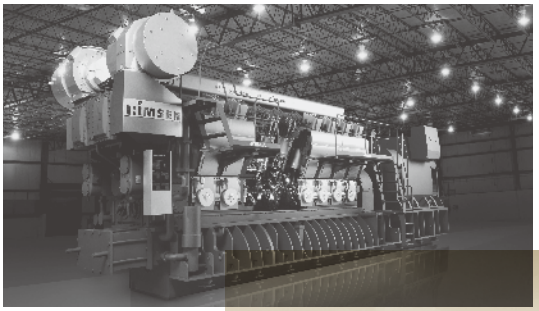
# NEW *Horizons*

Spring 2013
A Publication of Hyundai Heavy Industries www.hyundaiheavy.com



**ENGINE & MACHINERY**
Developing Tomorrow's Engine

**SHIPBUILDING**
Leading the Global Market

**GREEN ENERGY**
Creating Future Value


**CONSTRUCTION EQUIPMENT**
Opening New Frontier

# Planning the Future

**INDUSTRIAL PLANT & ENGINEERING**
Bringing Light and Water to the World

**ELECTRO ELECTRIC SYSTEMS**
Pioneering Innovative Technology

**OFFSHORE & ENGINEERING**
Going Beyond Horizons

# Bokjumeoni

Koreans give *bokjumeoni*, symbolizing good fortune, to their family and friends on Lunar New Year's Day. It is believed that these gifts could ward off evil spirits and bring good fortune. Unlike similar traditions in other parts of Asia, Korea's *bokjumeoni* are made of silk or cotton in various colours such as red, blue, or green. They are also typically embroidered with the character for long life(壽), good fortune(福), wealth(富), and respect(貴). HHI

*Source - The Museum of Korean Embroidery*







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Lee Jai-seong, President & CEO

# Laying the Foundation of Growth for 2013 and Beyond

The year 2013 has dawned on us. I would like to wish all our clients and investors the best of success and prosperity in the New Year.

Since breaking ground on a wind-swept beach in 1972, Hyundai Heavy Industries' journey to top shipbuilder has been marked by its audacity and vision in meeting and surmounting countless challenges. Over the years, we have grown into the world's leading heavy industries company doing business in diverse industrial fields.

Nevertheless, determined not to rest on our laurels, we are preparing to take another giant step forward into the future. We are aiming at another 40 years of excellence with fresh vision, commitment, and resolve.

The prospects for the global economy this year are filled with more gloomy forecasts than uplifting ones. The world economy has to steer clear of numerous pot holes on the road to recovery, including the increasingly weak yen brought on by quantitative easing in Japan and the continued uncertainty of the European economy. Moreover, warning signals are flashing for the growth of emerging economies which have been driving the world economic growth over the past few years. The further slowdown of the overall world economy will mean an adverse business environment.

However, it has been in Hyundai's DNA to meet challenges head on and prevail. To lay a solid foundation for growth in 2013 and beyond, we have set the order target for this year at USD 29.7 billion, a 52.3 percent rise over last year, and we are aiming to achieve sales of KRW 26.9 trillion, a 7.1 percent increase compared with last year.

In view of the current world economic situation, it can be quite a daunting task to achieve our goals for 2013 even from our position as the world's leading heavy industries company. Unperturbed by the uncertainties, we are going to focus not only on further developing individual business divisions but also on achieving increased synergy across Hyundai Heavy Industries Group. We will also continue to strengthen our technological competitiveness through research and development, maintaining the upper hand over our competition in productivity and sales.

Despite no clear sign of upturn in the world economy, there is one constant that keeps inspiring and motivating us: our confidence that we will come out stronger than ever before. Once again, I would like to take this opportunity to thank you for your support and patronage. HHI

# Planning the Future

Our strategic focus will be the development of core technology to enhance competitiveness in existing businesses while exploring new businesses as the growth engine of the company

For Hyundai Heavy Industries (HHI), a global industrial giant in shipbuilding, offshore engineering, and other sectors, a repeat of the slowdown is not in the plan this year.

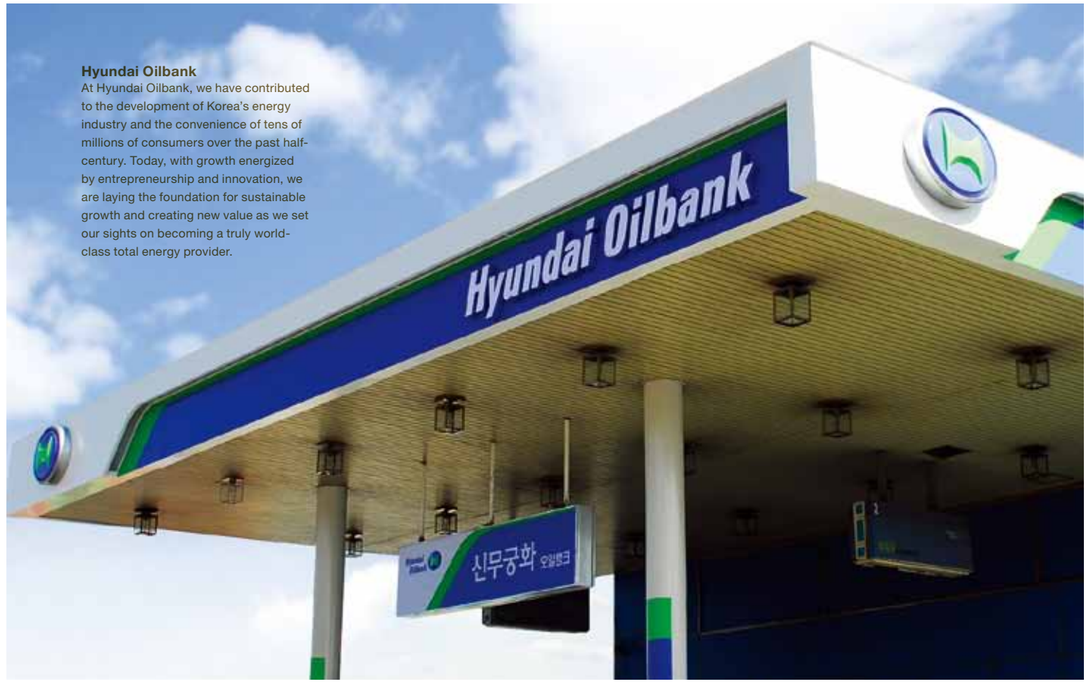
Hyundai Heavy's new orders fell short of its target last year with the euro zone debt crisis weighing heavily on the global economy. This propelled the company to come up with an aggressive campaign to mount a quick recovery and establish the basis for sustainable growth over the long term.

In his New Year message, Mr. Lee Jai-seong, president & CEO of Hyundai Heavy, called for aggressive sales and marketing across the company to secure more contracts and look for new opportunities.

He also said the company should activate a crisis response system against deepening economic woes, pursue a differentiated business strategy, and boost competitiveness through "choice and concentration".

This year's order target of USD 29.7 billion, up 52.3 percent from last

**Hyundai Heavy Industries**
Hyundai Heavy Industries has grown as the world's leading premier shipbuilder by providing a competitive skill set through pioneering spirit. Additionally, HHI's broad knowledge built upon our experience has allowed us to lead the heavy industries market and to contribute to economic development.




**Hyundai Oilbank**
At Hyundai Oilbank, we have contributed to the development of Korea's energy industry and the convenience of tens of millions of consumers over the past half-century. Today, with growth energized by entrepreneurship and innovation, we are laying the foundation for sustainable growth and creating new value as we set our sights on becoming a truly world-class total energy provider.

year, looks quite ambitious given the dim prospects of a quick turnaround in the world economy and an increasingly tough competition with rivals at home and abroad.

However, Mr. Park Dong-won, executive vice president of Hyundai Heavy's Corporate Planning Office, believes this target is achievable.

Underpinning his optimism is a flood of pending big orders expected to be signed in the early part of this year. Mr. Park cited as one example a multi-billion dollar contract to build an LNG plant in Nigeria which was supposed to be signed late last year.

"The reason why we set the order target 50 percent higher this year is not intended to offset last year's sluggish performance. I believe it's because some emerging market orders that were supposed to be awarded at the end of last year will be moved to this year," said Mr. Park.

He said demand for power plants and energy development vessels such as FPSO, LNG carriers, and drillships will remain strong regardless of the slowing global economy and that a focused and aggressive sales operation in those areas will help boost the turnaround in new orders.

Hyundai Heavy's mainstream shipbuilding division delivers about two ships a week from the world's biggest yard in Ulsan while six other divisions cover broad business areas including offshore engineering, industrial power plants, marine engines, switchgears, construction vehicles, and renewable energy.

Mr. Park said the company's shipbuilding division, hit hard by the euro zone debt crisis and the subsequent credit squeeze for ship financing, is aiming to win USD 7.8 billion in new orders, up 22 percent from last year's USD 6.1 billion.

The division, and other major shipbuilders, will certainly benefit from restructuring in the world shipbuilding industry as one of the worst downturns afflicted the global shipping industry in recent years, he said.

"Overcapacity concern in the shipbuilding sector is expected to ease," he added.

Mr. Park said he cannot see a quick market recovery in conventional vessels such as containerships, bulk carriers, and tankers, and so greater focus will be put on securing orders for drillships and LNG carriers. He says demand for these ships will likely remain robust again this year.

In recent years, Hyundai Heavy has also actively developed more fuel efficient and less polluting ships on rising demands for such vessels due to volatile oil prices and new environmental standards.

The world's largest shipbuilding firm made a good start this year, winning a USD 600 million order for five ultra-large containerships from Seaspan in January.

Mr. Park said weak ship prices after a prolonged recession and the increasing demand for eco-friendly and high-efficiency vessels will create a momentum for shipowners to start placing new orders in earnest.

"This year's business will be better than last year's though we do not expect a significantly high growth in view of overall economic conditions," said Mr. Park.

Looking at Hyundai Heavy's non-shipbuilding sectors, the Construction Equipment Division suffered a sharp drop in orders from China last year, though the division could offset the impact of Chinese economic downturn by advancing into relatively untouched markets such as the Middle East, Russia, South America, and other emerging markets.

Even with US anti-dumping duties on imports of Korean power transformers, the Company's Electro Electric Systems Division posted USD 2.3 billion in new orders last year. Mr. Park expects the division to post about USD 3 billion in new orders this year.

The Offshore & Engineering Division, which posted record high sales last year, is aiming to win USD 6 billion in new orders for floaters, fixed platforms, pipelines, and other offshore products.

The Green Energy Division, however, is expected to continue facing difficulties due to a worldwide squeeze in the renewable energy sector.

### Beyond Shipbuilding

During a recession, shipbuilding is usually the first and hardest hit sector as

## Hyundai Heavy Industries Group

- Hyundai Samho Heavy Industries
  - Hyundai Mipo Dockyard
    - Mipo Engineering
    - HI Investment & Securities
      - HI Asset Management
- Hyundai Oilbank
  - Hyundai Cosmo
  - Hyundai Oil Terminal
- Hyundai Corporation
- HYMS
- Wärtsilä Hyundai
- Hyundai Finance Corporation
  - Hyundai Venture Investment Corporation
  - Hyundai Futures
- Hyundai Avancis
- Hyundai Energy & Resources
- Taebaek Wind Power Generation
- Hotel Hyundai
- Komas
- Hyundai Heavy Industries Sports
- Muju Wind Power Generation
- Changjuk Wind Power eneration
- New Korea Country Resort


**Hotel Hyundai**
With the objective of becoming the leader in hospitality, Hotel Hyundai provides executive-level service. Hotel Hyundai has branches in Gyeongju, Ulsan, Gyeongpodae, Mokpo, and Vladivostok with the best business service to help you complete your business obligations and see the best of Korea.

**Mr. Park Dong-won** Executive Vice President of Hyundai Heavy Industries

shipowners delay or cancel orders for new vessels to conserve capital reserves.

To reduce its heavy dependence on the highly cyclical shipbuilding sector, Hyundai Heavy has been diversifying its business portfolios. Now the shipbuilding sector accounts for only about 35 percent of the company's total sales, compared with about 60 percent several years ago.

Hyundai Heavy has also increased the number of its affiliated firms at home and abroad in recent years in a bid to sharpen its competitive edge in existing businesses and deliver new opportunities for future growth.

Hyundai Heavy Industries Group is the seventh largest business group in South Korea, with 70 affiliated firms in various industrial sectors, including shipbuilding, construction machinery, trade, financial services, oil refinery & petrochemicals, and energy & resources development.

The Group, whose size almost doubled after acquiring Hyundai Oilbank, Hyundai Corporation, and HI Investment & Securities, generated KRW 63 trillion in revenues last year, up 3 percent from 2011.

Mr. Park said "So far the Group has gone through the process of increasing the number of affiliated firms for the sake of expanding our business areas. Now I would say it is time for us to focus on upgrading quality."

"So, our strategic focus will be the development of core technology to enhance competitiveness in existing businesses while exploring new businesses as the growth engine of the company."

He said Hyundai Heavy is also interested in strategic partnerships and acquisitions as another way to keep its leading position in the booming offshore engineering and plant sectors.

Last year, Korea Aerospace Industries (KAI), a maker of trainer jets and helicopters, abandoned the sale of a USD 1 billion controlling stake after failing to receive enough bids.

Hyundai Heavy was the only bidder ahead of deadline after Korean Air Lines decided against making an offer. At least two bids are needed for a deal to go ahead because of rules covering sales by government entities.

It is not clear whether and when Korea Finance Corporation (KoFC) under the new administration will proceed with the sale of Korea Aerospace. The company also makes parts for Boeing and Airbus.

Hyundai Heavy has been seeking to buy Korea Aerospace as part of its strategy to establish the basis for sustainable growth in the future by advancing into higher value-added businesses.

Last year, Hyundai Oilbank dropped its plan for an initial public offering, citing weak investor sentiment and unfavourable market conditions, stemming from the euro zone crisis. This forced its parent, Hyundai Heavy, to sell a stake in Hyundai Motor Company for KRW 705 billion to improve its balance sheet.

Mr. Park said the Group might tap the IPO market again this year or later when the equities market improves to warrant reconsidering an offering.

Looking back on the past four decades, Hyundai Heavy faced one crisis after another but every time emerged stronger, turning the challenges into new opportunities. HHI

*The writer is a journalist based in Seoul.*



Companywide

# Hyundai Heavy Sets Record Number of World Class Products

HHI set a new record for the most 'World Class Products' by gaining three additional certificates on December 10. This brings the total to 37 products.

HHI's newly certified 'World Class Products' are Drillship, Diesel Forklift, and the 345 kV Shunt Reactor.

'World Class Product' is a policy where Korea's Ministry of Knowledge Economy selects products that have over 5 percent global market share, rank within the Top 5 in their market, and with an international market worth over USD 50 million annually.

HHI's drillships use advanced technologies including dynamic positioning system and a computer-based propulsion system to keep their position despite swells. They also include seven Blow Out Preventers for enhanced safety.

Diesel forklifts built by HHI use the best engine in their class and use a power-by-wire system to increase fuel efficiency. In addition, an enhanced weight measuring system and back wheel angle indicator have been installed.

The Shunt Reactor is a high voltage power device that improves power supply efficiency. HHI's 345 kV Shunt Reactor also reduces noise and vibrations.

Companywide

### 2013 Management Strategy Seminar

Hyundai Heavy Industries Group held the 2013 Management Strategy Seminar on January 12. The seminar was held to encourage mutual growth among affiliated companies by sharing mid- and long-term business visions and ways of weathering the economic downturn.

The seminar was attended by senior management from Hyundai Heavy Industries, Hyundai Mipo Dockyard, Hyundai Samho Heavy Industries, Hyundai Oilbank, Hyundai Corporation, and other affiliated companies.

Mr. Lee Jai-seong, president and CEO of Hyundai Heavy said, "We will create a sustainable growth momentum by focusing on sales and improving management." Mr. Lee also called for turning the downturn into opportunity with ceaseless innovation and a stronger leadership.


Shipbuilding

### Hyundai Heavy Develops New Independent LNG Storage Tank

HHI developed an independent liquefied natural gas storage tank model, Lobe-Bundle Tank, on November 27.

HHI's newly-developed LNG storage tank won Approval in Principle from the Japanese classification society Nippon Kaiji Kyokai (NK) in June 2012. While the storage tank is designed for 165,000 cbm LNG carriers, it can also be used in other LPG carriers, LNG FPSO, LNG fueled vessels, and LNG bunkering systems.

The Lobe-Bundle Tank uses ring-shaped plates instead of conventional flat plates to reduce the weight of the tank and building cost significantly. The tank is built using spray-type insulation rather than panel-type insulation, substantially reducing construction time.

HHI's LNG tank technology meets International Maritime Organization standards requiring high level of structural analysis and fatigue/fracture analysis for Type B independent LNG storage tanks.

HHI plans to build pilot LNG storage tanks and acquire general approval from NK in 2013.



Shipbuilding

# Hyundai Heavy Wins USD 600 Million Boxship Order

HHI won an order for five 14,000 TEU containerships from Seaspan on January 16. The contract includes an option exercisable by the owner for five additional same-class boxships.

This order means HHI has won all ultra-large containerships ordered worldwide over the last 12 months.

The ultra-large container ships, measuring 368 m in length, 51 m in width, and 30 m in depth, are scheduled to be delivered from 2015. Each ship can carry more than ten thousand 20-foot equivalent containers. Upon delivery, the vessels will be charted to Yang Ming Marine Transport on a long-term contract.

The containerships will feature an electronically-controlled main engine and HiBallast seawater treatment system. The electronically-controlled main engine will maximize fuel efficiency, reduce noise, vibrations, and carbon emissions by automatically controlling fuel consumption to suit sailing speed and sea conditions.

The HiBallast system is a seawater treatment system HHI developed in 2011. HiBallast can treat 8,000 cbm of seawater per hour by filtering and sterilizing bacteria and plankton bigger than 50 μm through electrolysis.

Shipbuilding

### Hyundai Heavy Wins DSV Order from Subsea 7

HHI won a dive support vessel (DSV) order from Subsea 7 on November 22, 2012.

The vessel, 123m long, 24m wide, and 10.5 m high, will be delivered to the British firm in September 2015. The DSV is a special purpose vessel for underwater missions with accommodation for 100 people and a support system for 18 divers working at depths of 300m.

Offshore & Engineering

# Hyundai Heavy Wins USD 1.1 Billion Topside Order

HHI won a USD 1.1 billion order for the topside facility to be installed on the Aasta Hansteen spar hull, also being built by HHI, from Statoil on January 18.

The 21,000-tonne topside facility, capable of producing 23 million cbm of oil and gas per day, will be installed in the Aasta Hansteen field, 300 km off the coast of Norway, in 2016. The offshore facility will be built with the assistance of the engineering company CB&I in The Hague and suppliers in Europe under the NORSOK standard that is applicable to offshore facilities operating in the harsh conditions of the North Sea.

HHI also won an order from Statoil to build the Aasta Hansteen spar hull. The cylindrical, partially submerged offshore production platform, measuring 195 m in total hull height, will be able to store 160,000 barrels of condensate when it begins operation.

Mr. Kim Jong-do, COO of Hyundai Heavy's Offshore & Engineering Division said, "I believe our long experience in the offshore facilities field will continue to give us an edge in winning orders from the Middle East, Australia, West Africa, and the North Sea."

HHI has constructed the most (11) ultra-large floating, production, storage and offloading units (FPSO units capable of holding more than 2 million barrels of oil) in the world. The Company is currently building two other FPSO to be deployed in the North Sea.

Shipbuilding

### HHI Group Wins Orders Worth USD 1.05 Billion

HHI won an order for one 155,000 cbm liquefied natural gas carrier worth USD 210 million from Brunei Gas on December 21.

Affiliated company Hyundai Samho Heavy Industries (HSHI) won an order for four 174,000 cbm LNG carriers worth USD 840 million from Maran Gas on December 20. The contract with Maran Gas includes an option exercisable by the owner for two additional same-class LNG carriers.

These membrane-type LNG carriers, scheduled to be delivered between 2015 and 2016, will feature the Dual Fuel Diesel Engine System (DFDE), allowing ships to run on diesel fuel or natural gas.

Since its first LNG carrier order in 1991, HHI has built 40 ships for liquefied natural gas. Hyundai Samho Heavy has won orders for 10 LNG vessels since 2011.

Shipbuilding

### Hyundai Heavy to Build World's First New LNG-FSRU

HHI started building the world's first new LNG Floating Storage Regasification Units (FSRU) on January 21.

The vessel, 294 m long, 46 m wide, and 26 m high, can store and supply up to 70,000 tonnes of LNG - the rough equivalent of Korea's daily use. The LNG-FSRU is scheduled to be delivered to Hoegh on February 2014.

LNG-FSRUs receive liquefied natural gas from offloading LNG carriers. The installed regasification system provides gas send-out through flexible risers and pipelines to shore. Typically, LNG FSRUs are converted from other ships but these will be the world's first newbuild LNG FSRUs.

LNG FSRUs take a year less and cost half as much as an onshore LNG terminal to complete. Furthermore, HHI's special engineering techniques help shipowners save on maintenance downtime as the maintenance interval is extended from five years to ten. Converted LNG FSRUs need to be drydocked for repairs and maintenance for two to three months every five years.

Offshore & Engineering

### SHWE Project Topside Sails Away

HHI held a sail away ceremony for SHWE's topside on November 15.

The offshore facility, the largest so far made by HHI, weighs 26,000 tonnes and measures 100 m long, 60 m wide, and 42 m high. HHI won this USD 1.4 billion order from Daewoo International in February 2010.

Other than the topside, HHI also built subsea systems such as a manifold and four Christmas trees as well as a total of 126.5 km of subsea pipelines and an onshore gas terminal. Daewoo International will be able to produce 640 million cubic feet of gas per day when the facility begins operations.

The platform is scheduled to be installed at the SHWE gas field in December and handed over to Daewoo International in April 2013.

Engine & Machinery

# Hyundai Heavy Produces Milestone 7,000th HiMSEN Engine

HHI produced the 7,000th HiMSEN engine on December 26. This surpasses the previous milestone of 5,000 engines achieved on February 11, 2011. The engine will be installed on a 318,000 DWT VLCC being built by Daewoo Shipbuilding & Marine Engineering.

HHI developed the medium-speed engine model HiMSEN (Hi-touch Marine & Stationary Engine) in 2000. The HiMSEN engine can be used for power generation for ships and onshore power plants, and portable power plants.

Offshore & Engineering

### Hyundai Heavy Names World's Largest Transport Vessel

HHI held a naming ceremony for *Dockwise Vanguard*, the world's largest offshore facilities transportation vessel, in Ulsan on November 30.

Mr. Andre Goedee, CEO of Dockwise; Mr. Kim Jong-do, COO of Hyundai Heavy's Offshore & Engineering Division; and 200 guests attended the naming ceremony.

*Dockwise Vanguard* measures 275 m long, 70 m wide, and can carry up to 110,000 tonnes of offshore facilities.

The vessel will be used to transport the Jack St. Malo offshore facility from Korea to the Gulf of Mexico, and then deliver the HHI-built Goliat FPSO to the Goliat field off Norway.

To be able to transport 110,000 tonnes of offshore equipment safely in rough seas, *Dockwise Vanguard* has high-tech equipment such as location control systems and twin propulsion. The vessel also has diesel electric propulsion and controllable pitch propellers to maximize energy efficiency.

Electro Electric Systems

# Hyundai Heavy Completes GIS Plant in Russia

HHI announced the completion of the Hyundai Electrosystems gas insulated switchgear plant (GIS) in Vladivostok, Russia on January 25.

The completion ceremony for the USD 50 million plant, covering 100,000m², was attended by Mr. Igor Shuvalov, Russian first deputy prime minister; Mr. Oleg Budargin, chairman of the Management Board of FGC UES; Mr. Lee Jai-seong, president and CEO of Hyundai Heavy; and Mr. Kim Hwan-goo, COO of Hyundai Heavy's Electro Electric Systems Division.

HHI is the first foreign company to build a GIS plant in Russia. Hyundai Electrosystems has a production capacity of 350 units a year, ranging from 110 kV to 500 kV. The company plans to expand its annual capacity to 500 units by 2015 in view of market conditions.

In close cooperation with FGC UES for the upgrade of Russia's power grid, HHI has been nurturing talented engineers by opening the new electrical engineering department in Energeticheskiy Kollege, modernizing the college building and teaching equipment, and preferentially hiring graduates from the college since 2011.

In his congratulatory remarks, Mr. Lee Jai-seong said, "Hyundai Heavy's advanced GIS technology, the Russian government's strong support, and talented engineers from Primorsky Krai are the three main pillars of Hyundai Electrosystems as a model case of successful foreign investment in Russia. We believe the GIS plant will serve as a catalyst for the development of the Russian Far East region."

Electro Electric Systems

### New Electro Electric Systems Testing Facility

HHI held a completion ceremony for the new electro electric systems testing facility in Yongin, Gyeonggi province on November 16.

Attending the ceremony were Mr. Lee Jai-seong, president & CEO of Hyundai Heavy; Mr. Lee Choong-dong, senior executive vice president of Corporate Technology Institute ; Mr. Hwang See-young, CIO of Hyundai Heavy Industries Group, and 120 guests.

The new testing facility will lead R&D for Electro Electric Systems and Engine & Machinery divisions. The facility houses power & electricity laboratories, robot clean room, electricity-based laboratory, system control rooms, and design rooms.

The original testing facility, located next to this new building, will continue in its current role and capacity. The original facility has robot durability testing areas, power storage and robot laboratory, and construction equipment laboratory.


Electro Electric Systems

### Hyundai Heavy's New Generator for Offshore Wind Turbines

HHI developed 5.85 MW Permanent Magnet Synchronous Generator (PMSG) for offshore wind turbines on December 11.

The PMSG is the main equipment in a wind turbine for converting wind energy to electricity. With improved durability and minimized use of expendables, product life of the generator is extended from 20 to 25 years.

The development of PMSG will be a catalyst for HHI to enter the 5 MW and 6 MW offshore wind turbine markets.

HHI plans to commercialize the generator by 2014 after finalizing field tests.

Construction Equipment

### Bauma-China 2012, Shanghai

HHI participated in Bauma-China 2012 held in Shanghai from November 27 to November 30.

Bauma-China is an international trade fair for mining and construction equipment held every two years. More than 1,858 companies from 37 countries attended the exhibition.

HHI's booth drew around 87,000 visitors, who showed great interest in mining excavators and wheel loaders.

HHI displayed seven models of its product line including R805LC-7 and R485LC-9T excavators.

Construction Equipment

# IMME 2012, India

HHI took part in the International Mining and Machinery Exhibition from December 5 to December 8 in Kolkata, India.

HHI unveiled five models of excavators including R210LR, R220LC-9S, R340LC-7, R500 Mining LC-7, and R800LC-7, and two models of wheel loaders (SL760, SL730) at the booth. A great amount of interest in the models and various performances also attracted attention from visitors.

Mr. Kong Ki-young, head of Hyundai Construction Equipment India (HCEIPL) said, "We focus on sales with exhibition promotion programs to win contracts. Our booth is the most popular booth at the exhibition because of our driving simulator and dance performance."

Construction Equipment

### Chinese Dealers' Annual Conference

HHI held an annual conference for Chinese dealers in Chengdu from December 16 to December 19.

Over 96 dealers and 66 sales staff from HHI's China subsidiaries (Jiangsu, Beijing, Shanghai, Taian) attended the annual gathering to discuss an outlook for the Chinese market, and to share ideas to reinforce its sales goal this year.

There was also a keynote lecture about the situation of the Chinese construction equipment market.

# Dockwise Vanguard Launch

## Dockwise sees *Dockwise Vanguard* as the first of a new type of transportation vehicle

Hyundai Heavy Industries handed over the *Dockwise Vanguard* semi-submersible heavy transportation vessel (SSHTV) to Dockwise on February 1. *Dockwise Vanguard* is the world's largest SSHTV, surpassing the previous title holder's carrying capacity and deck size by more 50,000 tonnes and 50 m, respectively. The vessel measures 275 m long, 70 m wide, and can carry up to 110,000 tonnes of offshore facilities. It has been specifically designed to carry even the biggest offshore facilities intact from shipyard to oil field, halving the delivery time and moving up installation and commissioning.

Due to her unique design, *Dockwise Vanguard* can also carry other ships and, importantly for offshore operators, act as a drydock facility. For example, if an FPSO needs maintenance while at an offshore field, it usually means taking the vessel offline and transferring it to a shipyard in the Mediterranean or Asia. *Dockwise Vanguard* can position alongside the FPSO, submerge underneath it and then lift the vessel up. This will allow maintenance crews to perform the work required on-site and reduce the time the vessel is not operational.

Dockwise sees *Dockwise Vanguard* as the first of a new type of transportation vehicle. Before Vanguard, platform sizes were limited by the size of the transportation vehicles. To deal with this limitation, the topside and hull had to be built separately and then integrated into one unit closer to the oil field. Now, spar platforms and even FPSO can be built at one shipyard and transported ready for field installation.

*Dockwise Vanguard*'s first delivery will be Chevron's Jack St. Malo platform to the Gulf of Mexico. Vanguard will also deliver the world's biggest circular FPSO, EniNorge's Goliat FPSO, and the world's biggest spar platform, Statoil's Aasta Hansteen spar, from Hyundai Heavy's Ulsan yard to the North Sea in 2013 and 2015. HHI

# Changes to the Northern Sea Route and Arctic Offshore Exploration

By Prof. Choi Kyung-sik


The Arctic region is the last frontier on earth and there exists a vast amount of natural resources underneath the frozen sea. Three specific motives have driven humans to the remote Arctic region: exploration and science, commercial resource extraction, and transportation. Concerns over global energy shortages and high commodity prices demand ever increasing efforts for the development of the Arctic.

2012 was an atypical year of global warming for the Arctic Circle. Greenland experienced its warmest summer in 170 years. Permafrost-monitoring sites in northern Alaska recorded their highest temperatures. In September, sea ice extent in the Arctic Ocean has been reduced to 3.4 million square kilometers, at its lowest summer coverage since scientists have been able to see it from satellites. Two major shipping routes in the Arctic Ocean, the Northern Sea Route (NSR) along the Russian coastline of Siberia and the Northwest Passage (NWP) through the Canadian Arctic Islands, have been open simultaneously in summer since 2006.

The NSR is a series of shipping lanes that connects the Atlantic and Pacific oceans. The lane followed at any one time depends on the prevailing ice conditions in the various locations. In geometrical terms the NSR is the maritime short-cut between the Atlantic and the Pacific. The shorter distance along the NSR seems to be economical enough as a year-round commercial shipping route when compared to Suez Canal route or Trans-Siberian railroad.

During 2012, never before have so many vessels taken the Arctic short-cut between Europe and Asia, and never before has so much cargo been transported along the route. There has been a tenfold increase in the number of vessels using NSR over the last two years. In the 2012 season, 46 vessels sailed the route, compared to 34 in 2011 and only four in 2010. In 2011, 34 vessels transported a total of 821,000 tonnes during the five months

The Arctic region is the last frontier on earth and there exists a vast amount of natural resources underneath the frozen sea. Three specific motives have driven humans to the remote Arctic region: exploration and science, commercial resource extraction, and transportation.

**Figure 1**

Two Major Arctic Sea Routes, NSR and NWP

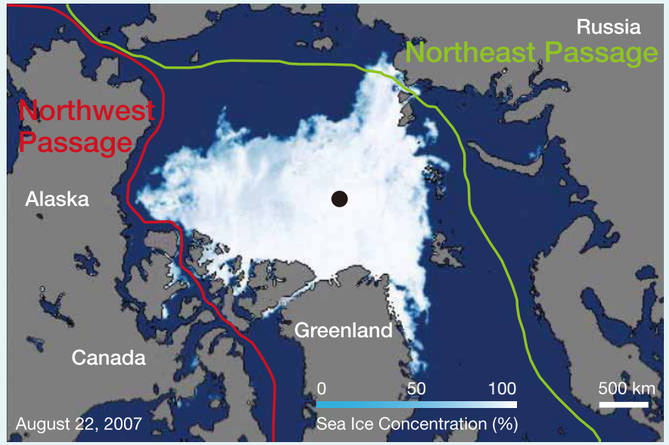



**Table 1**

Comparison of Suez Canal Route and NSR for a Containership Operation

**Busan - Bremen** (Data source : KMI, 2011)

| | Suez | NSR |
|---|---|---|
| **Distance (nm)** | 11,098 | 7,656 |
| **Time (day)** | 25.7 | 19.9 |
| **Operation Cost (USD/TEU)** | 1,049 | 764 |

Based on Fuel Cost USD 720

the route was open. Petroleum products constitute the largest cargo group. The second largest cargo group was iron ore and coal, which were transported along the route six times. Also, in 2012, the NSR was used for transportation of LNG for the first time.

One of the technical challenges for a year-round commercial operation in the NSR is the understanding of site-specific ice and other environmental conditions and the transit analysis with icebreaking cargo vessels. In ice-covered sea, the size and distribution of sea ice significantly restricts the operation of ships and icebreaker assistance may be an important decision for keeping the speed and direction as planned. Ice and environmental information such as sea ice thickness and concentration, multi-year ridge formations, and weather conditions along the Arctic sea routes are necessary for high Arctic activity. Receding sea ice observed during the summer and autumn in the Arctic has allowed conventional ships to operate in this previously inaccessible region. From 2013 to 2015, progress will be made toward IMO Polar Code completion. The increasing traffic in the area necessitates urgency for many.

The Arctic is attractive for exploration because it is estimated to hold at least 32 percent of the world's undiscovered oil and gas reserves. The region will become more accessible as global warming melts sea ice. Concerns about future energy security



**Table 2**

Examples of Recent Commercial NSR Transits

| Year | NSR Transit Cases | Remarks |
|---|---|---|
| **2009** | Beluga Fraternity / Beluga Foresight (Bulker GT 9,611 tonnes) Construction Material | Total 69 ships 1906-2006<br>Total 24 ships in 2009 |
| **2010** | SCF Baltica (Tanker 100,000 DWT) Gas condensate<br>MV Nordic Barents (Bulker 45,000 DWT) Iron ore<br>Perseverance (Tanker, 75,000 DWT)<br>Vladimir Tikhnov (Gas carrier 162,000 cbm) Gas condensate | |
| **2011** | STI Heritage (Gas carrier) | Total 41 ships in 2011 |
| **2012** | Nordic Odyssey (76,500 DWT) Iron ore<br>Mikhail Kutunov / Dmitry Pozharsky (23,000 DWT) Iron ore<br>MT Stena Poseidon (Tanker) Oil product<br>Nordica / Fennica (Offshore Supply Vessel) | Total 46 ships in 2012 |

are driving several oil & gas majors to seek new sources of hydrocarbons. Majors like Statoil, Exxon Mobil, Gazprom, Rosneft, BP, Shell, and Total have started or plan to start drilling for oil and gas in the Arctic region. The extent of interest in widespread drilling in the Arctic for natural resources such as oil and gas is still uncertain as the commercial viability of exploration in such a remote environment is unknown. However, a race to drill is inevitable in the Russian Arctic, very probable in the Norwegian Arctic and probable in the Alaskan Arctic. The question is whether it is economical to bring oil out. After a slow start, there will be a successful season for Shell in 2013 for offshore oil and gas exploration in Alaska. The Norwegian/Russian collaboration in the Barents Sea continues to give the high North a priority in the region.

Arctic hydrocarbon resources may account for a bigger share of the world's hydrocarbon production in the future if the reserves can be exploited in an economical way. In this context, technical challenges must be resolved and the actual costs for infrastructure lowered. Future development of Arctic resources will also be dependent on the actual energy price, production from other regions, alternative fuel developments, and the way in which climate change will alter the accessibility of the Arctic. HHI

*The writer is a professor at Korea Maritime University's Ocean Engineering Department.*

# New Electro Electric Chief: Read and Lead Market Trends

By Grace Choi

"To me, making a judgment on what already happened didn't seem to create added value. Instead, I was attracted to the aggressive corporate culture of Hyundai Group."


**Mr. Kim Hwan-goo** Senior Executive Vice President

Hyundai Heavy Industries has always appointed executives with engineering backgrounds as head of the Electro Electric Systems Division but this year the Company has made a different decision for the first time in an effort to revive the ailing business.

In January, the Company appointed Mr. Kim Hwan-goo, who has spent much of his 30-year career involved in purchasing and sales operations, in anticipation that he will make a difference. Mr. Kim said the company wanted a "different" leader for the division, one capable of reading market trends and leading the division through sluggish demand and oversupply.

"Making good quality products was the most important in the past but now, the ability to analyze and forge market-tailored strategies has also become a critical management skill," said Mr. Kim. "I think the market requires a different leadership by looking at the big picture in the industry and offer guidelines to employees."

In 2012, the Electro Electric Systems Division posted a 12 percent drop in orders to USD 2.3 billion from a year earlier, accounting for 12 percent of the shipbuilder's total orders of USD 19.57 billion.

This year, Hyundai Heavy is targeting USD 3.2 billion worth of orders in the division, one of the company's seven businesses ranging from shipbuilding and offshore engineering to engines and construction equipment.

The electro electric operations consist of nine products such as power transformers, motors, generators, circuit breakers, and inverters, all related to power generation and distribution.

He said growth in the electro electric systems business began to slow down in 2009 as the global capacity reached a supply glut, putting an end to the era of a seller's market.

Adding to the challenge, demand from emerging and developed markets does not show signs of recovery after the financial crisis. Worse still, the Company is left behind global top-tier players in terms of core technology and production capacity.

In a market where the Top 5 players – ABB, Siemens, Schneider, Mitsubishi, and Alstom – claim a combined share of 56 percent, Hyundai Heavy increased the number of plants to five to tap the USD 255 billion electro electric systems market, three times bigger than the shipbuilding market.

Hyundai Heavy's share in this market stood at a mere 1.2 percent at the end of 2012.

In a move to make further inroads into the huge market, the Company is in talks with some of the top-tier companies pursuing a joint project.

"We expect a joint project in which Hyundai Heavy is in charge of the production and its partner offers technologies to come to fruition as early as next year," said Mr. Kim, adding the Company has been approached by Siemens, Alstom, and GE.

As for the Company's planned capacity expansion, Mr. Kim said the Middle East will likely be the location for Hyundai Heavy's sixth plant as countries in the region are relatively financially healthy due to high oil prices unlike the US and Europe that have yet to exit from financial problems. The Company currently has five plants outside Korea; in Bulgaria, China, Russia and two in the US.

This year, developed markets are facing macroeconomic weakness and emerging countries are faced with cooling economies.

At this critical juncture, Mr. Kim is more determined than ever to put the business back on track while achieving the annual order target.

"We are putting a bigger focus on selling more mid-and small-sized products such as motors and inverters," he said, adding that his experience as purchasing and sales manager in London and China will help him guide the division through uncertainties.

Though Mr. Kim is not an engineer, his experience and know-how in sales will prove to be a catalyst for change.

He said "I had a chance to get involved in sales of construction equipment for eight months in 2011. At that time, I learned how important market demand projections are for a company to prosper."

The 58-year-old veteran's career at Hyundai all started from a decision 30 years ago. Back in 1981, after majoring in law at Seoul National University, Mr. Kim said he didn't hesitate to apply at Hyundai Group, which covered construction, heavy industry, automobiles, and machinery, instead of taking an exam to enter the legal profession.

"To me, making a judgment on what already happened didn't seem to create added value. Instead, I was attracted to the aggressive corporate culture of Hyundai Group."

Mr. Kim said that Hyundai Group has played a pivotal role in the course of the country's industrialization and he is proud of having been part of it. Moreover, "I found my role in helping finish the militant labor-management relations at Hyundai Heavy in the late 2000s rewarding."

That's why he put a high value on communication within the division. "Among other things, we badly need to recognize what's going on in the business and set a common goal to tackle the situation."

Executives tend to come under stress due to the huge responsibility given to them. Asked how he takes care of work-related stress, Mr. Kim said he has a motto he wants to follow in his life. "There is a phrase Chung Ju-yung (the late founder of Hyundai Group) created based on General MacArthur's prayer," he said.

"Staying calm makes you strong, straight, and smart." HHI

*The writer is a journalist based in Seoul.*

# The Art & Science of Drillships

By George Deftereos

"You can have the people, the processes, and the tools, but how do you get those people at peak performance consistently, whether it's raining or snowing or sunny. This is the secret ingredient that HHI has."

"There are two things that have been constant in my 20 years in the oil and gas industry: change and 'design one, build many'," says Mr. Ricardo Castillo, project manager of Noble Drilling's *Noble Don Taylor* ultra-deepwater drillship. He holds a master's degree in business administration from the University of Houston as well as a Project Management Professional Certification from the Project Management Institute. During his career, Mr. Castillo has worked on oil and gas projects valued from USD 20,000 up to USD 14 billion in many different countries.

The latest addition to Noble's 79-strong offshore drilling unit fleet, and a part of its on-going fleet modernization strategy, Noble is building 11 of the worlds most advanced drillships. *Noble Don Taylor* will be able to drill down to water depths of 12,000 feet and total drilling depth of 40,000 feet. The first of four ships built by HHI using an upgraded version of the Gusto P10000 design, *Noble Don Taylor* is 229 m long, 36 m wide, and has a draft of 11 m. For propulsion, the drillship uses six of Hyundai Heavy's own HiMSEN 16H32/40V engines.

Once the ship is delivered from HHI she will sail to the Gulf of Mexico for final deep water acceptance testing, DWAT, in a test well before drilling commences. "Even though *Noble Don Taylor* has been built with the world's most rigorous integrity management standards, we are not taking anything for granted, and with the DWAT we want to make sure the systems are working as designed in real life conditions," says Mr. Castillo.

**Mr. Ricardo Castillo** Project Manager of Noble Drilling's Noble *Don Taylor* ultra-deepwater Drillship


But, what sets this series of drillships apart from others under construction is that Noble Drilling and Hyundai Heavy collaborated from the initial design phase. While basically a Gusto P10000 design, Mr. Castillo says there are more than 200 change orders seeking to ensure sustained safe and reliable operations with a 'flawless startup'. A project of this magnitude and complexity requires between 34,000 and 37,000 mechanical completion certificates (ie, MCs, elements that need to be checked), and a frontend approach was taken to decrease build time ensuring that each of those MCs is done right the first time as well as each commissioning procedure.

"One of the reasons for being at HHI is the willingness to take a frontend approach, we have been working as one big team, Noble, HHI, and subcontractors, in more than 25 countries to deliver the strategy that fits Noble's mantra on the project to 'Do it right the first time'."

A major challenge in the industry is that many of these offshore drilling projects are built but when they are commissioned, startup is delayed because too many modifications need to be made. Typically, a drillship is built in one shipyard and then taken to another shipyard for final modifications and to load third party equipment, or simply to redo something that wasn't done correctly. There are too many examples in the industry in which this extra work can take up to an additional six months to complete; six months that could have been spent drilling if the drillship had been built 'with the end in mind' (another Noble Drilling mantra).

Another challenge is the balance of what Mr. Castillo refers to the 'art & science' of building a drillship. The science is obvious; hire the best personnel, develop and use the best practices available, use the best tools. He explains, "What I've learnt is that there needs to be more focus on answering the question "How do you get the 3,500 people involved in the design, procurement, fabrication, installation, and commissioning, with very different cultures and backgrounds, to wake up every single morning and think 'How can I do it right the first time' even when they have done it many times before." He likens this process to creating a symphony, where the winds have to start with certain impetus right after the strings. It's no surprise that Mr. Castillo plays both guitar and piano.

The offshore drilling industry has great challenges, and HHI can take a more active role in it because the overall market trend seems to be calling for having more automated and remote-controlled drilling units with safer operations. Even though there are about 92 jackups and 63 floaters currently being built worldwide, these additional drilling units cannot meet projected energy demand of an additional 30 percent to 50 percent more energy worldwide by 2040-2050. On the other hand, it is estimated that the drilling industry needs about 19,000 operators by 2014; and most of these people need to have multiple years of experience. This situation is not sustainable in the long run. With automation in *Noble Don Taylor* and the other three ships in the series, the people can be taken out of the more dangerous areas of the ship and the labour challenge can be alleviated.

Though not a stranger to working with Koreans, this is Mr. Castillo's first time being based in Korea. "I wanted to see Korea with my own eyes. I wanted to know how they have been able to deliver high quality projects on a consistent schedule. It is something the rest of the world needs to learn from. But this comes back to the 'art'. You can have the people, the processes, and the tools, but how do you get those people at peak performance consistently, whether it's raining or snowing or sunny. This is the secret ingredient that HHI has."

Regarding his life in Korea, Mr. Castillo feels that the Korean ethos can be a competitive edge as HHI moves into the oil industry. There are various systems in place in Ulsan, ranging from expat villages, a fulltime service team, and an accredited international school (Hyundai Foreign School), as well as expat-run events. All these increase the community feeling one experiences when in Ulsan as well as Korea at large. On a recent trip to Seoul, he forgot his passport and wallet in a taxi. In any other city of 10 million people, they may have been lost forever. But in Seoul, all it took was a passerby calling the taxi driver and letting him know the situation. The driver then delivered the valuables to Mr. Castillo's hotel.

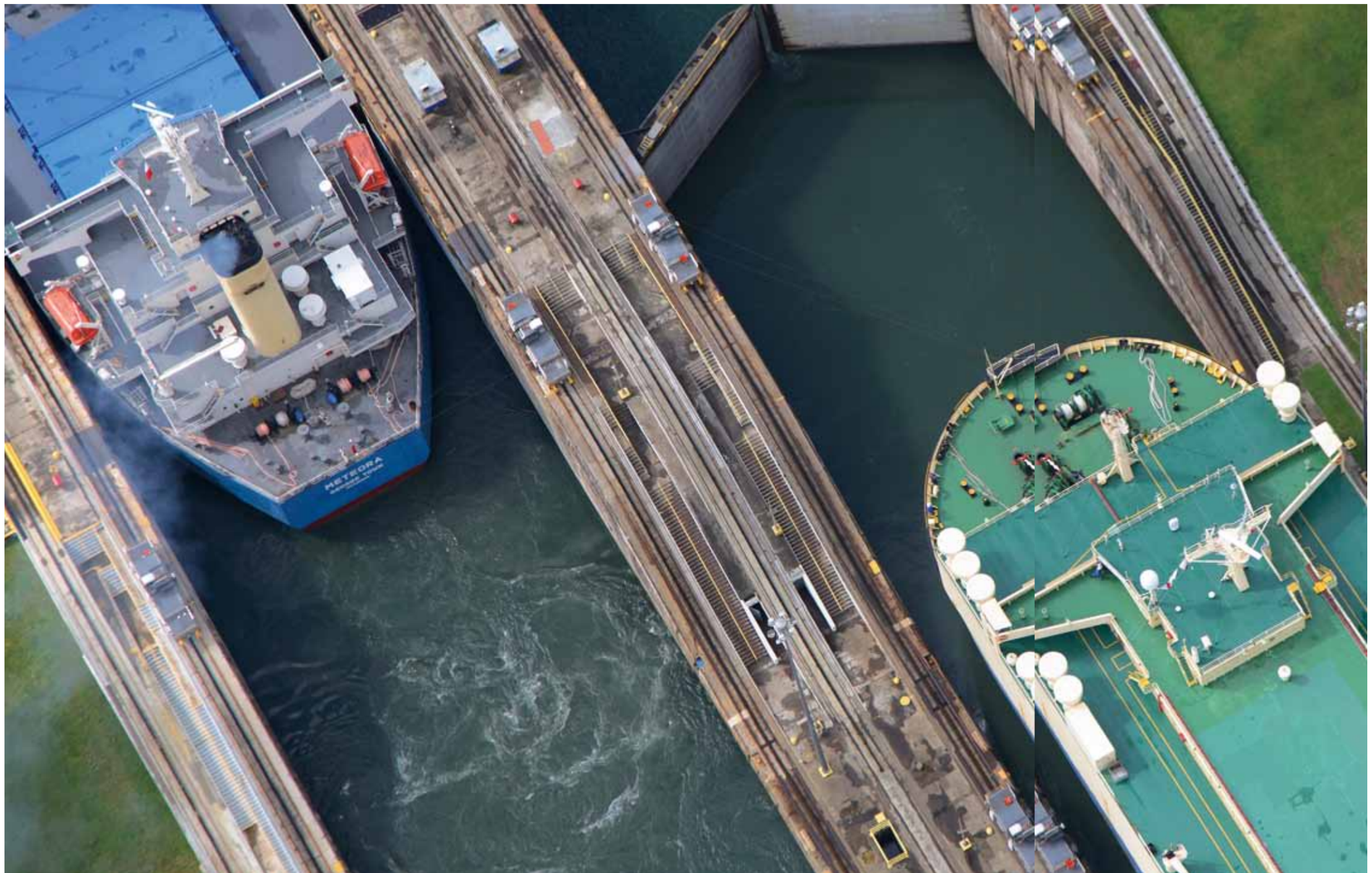
*Noble Don Taylor* was even featured in the Korean TV soap opera *May Queen*. The show is set in Hyundai Heavy's Ulsan shipyard during Korea's modernization. Though he missed the opportunity to meet the stars when they were filming last summer, perhaps he will have a chance with the next ship. HHI

*The writer is a copy editor of New Horizons.*

# Expansion of Miraflores Power Plant for Panama Canal (ACP)

By Cho Woong-rae

## Youthful enthusiasm and strong momentum is the key to the success of a project

Miraflores Power Plant is located just next to Panama Canal in Panama City. Under a turnkey service approach, Hyundai Heavy Industries is building a new power plant for the Panama Canal as part of the expansion of the Miraflores Thermal Power Plant.

The project consists of two Hyundai diesel engine (12K80MC-S) power plants, based on two-stroke engines with individual nominal capacity of 35 MW and a total nominal capacity of 70 MW plus additional power from Turbocharger Compound System (TCS), made by MAN Diesel & Turbo.

The ACP project includes the internal combustion Hyundai engines, generators, transformers, auxiliary mechanical and electrical equipment, instrumentation and controls, powerhouse metal building with ample control room, fuel pumps and distribution piping, warehouse and workshop building, employee facilities including dining and sanitary areas for employees, and all civil, electrical and mechanical work required for complete installation. The new plant also includes a distributed control system (DCS) to monitor and control the new plant.

**Turnkey service plus additional scope of supply within 24 months**

Hyundai Heavy provides engineering design, fabrication, transportation, installation, testing, and starting-up of the complete power generating plant within the 24-month time frame. In addition, HHI carried out the demolition of an existing 55,000 barrel fuel oil tank and construction of a new tank of the same capacity, a new 115 kV substation with relocation of sections of the existing 44 kV and 115 kV electrical lines and interconnection of 54-inch cooling water system from Miraflores Lake in the same 24-month time frame.

Despite the very tight time frame and wet season, the project recently reached 85 percent performance completion, 2.8 percent ahead of schedule based on baseline schedule according to earned value cost of the overall project. The assembling of two sets of generator, piping, cabling, and installation of auxiliary equipment are the current major activities in this reporting period.

### Ideal Cooperation with Subcontractors

The project is a multi-tasking worksite with various subcontractors working in parallel in the limited jobsite starting from demolition of the existing fuel oil tank and relocation of sections of existing live electrical lines. There is also a lot of interconnecting work between the existing power plant and the new ACP-HHI project that is causing lots of idle time to make a decision of cooperation with related parties. Cooperation and coordination for the interference works with subcontractors are the most important act in this project that is discussed and resolved on a daily & weekly basis.

### Side by Side with Panama's Growth Engines

The ACP project tested & commissioned on January 21 and February 18 for engines No.9 and No.10 to meet the demand of electricity for Panama Canal Expansion Project & the new Panama Metro Project and Panama's peak electricity demand during the dry season.

The expansion of the Panama Canal is a project that will double the capacity of the existing Panama Canal by August 14, 2014 by allowing more and larger ships to transit.

Panama Canal Expansion was approved by Panama's citizens through a national referendum, with 76.8 percent in favor, on October 22, 2006.

The completion date of this expansion project is on the 100th anniversary of the opening of the existing Panama Canal.

In addition to the Panama Canal Expansion Project, Panama City Metro is also one of the biggest projects under construction. The Metro Project consists of a north-south route, from Los Andes to Albrook Bus Station. It will be 13.7 km long, with 7.0 km of tunnels and 6.3 km of viaducts.

The HHI team is helping build the country's future by fulfilling the basic demand of electricity for the infrastructures of Panama's growth engines.

### Culture & Language Barrier

There are many challenges that HHI has to overcome in the course of the project. Salaries are being paid every two weeks, so the workers need to adjust to a different life cycle that will potentially stop the continuity of the work. [Ed: Salaries are paid monthly in Korea]

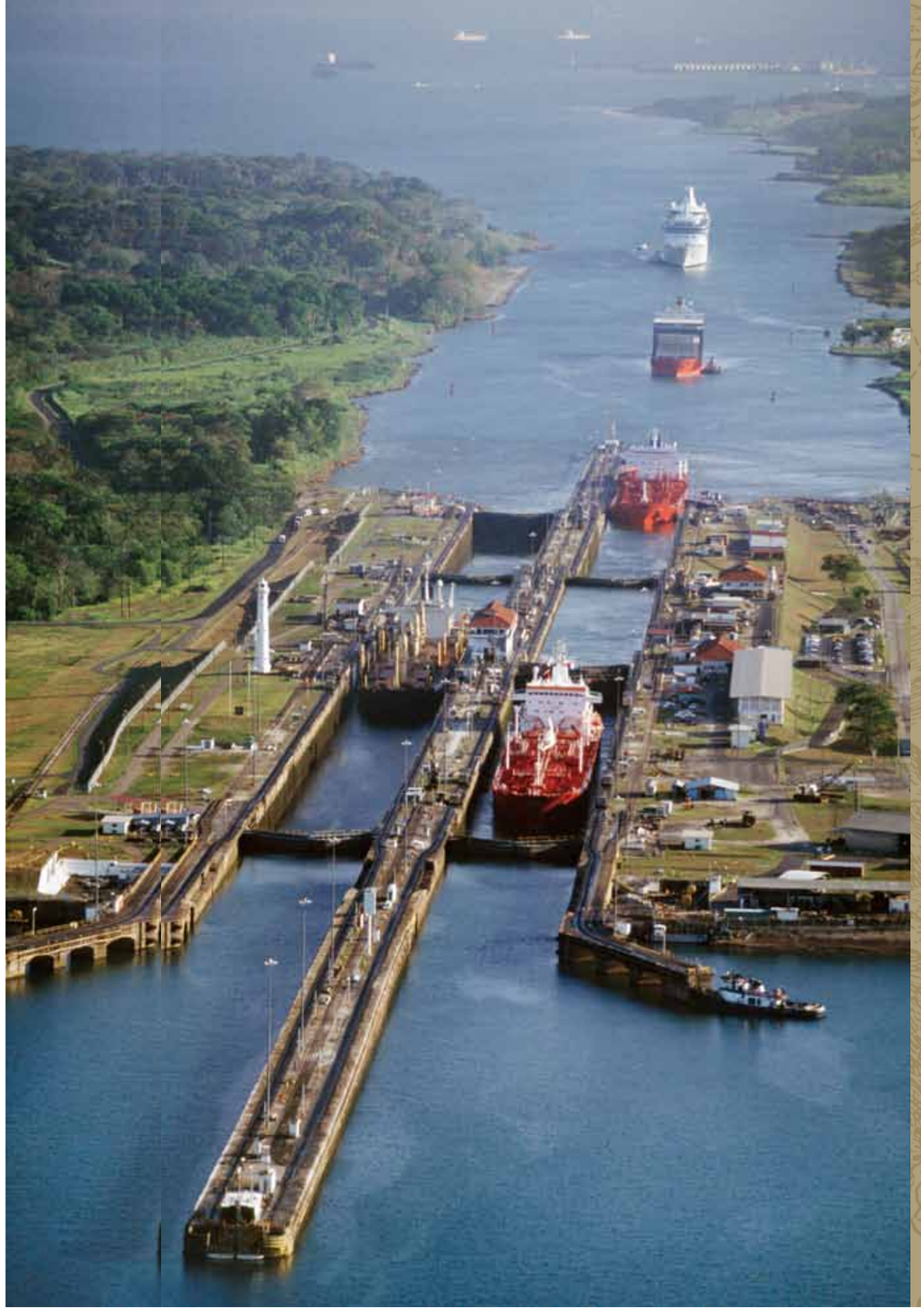
The commute time from outside city areas, where most of the workers live, to construction sites is 2-3 hours due to an underdeveloped public transportation system. This is one of the biggest risks to the project in Panama. As a solution, a shuttle bus for employees has been arranged in order to transport workers from construction site to the bus terminal.

As with most projects outside Korea, communication and language are major issues. As Spanish is the lingua franca in Panama, every HHI engineer spends his free time studying Spanish.

¡Animo! HHI

*The writer is site manager of ACP project*





# Panama Canal : Waterway of the World

The Panama Canal is 82 km long, connecting the Atlantic and Pacific oceans. The canal used revolutionary engineering techniques at the time, such as a three-stage lock gate, to allow ships to pass. Over 15,000 vessels have been through this canal. The Panama Canal is an important conduit of international trade, and has a storied history stretching back to the 1500s.

The canal-building program was planned by Charles V, Holy Roman Emperor and King of Spain, in 1534 as he sought a faster route for ships travelling from Peru to Spain. After many false starts, the United States acquired the previous construction efforts in 1904 and completed the Panama Canal in 1914. The United States government controlled the Canal Zone until 1999, when control was handed over to Panama on the condition that Panama guaranteed the permanent neutrality of the canal.

As shipowners and shipbuilders have been steadily increasing the size of their ships, the canal has needed to increase its capacity. The reason is that the width of the canal is too narrow for bigger ships to pass as the space between the inside wall of the canal and the ship is sometimes less than 1 m. In these cases, it is too dangerous for the ship to move under its own power, so the ships need to be pulled through the canal with ropes. The current expansion project, the Third Set of Locks Project, began in 2006 and is expected to be completed by 2015. Hyundai Samho Heavy Industries has been chosen to supply the valves for the new Panama Canal locks. HHI

# Rough Economic Conditions a Catalyst for a Better Future

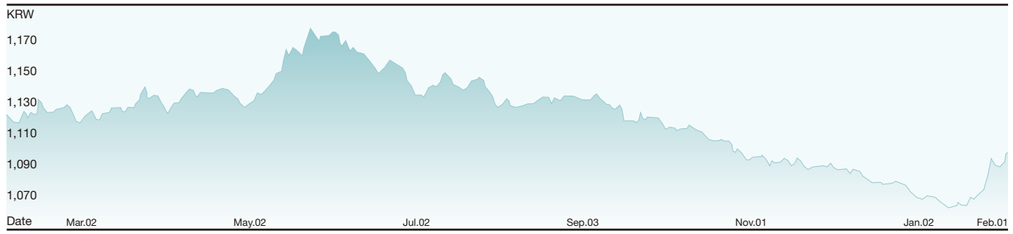
### New Orders & Backlog

(unit: USD million, as of the end of September)

| Divisions | 2013 Plan | 2012 Dec. (YTD) | 2011 Dec. (YTD) | Achievement (%) | YoY (%) | Backlog (Delivery basis) |
|---|---|---|---|---|---|---|
| Shipbuilding | 7,750 | 6,143 | 10,905 | 67.4 | -43.7 | 20,470 |
| Offshore & Engineering | 6,000 | 2,072 | 4,480 | 39.8 | -53.8 | 14,781 |
| Industrial Plant & Engineering | 6,000 | 4,077 | 1,014 | 81.5 | 302.1 | 9,346 |
| Engine & Machinery | 3,100 | 1,858 | 3,176 | 51.6 | -41.5 | 3,313 |
| Electro Electric Systems | 3,160 | 2,318 | 2,625 | 62.2 | -11.7 | 2,683 |
| Construction Equipment | 3,272 | 2,773 | 2,734 | 88.3 | 1.4 | - |
| Green Energy | 394 | 326 | 390 | 42.2 | -16.4 | 136 |
| Total | 29,676 | 19,567 | 25,324 | 64.0 | -22.7 | 50,729 |

### USD Exchange Rate

Source: KEB




### Stock Metrics

| | 2009 | 2010 | 2011 | 2012 | Feb. 12, 2013 |
|---|---|---|---|---|---|
| High for the Year (Closing, KRW) | 250,000 | 456,500 | 554,000 | 345,000 | 248,500 |
| Low for the Year (Closing, KRW) | 148,500 | 171,000 | 235,500 | 195,500 | 205,500 |
| Closing, KRW | 173,500 | 443,000 | 257,000 | 242,000 | 205,500 |
| Market Cap. (Closing, KRW billion) | 13,186 | 33,668 | 19,532 | 18,392 | 15,694 |
| Foreign Ownership (%) | 17.38 | 20.20 | 16.91 | 18.89 | 19.51 |
| PER (H/L) | 7.0/4.2 | 9.8/3.7 | 17.2/7.5 | N/A | N/A |
| EPS (KRW) | 35,705 | 46,594 | 31,751 | N/A | N/A |

### Stock Price

HHI's stock price hit a 52-week low on November 12. This was mainly due to low new orders, as experienced across the industry.

### Stock Performance


### 2012 Business Result

Hyundai Heavy Industries posted K-IFRS consolidated sales of KRW 54.97 trillion for 2012, an increase of 2.3% from 2011. The figure is lower than the company's average growth rate of 12% over the last 10 years, mainly due to a frigid general industrial market especially shipbuilding.

In 2012, HHI's target was USD 30.5 billion in new orders. However, due to project delays in Nigeria and the Middle East, new orders only reached USD 19.6 billion.

The overall operating profit dropped from a year earlier because of unfavorable economic circumstances and low-priced ships.

The Shipbuilding Division achieved KRW 17.79 trillion in sales, down 3.1% from a year earlier, as low-priced vessels were delivered. The Engine & Machinery Division's sales were KRW 2.01 trillion, down 5.8% owing to contraction of the marine engine market. The Construction Equipment Division achieved annual sales of KRW 3.79 trillion, down 11% compared with a year earlier due to the Chinese construction equipment market dragging down global growth.

The Electro Electric Systems and Green Energy divisions also did not meet their annual sales targets because of fierce competition in the power plant component market and sluggish recovery in the renewable energy market.

A number of mega projects have been postponed to this year so that the Offshore & Engineering and Industrial Plant & Engineering divisions were not able to fulfill their new orders targets in 2012. Fortunately, the divisions have shown their potential by securing projects such as USD 3.2 billion Jeddah South Thermal Power Plant project and the world's largest spar platform from Statoil.

The Shipbuilding Division is turning to special purpose ships as the number of commercial shipbuilding orders is at a low ebb. In 2012, the Shipbuilding Division received orders for 7 LNG carriers, 7 LPG carriers, 2 drillships, 1 semi-submersible rig, 3 special vessels, and 10 containerships. Notably, the division won all ultra-large containership orders made last year.

### Sales and New Order in 2013

HHI set its 2013 goal for K-IFRS separate sales at KRW 26.8 trillion. The Company aims to receive USD 29.7 billion worth of new orders in 2013, up 52.3% from last year.

The Shipbuilding, Engine & Machinery, and Electro Electric Systems divisions set their new order targets slightly lower than last year considering market fluctuations. However, non-shipbuilding divisions, especially Offshore & Engineering Division and Industrial Plant & Engineering Division, are expected to achieve their highest performance ever. Both divisions are aiming to reach USD 6 billion in new orders.

The Company expects operating margin will recover in 2014, thanks to robust performance in China and South America.

### Market Outlook

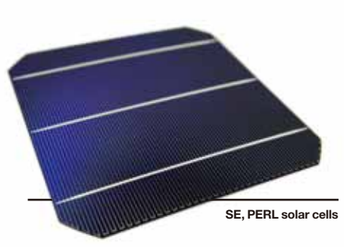
In 2013, the Company expects new orders for vessels and offshore facilities as oil prices continue to sustain profitable levels with unclosed projects in 2012. Shipowners' slow steaming strategy to reduce fuel consumption and greenhouse gas emissions is easing oversupply and encouraging shipowners to order fuel-efficient ships at the currently low ship prices. Also, we can see evidence that shipowners are likely to place orders for high-value eco-friendly ships to replace aging ships. On top of that, shipowners intend to deal with low fuel efficiency ships and accelerate their scrapping plans because of robust trend in scrapping market price. HHI

# Development of the Highly Efficient SE, PERL Solar Cells by Green Energy Research Institute

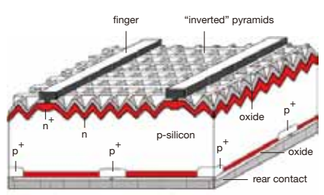
Hyundai Heavy Industries successfully developed world-class solar cells in 2012, taking a significant step toward becoming a leading solar panel products manufacturer. The selective-emitter solar cell and rear-passivated solar cell have been measured to be 19.8 percent and 20.4 percent efficient, respectively, by Fraunhofer Solar Energy Institute in Germany.

Selective-emitter and rear-passivated solar cells are both next-generation products that guarantee higher power output than conventional products. The selective emitter solar cell adopts improved front side structure, which consists of the efficient emitter in the light receiving area and the less efficient but highly conductive emitter under the electrodes. Additionally, on the rear side, the passivation layer can be applied to improve the electrical charge collection probability significantly. However, as they require more technologically demanding production process to manufacture, the performance gain must be high enough to justify the increased cost. A number of companies have developed selective-emitter solar cells that are ~19.3 percent efficient and rear-passivated solar cells that are ~20.0 percent efficient, but only a handful have achieved results as high as those achieved by Hyundai Heavy Industries. The new 6-inch cells also offer a 55 percent increase in power production as they are a full inch bigger than other cells on the market. Furthermore, the front face of the cells developed by HHI uses copper as the electrode material, allowing a significant cost reduction possibility compared to the conventional products that use expensive silver.

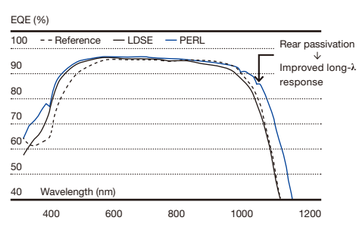
The global solar industry is currently suffering from excessive competition by hundreds of manufacturers selling products with little difference. Hyundai Heavy Industries seeks to rise above the rest by offering products with better performance and excellent value. **HHI**



**SE, PERL solar cells**




**Original passivated emitter and rear locally diffused (PERL) structure**
MA Green, "Crystalline Silicon Solar Cells"

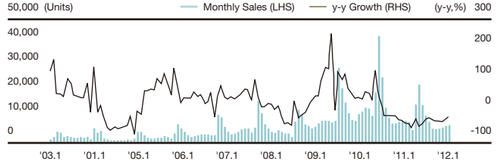







# Global Construction Equipment Market Outlook

By Paul Hah




**China Excavator Sales Trend**


**US Housing Starts Trend** Source : Bloomberg

Due to the global economic downturn, the construction equipment market saw sluggish growth throughout 2012. In particular, while the US market slowly turned around (spurred on by the housing market recovery), the Chinese market dragged down global growth. However, assuming that the global economy continues to pick up, we forecast that the construction equipment market will also gradually recover in 2013.

## Chinese Market to Recover Slowly

It appears that the Chinese construction machinery market still needs more time to show a meaningful recovery. We believe Chinese government policies caused the nation's economic growth to contract over the last few years, leading to the construction machinery market suffering from a significant downturn (witnessed since mid-2011). Of note, sales at six major construction companies in China (Sany, Zoomlion, LiuGong, XCMG, Shantui, and Xiamen XGMA) dropped by an average of 4.8% in 3Q12. In particular, excavator sales growth has down trended for 15 months straight (through 3Q12), which is attributable to saturated demand, excess capacity, and increased inventory levels. We take the view that the incoming government needs to focus more on infrastructure investment in order to boost economic growth. Of note, as the government has officially announced plans to develop rural areas, infrastructure investment appears to be inevitable. In view of the above, although construction machinery growth in 2013 will likely be limited, the Chinese construction equipment market is expected to strengthen over the next few years.

## US Market to Drive Overall Growth

The US construction equipment market will likely grow in 2013, backed by a recovery of the housing market. Over 2008-2010, US housing starts hovered around 400,000 and 500,000 units/month (annualized), which is the lowest level seen since 1947. However, in early 2012, the figure began to edge up, and is forecast to reach 1 million units in 2013. Meanwhile, housing permits, perceived to be a leading indicator of housing starts, also rose in 2012; thus, we believe that housing starts will gain traction in 2013. As President Obama has been re-elected, the US government's policies towards housing, such as mortgage interest rate deductions and MBS purchases, should remain unchanged. According to OEM off-highway, although the US construction machinery market may correct by 5 to 10 percent YoY in 1H13–due to high-base effect–the market is expected to turn around in 2H13, growing 10 to 20 percent YoY.

## Global Top Players Cautious

According to Caterpillar, one of the largest construction companies in the world, its revenue in 2013 will be similar YoY (assuming that economic conditions remain stable). Given that dealers' inventory levels remain high, we believe that it will take more time before strong demand for new equipment materializes. Nonetheless, replacement demand for obsolete equipment remains intact and a housing market recovery should also help sustain steady growth in the construction equipment sector. **HHI**

*The writer is an analyst at Woori Investment & Securities Co.*

# *Arirang*

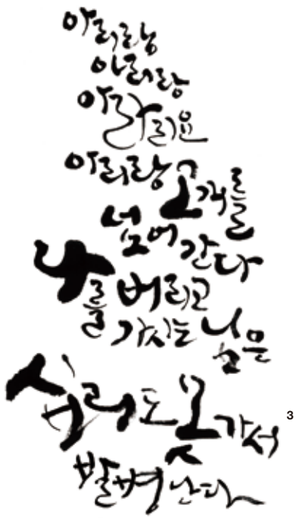
## *the Healing song of Korea*

Arirang is a Korean folk song that has come into being spontaneously in various regions. It is a cultural heritage itself as it allows us to experience Korean history and culture with its beautiful rhythm and sound.


1

2

1 Movie poster for "Arirang" filmed by director Na Woon-gyu, 1926
2 The standing Jung-Seon lady statue is facing Auraji River
3 Arirang lyric written by calligraphist Kwon, Young-gyo
4 'Arirang Arariyo Festival' held at Suwon World Cup Stadium



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Arirang, the Korean folk song, was designated as an Intangible Cultural Heritage in 2012. Arirang is the 15th intangible cultural heritage in Korea after *pansori, ganreung danohje, jongmyo jerye, ganggangssulae, namsadang nori*, and *jultagi*. The song, which has over 150 variations and 8,000 different lyric versions, completely encompasses the Korean experience with different stories and sentiments depending on the region and era.

### The People's Song

It is difficult to pinpoint the exact age of the song as it is part of oral tradition and people have been adding their experiences to it throughout the ages. It has been estimated that Arirang was sung from ancient times on the Korean Peninsula. Arirang has three compound beats in a moderate tempo, but it changes depending on the specific tone of the area. The lyrics change as well. Every lyric tells different stories from different regions in that region's vernacular.

*Jungsun Arirang*, *Jindo Arirang*, and *Milyang Arirang* are the typical Arirang songs. The lyrics of *Jungsun Arirang* reflect the rustic and isolated sentiments of that region. *Milyang Arirang* gives the impression of masculine and brusque song and the lyrics and compositions of the song are fun and easy to sing along to. *Jindo Arirang*, which has a cheerful melody and requires superb skill to sing, is the exclusive property of the southern province, famous for Jindo dogs. Arirang is a Korean folk song that has come into being spontaneously in various regions. It is a cultural heritage itself as it allows us to experience Korean history and culture with its beautiful rhythm and sound.

### Sharing Feelings and Stories

Arirang was not sung by the nobility; it was sung by the peasantry, unknown and powerless. People usually learned the song by humming it themselves instead of reading the written lyrics. Because Arirang is divided into two parts with the lead of different words in each time and repetitive lyrics "Arirang", the singer could compose the song and lyrics to reflect their own creativity and expressions. The lyrics were spread by word of mouth and handed down by tradition. This openness of Arirang has carried out the role of oral tradition which passed down the stories of hardship and pleasure through the ages.

The standard version of 'Arirang' is also comprised of two parts. At first, several people start singing the refrain 'Arirang arirang arariyo, crossing over Arirang pass,' then one of the women sings the lead part 'Dear who abandoned me here shall not walk even *ten li* before his feet hurt' with a sorrowful voice. Then the refrain comes again, as if to console her wounded heart. Even the words in the second verse of this song, 'Just as there are many stars in the clear sky, there are also many dreams in our heart', sound very poetic. The lead singer tells her joys and sorrows with the lyrics, and then the other singers reply. Once they sing all the way through the song and reveal their true feelings, both the singer and the audience have peace of mind.

### Significance of Arirang

For Koreans, the word "Arirang" has a deep meaning. It's probably because the song, which has a history as long as that of the Korean people, has the communal sensitivity to share great sorrow and joy. It was the reason people sang this song when they carried on the independence movement during Japanese colonial rule, but also during other difficult times. Arirang was even designated as the official march of the US Army 7th Infantry Division (currently inactive) by the South Korean government in 1956.

Arirang has healed the minds of Koreans with its soulful sentiment. Even when it has some other melody or lyrics, Koreans have embraced Arirang deep down in their hearts. HHI

**Sources**

Calligraphy - Kwon, Young-gyo

Photos - Gwangju World Arirang Festival

**Playing *'gayageum'* which is a Korean traditional instrument on Gwangju World Arirang Festival**





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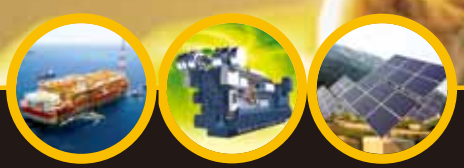

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