their sleeves in an effort to make a turn around. Top executives of HHI and its affiliates gave up 100% of their salaries while other executives returned up to 50% of their payments. We also implemented an organizational reshuffle by slimming down the number of departments by 25%. More importantly, we are carrying out efficiency-oriented drydock management policy that we set up in May this year.

At the same time, we are now faithfully implementing a ₩3.5 trillion worth management improvement plan with the aim of rebuilding trust in the market and improving our financial soundness and competitiveness. According to the plan, we are selling our shares of Hyundai Motor and KCC, our stakes in Hyundai Avancis, and other properties and receivables. We are also reorganizing affiliated companies through the spin-off and sell-off of a part of our business, and the reorganization of affiliated companies including the disposition of Hyundai Finance Corporation, Hyundai Venture Investment Corporation, Hyundai Futures, Hi Asset Management and Hi Investment & Securities.

Once the plan is in place, we expect that our liabilities-to-equity ratio will drop from the current 134% to 80% by 2018. The total debt will also be cut down by about ₩2 trillion. We all know that these remedies are not an easy task but we desperately need those to fight the uphill battle ahead of us. Aside from the faithful execution of the management improvement plan, we are earnestly steering our daily business operation to regain trust in the market and bring more values to our clients.

In July this year, HHI met with Saudi Arabia's Energy Minister

Khalid al-Falih in Seoul to discuss ways to expand the cooperation with Saudi Aramco for the construction of shipbuilding complex in Saudi Arabia. In the same month, based on the strong mutual trust with Diamond Offshore, we delivered the world's largest semi-submersible drilling rig capable of operating in waters up to 3 km deep and drilling down to a depth of 10.67 km from the sea surface. With the successful delivery of the offshore facility, which was possible thanks to the much stabilized manufacturing processes, we are now laying the solid foundation for the on-time completion of offshore projects on our order backlog.


We also recently won an order to build a 23,000 ton class ice-strengthening logistics support vessel for New Zealand Defence Force's Maritime Sustainment Capability (MSC) project. What makes the project noteworthy is the fact that the Royal New Zealand Navy (RNZN) came back to us to order a similar class vessel to replace HMNZS Endeavor that was also delivered by HHI 30 years ago.

Factors that determine sustainability of a corporation and play a critical role in tiding over numerous difficulties in the course of business may vary depending on the times when we live in or sectors where we operate. However, an invariable constant is retaining client's loyalty as seen in the case of winning the logistics support vessel from New Zealand. We do know that no industry is free from ups and downs of the industry cycle and companies that can continuously roll out innovative products exceeding clients' expectations are the only ones that can survive in increasingly adverse business environment with persisting uncertainties.

However we have a proud history of meeting challenges head on

and turning them into new opportunities for growth. All of the HHI staff share the understanding that we don't have the luxury of shrinking back in the face of current hardships and we have to power through them with the sense of urgency. While continuing to strengthen our core competencies, we are aiming higher with our sights set on providing greater value for our clients.

At the point in time when we are going through difficult moments, unwavering support from all our clients is a source of strength for us to overcome the challenges and rise up again.

In this regard, we value your unwavering support and patronage. 

Choi Kil-seon, Chairman & CEO



Kwon Oh-gap, President & CEO







# Driving Tech Supremacy

“HHI’s deep commitment to research is well reflected in its 2016 business plan to increase the R&D spending by 17% to about KRW 270 billion from last year’s KRW 229 billion.”



A prolonged business slump has put Hyundai Heavy Industries (HHI) into a crisis management mode, but it appears that the South Korean industrial giant’s commitment to innovation and technological advances remain as strong as ever.

Like other major players in the troubled shipbuilding sector, HHI has shed thousands of workers under a painful restructuring program, but its research and development staffers remain largely unaffected by the move, reflecting management views that technological supremacy is the key to surviving in the increasingly challenging market conditions.

“I believe the key to overcoming these difficult times is technical innovation,” says Shin Hyun-soo, the company’s chief technology officer.

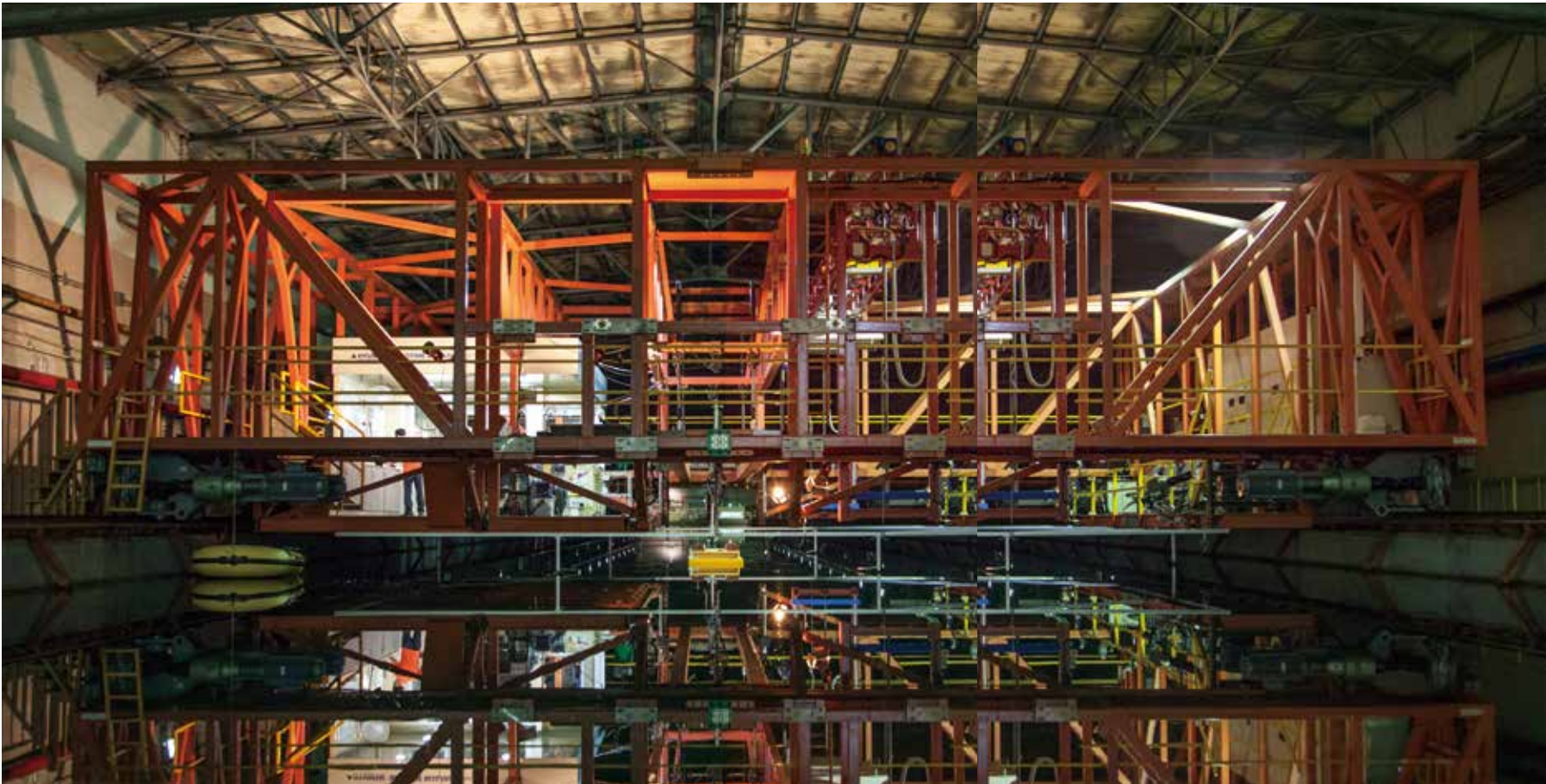
Shin, 59, has been charting the course of major long-term technological innovations since he was appointed the director of HHI’s Corporate Research Center – the company’s R&D center composed of several research institutes – in December 2014.

Under his leadership, more than 1,200 R&D projects are currently underway to upgrade the quality of the company’s existing products and help create new business opportunities by developing “game-changing” technologies.

The research center has about 400 staff including nearly 300 researchers who are closely working with hundreds of other research and engineering colleagues assigned to work at the company’s shipbuilding and five other business divisions.

They are responsible for defining and driving technical roadmap as the company continues to expand its customer solutions that automate and protect the technology innovation. Some work on joint projects with outside researchers while

“The key to overcoming these difficult times is technical innovation.”



- 1
- 2 5
- 3
- 4

- 1 A Model Ship in a Towing Tank under Performance Test
- 2 HiMSEN engine, a Proprietary 4-stroke Engine Developed in 2000
- 3 Spherical-type LNG Tank under Construction
- 4 Mid-sized Excavator R220LC-9S Placed in Storage Yard
- 5 Proprietary Marine Propellers Which Have Been Produced since 1985

others tackle various workplace technical challenges facing employees at shipyards and other production facilities.

“Our researchers at the research center are dispatched to troubleshoot various technical glitches. At the same time, they also help undertake difficult projects on the ground to meet technical requirements of customers,” said Shin.

HHI’s deep commitment to research is well reflected in its 2016 business plan to increase the R&D spending by 17% to about 270 billion Korean won (₩) from last year’s ₩229 billion, an increase in view of the company’s wide-ranging cost cutting program over the past two years.

The company’s ratio of R&D investment to sales currently stands at about 1.2%. “Despite a tough situation, the investment into research has not been dwindled. We will endeavor to deliver best-quality products to our customers through persistent investment in the R&D sector,” Shin said.

Shin, a 34-year R&D veteran at HHI, wants to refocus his team toward more strategic endeavors to help boost business competitiveness in shipbuilding, marine engines, construction equipment, power-grid equipment, green energy, robotics and other sectors.

In the area of shipbuilding, the company is striving to take yet another leap in developing greener and more fuel-efficient technology for ships for the future as well as designing new systems for next-generation smart ships.

Shin said South Korea needs to make investments into the development of such high-tech and value-added vessels as LNG carriers and ultra-large container ships more actively to maintain its current technological edge over competing countries and tide over the current industrial crisis.

Shin said one of his company’s breakthrough inventions is an eco-friendly and reliable new gas management system capable of re-liquefying boil-off gas (BOG) from a membrane LNG containment tank. Because LNG is handled at the ultra-low temperature of -160°C, partial gasification due to natural heat input from the outside cannot be avoided in LNG facilities. HHI internally developed the gas management system for ME-GI engines to be installed in LNG carriers integrating the Hi-GAS, HHI’s patent for LNG fuel supply system and N2 refrigerant BOG re-liquefaction system, which is able to re-liquefy 100% of the BOG and re-store it in the LNG tank. Processed boil-off gas can then be used as fuel for LNG carriers. In addition, it will offer 92%, 20% and 23% less emissions of SOx, NOx and CO2, respectively.

The two 176,000 m³ LNG carriers that HHI is building for Knutsen, Norway, are equipped with this gas treatment system.

As part of its drive to broaden its customer base in the rapidly growing but highly competitive LNG carrier market, HHI will keep developing LNG re-liquefaction and other key technologies in collaboration with domestic and foreign leading companies.

In recent, HHI announced a joint development of a single mixed refrigerant (SMR) reliquefaction system for LNG carriers with Babcock Liquid Gas Equipment (LGE), the UK-based and leading gas process technology company. This new system is capable of treating 100% of excessive BOG and offers improved efficiency compared with the conventional systems.

Through a technological partnership with GE Aviation and Marine (GE), a leading industrial gas turbine maker, HHI is also developing the world’s first gas turbine-powered 174,000 m³ LNG carrier, and has

“We need to make investments into the development of such high-tech and value-added vessels more actively to maintain its current technological edge over competing countries and tide over the current industrial crisis.”







# Briefing

## 01 3.5 Trillion Korean Won Management Improvement Plan

Hyundai Heavy Industries (HHI) announced that it will implement a management improvement plan by 2018 on June 8. This plan, worth 3.5 trillion Korean won (₩), is purposed to rebuild trust in the market, improve its balance sheet, and sharpen HHI's competitiveness.

According to the plan, HHI will secure ₩1.5 trillion with the sell-off of its shares of Hyundai Motor and KCC, its stakes in Hyundai Avancis, and certain properties and receivables. It will also secure ₩900 billion with an employee salary cut and work-sharing. It will also secure ₩1.1 trillion with the spin-off and sell-off of a part of its business, and the reorganization of affiliated companies. HHI is also

considering a contingency plan that it will secure an additional ₩3.6 trillion in case of need. Once the plan is in place, HHI expects that its liabilities-to-equity ratio will drop from the current 134% to 80% by 2018. The total debt will also be cut down by about ₩2 trillion to ₩6.6 trillion.

Since the inauguration of the current management in September 2014, HHI has practiced pre-emptive and intensive reform measures worth ₩3.9 trillion. These measures include sale of corporate shares and treasury stocks, issuance of perpetual bonds, re-engineering of HHI's portfolio to center more on its core businesses, and a restructure of its business organization by spinning off its industrial machinery business.

## 02 Teaming up with Partners to Establish Smart Ship Eco System

HHI announced the signing of a Memorandum of Understanding for Creating an Eco System for Smart Ships with SK Shipping, Intel, Microsoft, the Ulsan Center for Creative Economy & Innovation (UCCEI) and the Daejeon Center for Creative Economy & Innovation (DCCEI) on July 6.

Under the MOU, HHI and its partners will join forces to help domestic small and medium-sized ICT companies to develop "17 Ship Service Software," that meet the needs of shipowners for safe ship operation and improved crew well-being.

The Ship Service Software that is planned to be developed and applied to smart ships by 2019 will enable ballast tank inspection, remote medical treatment services

for crews, virtual reality training, automatic voyage information reporting, and maintenance for key equipment. HHI and SK Shipping will provide technological mentoring services and smart ship platforms for the to-be-developed software while UCCEI and DCCEI hold briefing sessions on technology demand for shipbuilders and shipping liners to encourage the participation of the ITC companies.

An HHI official said, "The Korean shipbuilding industry has been developed on the back of the advanced manufacturing technology but now is the time for us to shift our focus to differentiated ship service technologies. We see that customized and value-added software will play a role in reviving the industry."

## 03 Naming Ceremony of FPU for Total E&P Congo

HHI held a naming ceremony for a floating production unit (FPU) for Total E&P Congo, on June 29. The FPU named "FPU Likouf" will be deployed in Moho Nord field, 80 km off Republic of the Congo's coast.

The naming ceremony was attended by Mr. Jean-Marc, Minister of Foreign Affairs and International Development of Congo; Mr. Choi Kil-seon, chairman & CEO of HHI; Mr. Kim Sook-hyun, chief operating officer

of HHI's Offshore & Engineering Division; and 70 other guests at HHI's yard in Ulsan.

The 62,000-ton FPU, measuring 250 m in length, 44 m in width, and 18 m in depth, will process the received oil and gas, and send the products to onshore plants via subsea pipelines. The FPU has a production capacity of 100,000 barrels of oil and 2.5 million cubic metres of natural gas per day. HHI carried out engineering, procurement, supply, construction, and commissioning for the facility.

The FPU will be installed at the Moho Nord field in the first half of 2017.



## 04 \$40 Million Order To Supply 309 LCD Handling Robots

HHI won a \$40 million worth order to supply 309 units of LCD handling robots for Vibrant Display Technology (VDT), a Chinese affiliate of Chunghwa Picture Tubes (CPT), a Taiwan-based LCD panel provider on July 12.

The 6th generation LCD handling robots capable of handling LCD panels measuring 1,850 mm by 1,500 mm will be supplied to the LCD panel factory

of VDT at Fuzhou, China by the second half of 2017. The contract value is equivalent to 18% of HHI Industrial Robot Division's annual sales of 2015, ₩254 billion. This year, the company set an annual sales target of ₩273 billion, a 7.5% increase from last year.

HHI that started industrial robot business in 1984 now has a full line-up of 10 different LCD handling robot models ranging from second generation (cellphone display screen) to 10.5th generation (ultra-large TV panel). HHI takes up 40% and 30% of domestic and overseas LCD handling robot market shares respectively.



## 05 The World's Largest Semi-Submersible Drilling Rig for Diamond Offshore

HHI delivered *Ocean Greatwhite*, the world's largest semi-submersible drilling rig, to Diamond Offshore, a Houston-based drilling contractor on July 15.

The delivery installment worth ₩460 billion (\$395 million) HHI received from the client will help improve HHI's cash flow. *Ocean Greatwhite*, measuring 123 m in length and 78 m in width, is

capable of operating in waters up to 3 km deep and drilling down to a depth of 10.67 km from the sea surface. The rig will be chartered to BP for operation in the Great Australian Bight from October this year.

HHI won the order worth \$630 million to build the rig in 2013 and has delivered four other drillships to the US-based drilling contractor so far.

An HHI official said, "The close cooperation between Diamond Offshore and HHI on the basis of mutual trust is what made the delivery of *Ocean Greatwhite* possible."



## 06 Winning Logistics Support Vessel Order for New Zealand's Maritime Sustainment Capability Project

On July 25, HHI won an order to build a 23,000 ton class logistics support vessel for New Zealand Defence Force's Maritime Sustainment Capability (MSC) project. HHI was selected as a preferred bidder in December 2015. HHI will deliver the logistics support vessel to New Zealand by the end of 2019.

Under the MSC project, the Royal New Zealand Navy (RNZN) plans to replace its replenishment tanker HMNZS *Endeavour* to maintain replenishment capability for the New Zealand Defence Force. HMNZS *Endeavor*, which has served RNZN for the past 30 years and is still in good condition, was also delivered by HHI in 1987.

The MSC tanker is able to refuel two ships at a time while underway, carry and refuel helicopters, produce and store water, and store and transport bulk goods. The tanker also has ice-strengthening and winterisation features to support Antarctic base during summer season. The vessel has adopted Envronship Leadage Bow for improved fuel efficiency,

maneuverability and stability. The Electric Replenishment/Fuelling-at-sea systems allow ease of control and quieter operation while CODLAD (combined diesel-electric and diesel) propulsion system reduces emissions and ensures longer engine life. With the main crane located at the center of the vessel weighting 25 tons with a wider-than-average operating range of 23 m, the tanker can load and offload container boxes and bulk goods more effectively.

ROK Defense Acquisition Program Administration (DAPA) and ROK Navy have been supportive of HHI in its efforts to win the order. DAPA and ROK Navy joined due diligence sessions to promote HHI's capabilities showing existing HHI built logistic support vessel, and promised support in building the MSC Tanker.

HHI has built all the logistics support vessels for ROK Navy and has exported two logistics support vessels. Moreover, the company is currently building the next generation AOE-II. Since constructing and delivering the first Korean-built frigate ROKS Ulsan in 1980, HHI has solidified its position as a leading naval shipbuilder by delivering a variety of naval ships including Aegis destroyers, KDX-II destroyers, multipurpose frigates, submarines, and patrol/salvage ships.





07  
Applying the World’s  
First Flame-Retarding  
Insulation to LPG Carrier

HHI applied the world’s first flame-retarding insulation developed in cooperation with insulation system manufacturers to 84,000㎡ LPG carrier’s cargo tank on July 4. Polyurethane foam, the current and the most commonly used insulation material for LPG cargo tank, is vulnerable to fire spread once it is exposed to a fire source.

Therefore, in shipyards where welding cut is an essential part of shipbuilding work, there is a high chance of a fire outbreak that might result in serious accidents and delay the shipbuilding process. To alleviate the chronic risk factors in building LPG carriers, HHI established the world’s first safety standards for the insulation material, namely “Fire Safety Evaluation Techniques” and “Standards for Flame Retardancy.” Insulation system manufacturers joined forces to optimize insulation spray system and revise

the formulation of polyurethane to make it more flame resistant. The high flame-retarding insulation does not trigger fire spread even when it is in contact with fire sources. When the insulation catches fire it goes out within four minutes thanks to its self-extinguishability while at the same time drastically reducing smoke.



08  
HMD Secures Order  
To Build LNG-Powered  
Bulk Carrier

Hyundai Mipo Dockyard (HMD) has secured an order to build an LNG-powered bulk carrier for shipowner Ilshin Shipping on July 6. The 50,000-DWT bulk carrier, expected to be delivered in the fourth quarter of 2017, will transport limestone used by South Korean steel giant POSCO from Gangwon province

to the company’s steel mill in Gwangyang city. POSCO said in a statement issued that it started supplying its high manganese steel to HMD in the third quarter for the construction of the LNG fuel tank of the bulk carrier. The high manganese steel to be applied to the LNG fuel tank has a manganese content of approximately 20% and is durable under cold temperatures of up to minus 162 degree celsius, according to POSCO. “Once this vessel is put into operation, high manganese steel

will become more likely to be adopted as a material for ultra-low-temperature environments by the International Maritime Organization,” POSCO said. The bulk carrier will be equipped with a dual-fuel engine capable of using both LNG and oil.



09  
Clinical Trials of  
Medical Robots at  
Domestic Hospitals

HHI has successfully tested three types of its proprietary medical robots at Asan Medical Center, Ulsan University Hospital, Chonnam National University Gwangju 2nd Geriatric Hospital and Ulsan Noin Hospital on June 27. At Asan Medical Center where a presentation on “Future Growth Engine Flagship Joint Performance” organized by Ministry of Science, ICT and Future Planning took place, HHI announced that it provided rehabilitation robot Morning Walk, patient transfer robot Carrybot and Robin, a robot system that guides needle path in CT-guided interventional procedure at the aforementioned hospitals in March and April this year. HHI will continue the clinical trials to test the efficiency and safety of the robots by 2020.

Morning Walk, a gait rehabilitation robot that jointly developed with Asan Medical Center, was tested more than 400 times with 60 patients and it received a high level of patient satisfaction. Carrybot, a patient transfer robot that assists caregivers to move patients comfortably and safely proved its credentials of reducing muscle use of patients when they are transferred with the machine. HHI also started clinical trials of Robin, a robot system that guides needle path in CT-guided interventional procedure, at Asan Medical Center and Ulsan University Hospital with the goal of establishing liver cancer treatment methodology and lung tissue test.



Opening New Dormitory “Yuljeonjae”

Completion of Construction	April, 2016
Accomodation Capacity	666 rooms, 1,325 people
Parking Capacity	469 vehicles
Other Facilities	guest room, cafeteria, gym, billiard room, laundry room, parcel keeping service, family room, futsal ground
Location	955, Bangeojinsunhwan-doro, Dong-gu, Ulsan, South Korea



Family Room



Gym



Cafeteria “H”



# An Ounce of Prevention

Kim Hwan-goo,  
President & COO of HHI's HSE Management Office

Kim Hwan-goo might arguably have the most difficult job at HHI. As a veteran of HHI who has been in management for more than 30 years, he's the head of the head of HSE Management Office – at a company with nearly 60,000 shipyard workers in often physically demanding tasks, with perennial risk of injury.

But Kim, a mild-mannered president and COO, sounds as though he has been preparing for the role all his life.

“HHI has seven businesses, many with physical risks. Recent serious incidents prompted top leadership to declare safety as management’s top value, and upgrade its safety management support function to a division in May,” Kim said.

An ounce of prevention is worth a pound of cure, Benjamin Franklin once said, but Kim has his job for accident prevention cut out for him. He oversees some 490 safety monitors, clad in a bright yellow jacket, who are responsible for checking the safety of some 57,000 workers over 1,500 acres of

shipyard and production facilities.

Don't some workers dislike being monitored?

“Voluntary sense of safety is the most important, but very difficult to achieve. Someone must lead the way, and our safety monitors serve that role,” Kim said.

“I always emphasize that they need to be as thoughtful and sensitive as a mother, and be as firm and strong as a father to those that do not follow the rules.”

Kim has been in as diverse job positions as one finds himself in while working at one company for more than 30 years, from human resources management to working in HHI's China holding company to leading the Electro Electric Systems Division. He has distilled all his experiences into one clear insight about safety – it's a key indicator of “flow.”

“Some might ask, why are we talking about safety when the company is under difficult circumstances? But for on-site work, flow is very important. While automobile factories have conveyor



Safety Inspection Activities

“An environment that is efficient and safe for workers means we also get product quality, a smooth process and timely delivery to clients. Safety is a comprehensive indicator of our competitiveness.”

### Golden Rules

- |  |   |  |   |
|--|---|--|---|
| <br>No use of mobile phone or wearing earphones while walking / working / driving | <br>No smoking while walking / working / driving       | <br>Speed limits for vehicles under 30km/hr (Forklift under 8km/hr) | <br>Secure full body harness while working at height   |
| <br>No entry under suspended loads  | <br>No overriding safety devices without authorization | <br>Verify isolation and use lock out /tag out                      | <br>No simultaneous hot and painting work in same area |
| <br>No unauthorized erection / modification of scaffolding                        | <br>Ensure full welding to temporary lifting lugs      | <br>No modification of gas hoses and their couplings                | <br>No parking on crane tracks                         |

belts to maintain flow, HHI's shipbuilding and offshore businesses are difficult to mechanize or automate,” said Kim.

“In shipbuilding, some 20% of cost is labor expense – it's huge. An environment that is efficient and safe for workers means we also get product quality, a smooth process, and timely delivery to clients. Safety is a comprehensive indicator of our competitiveness.”

Kim spends more than half of his week outside of his office, talking with people in other departments to garner support for the safety campaigns including rewards for eagle-eyed safety monitoring and smartphone accessories outlining safety rules.

Every time there are safety incidents, he personally visits the sites and talks to the people involved to find out what happened – “the answer is always on-site” – and the full picture is not seen at first glance.

“Sometimes you first look at an incident and it's mystifying, how this could have happened. You have to dig deeper beyond

the surface, to a second layer, third layer, to the root cause. I've found it's often problems at home or preoccupations besides the job that lead to tragedies,” Kim said.

Kim is able to focus on the root cause which strikes at the heart of prevention because he is a good listener. A placid conversationalist who observes the needs of others, Kim is far from a spotlight hound as one can imagine.

“When people think of ‘communication’ they tend to talk as much as possible. I think true communication is listening to others as much as possible. If you listen diligently, you can understand what the others are thinking, this means you can form a common bond. If you listen diligently, even if we think differently, we become receptive,” Kim said.

“Only through listening and forming a common bond you can gain acceptance, consideration and respect from the other person.”

Concerning the difficulties South Korean shipbuilders currently face, Kim viewed it as a chance for HHI to become nimbler as necessary for a new age.

“Since 2009, we had not transitioned successfully from the rapid growth phase in 2005-2009. We are going through that transition now, starting last year,” Kim said.

“In the 21st century, the outside environment is changing too fast. We cannot remain big, heavy and slow while the entire market paradigm is changing. We need to be compact, nimble and flexible in response. The current restructuring and overhauling our health is part of such efforts.”

Kim's listening skills, in communicating with both internal clients and the world, will come in handy as HHI sheds weight. 📌

By Teresa Kim  
The writer is a journalist based in Seoul.



# Building a Legacy of Strong Relationship and Professionalism



Brian Engleman,  
Regional Construction Manager for ExxonMobil

**Please briefly introduce yourself.**  
My name is Brian Engelman and I am the Regional Construction Manager for ExxonMobil Upstream Projects in Korea. I moved to Ulsan two years ago in August 2014 with my wife and three children where we immediately felt welcomed in Korea and by the Hyundai community. I work in Hyundai Heavy Industries (HHI) Offshore Yard, live in the Hyundai Foreigners' Compound where my children attend Hyundai Foreign School, and of course I also drive to work every day in a Hyundai.

**Please describe your day at work.**  
HHI's Offshore Yard is a very exciting place to work as the landscape changes on a daily basis. Our teams usually start the day early arriving around 6:45 am, well before the rush of workers make their way in, and it is truly a majestic sight as the first morning light touches the yard. The rest of the day is busy with meetings,

site walks or special topics making it go by very quickly. At the end of the day, I use the short drive home to decompress, listen to music and prefer to spend my evenings with the family at home. Having said that, Korea is probably the finest team building environment I've ever been in and lasting friendships have been made around the grill of great Korean BBQ.

**What are the roles of regional construction manager?**  
As the Regional Construction Manager, I am responsible for project management oversight of our major capital projects being fabricated in Korea. HHI Offshore & Engineering Division continues to be the heart of that work where, over the last several years, we have executed contracts for three different projects. I also play a broader role in the region, maintaining strong relationships with other major fabricators and overall industry through ongoing

engagement in areas like the Korea Shipyard Safety Standardization initiative.

**What was the last project you led, and what was its outcome?**  
The recent level of activity at HHI has been unprecedented and we have had multiple projects under parallel execution over the last several years. Since I've arrived, we've delivered the Point Thomson modules to the North Slope in Alaska, the Hebron Drilling Equipment Set (DES) and Utilities and Process Module (UPM) bound for Newfoundland, Canada, and finally, the Odoptu Stage 2 modules, which will make the much shorter journey to Sakhalin Island, Russia. All of these projects have come with a unique set of challenges but have been safely delivered within their strict weather windows.

**How do you feel when the project is completed?**  
This is a very timely question as we have

“The hospitality and professionalism seen at HHI is first class and our teams look forward to continuing to deliver projects that will leave a legacy for both HHI and ExxonMobil.”



Sail away of the Hebron Utilities & Process Module

just sailed away the Hebron UPM, a fully-integrated topsides bound for the harsh, sub-arctic environment offshore Eastern Canada. In short, I believe a true test of a project's success can be measured if people are proud to claim they have worked on it. I personally am extremely proud to have worked as “one team” with our partner HHI to deliver this world class project at a high level of quality and completeness.

**Can you share with us any interesting episodes or experiences that you had while completing a project with HHI?**  
The Hebron topsides load-out was the world's largest transverse load-out, requiring years of planning with our partners at HHI. In June 2016, HHI and their subcontractor Fagioli worked around the clock over several days skidding the 41,010-ton module across the quayside and onto the Dockwise Blue Marlin. With five different companies involved in this critical operation, the successful load out

represented the culmination of years of fabrication at the HHI yard. A fantastic operation to be a part of here at HHI!  
On a more personal note, several members of our site team brought some of Texas to Korea and formed a country-rock band where I played guitar and vocals. What we didn't expect was the overwhelming response - so much so that I fulfilled a dream of mine to play at several live venues, including the Hard Rock Cafe in Busan. I am sure you can find some embarrassing video highlights on YouTube if you search for the “Won Hit Wonders of Ulsan”!  
**What impression did you have about HHI's management and people if you had chances of getting into personal contact with them?**  
There are many things that have impressed me with the people I have worked with across Korea and from HHI. Notably, each and every person - from members of project management to the welders and

laborers in the field - has a very strong work ethic. Along with this work ethic comes great pride and ownership that makes interaction with all HHI employees enjoyable. With several high profile projects, I have had the opportunity to interact with senior management and believe that there is strong leadership and integrity at the COO level in Kim Sook-hyun and his team, particularly in these difficult times ahead.

**Can you tell us about the strengths of ExxonMobil?**  
ExxonMobil has a long history in Korea dating back to the Harmony & Heritage Platforms fabricated in the 1980s. We also led the industry with the “Design One Build Many” concept in completing the Kizomba A and Kizomba B floating production, storage and offloading facilities here during the 2000s. Today, the core values remain the same where we look to be a leader in safely executing major projects around the globe with a commitment to operations integrity.

**When did you join ExxonMobil and what made you join the industry?**  
I joined ExxonMobil Development Company in early 2003, with a background in Mechanical Engineering. What really appealed to me, however, was the opportunity to expand beyond my core discipline into project management, particularly in working for a company like ExxonMobil that operates internationally. Most of all, the reason I chose ExxonMobil and why I continue to enjoy my job is the caliber of people I have the pleasure to work with. From all of these aspects, my assignment in Korea has been one of the most rewarding of my career.

**What else would you like to say to New Horizons readers around the world?**  
It is a pleasure to work in Korea, specifically at HHI Offshore Yard the past two years. The hospitality and professionalism seen here is first class and our teams are proud of the projects we have delivered here, which we hope will leave a legacy for both HHI and ExxonMobil. Thank you! 🇰🇷



# LNGreen 2 Joint Development Project: From Design Optimization to Operational Excellence



Inside Membrane Tank of LNG Carrier

“The project objective is to present a concept ready to build, attractive to owners and charterers by ensuring high operational performance while complying with future foreseeable regulations and minimizing per mmBTU transport cost”

The LNGreen 2 Joint Development Project (JDP) is the follow-up effort of the CWC Technology Innovation Award winning LNGreen 1 project by GTT, HHI, GasLog and DNV GL with the goal of developing the next generation 180,000 m<sup>3</sup> LNG carrier. By utilizing each partner’s expertise and building on the experience from LNGreen 1, DNV and partners aim to develop an LNG carrier fit for the ever changing market needs of developing LNG carriers that can carry more cargo in a more energy efficient and economical way.

Trade volume of liquefied natural gas is forecasted to rise by 1.6% per annum through to 2035. The increased production of the cooled natural gas will mostly come from emerging markets where the fuel is making substantial inroads in power generation and industrial use. Even though we have approximately 120 large LNG carriers contracted and still to be delivered, the need to order new tonnage is eminent. A 10-year-old LNG carrier is more expensive, less fuel efficient with less cargo handling capacity in comparison to today’s design. Further, the boil-off rate has also improved significantly over the same decade. All in all, with a trading time of 25 years, the business for building a new LNG carrier today remains positive.

The project objective is to ensure high operational performance while complying with future foreseeable regulations and minimizing transportation costs. We can achieve the goal by balancing the use of existing technologies that are ready to be commercially applied in the most practical and efficient way answering to the operational needs of charterers and owners. All developments will be compared to the state-of-the-art vessels in both current operation and newbuilding and in turn ensure that improvements are realistically achievable for the owners and charterers investing in a newbuild today.

### The Project Partners’ State-of-the-Art Competence

The Greek, Monaco and UK based owner GasLog aims to be at the forefront of the innovation by maximizing fleet efficiency and performance and ensuring operational flexibility to meet future trading patterns and operating profiles. Meanwhile, DNV GL

is investigating the potential for reducing energy consumption of LNG carriers by optimizing machinery under actual operational conditions using the in-house COSSMOS software tool. During the LNGreen 1 project, HHI and DNV GL looked into optimizing the hull form with enhanced wave resistance. The outcomes developed from the cooperation will be applied to the new tank layout of LNGreen 2. GTT, the French membrane manufacturer, is developing its membrane cargo tank containment systems with increased insulation capabilities that enable reduced boil-off. HHI is exploring possibilities for further improving its latest LNG carrier design both in terms of optimizing hull lines, enhancing hydrodynamic performance as well as looking into a revolutionary tank configuration.

By reducing the number of tanks from the standard four tank layout to the one with three tanks, it is possible to realize a reduction in the boil-off rate and construction costs to the benefit of shipyards, owners and charterers. The project will investigate the optimal tank arrangement to maximize the cargo carrying capacity, scantling of the structure, stability and cargo vent and auxiliary system. By utilizing the flexibility offered by the membrane technology and its insulation properties the sloshing impact will be addressed. Close cooperation among partners will also enable realization of the benefits while still ensuring that the concept will be compliant with the latest IGC Code requirements as well as DNVGL Class rules.


A detailed study investigating the tradeoff between twin and single skeg propulsion setup will be performed. In general, twin skeg has been considered the standard solution for the 170,000 m<sup>3</sup> or above class LNG carriers. What made the twin skeg the standard solution is its favorable propulsion efficiency and risk aspects such as redundancy and maneuverability. However, bearing in mind the changing market conditions and the concerns about the boil-off, the superiority of twin skeg might change. The economic tradeoff between the single and twin skeg will be further investigated taking into account complex operational scenarios,

which will provide better decision support for the selection of propulsion setup while also considering the market need for redundancy and maneuverability.

### Optimizing the Hull Lines to Enhance Hydrodynamic Performance of the Vessel

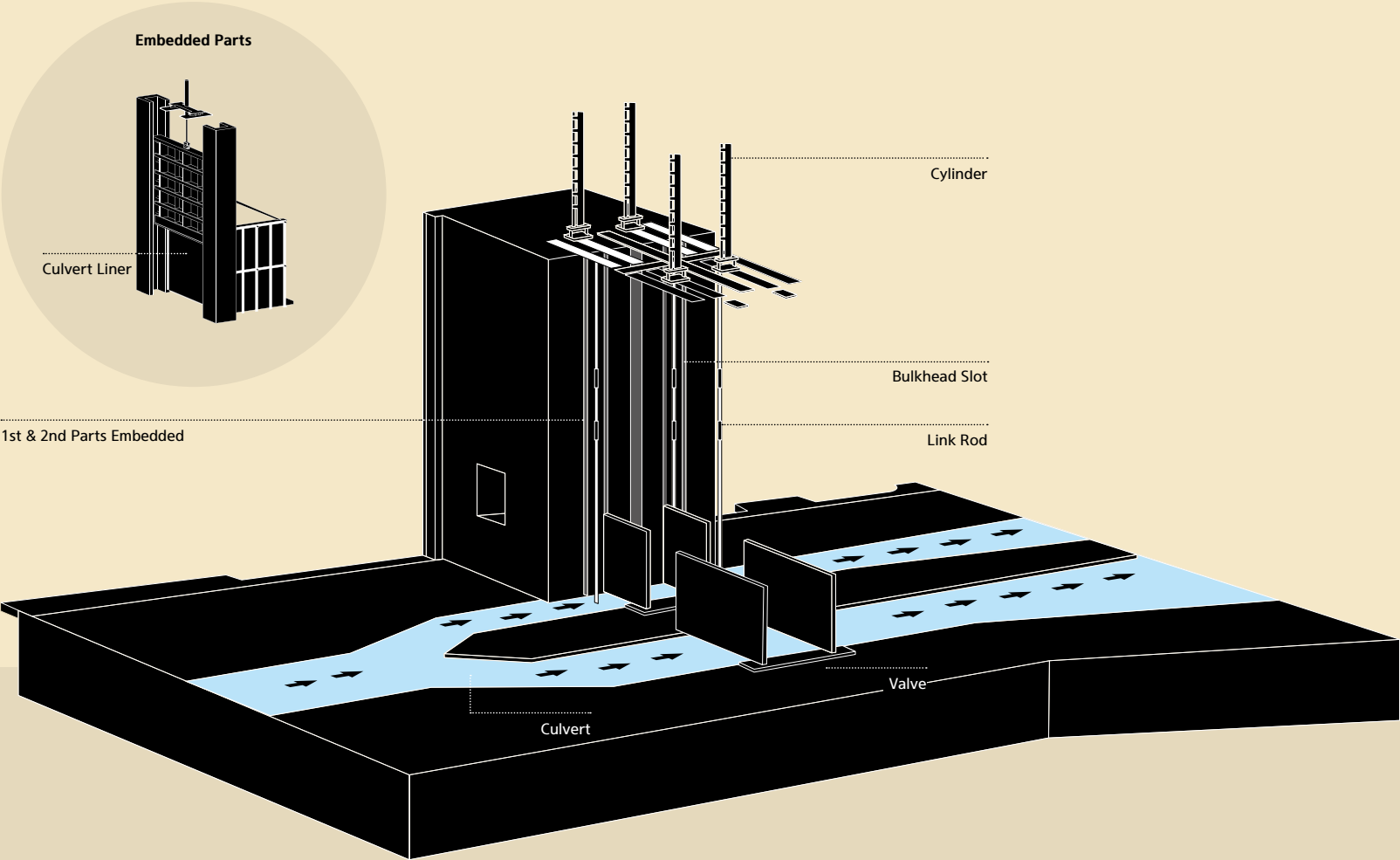
The complex nature of an LNG carrier operation calls for a machinery and system that are flexible and operate efficiently in the total operational profile. The project will investigate different system configurations, including technologies such as re-liquefaction, waste heat recovery, variable frequency drives, batteries and cold energy recovery. By using the simulation software COSSMOS, it is possible to assess the impact of each technology, how it interacts with other components over the whole operational profile and the overall performance change due to the application of such technologies.

The LNGreen 2 project aims to be finalized by the end of 2016 following an “official” presentation at GASTECH in Tokyo from April 4 to 7, 2017.

So why are we doing all this? Everything we do boil down to two main targets: improving the financial bottom line of our customers as well as the environmental footprint. An LNG carrier is a complex vessel, but our strategy is simple, ensuring more cargo to be transported in the most energy efficient way jeopardizing neither the safety of the vessel, nor the cargo or the crew. By doing so, both the charterers’ earnings will improve with less environmental impact. This is what we call: “From design optimization to operational excellence”. 



# HSHI Brings a Shortcut For New Panama Canal with New Set of Locks



Culvert Valves shall control water flow between contiguous lock chambers, from Gatun Lake, and to ocean level. The ports shall both feed water from the culvert into the lock chamber and draw it back from the chamber into the culvert.

Improvements			
Maximum Capacity			
Width	32 m	►	49 m
Length	294 m	►	366 m
Delievery	5,000 TEU	►	13,500 TEU
Delivery Lead Time (Eastern United States to Asia)			
	34 days	►	20 days



Aerial View of Expanded Panama Canal

On June 26, the New Panama Canal was opened after nine years of expansion work. The canal cuts through Gatun Lake and connects the Atlantic and the Pacific, as the shortest waterway between the Pacific and the Atlantic.

The Panama government held the opening ceremony of the new canal with representatives of 70 countries, including state leaders of Chile and Taiwan, in the new Pacific-facing Cocoli Locks.

It should be noted that there is a 26 m water level difference between Gatun Lake and the two oceans. To bridge the gap, it was necessary to build three consecutive lock chambers, which is the key technology behind the new canal. Before the expansion work, the locks were so small that only Panamax ships, such as ships with maximum width of 32 m and length of 294 m, were able to transit the canal. The expansion of the canal was inevitable amid the upsizing competition in the shipping industry.

Now, Panama ships up to 49 m in width and 366 m in length can pass through the waterway. While Panamax vessels handle up to about 5,000 TEU, post-Panamax vessels can carry 13,500 TEU, which means 97% of all vessels around the world can now pass through the canal.

The construction of the third set of locks will bring about a sea change to the global shipping market. The canal has shortened the lead time from Eastern United States to Asia to 20 days from 34 days, serving as a highly economic route for countries

in North and South Americas to directly transport shale gas, oil, crops, etc., to Asia. As mega-size vessels can enter the Canal, the cargo capacity is anticipated to see radical growth. In sum, the canal’s capacity should double and international maritime trade should increase by roughly 6%.

### New Canals Lock

At the heart of the historic project that would change the flow of international trade was Hyundai Samho Heavy Industries (HSHI). HSHI was in charge of supplying, installing and commissioning of locks, the core part of the expansion work.

As mentioned earlier, the key technology behind the new canal is to address the 26 m difference in sea level. For instance, if a ship comes into the locks from lower waters, the locks would close and fill the chambers with water to raise the level. Once the water level reaches the sea level, locks at the higher waters are opened so that the ship can sail forward.

As such, the lock system, which fills and empties the new locks and their basins, was made by HSHI supplying and installing 158 small locks, 158 sets of hydraulic facilities and 84 bulkheads, totaling 200,000 ton worth of facilities and machinery. To this end, HSHI opened offices at the shore side of the Pacific and the Atlantic Ocean in 2011 to facilitate the project and demonstrated the impeccable design of all facilities that had only 2 mm tolerance.

### Overcoming Hostile Conditions

Completing the new canal was not an easy task especially with cultural differences and language barriers between the workers. It was of frequent occurrence that construction equipment and materials were misdelivered due to communication errors with local staff. To eliminate these errors, HSHI workers communicated deeply with local staff every time and checked the construction process in detail from A to Z.

Also, HSHI faced an unexpected difficulty in the water tightness inspection. HSHI was asked to complete the inspection before the water came through the canal. It was an unreasonable request to test how much water pressure the locks can tolerate in a situation where there is no water. However, HSHI devised a novel solution and they set a partition wall between the lock and the wall and then pumped water into the gap. An HSHI official said, “We are proud of the fact that we played a role in changing the landscape of the world sea-borne trade with the completion of the third set of locks. We won’t stop here and we will continue to push ahead with unrelenting innovations to sharpen our competitiveness in this sector to bring more value for our clients.”



# ITER: The World’s Largest Tokamak



Cross-Sectional View of ITER

ITER (International Thermonuclear Experimental Reactor) is an international nuclear fusion research and engineering megaproject joined by 35 nations to build the world’s largest tokamak, doughnut-shaped vacuum chamber and a magnetic fusion. The large-scale building project is currently underway in Saint Paul-lez-Durance, south of France.

On a cleared, 42-hectare site, construction has been underway since 2010. Although the official communique does not mention the proposed date for the first plasma, it is known to be 2025 according to the timeline at ITER webpage. With tokamak, capable of containing 840 m³ of superheated hydrogen gas, or plasma, ITER is the biggest attempt so far and is predicted to produce at least 500 megawatts of power from a 50 megawatt input.

As soon as access to the tokamak building is available in 2019, scientists and engineers will progressively assemble, integrate and test the ITER fusion device. The successful integration and assembly of over one million components (ten million

parts), built in the ITER members’ factories around the world and delivered to the ITER site, constitutes tremendous logistics and engineering challenges.

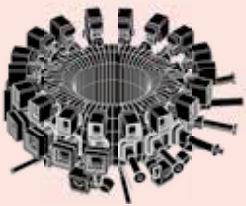
The heart of a tokamak is its doughnut-shaped vacuum chamber. Inside, under the influence of extreme heat and pressure, gaseous hydrogen fuel becomes a plasma – the very environment in which hydrogen atoms can be brought to fuse and yield energy. As a main participant for making the vacuum chamber, Hyundai Heavy Industries (HHI) concluded an MOU with National Fusion Research Institute to build ITER vacuum vessel sectors and ports at the Daedeok Research Complex, South Korea, in January 2010.

Under the MOU, HHI is currently constructing and delivering two of the nine vacuum vessel sectors and 35 ports out of 53 by December 2020, in recognition of its technological capabilities demonstrated by its experience with KSTAR (Korean Superconducting Tokamak Advanced Research) in 2007, a long pulse, superconducting tokamak designed to

explore advanced tokamak regimes under steady state conditions. HHI then designed a large key equipment of the magnetic fusion device KSTAR and built primary equipment, large scale cryogenic vessels and an ultra-high temperature vacuum vessel that can withstand temperatures of 100 million degrees Celsius.

The vacuum vessel sectors HHI is currently making will ensure the optimal vacuum environment for the plasma produced in the ITER, and will work as a first tier barrier for neutrons created during the nuclear fusion reaction. Building the vacuum vessel requires state-of-the-art 3D modeling and welding technologies for the equipment to be able to withstand ultra-high temperatures (100 million degrees Celsius) and ultra-high vacuum conditions.

In July this year, HHI won \$101.6 million worth of order to supply two vacuum vessel sectors (No.7, 8) for ITER. This is an additional order to the one HHI received from the international body in 2010. HHI is scheduled to deliver the two vacuum sectors measuring 400 tons in weight

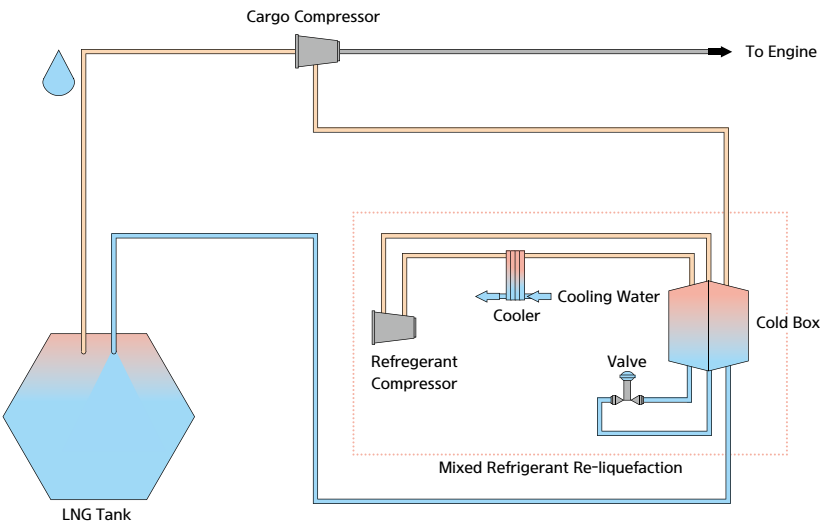


Vacuum Vessel Sectors HHI is currently making

and 12 m in height respectively at the Cadarache facility in the south of France. The signing ceremony for the order was attended by Mr. Kwon Oh-gap, president and CEO of HHI; Mr. Park Cheul-ho, COO of HHI’s Industrial Plant & Engineering Division; Mr. Bae Tae-min, director-general for Space, Nuclear and Big Science Policy Bureau, Ministry of Science, ICT & Future Planning of Korea; Mr. Kim Kee-man, president of National Fusion Research Institute of Korea; and Mr. Eisuke Tada, deputy director – general, relations coordinating officer of ITER Organization.

Mr. Park Cheul-ho said, “The 5,000 tons of vacuum vessel that must be built within a 10 mm allowable error requires an ultra-high level of precision in engineering and manufacturing process. We see the two orders we won are the fruit of our world’s top class technology. However, we won’t stop here but continue to pursue our goal of leading the world’s nuclear fusion power generation sector.”

# Developing Improved Re-Liquefaction System for LNG Carriers



On June 26, HHI jointly developed a single mixed refrigerant (SMR) reliquefaction system for LNG carriers with Liquid Gas Equipment (LGE), the UK-based and leading gas process technology company.

The development of SMR started from January this year. HHI suggested the basis of design (BOD) and decided the concept design with LGE. LGE took charge of detailed design on the basis of BOD and concept design.

The SMR system re-liquefies BOG by using mixed refrigerant. The new system is capable of treating 100% of excessive boil-off gas (BOG) and offers improved efficiencies by up to 20% in comparison with the current system. The coefficient of performance rises from 34% to 41% so that it can realize reduced operation cost.

On the back of the simplified plant configuration by removing an external hydrocarbon-based refrigeration system to pre-cool the SMR stream, the system also brings a 40% reduction in the space

required for the installation, and lowers installation costs.

If the SMR re-liquefaction system is applied to a 174,000 m³ LNG carrier, 11,400 tons of re-liquefied natural gas, equivalent to about \$4 million, can be saved.

Mr. Joo Won-ho, senior vice president, Corporate Research Center of HHI said, “We are pleased to introduce the improved and more reliable re-liquefaction system to the market, the result of the painstaking efforts of HHI and LGE. However, we won’t stop here; we will continue to strive to sharpen our competitive edge with the restless efforts to develop eco-friendly and high efficiency technology with the aim of bringing more value to our clients.”



# Extending Helping Arms



Panoramic View of Asan Medical Center

AMC is the largest medical institution in Korea with a total of 2,700 beds occupying about 85,000m<sup>2</sup>.

A responsible corporate citizen contributing to the sustainable development of the world and a proponent of the universal wellness and eudemonia of human beings: both are what Hyundai Heavy Industries (HHI) Group pursues relentlessly.

In a bid to abide by the corporate mantra, HHI Group has always been trying to render activities and services for the good of the neighborhood despite a series of crises it has been faced with.

In the latest development that mirrors the rare collaboration, the Korean conglomerate’s flagship affiliate HHI has supplied rehabilitation robotics to Asan Medical Center (AMC). The robotic device for therapeutic training for patients is being tested on its safety and efficacy. HHI is also preparing trial tests for self-developed medical robots for surgical assistance.

Established by the late Hyundai Group founder Chung Ju-yung under the name of Jung-ang in 1989, it was renamed Asan Medical Center in April 2002 when the center came under HHI’s umbrella. “Asan” is Chung’s nom de plume, and his Asan Foundation was inaugurated with a scope of activities comparable to those of Ford or Rockefeller Foundations in the US. Located on a total area of 85,000 m<sup>2</sup> in eastern Seoul, the hospital has since built a solid reputation for providing the very best patient care and excellent customer service. The hospital now has more than 2,700 licensed beds – the country’s highest in number, providing a more comfortable and homely atmosphere and experience to the patients or visitors during their stay. The nurse to patient ratio also is one of the best in the country.

“AMC’s first goal is to sustain its position as the most trusted hospital and the second is to provide the most optimized medical service,” AMC President Park Seong-wook, M.D., told New Horizons. “Not the best, but the most optimal (medical center) is what we pursue.”

Since 1993, AMC has been operating a healthcare quality improvement team helping not only to ensure that its patients receive the highest quality of care and treatment, but also guarantee safety to maximize their healing. In this regard, the hospital kicked off an internal service model called Asan Global Standard in 2011, with its top priority given to the best-quality care and safety of the patients.

In 2016, for the tenth consecutive year, AMC was picked as Korea’s “Most Admired Hospital” in the general hospital category in a survey conducted by Korea Management Association Consulting. In 2012, AMC was also named the “Most Trusted Hospital” in Korea in the Korean Standard Service Quality Index. In addition, AMC in 2010 received top overall ranking in the National Customer Satisfaction Index (NCSI) and in 2016 was ranked number one for nine consecutive years in the Global Customer Satisfaction Competency Index (GCSI).

Two achievements stand out the most: AMC’s unprecedented influence on the field of cancer treatments and internal organ transplants, as well as its posture as an institution for the care, treatment and embracement of the disadvantaged.

Following is just part of what AMC has achieved to date, backing up what the 27-year-old medical center is proud of.

AMC vs The Leading Cancer Centers (US)		
(US News & World Report 2015-16)		
Number of Cancer Surgeries (Inpatients)		
	AMC	18,815
MD Anderson Cancer Center (US)	8,656	
MSKCC Cancer Center (US)	11,370	
Number of Beds for Cancer Patients		
	AMC	712
MD Anderson Cancer Center (US)	631	
MSKCC Cancer Center (US)	469	

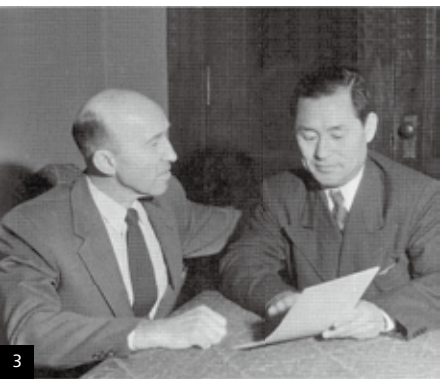




“AMC’s first goal is to sustain its position as the most trusted hospital and the second is to provide the most optimized medical service”

AMC had the highest surgical performance for eight of the ten major types of cancer, in relation to cancer incidence rates in Korea. A 2015 annual report of the Korea Network for Organ Sharing (KONOS), run by the Ministry of Health and Welfare, shows AMC was ranked first in Korea in the performance of liver (439 cases), heart (61 cases) and kidney (315 cases) transplants, which accounted for more than half of the nation’s total, and notably had the world’s highest volume of living Donor Liver Transplantation.

AMC also holds a wide range of world records in terms of organ transplants survival rates. As of 2015, the one-year, three-year and five-year survival rates for liver transplants performed by AMC stood at 97%, 89% and 88.5%, respectively. These records exceeded the comparable figures of the US – 88.7%, 82.7% and 79.7% – which is also a leader in the liver transplant field. Also in the heart transplants, the



corresponding rates noted by AMC were 95%, 86% and 76%, respectively, and far outscored international averages. Meanwhile, AMC’s network is not limited to Korea; it is a partner of Dana-Farber Cancer Institute and the Imperial College London. AMC is also engaged in an active exchange of research and training programs with the world’s leaders in medicine, including Mayo Clinic and Cleveland Clinic, both have garnered a high reputation in the field of “Patient Experience.”

Another pride of AMC in overseas partnerships lies in the fact that it now deserves to flaunt the center’s special achievements and techniques to foreign partners. Last November, AMC signed a joint research Memorandum of Understanding (MOU) on organ transplants and stem cells with the University of Minnesota Medical School (UMMS). Under this MOU, AMC will transfer its experience and skills in living donor liver

- 1 Pediatric Intensive Care Unit (PICU)
- 2 Liver Transplant Surgery Training
- 3 Medical Training in ‘Minnesota Project’ (1954)
- 4 Partnership Ceremony with University of Minnesota Medical Center (2015)
- 5 Innovation Design Center

transplantation which were accumulated for the past 20 years while the UMMS will work with AMC to develop artificial organs using stem cells.

Also under the accord, medical professionals at UMMS will visit AMC every year to learn AMC’s unique techniques for living donor liver transplantation, with some professionals from the school scheduled to visit AMC this year.

In 2013, AMC launched its own Innovation Design Center (IDC) under its key mission of “Healthcare for Life.” The IDC is aimed at providing basic but advanced services for the general public to foster their living. It has been playing a role as AMC’s center for innovation, consultant for innovation, as well as head office working on the hospital’s major “Patient Experience” project. This “Patient Experience” project has been designed to ultimately create emotional bonds between patients and the entire AMC staff members by fully understanding and figuring out the myriad needs from the patients.

Beginning in 1989, AMC kicked off the Asan Medical Information System (AMIS) projected to become a completely electronic and digital information hospital. AMIS has played a role in improving the health care quality based on the following measures: safety, effectiveness, patient-centeredness, timeliness, efficiency, privacy and security. AMC has been pouring a huge amount of effort into upgrading and advancing the system, and is now fully

prepared to launch its new version “AMIS 3.0” by the end of this year. AMC President Park, who himself is a world-renowned physician in cardiology, said that as for him, watching patients suffering from complications out of the blue has been surely the dregs of bitterness in his cup of anguish as a medical doctor.

“One of my most delightful moments in my life as a doctor was when a very old woman completely recovered from such complications she had been afflicted with,” said Park with an innocent smile on his face.

AMC, the largest medical institution in Korea, now has approximately 8,000 employees. It attends to 11,000 outpatients, has an average of 2,600 inpatients, and performs about 250 complex surgical procedures on a daily basis. Only in the year of 2015, 15,000 foreign patients or customers visited the hospital, with more than 600 of them under its treatment.

This is why HHI Group’s medical arm tacitly proceeds on to realize its ultimate goals of cutting off the vicious circle and advancing the day when all diseases disappear from the face of earth. 🇰🇷

By Shim Sung-won  
The writer is a journalist based in Seoul.





# Az-Zour North Phase 1, The First IWPP Project In Kuwait



Work Volume		
<b>Plant Area</b> 365,000m <sup>2</sup>	<b>Power Plant (1,550MW)</b> ~5 Gas Turbines & Generators (228MW ea): GE, USA	<b>Desalination Plant (107MIGD)</b> ~10 Multi-effect Distillers (10.7MIGD ea): SIDEM, France
<b>Buildings</b> 43 Buildings, 39,774m <sup>2</sup>	<b>Project Description</b> 1,550MW + 107 MIGD	~2 Steam Turbines & Generators (255MW ea): GE, USA
		~Remineralization Plant (107MIGD): SIDEM, France
		~5 HRSG's (489ton/h): HHI, China

Aerial View of Az-Zour North Phase 1 IWPP Area



Location 100 km South of Kuwait City, adjacent to the Az-Zour South Power Station

The EPC portion of the project is being executed by a consortium of HHI, General Electric and SIDEM along with the project owner ENGIE (formerly known as GDF SUEZ), Sumitomo Corporation and Al Sagar.



HHI Staff at Site

Although two and half years had already passed since the start of the construction at the end of 2013, all of HHI employees involved in the Az-Zour North Phase 1 project are still having a hard time with the extremely hot and humid weather in the Middle East where temperature rise as high as 54 degrees Celcius. However, even the unbearable weather wouldn't stop Mr. Kim Seong-hoon, commissioning manager, from painstakingly finalizing the project. Mr. Kim said "Since the unit-base individual completion tests for all gas and steam turbines of the power block, and Multiple Effect Distillation (MED) test for the water block have been completed, we are now taking a week off to catch a breath before proceeding into the next steps for the final completion. Over the past years, we have been working non-stop for this project. Now is the time for us to put our every possible resource into the combined commissioning and tests, which are the last milestone for the Engineering, Procurement and Construction (EPC) phase of the project."

However, we don't have the luxury to simply sit back and enjoy this 'plant shutdown period'. Rather, all the HHI employees are constantly moving around to check every equipment and resolve any possible faults before the delivery. "With a client's mindset, we are trying not

to overlook any seemingly minor issues which could be a cause for potential risks for the expected 40-year operation," Mr. Kim added.

If the reliability test run and subsequent performance test for the plant wrap-up successfully, then, we can celebrate the completion of Kuwait's first Independent Water & Power Plant (IWPP) project which is only four months away.

**Early Completion**  
The first gas turbine started commercial operation on June 28, 2015, The second and third gas turbines also achieved their Early Commercial Operation Date on August 11 and September 18 this year respectively, days ahead of the contracted schedule. At present, under the direction of Mr. Jung Ki-in, project director of HHI and with the close cooperation among project partners, the overall progress of the project is half a month ahead of schedule.

"The EPC portion of the project is being executed by a consortium of HHI, General Electric and SIDEM along with the project owner ENGIE (formerly known as GDF SUEZ), Sumitomo Corporation and Al Sagar. We are pleased to be working with them on this project," Mr. Jung explained.

**Energy Management**  
Upon completion, there will be five gas turbines generating power with five heat





Panoramic View of Az-Zour North Phase 1 IWPP Area

“We are proud of being part of this project which will play a key role in supporting the economic development plans of Kuwait.”

Jung Ki-in,  
Senior Vice President of HHI



recovery steam generators (HRSGs) and two steam turbines. The 1,550 MW gas fired power facility will be one of the most efficient and eco-friendly generation sources in Kuwait. MED process is designed to produce distilled water with the 10 MED units capable of producing a net total of 107 million imperial gallons per day.

Once fully operational, the capacity of Az-Zour North Phase 1 will account for about 10% and 20% of Kuwait’s installed power generation and desalination capacity. All of the plant’s output will be provided to Kuwaiti citizens under a 40-year long-term Energy Conversion & Water Purchase Agreement.

The design of the power and water plant combination is considered to produce power and water to suit different levels of demand. It is very important for the off-takers to maximize the benefit by meeting the market’s demand and following the end-user’s trend. For example, during summer the plant is expected to be working at its best to produce both maximum power and water, while in winter the demand for power will be decreased and the need for water will remain quite high. Optional flexibility built in the plant, such as the ability to take any of gas and steam turbines in and out of service and to burn fuels directly in the HRSGs in order to produce more steam to meet the water demand in the winter, will help the plant get more value and reputation.

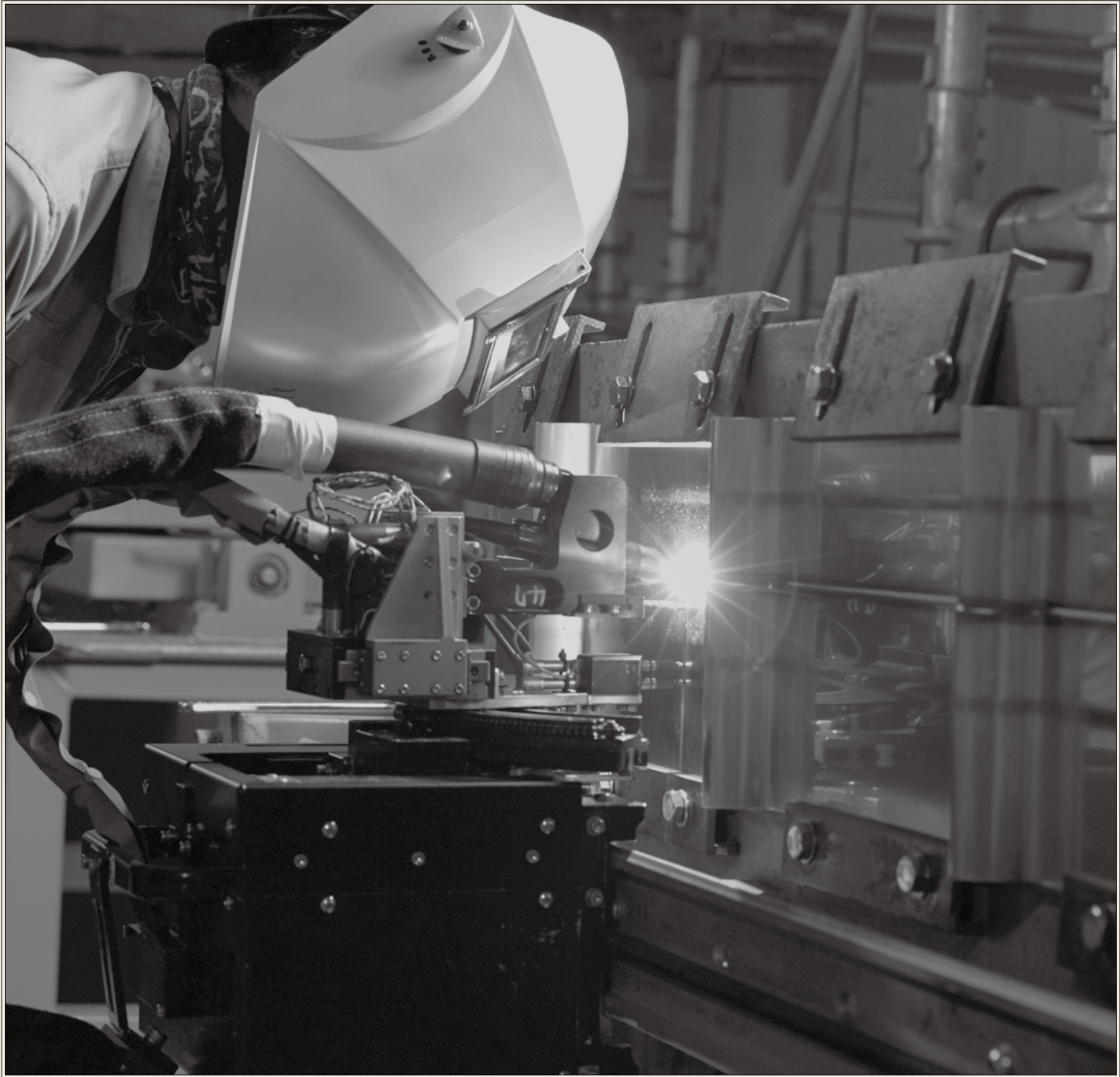
**Kuwait’s First IWPP Project Under PPP**

Az-Zour North phase 1 is the first independent water and power project in Kuwait developed as part of long-term expansion plans of the power and water production capacity in Kuwait and a pathfinder scheme for Kuwait’s public-private partnership (PPP) program. A private consortium comprising ENGIE, Sumitomo Corporation and Al Saga owns 40% of the project company Shamal Azzour Al-Oula. The remaining 60% is owned by the Government of Kuwait through the Kuwait Investment Authority (KIA: 5%), the Public Institution for Social Security (PIFSS: 5%) and Kuwait Authority for Partnership Projects (KAPP: 50%).

The Government of Kuwait is scheduled to sell 50% of the total ownership through an IPO to Kuwaiti citizens after the construction is completed. The government will retain 10% after the IPO. “We are proud of being part of this project which will play a key role in supporting the economic development plans of Kuwait,” Mr. Jung added. 🇰🇼

“Success or failure of all tasks depends on the mind and attitude of the person who does them.”

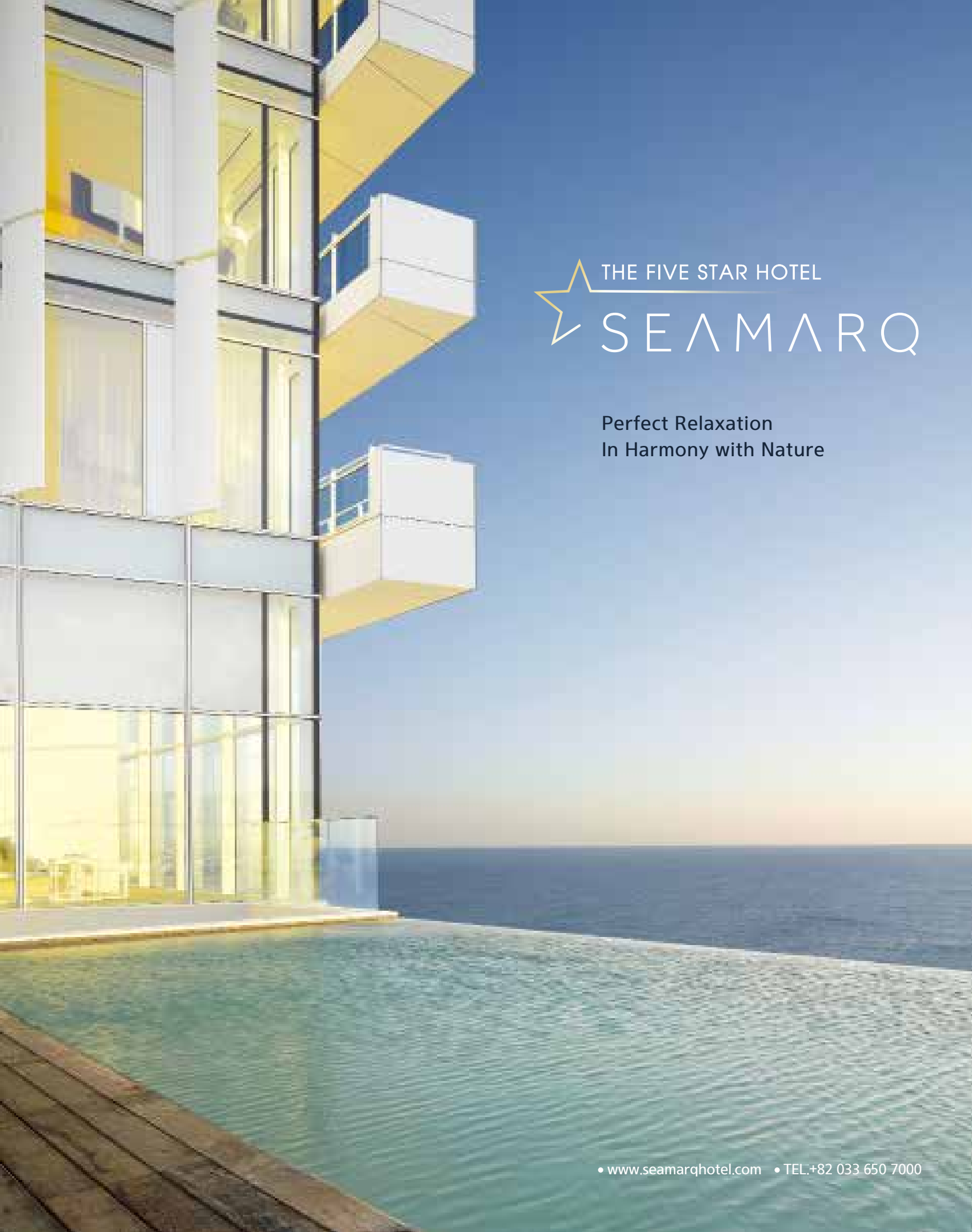
Chung Ju-yung, Hyundai Group Founder







Overseas Offices				Overseas Incorporated Firms		
Asia				Asia		
Japan				China		
Tokyo	81-3-3211-4792			Beijing	Beijing Hyunda Jingcheng Construction Machinery Co., Ltd.	86-10-8321-8347~8
Osaka	81-6-6261-5766~7			Changzhou	Hyundai Construction Machinery Co., Ltd.	86-519-8519-1002, 1020
Singapore	65-6337-2366			Yangzhong	Hyundai Heavy Industries Electric Co., Ltd.	86-511-8842-0666, 0500, 0212, 0250
Americas				Taian	Hyundai (Shandong) Heavy Industries Machinery Co., Ltd.	86-538-349-0110
US				Yantai	Yantai Hyundai HeavyIndustries. Co., Ltd.	86-535-216-5800~1
New Jersey	1-201-816-4080~2			Wendeng	Weihai Hyundai Wind PowerTechnology Co., Ltd.	86-631-896-6000
Houston	1-281-578-7097, 7802			Shanghai	Hytundai Heavy Industries China Investment Co.,Ltd.	86-21-3357-5888
Atlanta	1-678-823-7839				Hyundai Financial Leasing Co., Ltd.	86-21-2033-2000
Mexico	52-55-2623-7048				China R&D Center	86-21-5013-3393
Europe				India		
UK				Pune	Hyundai Construction Equipment India Pvt., Ltd.	91-21-3530-1700
London	44-20-8600-7124			Indonesia		
Norway				Jakarta	Pt. Hyundai Machinery Indonesia	62-21-2945-5019
Oslo	47-2310-0890			Middle East		
Greece				Kuwait		
Athens	30-210-428-2992~3			Kuwait City	Hyundai Green Industries Co., W.L.L.	965-6096-6639
Russia				Saudi Arabia		
Moscow	7-495-258-1381			Al Khobar	Hyundai Arabia Co., Ltd.	966-13-898-4925
Middle East				Africa		
UAE				Nigeria		
Dubai (Fujairah)	971-4-425-7995			Lagos	Hyundai Heavy Industries Co., Nigeria Ltd.	234-1-342-7729
Jebel Ali	971-4-884-0566					
Saudi Arabia						
Riyadh	966-11-464-4696/9366					
Al Khobar	966-013-849-3876~7					
Africa						
Angola						
Luanda	244-923-585-130					



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