Korea monthly shipbuilding magazine

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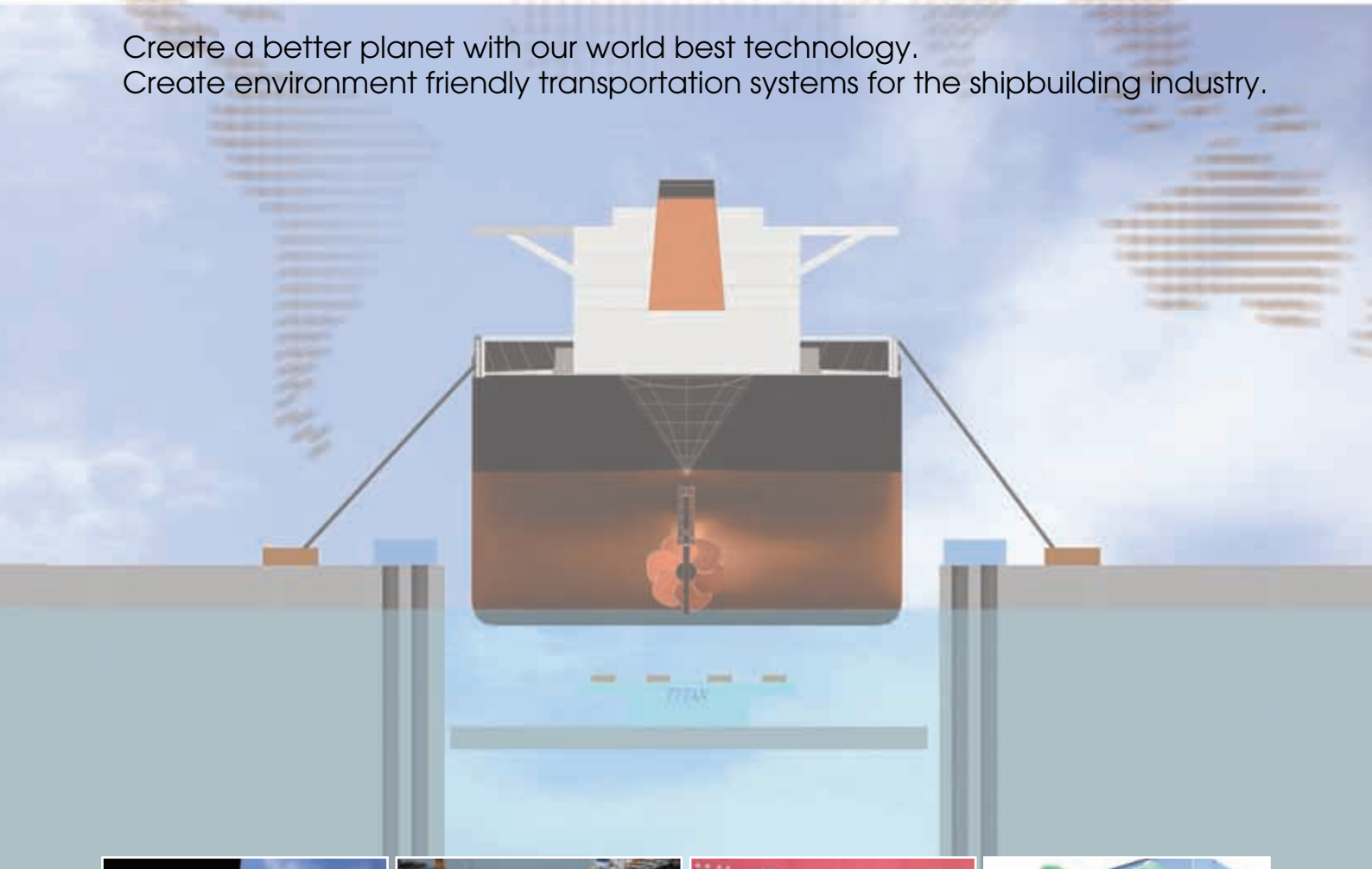

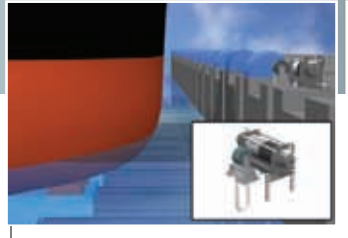

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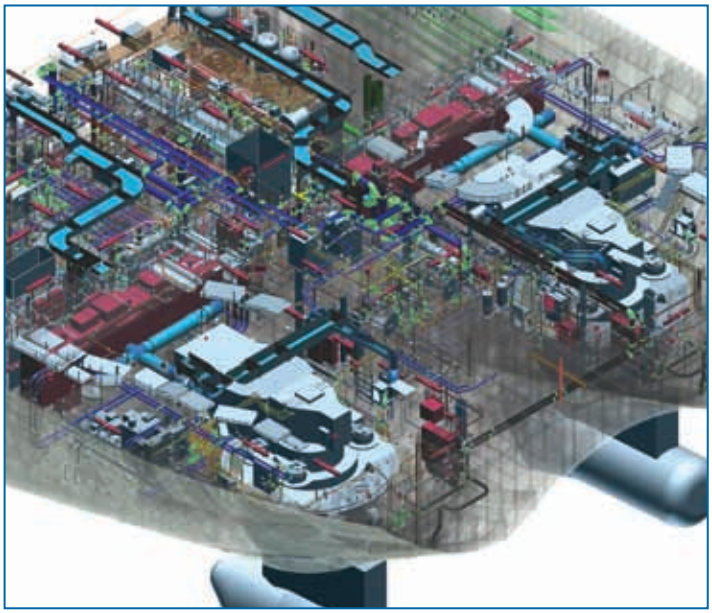

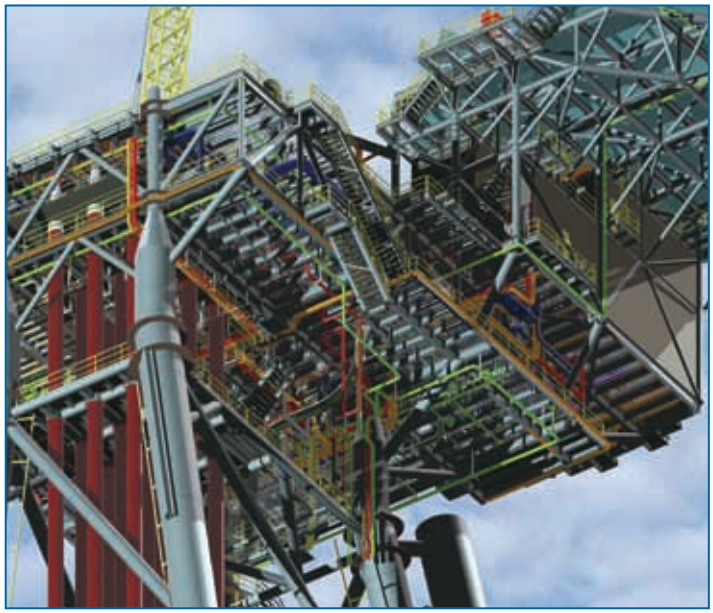

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|---|---|---|---|---|---|---|---|---|
| Capacity | $m^3/hr$ | 750 ~ 3,000 | 3,000 ~ 5,500 | 5,000 ~ 8,500 | 8,000 ~ 15,000 | 14,000 ~ 23,000 | 22,000 ~ 47,000 | 51,000 ~ 122,000 |
| Motor | HP | 125 ~ 20,000 | | | | | | |
| Discharge Pressure | Bar A | 4.5 ~ 25 | | | | | | |
| Dimension(W x L x H) | M | 1.5x 2.6 x 1.9 | 2.1 x 4.4 x 2.1 | 2.1 x 4.7 x 2.2 | 2.2 x 5.2 x 2.1 | 2.3 x 5.8 x 2.6 | 4.4 x 8.0 x 4.3 | 6.5 x 13 x 7.0 |
| Weight | Ton | 3.4 | 7 | 9 | 12 | 18 | 40 | 140 |

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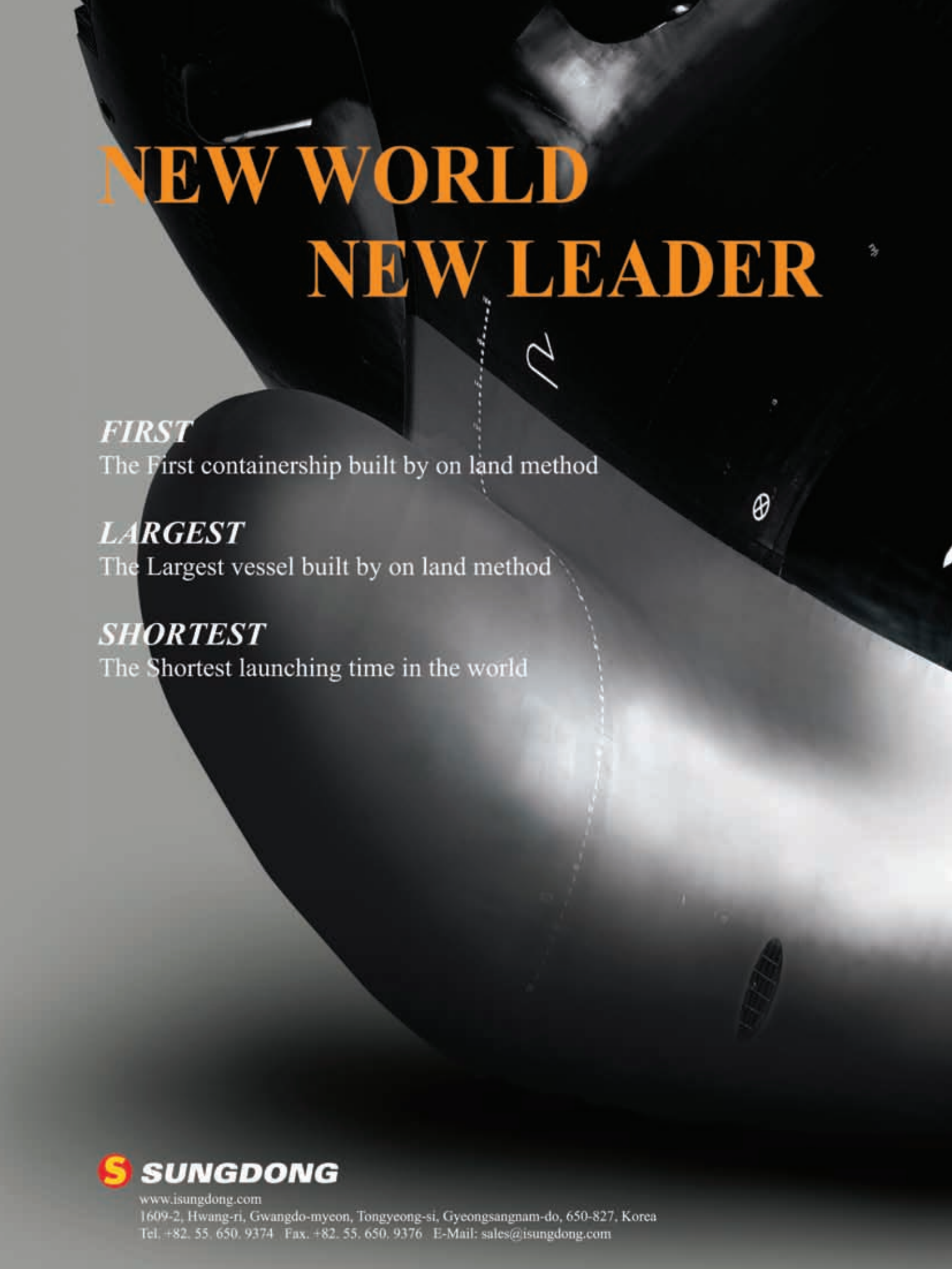

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## FORTUNE Magazine Again Names National Instruments Among "100 Best Companies to Work For"

For the 12th consecutive year, FORTUNE magazine has named National Instruments (NI) to its annual "100 Best Companies to Work For" list. The national recognition is based on an annual survey that randomly polls employees from hundreds of companies regarding the quality of their corporate cultures and filters results through strict criteria to select the best workplaces.

"The fact that FORTUNE has again recognized NI as one of the best places to work in America shows the value of our long-term commitment to our employees and corporate culture," said Dr. James Truchard, president, CEO and cofounder of National Instruments. "The dedication of our employees has brought us through one of the toughest economic climates in history, and this recognition reinforces the value of our long-term vision."

For 35 years, NI has worked to provide engineers and scientists with hardware and software solutions that help them innovate more efficiently. NI is best known for pioneering virtual instrumentation with its LabVIEW graphical system design platform. As an employer, the company holds the philosophy that a well-balanced work culture improves employees' well-being, inspires excellence, advances good corporate citizenship and benefits all of the company's stakeholders. To support that philosophy, NI offers its employees professional, personal and community development initiatives, volunteer opportunities and wellness programs and facilities.

"Our success this year directly reflects the values we hold as an employer," said Mark Finger, NI vice president of worldwide human resources. "We realize that our sustained strength as a business only comes when our leaders and employees work together to maintain a positive corporate culture. The power of our culture has carried us through these challenging times and has positioned us well for long-term success."

## Techcross has delivered and installed a ballast water treatment system in VLCC, first-ever in the industry

Techcross announced that it delivered Electro-Cleen System (ECS), a ballast water treatment system, to be installed in very large crude carriers (VLCC) for the first time in the industry.

The system was supplied and installed in August 2010 in 317,000DWT VLCC built by Hyundai Heavy Industries (HHI), which was delivered to a Middle Eastern ship owner in January 2011.

This marks the first time that a ballast water treatment system is installed in VLCC, although many companies worldwide, including Techcross, have developed and marketed ballast water treatment systems.

Ballast water treatment systems must be capable of accommodating large flow rate capacities because large vessels such as VLCC use a tremendous amount of ballast water.

ECS is a ballast water treatment system suitable for VLCC, considering that different models of the ECS can be combined and installed according to the ballast water tank capacity of the ship.

In addition, the installation, maintenance, and repair have become far easier because all equipments are made available in package units ready for installation with a separate room for ECS on deck if the system is installed in 317K VLCC.

Specifically, ECS model can be adapted in various ways according to the ship environment and be mounted on board without regard to the type of ship.

Techcross had already installed the world's first explosion-proof ballast water treatment system, and has proved its excellent technology again with its installation of the system in VLCC this time, first-ever in the history of shipbuilding industry.

Installation of Electro-Cleen System

An official in charge of sales operation at Techcross said, "It is very encouraging that Techcross has installed this ballast water treatment system in VLCC for the first time in the industry. Importantly, it will have positive effect in our winning new orders for various types of ships in the following period."

## SSME held a tree planting event with a Japanese ship owner

Sungdong Shipbuilding & Marine Engineering (SSME) held a tree planting event with a Japanese ship owner on January 24 at Mangilbong Park in Tongyeong City. The event took place one day prior to the naming ceremony and the signing ceremony of delivery agreement on January 25 for a 180,000DWT bulk carrier ordered by KUMIAI of Japan.

During the event, about 670 trees were planted, including red maple trees, citron trees, rose bay azalea, etc, which will surround the promenade of Mangilbong Park, one of major tourist attractions of Tongyeong City.

This tree planting event was organized by KUMIAI to express its satisfaction with the successful construction of the 180,000 DWT supersize bulk carrier which the Japanese ship owner ordered to SSME for the first time, as well as its trust in and gratitude to SSME for the shipbuilder's superb technology.

This vessel order is the first one which KUMIAI, one of top 10 ship owners in Japan, first ever awarded to any Korean shipyard in 2009, although Japanese ship owners very often place shipbuilding orders with domestic shipyards and are very difficult to satisfy in terms of technological requirements. Also, this vessel is the first order that SSME received from any Japanese ship owner.

Meanwhile, the tree planting event was attended by Nobutaka Mukae, President of KUMIAI, and Chikako Yoneda, Chairman of KUMIAI who attracted attention when he delivered congratulatory address in fluent Korean.

Kim Dong-jin, Mayor of Tongyeong City remarked in his congratulatory speech, "I am thankful for all the support that we have received from the Japanese company in our attaining the green growth and creating leisure and recreation space for the citizens of Tongyeong City as part of social responsibility going beyond the corporate trade and borders."

Byeon Moon-seong (President of SSME Sales Division), Kim Yoon-il (Manager of Park Green Space Dept. of Tongyeong City), Kim Dong-jin (Mayor of Tongyeong City), Jeong Hong-joon (Chairman of SSME), Chikako Yoneda (Chairman of KUMIAI SENPAKU), Nobutaka Mukae (President of KUMIAI SENPAKU) are planting trees during the event.

Chikako Yoneda, Chairman of KUMIAI, directly presented gifts that he personally prepared to Kim Dong-jin, Mayor of Tongyeong City, and employees of Park Green Space Department of Tongyeong City to express his gratitude.

Meanwhile, the vessel named 'HANJIN MAT SUYAM' measures 292.0m in length and 45.0m in width and can sail at an average speed of 15.2 knots.

## KSEG, Busan's joint brand for shipbuilding/maritime industry, signed KRW 16 billion export contract

KSEG (Korea Shipbuilding Engineering Group), the joint brand of Busan-based companies in the shipbuilding/maritime/port sector, entered into a $15 million (approximately KRW 16 billion) contract on January 25 with NOSCO of Vietnam to export the shiplifting system.

The shiplifting system is one of the ship launching system and an equipment with the largest capacity worldwide. This contract paves the way for winning widespread recognition of Korea's excellent shipbuilding technology both at home and abroad.

Specifically, this export contract is all the more significant, considering that it was finally executed after about 1 year of thorough preparations from last year by KSEG, Vietnam Trade Representative Office in Busan, KOTRA (Korea Trade-Investment Promotion Agency), Hochimin KBC (Korea Business Center) which made concerted efforts, such as constant collection of market information, joint marketing, visits to local shipyards, etc, in a bid to actively make inroads into the shipbuilding market of Vietnam, the emerging shipbuilding country.

Jang Cheol-soon, Chairman of Shindong Digitech which took the lead in the establishment of KSEG, said, "This contract is difficult to be executed by a single individual company. KSEG, a joint brand, Busan City, and reliable government organizations such as KOTRA, etc, collaborated for the joint marketing in order to successfully execute this contract." He stressed, saying "It is an example showing that the shipbuilding, maritime, and port companies of

Busan with excellent technologies can compete effectively in foreign markets if they work closely together."

KSEG plans to expand the marketing efforts into the shipbuilding markets in South East Asia, in addition to Vietnam, and drastically increase the participation of companies in the joint brand and expand the boundary of the brand.

KSEG was formed in 2002, and has been participated by 10 local companies, including Shingdong Digitech, TSB, Yunex, Ji In Tech, DK Industrial, and others.

To secure footholds in foreign markets, KSEG established the engineering & consulting group related to the shipbuilding and marine equipments and has provided one-stop services related to the construction design and operation of shipyard, export of marine equipments, engineering, and others.

## HVS delivered 2 vessels in a row

Hyundai-Vinashin Shipyard (HVS), a joint venture between Hyundai Group in Korea represented by Hyundai Mipo Dockyard (HMD) and Vietnam Shipbuilding Industry Corporation, made a good start for 2011 by delivering 2 ships one after another recently.

HVS held a naming ceremony on January 26 in Vietnam for the ship no. S007, the 7th vessel out of the 10 units of 56,000-ton bulk carriers ordered by the E.R. Schiffahrt, the ship owner based in Germany.

In the naming ceremony, S007 was christened 'E.R. BASEL' by Jeong Myeong-ae, the wife of Kim Byeong-oh, Managing Director in charge of Sales & Customer Support at HMD, who was invited as sponsor upon the request of the ship owner. The vessel, which measures 187.8m in length, 32.2m in width, and 18.3m in height, departed for a port in Singapore to load the cargo on January 27 after the delivery ceremony.

Following that, HVS held a naming ceremony on January 28 for SO28, the second vessel out of the 3 units of the 37,000-ton bulk carriers ordered by Norden, a Denmark-based shipping company. This vessel, christened 'NORD BARCELONA' by the ship owner, is 187.0m long, 27.8m wide, and 15.6m high. It was delivered on January 31 and left the port for Taiwan.

HVS, which was established in 1999 as a joint venture with a state-owned shipyard of Vietnam for the repair/conversion of ships, launched the newbuild business in later part of 2000, and won orders for 2 units and 5 units in 2009 and 2010, respectively, and set the delivery target of 11 vessels for this year.

Naming ceremony of E.R. BASEL, a 56,000-ton bulk carrier, held on January 26

## Oil States awarded PTTEP contract for the supply of marine cranes

On February 10, Oil States Internationa announced that its subsidiary, Oil States Industries (Thailand) has been awarded a three-year contract valued at approximately $14 million (THB 432 million) to supply Offshore Marine Cranes to PTT Exploration and Production Company Limited (PTTEP).

These cranes will be installed on new wellhead platforms in the Gulf of Thailand for the Bongkot and Arthit concession areas. The first six cranes will be delivered during the second half of 2011.

"This is a significant achievement for Oil States," said Frank Timmons, General Manager of Oil States Thailand, "which further enhances our leadership position in Thailand and the Southeast Asian markets and demonstrates the confidence PTTEP has in our Nautilus brand of offshore marine cranes."

Offshore marine cranes are typically installed on fixed or floating offshore structures and are used to transfer both equipment and people between supply vessels and the platform deck. These cranes are designed to strict engineering standards to ensure safe and reliable operation in the challenging marine environment.

A subsidiary of Oil States International, Oil States Industries is a leading manufacturer of API certified marine cranes, and also provides a broad range of highly engineered products and services to the offshore and onshore oil and gas industry. Oil States Thailand is a leading marine crane equipment and service provider in Thailand, and is a licensed distributor and repair facility for many crane components

and systems. Oil States Thailand provides parts and service support for marine offshore cranes throughout the Asian region from its facility in Rayong province.

The foregoing contains forward-looking statements within the meaning of the Securities Act of 1933 and Section 21E of the Securities Exchange Act of 1934. Forward-looking statements are those that do not state historical facts and are, therefore, inherently subject to risks and uncertainties. The forward-looking statements included therein will be based on then current expectations and entail various risks and uncertainties that could cause actual results to differ materially from those forward-looking statements. Such risks and uncertainties include, among other things, risks associated with the general nature of the oilfield service industry and other factors discussed within the "Business" and "Risk Factor" sections of the Form 10-K for the year ended December 31, 2009 filed by Oil States International with the SEC on February 22, 2010 and the "Risk Factor" section of the Form 10-Q for the period ended September 30, 2010 filed by Oil States International with the SEC on November 5, 2010.

## KR was named the inspection agency of Public Procurement Office

Korean Register of Shipping (KR) was designated as the inspection agency of Public Procurement Office (PPO) and will carry out duties related to the inspection of quality, starting from March 1, 2011.

Among the products that the Quality Management Group of PPO will commission KR to inspect are included 3-phase induction motor, diesel/gasoline engine, ventilator, centrifugal pump, water pump, sewage pump, oil pump, borehole pump, chemical pump, booster pump, multi-stage pump, pump combined with pump motor, mixed-flow pump, and inline pump.

An official from KR said, "Korea Register of Shipping, named the inspection agency of PPO, will use its expertise and skill related to the ship safety inspection to help improve the quality and safety of products supplied to government organizations."

## HHI accomplished a world record-breaking milestone of 1,700 ship delivery

Hyundai Heavy Industries (HHI) became the first shipbuilder around the globe to deliver 1,700 vessels.

On January 31, HHI delivered the MORNING LILY, an 8,100 unit pure car/truck carrier (PCTC) ordered by EUKOR Car Carriers.

HHI became the first shipbuilder worldwide to reach the milestone of 1,700 vessel delivery 37 years after it launched the shipbuilding business with the delivery of Atlantic Baron, a 260,000-ton oil tanker, its first ship, in 1974.

HHI is expected to break the 2,000 mark by the second half of 2013, writing new chapter in the history of global shipbuilding industry, if HHI continues the current momentum and meets its delivery target of 110 vessels for this year.

The accumulated GT of vessels that have been delivered so far by HHI stands at 97.76 million GT, which surpasses 94.30 million GT (according to Clarkson data) delivered by shipbuilders worldwide last year. HHI will set a new delivery record of 100 million GT in April.

Also, HHI's ships have been named Significant Ships for 28 consecutive years since 1983, thus pushing the notion "Korean ships are the best quality products" deep into the consciousness of people in the global shipbuilding and shipping industry.

Meanwhile, EUKOR Car Carriers, the ship owner, donated KRW 10 million to the welfare fund for HH's employees who built the excellent quality ship to celebrate HHI's delivery of 1,700th vessel.

Yang Jae-sik, Senior Managing Director of HHI, in charge of customer support, said, "Reaching the milestone of 1,700 ship delivery, first time worldwide, is very significant in confirming HHI's position as the world's largest shipbuilding company. We will ceaselessly develop technologies and improve shipbuilding methods to cement our status as the world's no. 1 shipbuilder."


Yang Jae-sik, Senior Managing Director of HHI, is celebrating the successful delivery with Peter Johansson, chief supervisor of the ship owner, during the signing ceremony for delivery.

## PaxOcean ordered two Rolls-Royce designed offshore vessels

Recently, Rolls-Royce announced an order from Singapore-based offshore company, PaxOcean, to provide the ship design, propulsion systems and deck machinery for two platform supply vessels.

The order is worth over EUR 12 million to Rolls-Royce with additional options to construct a further four vessels of the same type.

YK Tang, Director of PaxOcean Group Marketing, added, "We are very happy to build on our good relationship with Rolls-Royce and pleased to construct this leading design in diesel-electric offshore vessels. Our in-house PaxOcean Engineering Design team is also very pleased with the close collaboration with Rolls-Royce."

Ronny Pál Kvalsvik, Rolls-Royce, Sales Manager - Ship Technology Offshore, said: "These vessels combine a proven Rolls-Royce ship design, integrated with a range of mission-critical onboard technology, enabling safe and efficient operation in the challenging environments of oil and gas fields. We look forward to working closely with PaxOcean throughout the construction of these advanced vessels."

The UT 755 CD is a development of the popular UT 755 series. The vessels will be built at PaxOcean Engineering's offshore vessel shipyard in Zhuhai, China, with delivery due in 2012.

Since the first UT 755 was delivered in 1996, more than 170 vessels of this design have gone into service or are on order worldwide. The latest models feature increasingly efficient hull designs and diesel electric propulsion technology, which minimise the impact on the environment and improve the comfort and safety of the crew. In total, more than 650 Rolls-Royce designed UT vessels are in service around the world.

Offshore Support Vessel

## HHI produced its 5,000th HiMSEN engine

Hyundai Heavy Industries (HHI) accomplished the total production milestone of 5,000 units of HiMSEN engines, developed by purely domestic technology, in 10 years after its first unit in 2001.

HHI successfully completed the trial operation of HiMSEN engine (model name: HiMSEN 8H25/33) that would be used for the power generation in the 4,500TEU container ship of Denmark's A.P. Moller at its headquarters in Ulsan on February 10, and announced that it set a new milestone in the world's marine diesel engine industry.

HiMSEN engine, the nation's home-designed engine developed by purely domestic technology, is used for both the propulsion of ships and power generation. HHI had invested KRW 40 billion in R&D for 10 years to develop this engine which made debut in 2000.

HiMSEN engine boasts lightweight, high output, and high efficiency, etc, adopting unique modular design, and was selected as one of "Korea's 10 Best New Technologies of 2002" and "World Class Product in 2004".

Bolstered by this excellent technology, the annual production of HiMSEN engine skyrocketed to over 8 million after 2007, which stood at 4 units in 2001 and 123 units in 2004. HHI has successfully penetrated the conservative and high barrier engine market and has held a significant position in the global market in 10 years, a relatively short period of time.

In addition, HHI received the prizes in iF

HiMSEN engine

Design Award (2009) and Red Dot Design Award (2010), the world's 3 major design awards, in recognition of its design prowess, as well as excellent quality.

Recently, HiMSEN engines have been installed in Packaged Power Stations (PPS) and Diesel Power Plant (DPP) and exported to Central/Latin America, South East Asia, and others, helping alleviate chronic power shortage of those countries. HiMSEN engine is also used for onshore power generation and has come under spotlight.

HHI has garnered approximately 23% share of the global market for ship propulsion and power generation medium-sized engines, and HiMSEN engine accounted for 91% of all medium-sized engines in terms of quantity last year, overwhelmingly surpassing the quantity of licence products. In other words, HiMSEN engine has captured a large share of the market for medium-sized engines, which is attributed to the customers' preference for HiMSEN engine and its stronger competitiveness over the licence products of overseas engine makers.

## Rockwell Automation introduced free online tool to help manufacturers reduce energy use and improve competitive edge

Rockwell Automation has developed a free, first-of-its-kind online tool that gives a manufacturer a complete analysis of its current water, air, gas, electric and steam (WAGES) management performance, as well as a clear understanding of how its operating strategies compare with peers in both the same industry and across other sectors. The tool uses a 20-minute online assessment to generate a real-time report outlining a facility's competitive WAGES management baseline. The results allow employees at all levels of the business to identify and implement strategic changes, and to set improvement goals both for single facilities and across their entire organization.

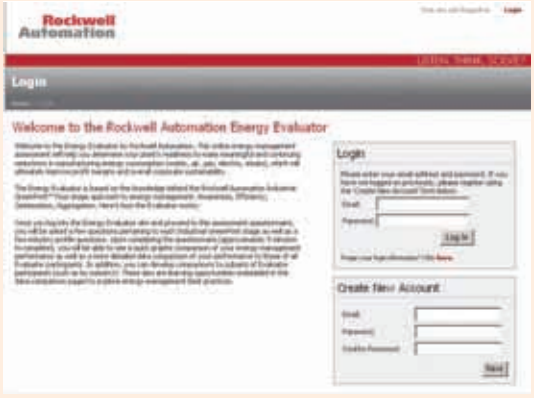
"Many manufacturers are not aware of how much energy their machines and facilities are consuming at a given time, and how that behavior compares to peers in their industry," said Randy Selesky, vice president of Power and Energy, Rockwell Automation.

"The Energy Evaluator tool offers insight into WAGES management strategies and allows users to identify meaningful changes to help lower their overall energy costs and make them more competitive in the marketplace."

"Due to variability in demand, availability and costs, manufacturers are recognizing the need to manage natural resources like electricity, water and gas more effectively," said Tom Fiske, senior analyst, ARC Advisory Group. "Unfortunately, most companies don't have a detailed perspective on usage of these scarce resources and where opportunities exist to improve operations and their bottom line. Tools like the Energy Evaluator can provide a first step toward a continuous improvement process that optimizes WAGES resource utilization throughout the enterprise."

The tool is based on the Rockwell Automation Industrial GreenPrint methodology, which is designed to provide manufacturers with a customized, strategic roadmap for industrial WAGES resource management. The Rockwell Automation Industrial GreenPrint methodology consists of four stages - "Awareness," "Efficiency," "Optimization" and "Aggregation" - which help companies transform their practices and production, improving profitability and enabling supply chain optimization.

The Rockwell Automation Energy Evaluator tool is available at www.rockwellenergyevaluator.com. The report generated by the tool can be exported into Excel, PDF or printable HTML formats to allow for easy internal sharing and manipulation of data to visualize the impact of operational and behavioral improvements. Users also can continuously access their report and update information to track their progress. Rockwell Automation Industrial GreenPrint consultants are available to help analyze results and identify customized, holistic strategies for implementing improvements.

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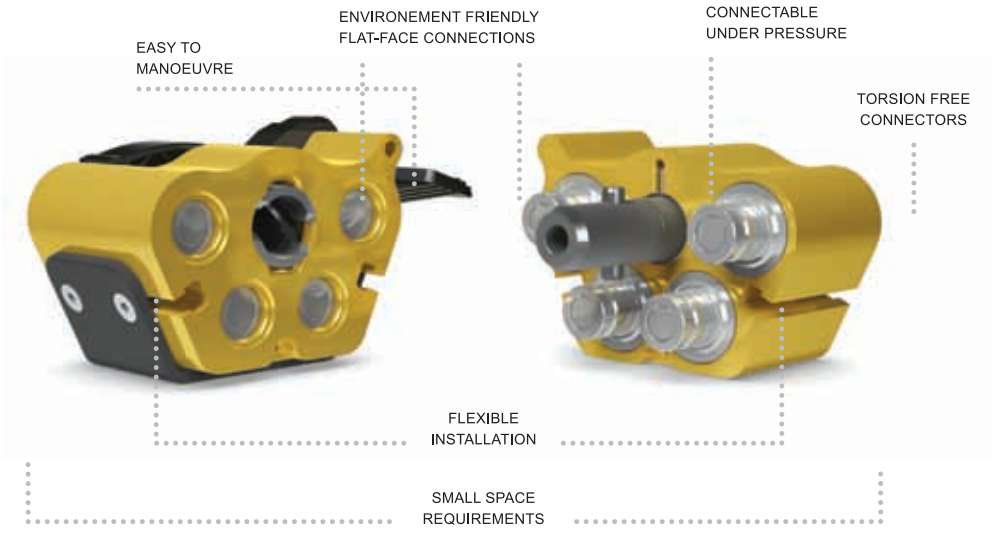


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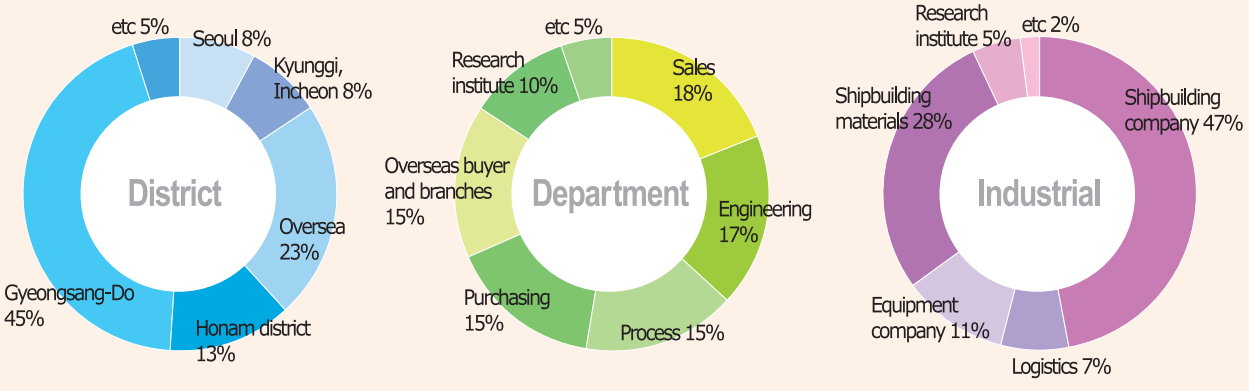

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# Container ships, the locomotive of growth in merchant ship sector in 2011

Volumes of merchant ship order in 2011 will stand at approximately 28 million CGT, which remains at a level similar to that of 2010. Based on the type of ship, it is widely speculated that bulk carrier order-book will shrink sharply while new container ship and LNG carrier orders will increase.

Specifically, container ship orderbook will rise nearly two-fold compared to the previous year. Korean shipyards are expected to receive a considerable portion of total orders based on their competitive advantage with unrivalled experiences and technologies for the construction of large container ships.

Also, the recent surge in new orders for ultra large container ships, driven by the motivation to gain economic benefits, increases the possibility that shipyards will have more container ships on their orderbooks this year.

Here, we will foresee the prospect for the merchant ship market in 2011 by focusing on container ships.

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This report was produced with reference to "Trend & Outlook of Container Ship Order Placement (2011, Im Jae-mook)" of KDB Research Institute, "Outlook of Shipbuilding Industry in 2011 (December 2010, Lee Eun-chang)" of Hana Institute of Finance, and industrial analytical data of the Research Center of Daishin Securities.

The merchant ship orders in 2010 stood at 29 million CGT (based on October, 2010), which exceeded 16 million CGT, set at the beginning of the year, by as much as 69%. Shipyards are expected to have similar number of merchant ships on their orderbook at a level similar to that of 2011. Although new order intake will remain almost same as last year, new orders for vessel types - which large domestic shipyards are better positioned to build - will comprise larger portion than ever. In that light, large domestic shipyards will show stronger performance this year than the previous year.
Bulk carrier orders will diminish sharply in 2011 compared to 2010, and shipyards are expected to have a significantly more number of containers ships/LNG carriers on their orderbooks this year. Korean shipyards will receive more orders than the previous year, taking up an increased share in the global ultra large container ship/LNG carrier markets, although new orders worldwide hold near last year's level. That is attributed to the fact that Korean shipyards have superior competitive advantage over Chinese shipyards in this segment.

## Container ship market buoyant in 2011 with bulk carrier market in decline

The orders for new merchant ships picked up after falling to the lowest level in the second quarter of 2009, and shipbuilders began to see a strong growth in new orders from November, 2009. The merchant ship order in 2010 did not only mark a turnaround but also outpaced the annual new order target.
The momentum for the robust growth in new orders, which surpassed the expectation, came from the soaring bulk carrier orders. Volume of new orders for bulk carriers in 2010 was the third largest in history behind the one recorded in 2007 and 2008 based on annual new order volume. This sharp increase in bulk carrier orders is attributed to fact that Baltic Dry Index (BDI) rose to over 4,000pt in the first half of year, much higher than expected, and there was an upward shift in demand for low price vessels to take advantage of a 40% drop in ship price based on the dollar which hit the peak in August 2008.
In 2010, large global shipping companies, such as Vale, secured their ship fleets and China intensively made investment to an extent that it constructed Chinamax (400K DWT), a new ship type, to handle the growing trading volumes.
In 2011, bulk carrier orders are expected to plunge for these


reasons:
First, there is a growing concern over the excessive order backlog in the aftermath of the shipbuilding order boom in 2010.
Second, the sharp increase in new order placements - for taking advantage of the low ship price in 2010 - is partly based on the demand formed 1 year ago.
Third, ship owners have sharply declining motivation to place new orders, compared to 2010, because the ship price is rising while the freight charge is dropping from the peak recently.
BDI, the benchmark for commodity shipping rates, averaged around 2,800p in 2010, and is expected to be adjusted downward to 2,420p in 2011.
A concern over possible glut in the market for oil tankers in 2010 has been raised amid the steady increase in the delivery. However, the market was vibrant with WS (VLCC-TD3, MEG-Japan) index being averaged around 88.4p in the first half of year even in the midst of Iran's demand for storage, Arctic air and record snowfalls which gripped the northern hemisphere and rapid phaseout of single hull (monohull design), etc.
WS index is expected to average around 54p (average until November 18, 2010) and hit 70p on the annual average in the second half of year as the factors driving up the index disappear in the first half of year.
Tanker orders soared in parallel with the bulk carrier order boom amid the surge in demand among ship owners to take advantage of low price and favorable market conditions in

the first half of year. However, the glut in the market is expected to be difficult to be cleared this year, and therefore, the market will turn down compared to 2010 and new orders are likely to decrease.

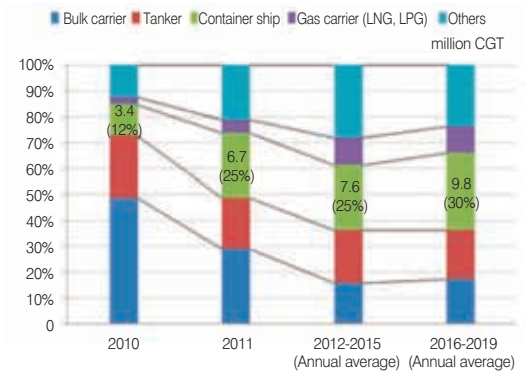
Meanwhile, product tanker orders are expected to rise steadily, considering the decrease in deliveries from shipyards after 2011 and steady increase in the trading volumes.

The container ship market did not recover dramatically in 2010, but the freight charge climbed to the pre-financial crisis level while charterage has yet to fully recover. The slow-steaming effect on the marketplace and recovery in trading volumes put strain on the fleet operation during the peak season, and as a result, ship owners, specifically, shipping lines, withdraw their request of delay in delivery and placed unprecedented amount of new orders ever recorded after the financial crisis.

Although container ship market is not expected to undergo major adjustment in 2011, the demand for ship chartering will not rebound rapidly. Thus, a significant portion of shipbuilding orders in 2011 will be placed by the shipping companies which could not afford to award orders in 2010, and approximately 600,000TEU is expected to be recorded this year, a level similar to that of 2010.

## New orders for container ship rising from 2010

Container ship orders, which had dried up for 2 years since the outbreak of financial crisis, skyrocketed in the third quarter of 2010. New order placements in the third quarter of 2010 stood at 400,000TEU, which exceeded the aggregate (270,000TEU) recorded from the third quarter of 2008 to the



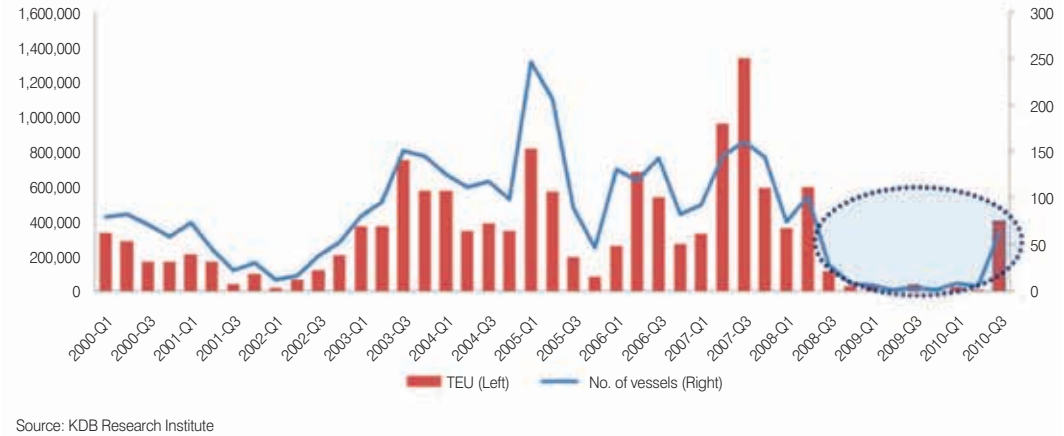

Source: KDB Research Institute

Fig. 1 Share of mid-to-long term demand for vessels by type

Table 1. Container ship orders received by shipbuilders, based on size

| Type | Korea | China | Taiwan |
|---|---|---|---|
| 8,000TEU or larger | 36 | 10 | |
| Under 5,000-8,000TEU | 3 | | |
| Under 3,000-5,000TEU | 12 | 12 | 6 |
| Under 2,000-3,000TEU | | 8 | |
| Under 1,000-2,000TEU | 7 | 10 | 4 |
| Under 1,000TEU | 1 | 3 | |
| Total | 59 | 43 | 10 |

*Source: KDB Research Institute*




Source: KDB Research Institute

Fig. 2 Trend of container ship order placements by quarter

Table 2. Container ship orders received by domestic shipyards in 2010

| Type | Date | Ship owner | Size (TEU) | No. of vessels | Remark |
|---|---|---|---|---|---|
| Hyundai Heavy Industries (HHI) | 12.14 | Hapag Lloyd | 13,100 | 4 | 6 vessels received in 2008 were also upsized into the same class USD 1.45 billion (10 vessels) |
| | 1.1 | NYK | 4,900 | 4 | |
| Samsung Heavy Industries (SHI) | 12.13 | CSAV | 8,000 | 2 | USD 180 million, 4 optional vessels |
| | 9.29 | Evergreen | 8,000 | 10 | USD 1.03 billion |
| | 7.2 | Evergreen | 8,000 | 10 | USD 1.03 billion |
| Dawoo Shipbuilding & Marine Engineering (DSME) | 7.22 | NOL | 8,400 | 10 | USD 908 million |
| | 7.22 | NOL | 10,700 | 2 | USD 230 million |
| STX Offshore & Shipbuilding (STXOS) | 11.19 | Shpg. Corp. | 6,500 | 3 | |
| | 10.14 | Zodiac Maritime | 13,000 | 4 | USD 506 million, 6 optional vessels |
| Hyundai Mipo Dockyard (HMD) | 6.13 | CK Line. Co | 1,060 | 2 | |
| Hanjin Heavy Industries & Construction (HHIC) (Subic) | 11.12 | Delphis. N.V | 3,800 | 2 | |
| Sungdong Shipbuilding & Marine Engineering (SSME) | 11.4 | Goldenport S/Mngt | 3,600 | 2 | |
| SPP Shipbuilding | 11.8 | Metrostar Mngt | 3,500 | 2 | |
| Daesun Shipbuilding & Engineering (DSSE) | 11.18 | Shandong Int. Trans | 1,040 | 2 | |
| | 11.18 | Shandong Int. Trans | 953 | 1 | |
| | 6.1 | Dong Jin Shipping | 1,043 | 1 | |
| | 1.1 | Cosmoship Mngt | 1,043 | 1 | |

*Source: KDB Research Institute*

second quarter of 2010 (See Fig. 2).

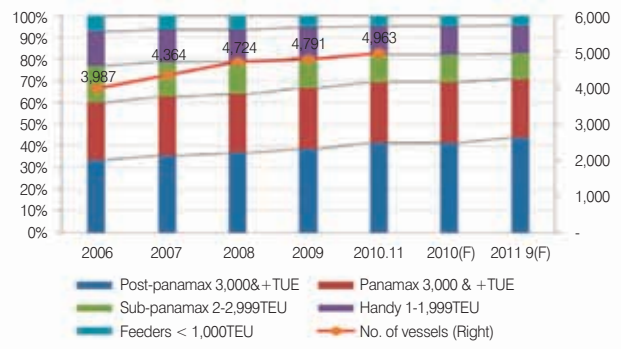
According to Clarkson data, the share of container ship order intake in 2010 by country was 67% in Korea, 28% in China, and 5% in Taiwan. For the container ship order intake by size, see the Table 1.

Korean shipyards received orders for 36 units of large vessels beyond 8,000TEU class, capturing 67% (based on TEU) of total container ship orders in 2010.

Hyundai Heavy Industries (HHI), Samsung Heavy Industries (SHI), Daewoo Shipbuilding & Marine Engineering (DSME), and STX Offshore & Shipbuilding (STXOS) won orders for vessels beyond 8,000TEU class in the second half of year, and the rest of those shipbuilders received orders for vessels of 1,000 to 4,000 TEU class. It is said that SHI will soon receive additional orders for 10 vessels ranging from 8,400 to 10,700TEU class with NOL, and DSME is slated to receive orders for 20 vessels of 18,000TEU from Maersk.

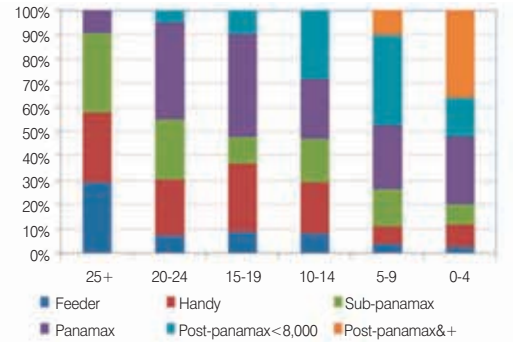
## Container ship fleet expansion

The container ship fleets worldwide have increased steadily to 4,963 vessels and 14.10 million TEU. Large container ships beyond Panamax class have been steadily rising in number




Source: KDB Research Institute

Fig. 3 Trend of container ship fleets worldwide




Source: KDB Research Institute

Fig. 4 Share of ship age by size

and occupies approximately 70% of entire container ship fleets.

71% of entire container ship fleets are under 10 years old. The larger the ship is, the younger it is.

In relation to the share of container ship fleet by ship age, vessels from 0 years to 4 years old comprises 47%, those 5 to 9 years old 24%, those 10 to 14 years old 15%, those 15 to 19 years old 8%, those 20 to 24 years old 3%, and those over 25 years old 3%.

Small ships below Sub-Panamax class comprise 90% of all container ships over 25 years old, while Panamax class container ships 15 to 24 years old account for 42% of all container ships aged over 25. Post-Panamax class container ships are under 10 years old because they were ordered as early as in 2000s.

20 shipping companies which own fleets over 200,000TEU have dominated the market with up to 84% share. 3 companies such as Maersk (Denmark), MSC (Switzerland), CMA CGM (France) from the highest echelons of the industry capture about 35% share of the market, and the remaining shipping companies take up about 1.5 to 4% share of the market.

Table 3. Composition of fleets and order backlogs of top 20 container shipping companies

| Rnk | Operator | Total | | Owned | | Chartered | | | Orderbook | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | TEU | Ships | TEU | Ships | TEU | Ships | % Chart | TEU | Ships | % existing |
| 1 | APM-Maersk | 2,142,582 | 576 | 1,110,607 | 207 | 1,031,975 | 369 | 48.2% | 345,496 | 55 | 16.1% |
| 2 | Mediterranean Shg Co | 1,861,036 | 450 | 967,220 | 208 | 893,816 | 242 | 48.0% | 459,286 | 40 | 24.7% |
| 3 | CMA CGM Group | 1,208,076 | 399 | 443,176 | 93 | 764,900 | 306 | 63.3% | 272,771 | 26 | 22.6% |
| 4 | Evergreen Line | 605,498 | 159 | 330,167 | 88 | 275,331 | 71 | 45.5% | 176,000 | 20 | 29.1% |
| 5 | Hapag-Lloyd | 603,345 | 138 | 292,613 | 60 | 310,732 | 78 | 51.5% | 131,000 | 10 | 21.7% |
| 6 | APL | 586,921 | 147 | 172,007 | 47 | 414,914 | 100 | 70.7% | 201,180 | 22 | 34.3% |
| 7 | CSAV Group | 582,279 | 155 | 51,090 | 10 | 531,189 | 145 | 91.2% | 62,589 | 8 | 10.7% |
| 8 | COSCO Container L. | 544,197 | 138 | 309,057 | 93 | 235,140 | 45 | 43.2% | 313,526 | 38 | 57.6% |
| 9 | Hanjin Shipping | 474,409 | 103 | 175,286 | 33 | 299,123 | 70 | 63.1% | 230,688 | 23 | 48.6% |
| 10 | CSCL | 451,782 | 136 | 263,142 | 75 | 188,640 | 61 | 41.8% | 150,400 | 16 | 33.3% |
| 11 | MOL | 403,057 | 99 | 193,102 | 33 | 209,955 | 66 | 52.1% | 82,616 | 14 | 20.5% |
| 12 | NYK Line | 388,278 | 99 | 289,507 | 55 | 98,771 | 44 | 25.4% | 29,192 | 5 | 7.5% |
| 13 | Hamburg Süd Group | 374,864 | 118 | 161,126 | 41 | 213,738 | 77 | 57.0% | 117,600 | 24 | 31.4% |
| 14 | OOCL | 353,557 | 79 | 274,390 | 46 | 79,167 | 33 | 22.4% | 51,600 | 6 | 14.6% |
| 15 | K Line | 328,327 | 78 | 232,724 | 42 | 95,603 | 36 | 29.1% | 76,576 | 12 | 23.3% |
| 16 | Yang Ming Marine Transp | 322,091 | 79 | 187,201 | 45 | 134,890 | 34 | 41.9% | 108,802 | 17 | 33.8% |
| 17 | Zim | 318,485 | 93 | 174,017 | 38 | 144,468 | 55 | 45.4% | 160,019 | 15 | 50.2% |
| 18 | Hyundai M.M. | 287,481 | 55 | 83,781 | 14 | 203,700 | 41 | 70.9% | 65,460 | 5 | 22.8% |
| 19 | PIL (Pacific Int. Line) | 260,134 | 141 | 158,454 | 91 | 101,680 | 50 | 39.1% | 39,606 | 14 | 15.2% |
| 20 | UASC | 216,799 | 55 | 113,596 | 27 | 103,203 | 28 | 47.6% | 117,900 | 9 | 54.4% |

*Source: KDB Research Institute*

The order backlog of container ships worldwide stands at 645 vessels with a capacity of 3.89 million TEU, and Korea and China hold a majority of share.

Korea has an order backlog of 308 vessels with 47.8% share in terms of number of vessels. However, the country takes up as much as 70.2% share in terms of TEU, which means that large vessels comprise a larger portion in Korea compared to China. The share of the remaining order backlog is captured by other countries, such as Taiwan, Germany, Brazil, Vietnam, Rumania.

Most ships on the orderbook of both Korea and China are due for delivery in 2011 to 2012, and about 20% of ships on orderbook are scheduled for delivery after 2013.

## Buoyant outlook for container ship market

### *Burgeoning orderbook for container ships in 2011*

Merchant ship order placements are expected to rise steadily in 2011, and specifically, the container ship order placements will increase sharply.

According to Clarkson data, the merchant ship order placements will reach 26.90 million CGT in 2011, a similar level to that of 2010, and is expected to average annually around 30.20 million CGT between 2012 and 2015 and 33.10 million CGT between 2016 and 2019.

In 2011, 6.70 million CGT is expected to be ordered, a two-fold year-on-year increase. The ratio of order backlog to the container ship fleet fell from 60.2% in 2007, the peak year of merchant ship order placements, to 27.1%.

The steadily rising delivery of container ships has led to the expansion of fleets, but the declining volume of new orders has resulted in the diminishing order backlog. Particularly, container ship is the only type of vessel to be in short supply in the second half of 2012 and the following period in view of the supply and demand, unlike oil tankers and bulk carriers.

Despite the expected shortage of ships in supply, fresh order placements have been hindered because most container ship operators have no room for awarding newbuilding contracts in the aftermath of their massive order placements between 2007 and 2008 and the shipbuilding finance has yet to recover fully.

New orders have begun to be placed for container ships from July since Evergreen ordered ships. Container order placements are expected to further increase, considering that container ship operators will see their business prosper at least until 2011 on the back of the rising container freight rates to the previous level and the increase in the resultant profit.

### *Large container ships, advantageous for large domestic shipyards*

Large domestic shipbuilders are expected to be better positioned to fend off fierce competition from Chinese rivals in winning new orders, considering the trust that they earned from the shipping companies, the effect of foreign exchange rate, and other factors. Chinese government is expected to induce new orders to be placed with domestic yards by providing ship financing and others.

Shipping companies are likely to award shipbuilding orders to large Korean shipyards, rather than Chinese shipyards, in light of Korean shipyards' extensive experience with the construction of large container ships, technologies, mid-to-high ship price range, etc.

Korea is also in advantageous position than China and Japan even in terms of ship price which takes the foreign exchange rates of order-receiving counties into account. Ship prices fell by about 22% based on dollar. However, ship prices dropped only by 5% in Korea, if converted into U.S. dollar (down by 34% in China and 46% in Japan).

Table 4 shows the list of shipping companies which are expected to consider awarding new orders or projects currently in progress. In the table, the list focuses on the orders for very large container ships.

Most new orders for very large container ships are expected to be awarded to Korean shipyards as China still lags behind Korea in terms of technologies and production capability for shipbuilding construction, except in the case of financial problems or order placements from Chinese shipping companies.

Meanwhile, strong yen has eroded Japan's price competitiveness against Korean shipyards and will make it less likely that Japanese shipyards receive orders.

Each of 3 large domestic shipyards will be able to rake in USD 3.2 billion from projects awarded to them jointly as listed in Table 4, meeting 57% of their average merchant ship order target of USD 5.6 billion set for 2011.

### *Very large container ships preferred for economic benefits*

Deliveries of very large container ships have steadily risen since 2000. So far, 806 units of Post-Panamax class container ships, large-sized vessels, have been delivered, and

Table 4. Projects expected to be ordered in 2011 (focusing on very large container ships)

| Shipping company | Size (TEU) | No. of vessels | No. of vessels (Option) | Price per unit (USD 1 million) | Total contract value (Firm order only) | Remark |
|---|---|---|---|---|---|---|
| Maersk | 18,000 | 20 | 20 | 180 | 3,600 | |
| OOCL | 13,000 | 10 | | 143 | 1,430 | |
| Hanjin Shipping | 4,000 | 14 | | 42 | 588 | |
| Evergreen | 8,000 | 10 | | 88 | 880 | |
| Seaspan | 10,000 | 20 | | 110 | 2,200 | |
| COSCO | 13,000 | 10 | | 143 | 1,430 | Expected orders to Chinese Shipyards |
| MSC | 13,000 | 20 | | 143 | 2,860 | |
| CMA CGM | 13,000 | 10 | | 143 | 1,430 | |
| NYK | 13,000 | 10 | | 143 | 1,430 | |
| Total | 1,476,000 | 124 | 20 | 128 | 15,848 | |

*Note: 1. The blue shaded area indicates either the shipping companies which have made clear of their intention to place orders or the projects currently under negotiation with shipyards. The gray shaded area shows the shipping companies which are expected to award orders when the operational fleets and order backlogs are taken into consideration.*
*2. Shipping companies other than those listed in the Table above are likely to place orders. Seaspan announced that it would place orders for 40 vessels, but it is indicated that the company would order 20 vessels in 2011.*
*Source: Research Center of Daishin Securities, Lloyd's List, etc*

among them, 705 units were delivered during the period after 2000. As many as 67 container ships of Post-Panamax class were delivered in 2009, and 94 units were delivered in 2010. The delivery of this vessel type reached the peak in 2006.

Based on the delivery schedule of large container ships on orderbooks, the delivery of these vessels are expected to hit the peak with 145 units in 2011 and dwindle gradually after 2012 (4 units in 2010, 145 units in 2011, 123 units in 2012, 22 units in 2014, 3 units in 2015). A big orderbook for vessels due for delivery by 2012 has negative impact on new order placement, but shipping companies that want the delivery by 2013 to 2014 are expected to actively place new orders in 2011.

Container volumes climbed to the pre-financial crisis level and are expected to expand steadily as growth rate of global economy hovers around 4%. Although the global economic output shrank by 0.6% and the container volumes fell by as much as 8.8% in 2009, the growth rate of world economy and container volumes stand at 4.8% and 11.3%, respectively, in 2010. The container volumes are expected to expand annually by 10 to 11% in 2011 and thereafter.

Probably, new orders for very large container ships will be placed, depending on the trend toward large container ships, economic efficiency of operation, and intention of shipping companies to expand their fleets.

Large container ships which heighten the economic efficiency of operation will continue to be a trend in the period ahead amid the increase in the quantity of ships necessary for the widespread eco-streaming, coupled with the necessity of improving the fuel efficiency in the wake of rising international oil prices and the expansion of the Panama Canal.

27 units of container ships with the capacity of over 10,000TEU were delivered, such as 2 units of 14,000TEU class container ships, in 2010, and Maersk, the world's top shipping company, is very likely to place new orders for very large container ships, maybe in a row in 2011.

In 2011, many 4,000 to 8,000TEU class container ships operating on routes between Asia and Europe, Mediterranean Sea, U.S. West Coast are expected to be replaced, following the delivery of huge number of very large container ships with the capacity of 8,000 to 18,000TEU. These vessels waiting to be replaced in Europe, Mediterranean Sea, and U.S. West Coast represent approximately 2,105,000TEU equal to 82.2% of order backlogs of vessels with the capacity ranging between 8,000TEU and 18,000TEU.

The main factor behind shipping companies' replacement of these vessels is to relish economic benefits from large-sized ships. Shipping companies can save around 11.6 to 12.2% of fixed costs if they replace 4,000TEU class container ships with 8,000TEU and 10,000TEU class container ships.

# Ports entering a new era of 20 million TEU container throughput in 2011

The Ministry of Land, Transport and Maritime Affairs announced recently that it set the nationwide ports' container throughout target of 20.76 million TEU for 2011, a 7.5% increase from 2010. That is an increase by 1.46 million TEU container throughput, compared to the last year which recorded the highest container throughput in history, and means that the ports will handle more than 120,000 TEU container throughput on monthly average.

Korea is expected to become the world's fourth country that will handle 20 million TEU after China (including Hong Kong), the United States, and Singapore, if it meets the container throughput target this year.

Busan Port which handles 73.5% of all domestic container volume set the target of 15.07 million TEU for this year, 6.3% up from the previous year. The export/import cargo and transshipment cargo volumes stood at 8.273 million TEU (5.6%) and 6.713 million TEU (7.1%), respectively.

Gwangyang Port, which handles 10.7% of domestic container volumes is mapping out an ambitious plan to process 2.3 million TEU (11.0% up) this year, the largest ever since its opening after entering the era of 2 million TEU last year.

Incheon Port which handles 9.6% of all domestic container volumes set 2.043 million TEU for 2011, 9.8% up from 2010, and thus is expected to become the port that processes 2 million TEU after Busan Port and Gwangyang Port.

In relation to the cargo, the container volume of export/import cargo was estimated by comprehensively considering the container volume trend compared to the trade amount, container volume forecast of Korea Maritime Institute (KMI) and other factors, and is expected to reach 13.2 million TEU, a 7.3% year-on-year increase.

Meanwhile, high value-added cargo transshipment cargo, an important factor for the hub port evaluation, was estimated on the basis of the volume target set by ports. In 2011, the transshipment cargo volume is expected to grow 7.6% year-on-year to 7.134 million TEU as the Chinese economy will keep rapid growth and the hinterland logistics complex in domestic ports (Busan Port, Gwangyang Port) becomes fully operational.

The government has given exemption of wharfage for transshipment containers in an endeavor to boost the volumes, and in parallel with that, has granted 100% exemption of entrance and clearance fee, etc, for coastal full container ships in a bid to shift from road transportation by truck to marine transportation.

Specifically, the government has lavished support to help newly opened ports be on track, like giving exemptions of port facility utilization fee imposed on new ports, such as Gyeongin Port slated to open in October this year, including the new ones in Ulsan and Pohang.

Major container ports have taken various incentive measures and set marketing strategies to increase container traffic.

Busan Port has raised the volume incentive ceiling for shipping companies in order to expand transshipment traffic, and plans to actively move ahead with marketing strategies targeting the ship owners and logistics companies in strategic regions such as Japan and China. In addition, they will redouble efforts for green logistics by expanding the coastal and marine transportation subsidy, which has been granted only to Incheon Port so far, to all ports across the country.

Gwangyang Port plans to intensively focus on the shipping companies in the central part and capital area of the country as the national expressway network is complemented by the newly added Jeonju and Gwangyang segments.

Incheon Port put various service systems in place by attracting shipping companies, and has embarked on a full-fledged effort to attract the sea & air transshipment traffic between Korea and China and between Korea and Japan.

An official from the Ministry of Land, Transport and Maritime Affairs said, "The economic growth has slightly slowed down and the world economy still faces instability such as global inflation. However, the economy is showing signs of recovery, led by emerging economies such as China. So, if we actively attract transshipment traffic and make multifaceted efforts for diversification of hinterland logistics complex, the throughput target will be met."

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# A solution provider flying high on strong performance

**Endress+Hauser, the top leader in instrumentation, services and solutions, has provided the instruments measuring the level, flow, pressure, temperature, and analytical instrumentation since its entry into Korea in 1978. Endress+Hauser Korea has achieved remarkable success with strong performance in the shipbuilding and EPC market over the last 5 years and plans to move ahead with sales activities vigorously targeting the vibrant shipbuilding and food industry in a bid to continue the momentum of growth.**
**In addition, the company will provide instrumentation/control solutions suitable for the production processes of industries, reinforcing its role as the reliable solution provider.**

*Endress+Hauser Korea Co., Ltd*

CEO Kim Ie-seob of Endress+Hauser Korea

Endress+Hauser, based in Switzerland, has specialized in the production and sales of instruments measuring the level, flow, pressure and temperature since its establishment in 1953 and has achieved a top position in the global market.
It maintains 23 factories in 11 countries around the globe and a network of sales branches/agencies in 113 countries, operates 9 support centers, and employs a work force of about 8,500 who can access and support customers worldwide.

## Targeting all industries with a broad range of instruments

Endress+Hauser made its first entry into the Korean market as agency in 1978. In December 1997, Endress+Hauser Korea was launched as Korean agency with 100% investment of the headquarters. Since then, the company has offered a wide range of services, including technical support, moving beyond the mere sales of products.
Endress+Hauser has focused on supporting the system components along with various instruments which measure the flow, level, pressure, temperature and a range of analytical instrumentation, and has recently stepped up efforts to provide solutions optimized for the characteristics of industries.
CEO Kim Ie-seob of Endress+Hauser Korea remarked, "Unlike competitors, we provide only the instrumentation-

Flowtec of Endress+Hauser based in Switzerland

related products, offering a vast array of products which can be deployed to many different industrial sites."

Endress+Hauser Korea is applying the headquarters' products to nearly all industries such as food, pharmacy, water treatment, power generation, steel, shipbuilding, etc, as well as the instruments for a burgeoning number of clients from public and private sector oil and gas companies. Specifically, it has shown brisk performance in the oil/gas, chemical, power generation, and shipbuilding market recently.

## Taking over the shipbuilding market from 2006

Kim Ie-seob was appointed the CEO of Endress+Hauser Korea in 2005. He said, "13% of all sales were generated from the power generation market when I came onboard as CEO. However, we could not rake in huge revenue from the power generation market facing the cutthroat competition."

CEO Kim Ie-seob has put the focus on the shipbuilding and EPC, the new markets with bright outlook, which he thinks will become the major source of revenue, and this approach was working very well.

"Korea needs to give heightened attention to the export industry which creates about over 40% of the nation's total GDP. As Korea is the world's largest shipbuilding nation, we thought it absolutely necessary to pay more attention to the shipbuilding industry, a key export industry, and officially opened an office in Busan in 2006 which fully handles the matters related to the shipbuilding industry, although the headquarters were not interested very much in the shipbuilding industry."

Since the Busan office opened in 2006, the Global Industry Manager in charge of marine industry had visited domestic shipyards, holding seminars on various shipbuilding and related applications and discussing with ship owners in technical meetings, while he was stationed in Busan for 2 years. From 2007, we have actively participated in 'KORMARINE' an international shipbuilding trade show.

In 2010, Endress+Hauser Korea hosted a seminar which revolved around the themes related to the shipbuilding and marine industry in Geoje, South Gyeongnam Province. That event was significant in sharing the information about new products being rolled out by Endress+Hauser and announcing its business strategies, drawing about 200 people from related industries.

CEO Kim Ie-seob said, "That seminar was instrumental very much in introducing new products and solutions to customers in the shipbuilding and marine industry and paved the way to build a relationship of trust and reliability with cus-

tomers. Internally, it was an opportunity to evaluate our business in the shipbuilding sector. The headquarters directly partook in that event and heaped praises on it.

Those efforts laid the cornerstone for Endress+Hauser Korea to accomplish its current strong performance in the shipbuilding market. Endress+Hauser Korea achieved KRW 10 billion in sales in 3 years after its advancement into the market in 2009. In 2011, the company's sales growth was slightly declining in 2010 after the order became dry in 2009, hit by the financial crisis, but is expected to return to the level of 2009 in 2011.

Endress+Hauser Korea garnered 20% of its total sales from the shipbuilding sector in 2009, which declined to 12% in 2010. However, its sales from the shipbuilding market is expected to comprise 17% in 2011, considering several factors: new demand along with the larger orderbook of domestic shipyards in 2010, the trend toward larger/more specialized shipbuilding market, and the fact that the company has served its role effectively as a provider of solutions tailored to the requirements of customers.

Endress+Hauser Korea has focused on supplying Coriolis Flowmeter, Guided Wire type Radar Level, Density Profiler, Interface level, Flow Metering Skid (FMS), Tank Gauging System (TGS), etc, which add the engineering features to the previous basic instruments measuring the pressure, temperature, transmitters, and others.

Major features of products are as follows:

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***• Coriolis Flowmeter DN250 (10˝ mass)***

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Levelflex M FMP40/FMP45

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Density Profiler

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- ***Levelflex M FMP55 (Interface level, Multiparameter)***

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CEO Kim Ie-seob explained, "The products used for shipbuilding must have high corrosion resistance and seismic performance and ensure stable and reliable measurement despite considerable temperature variation. Of course, high precision is essential. Our products satisfy all those requirements."

## We aim to become the solution provider in the shipbuilding sector

Endress+Hauser Korea is ready to do more to develop and supply new instruments and build up its brand name, targeting the shipbuilding market in a bid to become a leader in the instrumentation and automation sector of the shipbuilding industry.

CEO Kim Ie-seob said, "As I mentioned before, Endress+Hauser Korea will redouble efforts to provide user-oriented solutions and professional engineering services using the expertise that we have accumulated in the instrumentation and automation sector so far, going beyond the mere supply of instruments. Our ultimate goal is to become the true solution provider."

In addition, Endress+Hauser Korea will add more manpower to its Busan office currently staffed with a total of 8 persons in an attempt to expand its projects into various fields, and plans to inject new momentum into its sales and marketing activities.

CEO Kim Ie-seob said, "One of the most important things is the sales activities targeting the ship owners. We have proceeded with the sales activities that target ship owners in all of countries worldwide, including Norway, France, and Germany, although we are only the Korean representative office. Particularly, Endress+Hauser with a well-structured global network can support customers in conjunction with local representative offices. Endress+Hauser Korea leads the Group as long as the shipbuilding industry is concerned, considering that the Korea is the leader in the world's shipbuilding industry, and we are very proud of that."

In fact, Endress+Hauser Korea directly responded to the request of ship owners from France and the United States last year. For that reason, the Group is actively supporting the shipbuilding market of Korea. Klaus Endress, CEO of Endress+Hauser, is scheduled to visit Korea and meet with major customers.

## Realization of value-added services in 2012

Meanwhile, Endress+Hauser has showed strong performance with a remarkable growth in sales and market share over the last 5 years. In 2010, it was awarded the Cow Bell granted by the headquarters to the local representative office with the highest performance of the year.

CEO Kim Ie-seob said, "We achieved 46% and 37% year-on-year (YoY) growth in 2008 and 2009, respectively. The sales growth slowed down somewhat in 2010 as a result of the slight decline in facility investment in the wake of the financial crisis that broke out in 2009. Nevertheless, the growth continued. This year, we target 20% up from 2010. We expect more than a 4-fold increase in sales."

For that, Endress+Hauser Korea will aggressively target the power generation and food market, as well as the shipbuilding market, in 2011. It has already met more than a half of its annual sales target in the power generation sector, and expects that the sales from the power generation market will jump by 600% compared to 2010.

Endress+Hauser Korea has completed the analyses on the targeted food companies and mapped out strategies for each companies, and plans to operate OEM business team separately.

Besides, Endress+Hauser Korea plans to regularly hold the seminars which focused on the shipbuilding/marine industry last year, and has indicated that the seminars will revolve


Endress+Hauser maintains 23 factories in 11 countries around the globe and a network of sales branches/agencies in 113 countries.

around the theme of food industry this year. Through that, the company will introduce and share information with regard to new products and applications of concerned companies in a bid to solidify the bond with customers.

CEO Kim Ie-seob stressed, "All these efforts and accomplishments will lay the cornerstone for the value-added services that we aim to realize in 2012."

## The success is owed to the efforts of all employees

CEO Kim Ie-seob, cited the enthusiasm/hard efforts of all employees and well-prepared business plans as the major reasons for such a splendid growth over a short period of time.

He said, "All employees made concerted efforts with vigor to reach the goal, and the company lavished support to add momentum to such efforts and bring out the latent potential in individuals."

Furthermore, the company selected the shipbuilding and EPC as strategic markets and crafted marketing strategies with thorough preparations, planning, and investment over the period of 8 months.

Endress+Hauser Korea is currently operating 4 branch offices in Ulsan, Yeosu, Busan, and Daesan. Endress+Hauser Korea, the only company with branch offices in the instrumentation sector, provides more swift and accurate services which has led to the close bond with customers.

CEO Kim Ie-seob emphasized, saying, "The no. 1 and no. 2 companies in the instrumentation market have taken the lion's share, and the gap between the two and no. 3 is very wide. Currently, we have become at least no. 2 with our instrument products alone, unlike competitors that offer packages including even the DCS. We think that we are the real no. 1 in the instrumentation sector. That is the strength unique to Endress+Hauser."

That is largely attributed to the ceaseless R&D efforts of Endress+Hauser. In other words, Endress+Hauser has invested a considerable portion of its total sales into R&D and developed innovative products every year, rolling out the products that meet the requirements of customers and set to shape the market. That is consistent with the foundation philosophy of Endress+Hauser.

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# Lloyd's Register marks the 50th anniversary of its entry into the Korean market this year

Lloyd's Register has been supporting clients in the Republic of Korea for 50 years and responding to its remarkable rise as an industrial nation. The organisation has surveyed the world's largest ships; inspected refineries, desalination plants, pressure vessels and offshore module components; overseen the country's first nuclear power project; and supplied independent assurance services across complete supply chains in the energy and transport sectors.

Lloyd's Register's earliest work in the country occurred briefly from 1918 to 1922, when J F Robertson was appointed as exclusive surveyor for steel-testing duties. During the 1950s, Lloyd's Register was invited by the government of Korea to act as the load line authority, by the early 1960s this work included load lines, tonnage, safety equipment and radios, passenger ship safety and cargo gear.

Demand for Lloyd's Register's services grew rapidly as Korea developed exports and rapidly took a leading position amongst the world's shipbuilding nations. Lloyd's Register appointed Shin Dong-shik as a surveyor at Busan in 1961. An exclusive surveyor, Lee Hee-do commenced duties in 1971, and offices were opened in Seoul and Ulsan by 1973. Two years later the East Asia Area Committee was established, facilitating greater understanding of local needs and conditions. In order to meet Korea shipbuilding industries needs, design approval and technical service works had been commenced from 1981 at Busan. The combined output of shipyards in Korea allowed it to overtake Japan as the world's biggest shipbuilding country for the first time in 1993; a position it still holds today.

One of the first shipyards developed in Korea was the giant Hyundai Heavy Industries (HHI) yard at Hyundai Mipo Dockyard (HMD) Bay, Ulsan. This, and other yards such as Daewoo Shipbuilding & Marine (DSME) and Samsung Heavy Industries (SHI) have constructed increasingly specialised ships. As the demand for energy has increased, significant developments in the design of LNG carriers have taken place. This is typified by the 266,000 cubic metre capacity Q-Max tanker Mozah, the world's largest LNG carrier, built to LR class at SHI Geoje in 2008. The considerable expertise developed by Lloyd's Register has made it the leading classification society in this sphere.

Heavy industry has thrived in Korea, meaning further survey and inspection work of propelling machinery, offshore structures, components for nuclear power stations and desalination plants, pressure vessels, railroad wheels, cables and containers. Lloyd's Register is also active in quality assurance.

The organisation acts as a research partner to the Korean Railroad Research Institute in Seoul. In 2007, it was appointed to carry out an independent safety assessment of Seoul Metro Line 9, part of one of the most heavily used subway systems in the world, supporting well over eight million passenger trips daily. Lloyd's Register has also developed a regional centre of excellence in Korea to provide ASME services to the nuclear power industry.

Phased expansion has seen the earlier offices and surveyors based at Busan, Ulsan and Seoul joined by others at shipyards in Changwon, Koje, Mipo, Mokpo, Okpo, and Tongyeong. Today, expertise is provided to support clients across the breadth of industry and technology in the Republic of Korea, where the Lloyd's Register Group continues to build closer relationships for a safer world.

# World's best ships built by the best shipyards

**Naval Architect, Maritime Reporter, Marine Log, the world's renowned shipbuilding/marine magazines have selected the Significant Ships of the Year annually. Many vessels built at domestic shipyards were named the Significant Ships of the Year in 2010, proving the Korea's unparalleled technological prowess in shipbuilding.**

Naval Architect and Fairplay Solution, the U.K.-based monthly magazines, and Marine Log and Maritime Reporter, the U.S.-based monthlies of the United States, are among the world's most respected shipbuilding and marine industry magazines.

These magazines have selected the Significant Ships of the Year at the year-end among the ships built around the globe by evaluating the differentiated features, efficiency, design, preference of ship owners, etc, from the comprehensive perspective.

In 2010, ships of many prominent domestic shipyards were included in the list of Significant Ships selected by these media. Various types of ships built by Korea, such as bulk carriers, very large container ships, oil tankers, drillships, etc, were named the Significant Ships of the Year, solidifying the status as the world's most sophisticated shipbuilding nation.

## 3 ships of HHI, including its drillship, were named Significant Ships

3 ships of Hyundai Heavy Industry (HHI) were selected as the Significant Ships of the Year in 2010 by Naval Architect, Maritime Reporter and Marine Log, cementing its reputation built over the last 28 years as a leading shipbuilder which constructs and delivers highest quality products.

The 3 ships of HHI, named the Significant Ships of the Year in 2010, are 'Abdelkader', a 177,000$m^3$ LNG carrier built for the Japan-based ship owner Mitsui OSK Lines (MOL), 'E.R.Brandenburg', a 180,000-ton bulk carrier built for the German ship owner E.R.Schiffahrt, and 'Deep Water Champion', a drillship built for the U.S.-based ship owner Transocean.

Among them, the ship owner lavishly praised Deep Water Champion, HHI's first drillship which was successfully built with unique shipbuilding method and delivered without a single accident.

Thus, HHI has built 1 to 3 high-end and high-quality ships

'MSC Beryl', a 13,000TEU container ship of STXOS


'MSC Savona', a 14,000TEU container ship of DSME

every year since 1983 when it rose to the top spot worldwide in terms of volume of orderbook and vessels built, and set the record of building a total of 45 Significant Ships of the year.
Meanwhile, Abdelkader was delivered on February 27, 2010, and E.R.Brandenburg and Deep Water Champion were delivered on May 3, 2010 and November 16, 2010, respectively.

## 9 ships of DSME, including 4 container ships, were selected as Significant Ships

Daewoo Shipbuilding & Marine Engineering (DSME) built a total of 9 Significant Ships of the Year in 2010, securing a berth as one of the world's top shipyards that build high-end and high quality ships.
DSME announced that its 9 ships were named the Significant Ship of the Year: 2 ships by the Naval Architect, 1 ship by Fairplay Solution, 3 ships by Marine Log, and 3 ships by Marine Reporter.
Among the Significant Ships of the Year built by DSME in 2010 are included 'Cap Ines', a 4,600TEU container ship of B. Schulte, 'Barrcelona Knusten', a 150,000CBM LNG carrier of Knutsen, 'Virgo Star', a 317,000DWT VLCC (Very Large Crude Carrier) of Vela, 'MSC Savona', a 14,000TEU container ship of CP Offen, 'CMA CGM Corte Real', a 13,300TEU container ship of CMA CGM, 'Arcturus Voyager', a 320,000DWT VLCC of Maran Tanker, 'Dar Salwa', a 318,000DWT VLCC of KOTC, 'Agros', a 4,380TEU container ship of Marlow Navigation, and 'Expedient', a 150,900CBM LNG-RV (LNG Regasification Vessel) of Exmar.
Specifically, as many as 4 container ships of DSME were named the Significant Ships of the Year, besides LNG carriers and VLCCs in which the shipbuilder has traditionally held competitive advantage, thereby proving that the company has the world's best shipbuilding technologies. The 14,000TEU container ship is the largest of all container ships ever built worldwide to date.
Meanwhile, DSME has built a total of 111 Significant Ships of the Year for 29 consecutive years until 2010 since its Bow Pioneer was selected as the Significant Ship of the Year in 1982.

## 3 ships of SHI were named Significant Ships, including 10,000TEU container ship

Samsung Heavy Industries (SHI)'s ships have been selected by U. K. magazine Naval Architect as the Significant Ships of the Year for 29 consecutive years since 1984.
SHI built a total of 3 Significant Ships of Year in 2010, which are 'Hanjin Korea', a 10,000TEU container ship, 'Methane Julia Louise', a 170,000$m^3$ LNG carrier, and 'Saipem 12000', a drillship.
Hanjin Korea measures 334.0m in length, 45.6m in breadth, and 27.2m in depth, and has a maximum speed of 25.1 knots, and was delivered to Hanjin Shipping, the ship owner, on July 2010. Significantly, this vessel is the first very large container ship with the capacity of 10,000TEU introduced to any Korean shipping company.
Methane Julia Louise measures 279.0m in length, 45.0m in breadth, and 26.0m in depth, and has a maximum speed of 19.75 knots, and was delivered to BG in April, 2010.

'Hanjin Korea', a 10,000TEU container ship of SHI


'Deep Water Champion', drillship of HHI

Saipem 12000, a 96,000DWT drillship, measures 219.4m in length, 42.0m in breadth, and 19.0m in depth, and has a maximum speed of 12 knots, and was delivered to Saipem in April, 2010.

## STXOS's many first ship types in 2010 were selected as Significant Ships

3 ships and 1 offshore plant of STX Offshore & Shipbuilding (STXOS), constructed in 2010, were named the Significant Ships of the Year by Naval Architect and Marine Log.

These vessels are 'MSC Beryl', a 13,000TEU container ship of NIKI, the Greek ship owner, 'Castillo de Santisteban', a 173,600CBM LNG carrier of Elcano, the Spanish ship owner, 'Noble Globe Trotter' a drillship, and 'STX Changxing Rose', a 6,700 unit Pure Car/Truck Carrier (PCTC) of STX Pan Ocean, the Korean ship owner.

Particularly, MSC Beryl with a deck area as large as 3.5 football fields incorporates a variety of green technologies. In addition, the vessel was granted the Energy Efficiency Design Index (EEDI) Certification from Germanischer Lloyd, the classification society based in the city of Hamburg, Germany, which is the first-ever worldwide for any container ship with the capacity beyond 10,000TEU.

Noble Globe Trotter is the world's first compact size vessel which can pass through the Panama Canal among the current drillships, and boasts the drilling capacity equal to that of medium and large-sized drillships.

STXOS successfully built its very large container ships, LNG carriers, and drillships altogether in 2010 with its outstanding shipbuilding technologies in the large/high value-added vessel sector as proven by its Significant Ship of the Year title in 2010.

## 3 ships of HMD were named Significant Ships, including the con-ro

Hyundai Mipo Dockyard (HMD) built a total of 3 Significant Ships of the Year selected by Naval Architect in 2010, which are a 24,400-ton class con-ro, a container carrier, and a product carrier.

'Grande Marocco', a 24,400-ton class con-ro delivered to the Italian-based ship owner Grimaldi in April, 2010, is the first type of vessel ever built by HMD.

'Frisia Bonn', a 2,000TEU container ship delivered to the German-based ship owner Hartmann, was again highly acclaimed for its high quality as a new type of medium-sized container ship which rolled out following the 3 units of 2,800TEU class, 1 unit of 1,800TEU class, 1 unit of 3,500TEU, and 1 unit of 4,300 TEU class after 2002.

'Glenda Meredith', a 46,000-ton product carrier delivered to the Singapore-based ship owner ST, is the shipbuilder's 10th Significant Ship of the Year built to date.

HMD has built a total of 23 Significant Ships of the Year since it made inroads into the newbuilding market in 2001 with the construction of 'Knight', a cable laying vessel, including 10 product carriers, 7 container carriers, 2 LPG carriers, a con-ro, an open hatch general cargo carrier, and a special purpose vessels (TEFC).

## Various types of ships built by SPP have been selected every year as Significant Ships of the Year since 2007

2 vessels of SPP Shipbuilding were nominated the Significant Ships of Year in 2010 by the Naval Architect. Thus, SPP Shipbuilding has become the first company that built 2 Significant Ships of Year in a single year, except for large domestic shipbuilders.

'ARAMON' and 'THALASSINI AXIA' are the 2 vessels of SPP Shipbuilding, which were named Significant Ships of Year in 2010.

ARAMON, a 74,000-ton product carrier, is the first series of vessels ordered by Roxana, a Greek ship owner, in 2006. The vessel measures 229m in length, 32.24m in width, and 20.65m in height, and can sail at a speed of up to 15.8 knots.

THALASSINI AXIA, a 59,000-ton bulk carrier which is the first series of vessels ordered by Enesel, a Greek ship owner, in 2007. The vessel is 196m high, 32.26m wide, and 18.6m high and has a maximum speed of 14.5 knots.

SPP Shipbuilding earned the glory of building 4 Significant Ships of Year, all different types, for the period from 2007 to 2010. SPP Shipbuilding earned the glory of building 4 Significant Ships of Year, all different types, for the period from 2007 to 2010. Specifically, 'DUBAI STAR' and 'HANDY WIND' were named Significant Ship of Year in 2007 and 2009, respectively. The former is a 50,000-ton product carrier ordered from ETA, while the latter is a 35,000-ton bulk carrier ordered from Metrostar.

Vessels named the Significant Ships of the Year in 2010 can be viewed in the Major Performance Gallery(p. 78 to 83) section of this magazine.

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Onboard test of water cannon, the integrated anti-pirate system developed by SHI

# An integrated anti-pirate system has been developed

**Samsung Heavy Industries (SHI) has developed an integrated anti-piracy system which can carry out entire processes, like detecting, tracking, and fending off pirates, from the wheelhouse. SHI plans to equip this new system as basic option in all vessels to be built henceforward at its shipyard in a bid to differentiate its navigation safety technology.**

Recently, Samsung Heavy Industries (SHI) announced that it has developed an integrated anti-piracy system which enables the crews to detect, track, and subdue pirates from the wheelhouse.

Shipping firms have voiced heightened concerns over unabated pirate attacks after a freighter owned by the South Korean shipping firm was hijacked again recently. Under those circumstances, SHI's successful development of the

integrated anti-piracy system, first-ever in the shipbuilding industry, will help make SHI better-positioned in winning new-build orders.

Specifically, this new solution integrates core technology and system necessary to monitor and repel pirates, incorporating navigation information analysis system to detect pirate vessels, high resolution night vision for tracking and keeping close eye on pirates, and remotely controlled water cannons, and so forth.

The radar technology developed independently by SHI can analyze the distance and speed of vessels within a 10km radius of the ship, as well as their movement, and enables automatic detection of suspected private vessels, unlike the current onboard radar system capable of only identifying the position of vessels in the vicinity. In addition, the target tracking system tracks the position of suspected pirate vessels while activating alarm in cabins.

The night vision, the visual surveillance system, tracks and displays the movement of suspected vessels in real-time using the position information of radar, and generates high definition infrared images to track suspected pirate vessels.

Meanwhile, water cannons with a water pressure of 10bar can help thwart the approach of pirates if the effort to evade pirates fails. The water pressure of 10bar is equivalent to the force of 10kg applied to an area of 1 $cm^2$.

The water cannons can shoot powerful stream of water up to 70m, and firing the water cannons 40 to 50m can deal a heavy blow to pirate vessels.

Previous water cannons were operated on deck directly by sailors, which makes them more vulnerable to the gunfire of pirates. In contrast, the integrated system unveiled by SHI remotely controls the water cannons via CCTV from safe place such as the steering house, effectively repelling pirates when they attempt to climb aboard.

Last year, SHI tested the performance of this system on a moored ship in technological collaboration with Hanjin SM, a ship operation unit of Hanjin Shipping, and held a demonstration in a vessel under construction at Geoje Shipyard, which was attended by about 40 people including ship owners and related officials.

This system was also introduced to the Anti-Piracy Task Force organized under the supervision of the Ministry of Land, Transport and Maritime Affairs. The demonstration and trial operation of this system will soon take place on the ship owned by Hanjin Shipping.

Promotion image of anti-pirate system

SHI will move ahead with strategy to further differentiate its safe navigation technology by installing this integrated anti-pirate solution as basic option in all ships to be constructed at its Geoje Shipyard while launching promotional campaigns and running advertisements on international shipbuilding magazines such as Lloyd's List, etc, to encourage domestic and overseas ship owners to outfit this new system in existing ships.

An official from SHI said, "We have developed an unified system integrating the navigation and control system which is unprecedented in the shipbuilding industry. This new solution will significantly help protect ships and crews from pirates, and furthermore, remarkably build up competitiveness of SHI in winning orders."


FLIR Systems Korea held an event on February 9 at COEX Intercontinental Hotel to announce its new products.

# Innovative infrared cameras were unveiled

**FLIR Systems Korea, which specializes in thermal imaging cameras, announced its release of FLIR Systems' new products for 2011 on February 9. On that day, FLIR Systems Korea introduced a total of 4 new products, including E-Series and T600-Series models with the built-in WiFi, Bluetooth, iPhone APP, etc, as well as high definition thermal imaging capabilities.**


FLIR Systems Korea held an event to launch a new product of 2011 on February 9 at COEX Intercontinental Hotel with the presence of about 50 people, including those from major agencies, customers, and others.

On that day, FLIR Systems Korea unveiled 4 types of new infrared thermal cameras which offer superior capabilities coupled with industry-first innovations.

'T600-Series' attracted the attention, which boasts the highest performance and ergonomic design among E-Series and 640 high resolution cameras providing the capabilities such as WiFi, Bluetooth, touch screen, iPhone APP.

## Ultra-lightweight and compact E-Series

E-Series was developed for customers with preference for high definition thermal imaging. Specifically, they offer up to 76,800 pixels (320x240) for better long-range accuracy and the highest level of point & shoot camera infrared resolution. In addition, E-Series feature MeterLink (wirelessly transmit vital diagnostic data from clamp and moisture meters directly to the camera for annotating thermal images to further support findings and decisions), large 3.5″ LCD screen and the ability to communicate findings efficiently and easily by using Bluetooth.

E-Series, lightweight, portable, and affordable, are very economically efficient.
Kjell Lindstrom, product manager of FLIR Systems, explained "E-Series models are as light as 800g, the most lightweight in its category. They provide outstanding capabilities, designed to operate in harsh environments with high tolerance to vibration and shock."
The E-Series contains 3 different 'point and shoot' models, which are E40, E50 and E60. Capable of measuring the temperature ranging from 20 to 650°C, E-Series are widely used for electricity, industry, and building (bx range)

*-FLIR E40/E40bx : 160x120 infrared resolution (19,200 pixels), 70mK NETD, 2.72 mrad, zoom x 2*
*-FLIR E50/E50bx : 240x180 infrared resolution (43,200 pixels), 50mK NETD. 1.82 mrad, zoom x 4, thermal-real image fusion, scalable PiP*
*-FLIR E60/E60bx : 320x240 infrared resolution (76,800 pixels), 1.36 mrad, instant report*

Among these, Ebx (E40bx, E50bx, E60bx) model has the built-in insulation and dew point alert functions, and is suitable for moisture detection, water supply and sewage system, HVAC overheating and cooling, measurement of air flow, and others.
Lee Hae-dong, country manager, said, "I have great expectation of E-Series which will open new markets related to education, science, law enforcement, marine and veterinary science, as well as the maintenance and repair of electric and mechanical facilities."

## High performance T600-Series for professionals

T600-Series is a thermal camera for professionals, characterized by high definition thermal images and ergonomic design. They feature 640x480 pixels resolution, 17$\mu$m pixel pitch detector, 40mK (T640), 50mK (T620) sensitivity, and rotation lens block to enable the user to capture detailed images from any angle.
Specifically, T600-Series fitted with the best IR detector allow users to obtain sharper thermal images and enable accurate temperature measurement. In addition, the built-in digital camera with 5 million pixels resolution captures vivid corresponding real thermal images.

New products of FLIR Systems, E-Series (left) and T600-Series (right)

It incorporates a 4.3″ high definition LCD display which can be operated using finger pushes on a touch screen to fine tune the images and radiometric data at the site. Besides, onboard color view finder helps check the data visually even at a bright place.
Kjell Lindstrom explained, "T600-Series can transfer the measurement data obtained by the built-in Wi-Fi capability to iPad or edit such data or produce reports, dramatically improving the efficiency of work."
Lee Hae-dong, country manager, stressed, "T600-Series will open the new horizons of thermal imaging cameras for professionals with the highest level resolution and state-of-art functions."
During the event, FLIR Systems Korea presented and demonstrated the new models to test the performance.

## Strong growth momentum propelled from 2010

FLIR Systems Korea has cemented its status as the leader with highly advanced technologies in the market for infrared thermal imaging cameras by rolling out E-Series and T600-Series. Furthermore, the company has mapped out strategies to aggressively make inroads into various industrial sectors in a bid to increase sales dramatically.
The domestic market for thermal imaging cameras has expanded fast with an annual growth rate of 30%, and FLIR Systems has carved out 50% share of domestic market, a 6% increase from 44% in 2010.

Bertrand Sicot, CEO of Dassault Systèmes SolidWorks

# Cloud opens up new horizons for 3D CAD

**Dassault Systèmes SolidWorks announced cloud-based new line of products and gave presentation on successful cases to accentuate the importance of cloud-based collaboration in 'SolidWorks World 2011' which was held for 3 days from January 23.**

Dassault Systèmes SolidWorks (SolidWorks) showcased various cloud-based new products in 'SolidWorks World 2011' in San Antonio, Texas, United States, which ran from January 23 to 26, and presented new vision and strategies to become a leader in 3D CAD market for 2011.

## New line of cloud-based products were launched

Austin O"Malley, Executive Vice-President of R&D Center at SolidWorks unveiled N!Fuze, SolidWork's first cloud-based Product Data Management (PDM) service. He said, "Primari-

Scene of SolidWorks World 2011, held for 3 days from January 23


Award-winners of this year's Model Mania contest

ly, small and midsize companies simply cannot afford and are not ready for PLM because of their company size. For these small companies unable to operate PDM by themselves, cloud-based N!Fuse is available online for using the data without need for direct installation."

As the data center construction for collaboration is costly, SolidWorks will rent the cloud environment to small companies that are not able to build the system.

In addition, SolidWorks announced its first Post3D, a 3DVIA based online collaboration solution, which provides a virtual interactive online environment for product designers and engineers to collaborate in 3D through their personalized avatars. This 3D online collaboration platform offered by Post3D allows them to directly retrieve and manipulate design data and analyze physical properties for improving products.

Besides, a variety of new technologies slated to roll out in autumn were showcased, including Per pixel Lighting which uses the capabilities of Dassault Systèmes' 3DVIA Composer to enable more realistic rendering and the improved BOM highlighting that allows users to highlight components in a BOM. Furthermore, Freeze features, Large Design Review, and Clean Uninstall attracted much favorable attention.

## Emphasis on the importance of collaboration through successful cases

This event, the global conference of SolidWorks, occurred amid the growing interest worldwide in 3D technology and attracted about 5,000 3D designers, engineers, and experts, providing a window into the trend and future of 3D technology.

Featuring various technologies deployed to various sites and presentation of successful cases from experts in various fields, the event highlighted the role and value of 3D design technologies with applications to all industries.

Captain Jim Lovell, Commander of Apollo 13, and Gene Kranz, a retired NASA Flight Director and Manager, went up to the podium as special guests and reiterated the importance of cooperation and communication.

Captain Jim Lovell, answered "What is more important than knowledge is to listen attentively to colleagues and understand them well", when asked "what are the virtues for engineers in trying to reach goals?"

Gene Kranz said, "Engineers need to have curiosity and mindset that does not take things for granted and never say impossible."

Particularly, Captain Jim Lovell stressed the importance of cloud-based collaboration, saying "Apollo 13 malfunction was caused by multifarious problems such as the system mix, communication, and so forth."

Bertrand Sicot, CEO of SolidWorks, remarked, "Last year, SolidWorks' educational license passed the one million copy sales mark. With the rapid shift toward 3D in the design and engineering field, education and general copies have quickly become widespread and the 3D CAD market will have unlimited potentials."


Scenes of CIMPS held last year

# 2011 CIMPS highlights

**CIMPS (China International Marine, Port & Shipbuilding Fair) will be held at Nanjing International Expo Center in China for 3 days from April 12 to 14. For this event, the Organization Committee announced major highlights of CIMPS for the successful business of exhibitors and visitors.**

Located in the No. 1 shipbuilding base in China, with greatest support from the government sectors as strong protection and guarantee for its success, including the co-sponsoring of China Association of the National Shipbuilding Industry (CANSI), The Chinese Society of Naval Architects and Marine Engineering (CSNAME), and China Ship-owners Association (CSA) etc, and oriented to be international, professional and trade only, CIMPS (China International Marine, Port & Shipbuilding Fair), is striving for a brand show in the world.

With the Baltic Exchange as CIMPS' Global Brand Supporter, tradewinds as the Official Media, and K.Fairs, and Ahoy B.V., as Overseas Co-organizers, helping to invite international buyers or exhibitors with their own databases, CIMPS 2011 will be held at Nanjing International Expo Center on April 12-14.

## 2010 CIMPS Review

Having successfully bought several related fairs in the districts, CIMPS 2010 was held grandly in Nanjing during May 19-21, 2010. It is a most professional shipbuilding & maritime fair which all rank the first in show size, exhibiting country quantity and participating shipyard proportion in China in the year of 2010. CIMPS 2010 is awarded 2010 Chinese Top Ten Brand Exhibition.

CIMPS 2010 rents an exhibition space of 24,000 sqm, attracts 416 exhibitors (including 39 Chinese brand shipyards, and 51 overseas exhibitors) from 18 countries and regions, with 3 National Pavilion from UK, Korea and Finland.

CIMPS 2010 attracts 22,941 visitors from 16 countries and regions; overseas visitors from Europe, the Americas, and Southeast Asia areas mainly, reach 3,212 persons accounting for 14%. Domestic visitors from 22 Chinese provinces and municipalities.10 dynamic events and conferences with excellent and infinite commercial opportunities.

CIMPS - Grounded on 7-year-fair resources, to create a new quality brand.

## 2011 CIMPS highlights

### *Classified exhibition areas, professional operations*

2011 CIMPS is classified into 14 exhibition districts as brand district, ship building & repairing, offshore engineering, shipyard equipment, welding and cutting, marine steel & ship materials, painting and antisepsis, equipment suppliers, port technology, logistics and transport, service organization, industrial park, and so on.

### *Strong combination, devotedly created*

The Organization Committee takes advantages of its superiorities as exclusive agents in China of some large-scale overseas int'l shipping, shipbuilding and marine technology fairs, CIMPS cooperates jointly with more than 40 overseas promotion agents and many Organization Committees of related fairs to invite exhibitors from home and abroad. 2011 CIMPS is expecting to invite exhibitors from more than 20 countries and regions, totaling more than 600 exhibitors.

7 National Pavilion from UK, USA, Korea, Finland, Denmark, Turkey and Singapore; Maritime by Holland Lounge; and groups from Germany, Norway etc, have applied to exhibit in 2011 CIMPS.

More than 50 famous shipyards, like: Nantong Cosco Khi, Jinhai Heavy Industry, Yangtze River Shipyard, Newcentury Shipbuilding, Eastern Heavy, CSC Jinling Shipyard, Dongze Shipyard, Nantong Huigang Shipbuilding, Taizhou Kouan Shipbuilding, Taizhou Sanfu, Yangzhou Dayang, China Shipping etc, and hundreds of famous equipments suppliers, like: Jiangsu Sanxian Marine Accessories, Dalian Marine Diesel, Jinye Propeller, Nanjing High Accurate Marine Equipment, Desmi Pumping, Shanghai Telansen Coating Machinery, Shanghai Huawei Plastic, Dalian Huarui Heavy Industry Propulsion, Shanghai Accessen Group, Aig Industrial Group, Metal Machines Engineering, Shanghai Wind, Shandong Seoul Equipment Manufacture, Dalian Marine Equipment Park, etc, will exhibit in 2011 CIMPS.

### *Global promotion, emphasis on business*

The Committee has specially visited Germany, USA, Holland, Greece, Norway, Korea, Japan, Indonesia etc, sparing no effort to invite ship-owners and shipyards purchasing managers. Plus numbers of maritime shows on-site promotion like: Posidonia, SMM, Marin Tec, Seatec, etc. The Committee will invite more foreign ship-owners and Chinese shipyards to purchase during 2011 CIMPS.

### *Dynamic events & conferences*

Abundant dynamic events & conferences, including match-making between shipyards and equipment suppliers (Free to foreign suppliers), green shipping, inland shipping, wind-energy, shipbuilding, offshore engineering summit, etc.

The 5th Annual Shiptec Summit, will invite more than 150 overseas ship-owners to attend; The 2nd Cooperation & Communication Conference among Equipment Suppliers, Shipbuilders and Ship-owners will invite international ship-owners, shipbrokers, shipyards, ship designers and excellent equipment suppliers, to build up a trade platform for exhibitors.

The Organization Committee helps arrange foreign exhibitors to visit Chinese shipyards after the 2011 CIMPS.


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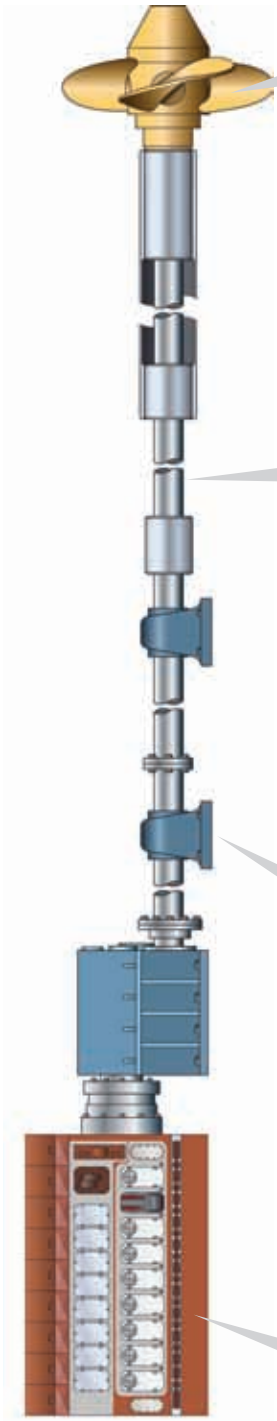
# Marine industry moves forward thanks to laser precision alignment

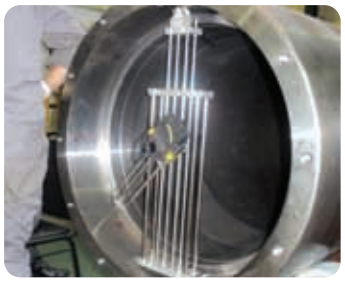


## PROPELLER

LEVALIGN Ultra

## STERN TUBE

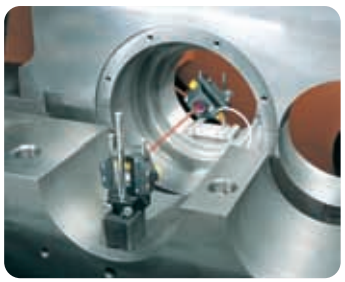
CENTALIGN Ultra
(unmounted shaft)



## LONG SHAFT

ROTALIGN Ultra
(mounted shaft)

CENTRALIGN Ultra
(unmounted shaft)



## MAIN ENGINE

ROTALIGN Ultra
(mounted crank shaft)

CENTRALIGN Ultra
(unmounted crank shaft)

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# Korea's shipbuilding industry to regain top spot in 2011 (2)

## Performance of shipyards in 2010 and the outlook for 2011

**According to the recent data of the Ministry of Knowledge Economy (MKE) and Korea Shipbuilders' Association (KOSHIPA), Korea's export of ships and marine equipments is expected to decrease 5.6% year-on-year (YoY) in 2011 to reach $47 billion. Meanwhile, new order target of large shipyards (7 companies) for 2011 totals $50.9 billion, 35% up from the previous year.**

### •Supply by type of ship

Different levels of demand for different types of newbuilds are expected in 2011 due to the concern about the oversupply (according to Clarkson, the order backlogs for newbuilds worldwide reached 30% of the existing freight space volume based on GT as of late November 2010), along with the unpredictable factors related to China, global oil demand, etc.

The bulk carrier market will be sluggish as a consequence of the oversupply of bulk carriers and the diminishing effect of raw material import from South East Asia, while the tanker market will maintain the status quo in the wake of the decommissioning of single-hull vessels (from 2011).

In addition, optimistic outlook is predicted on the demand for container ships (amid the recovery of global economy), LNG carriers (amid high oil prices, the demand for LNG carriers is expected to grow by 5.2% on the annual average), and offshore plants (amid high oil prices, the demand is expected to increase by 5.7% on the average).

### •New order target of shipyards

Large shipyards of Korea (7 shipyards) are expected to be in high gear to win orders amid the continuing signs of market recovery. Their combined new order target for 2011 totals $50.9 billion, 35% up from 2010 ($37.6 billion).

Concerning new order targets of respective shipyards, Hyundai Heavy Industries (HHI) (including Hyundai Samho Heavy Industries) and STX Offshore & Shipbuilding adjusted their new order target upward by more than 60% compared to 2010. Samsung Heavy Industries (SHI) and Hyundai Mipo Dockyard

Table 9. Outlook on the demand by type of ship and variables in 2011

| Type of Ship | Variables in 2011 |
|---|---|
| Bulk carrier (sluggish) | - Diminishing effect of raw material (iron ore, coal) import from South East Asia including China<br>- Ton-mile effect through abnormal temperature, etc, time on demurrage, and others |
| Tanker (status quo) | - Existence of demand for the substitute newbuilds in the wake of the decommissioning of single-hull vessels<br>- The tanker market faces a prolonged sluggish growth prospect compared to the bulk carrier market, and the growth in the order book for small and medium-sized vessels has been delayed.<br>- The demand for oil has increased worldwide. China has diversified the supplier of oil. |
| Container ship (optimistic) | - Rationalization of route through alliance, absorption of ship's space (freight space) due to the reduction in the speed of ship<br>- The effect of increased ship's space is insignificant compared to other types of ships. The global economy is rebounding. |
| LNG carrier (optimistic) | - The demand is expected to rise by 5.2% on the annual average by 2022 (The demand is expected to reach about 37 units in the period between 2013 and 2019.)<br>- No newbuilding contract had been awarded in 2009. Shipbuilding orders were awarded again from the second half of 2010. The demand is expected to normalize in 2012. |
| Offshore plant (optimistic) | - FPSO orders will continue to be placed, following the large-scale order for drillship in 2008.<br>- The demand is expected to grow at a 5.7% annual rate by 2022.<br>- The demand is expected to reach more than 150 units every year until 2019. (The demand for FPSO is expected to reach 10 to 22 units every year between 2010 and 2019, while the demand for drillship is expected to reach 3 to 14.) |

Table 10. Outlook on the long-term demand for newbuilds by type (base case)

*(Unit : 1 million CGT)*

| Type | Performance (Annual average: 1996-2009) | 2010 | 2011 | 2012-2015 (Annual average) | 2016-2019 (Annual average) |
|---|---|---|---|---|---|
| Tanker | 9.8 | 6.6 | 5.3 | 6.1 | 6.3 |
| Bulk carrier | 9.5 | 13.6 | 7.8 | 4.8 | 5.7 |
| Container ship | 7.0 | 3.4 | 6.7 | 7.6 | 9.8 |
| Gas carrier | 2.2 | 0.8 | 1.4 | 3.2 | 3.4 |
| Total | 35.2 | 27.9 | 26.9 | 30.2 | 33.1 |

**Note: Tanker: over 2,000DWT, Bulk carrier: over 10,000DWT, Gas carrier (LNG, LPG carrier)*

(HMD) adjusted their new order target by about 10% compared from the previous year. Daewoo Shipbuilding & Marine Engineering (DSME) set new order target similar to the 2010 level. Hanjin Heavy Industries & Construction (HHIC) set new order target of $800 million for 2011 although it received no order at all in 2010.

•Shipbuilding volume

As newbuilding orders were received mainly in the ultra boom years (between 2006 and 2008) (60% of all newbuilding order placements are concentrated in the period from 2003 to 2008.), massive quantity of newbuilds (specifically, bulk carriers) will be built and delivered from 2010 to 2012.

The shipbuilding volume worldwide in 2011 is expected to reach 45.4 million CGT, 9.5% down from 50.19 million CGT recorded in 2010, due to the shrinking order books with a decreasing number of fresh orders being placed in the period from 2009 to 2010, and delay in delivery, base effect resulting from the highest shipbuilding volume in 2010.

In 2011, Korea's shipbuilding volume is expected to total 14.6 million CGT, 5.9% down from 2010 (15.51 million CGT), as a result of order intake slump and decline in order backlog during the period between 2009 and 2010.

** Forecast on the shipbuilding volume in 2011 (Clarkson, unit: 1 million CGT): Korea 14.6 / China 16.1 / Japan 8.9 / Europe 2.8*

** Shipbuilding volume from January to November 2010 (Clarkson, unit: 1 million CGT): Korea 14.5 / China 16.4 / Japan 7.4 / Europe 3.2*

However, Korea's large shipbuilders (6 companies) have a combined order backlog of 45.44 million CGT which is equivalent to about 2 year's work, as of late 2010. The aggregate shipbuilding volume of those shipbuilders is likely to increase

Table 11. New order target of 7 large shipyards of Korea

*(Unit: $100 million)*

| Type | Order intake in 2010 | New order target in 2011 | Increase/Decrease |
|---|---|---|---|
| Hyundai Heavy Industries (HHI)+Hyundai Samho Heavy Industries (HSHI)* | 106 | 198 | 86.8 % |
| Samsung Heavy Industries (SHI) | 97 | About 110 | 13.4 % |
| Daewoo Shipbuilding & Marine Engineering (DSME) | 112 | 110 | △1.8 % |
| STX Offshore & Shipbuilding (STXOS) | 31 | 50 | 61.3 % |
| Hyundai Mipo Dockyard (HMD) | 30 | 33 | 10.0 % |
| Hanjin Heavy Industries & Construction (HHIC) | 0 | 8 | Annual net addition |
| Total | 376 | 509 | 35.4 % |

**Note: Hyundai Heavy Industries (HHI) shares the obtained order volume with Hyundai Samho Heavy Industries (HSHI) for the construction of vessels.*

Table 12. Outlook on the shipbuilding capacity by country worldwide (Clarkson, 2010.10)

*(Unit: 1 million CGT)*

| Year | Japan | Korea | China | Europe | Others | Total |
|---|---|---|---|---|---|---|
| 2009 | 10.0 | 16.5 | 13.0 | 7.0 | 3.5 | 50.0 |
| 2010 | 10.0 | 17.5 | 19.0 | 6.0 | 3.5 | 56.0 |
| 2015 | 6.0 | 14.0 | 14.0 | 2.0 | 2.0 | 38.0 |
| 2009-2015 | -40% | -15% | 8% | -71% | -43% | -24% |

slightly if the shipbuilding market rebounds faster than expected and more orders are received with shorter delivery schedule.

Meanwhile, small and medium-sized shipbuilders are expected to face a declining order intake in the aftermath of the worsening liquidity problem which persisted since the financial crisis came to a head in 2008.

The global shipbuilding volume and deliveries are expected to be diminished continuously over the next 5 years as new order volume returns to average level of previous years after the peak following the ultra boom years (between 2006 and 2008) and sluggish period (between 2009 and first half of 2010).

** Forecast on the shipbuilding volume (deliveries) (Clarkson, October 2010) (unit: 1 million CGT): (2010) 53.8 → (2011) 45.4 → (2012) 40.4 → (2013) 34.0 → (2014) 31.3 → (2015) 26.8*

•Export

In 2011, Korea's export of ships, marine equipments, and offshore plants is expected to reach $47 billion, 5.6% down from 2010 ($49.8 billion). That is considered attributable to the expected reduction in the domestic shipbuilding volume and deliveries in 2011 because most domestic shipyards produce ships for export (Shipbuilding volumes for export comprise 98% of total shipbuilding volumes in 2009 and 90% in 2010).

•Construction capacity

Countries across the globe strived to make investments in facilities when the shipbuilding market was vibrant (between 2003 and 2008), but the global shipbuilding capacity will shrink gradually over the next 5 years if new order volume returns to the normal level of previous years.

** Shipbuilding capacity (Clarkson, 2010. 10)(Unit: 1 million CGT): (2010) 56.0 → (2011) 50.5 → (2012) 45.3 → (2013) 42.0 → (2014) 40.0 → (2015) 38.0*

The shipbuilding capacity reached zenith in 2010, recording 56 million CGT, and is expected to reduce to 38 million CGT by 2015. Specifically, the shipbuilding capacity of China had increased two-fold to 13 million CGT between 2007 and 2009 and reached the peak in 2010, recording 19 million CGT, and is expected to decrease to 14 million CGT by 2015.

Korea is poised to regain its top ranking in the global shipbuilding industry in 2011, bolstered by its competitive advantage over China in the container ship sector, optimistic outlook on the demand for LNG carriers and offshore plants, IMO's regulation of $CO_2$ emissions from ships, fierce competition over the fuel efficiency.

Meanwhile, China is facing unfavorable conditions, such as the sluggish market for bulk carriers, the major ship type of China, pressure for the restructuring of shipbuilding industry due to the rapid expansion of facilities, rising labor costs, possible erosion of price competitiveness in the aftermath of Yuan revaluation, and so forth. However, it needs to be noted that China has expanded financing for ships (which strengthens the relationship with European ship owners), spurred by its tremendous foreign reserve, and has seen an increase in new orders for high value-added vessels (LNG carrier, etc).

# Marine Dehumidification for Cargo Care and Vessel Protection

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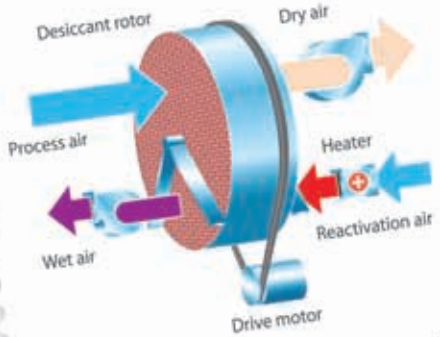


Munters dehumidification system are used in cargo hold, sand blasting, corrosion prevention

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Monthly Korship focuses intensively on major issues of shipbuilding industry and keeps you up-to-date with the latest news and trends of domestic and overseas shipyards with accuracy and swiftness.

**Technology** - It provides detailed overview of the expertise, know-how and products of companies, touting the technological competitiveness of shipbuilding equipment and material companies.

**Application** - It provides explanations on the function, strengths, weakness of products based on their application to ships.

# Instrumentation and control for FLNG vessels

**The automation of a typical Floating Liquefied Natural Gas (FLNG) vessel will include an Integrated Control & Safety System (ICSS) - which will control and safeguard the Subsea operations, the topsides and the hull, a fire and gas detection system and alarm management systems. The process units on the topsides will include gas separation, gas treatment, $CO_2$ compression and injection, dehydration, LPG fractionation, liquefaction and utilities.**

*Emerson Process Management Korea Ltd.*

## Introduction

While the concept of Floating Liquefied Natural Gas (FLNG) vessels is new, the technology for processing, liquefying, transporting and re-gassing Liquefied Natural Gas (LNG) is well established. In addition, there are many Floating Production Storage and Offloading (FPSO) vessels being used around the world which have similar systems and processes to those required on FLNG vessels.

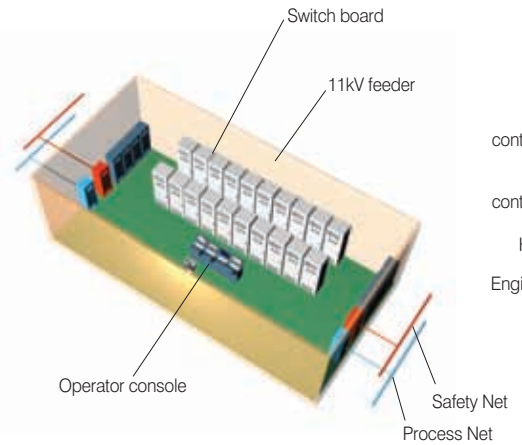
Based on experiences gained from these applications, design engineers and operators know that choosing the right automation supplier for a FLNG vessel is a critical success factor and one that can drastically reduce the risk associated with the design, execution and operation of this kind of untried project. Decisions that are made early on in the project with regards to the automation supplier and the automation technologies that are adopted can directly affect the three key areas of safety, robustness and availability.

How the automation supplier is embedded into the project team, and how the automation strategy is 'woven' into the overall project execution and vessel operating strategies, can have significant implications. A credible supplier needs to demonstrate they have relevant experience and appropriate technologies. They need to demonstrate their close involvement in LNG and FPSO projects and need to show they are developing new processes around their execution. They also need to be able to provide a well engineered and correctly specified modern control architecture. If the supplier meets these requirements, their work will help to minimise project costs, reduce time to full production, maintain maximum throughput, avoid unscheduled shutdowns, keep operating and maintenance costs as low as possible, help manage regulatory compliance and support plant safety and security needs.

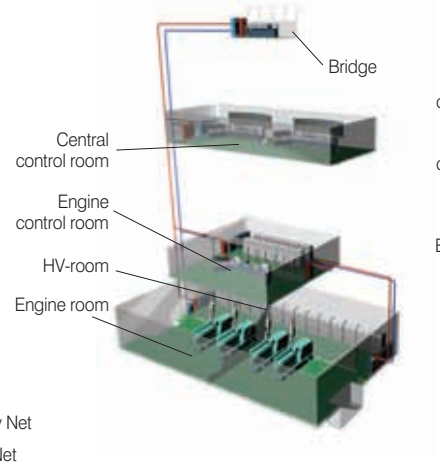
This article will look at the difference that automation can make based on some of the best practices that have been developed, and experience that has been gained from engineering FPSO and LNG projects. It would be impossible to cover all of the automation considerations in detail so only the main areas will be covered.

## The automation difference

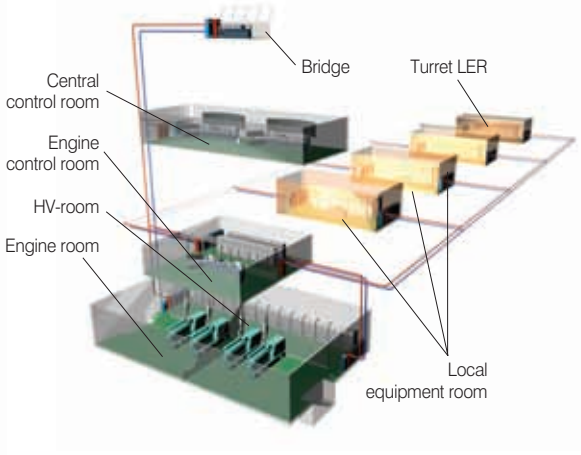
The automation of a typical FLNG vessel will include an Integrated Control & Safety System




Local Equipment Room as Autonomous Unit




Automation and Safety Architecture; Hull
-The shipyard can Install, Test and Operate Topside Automation and Safety System on The Hull independently




Automation and Safety Architecture; Add on topside modules
-Topside Modules can be tested locally before installed onboard

(ICSS) - which will control and safeguard the Subsea operations, the topsides and the hull, a fire and gas detection system and alarm management systems. The process units on the topsides will include gas separation, gas treatment, $CO_2$ compression and injection, dehydration, LPG fractionation, liquefaction and utilities.

It is in the engineering and integration of all these components that can make a project a success or a failure, both in the short term and also over the whole lifecycle of the vessel. Making an early decision on an automation supplier that has the right skills, expertise and product portfolio can reduce risk and make a huge difference to the engineering contractor in terms of reduced costs and faster completion, and also to the end user in terms of improved operation.

Engaging an automation supplier at the earliest possible phase of the project brings immediate and ongoing benefits. There will be synergies between all those involved in the project that can be taken advantage of in the design process, saving both cost and time. In addition, risk is reduced if key partners are committed to deliver broader scope of supply, and take ownership of performance.

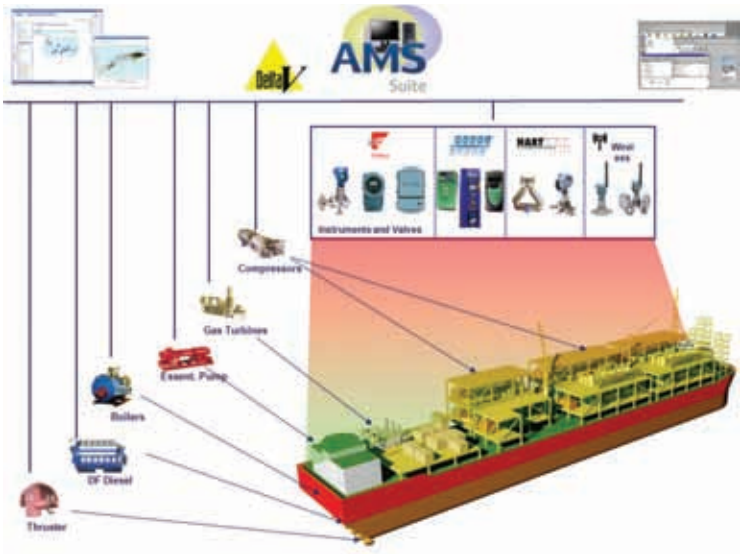
An early selection of suppliers can enhance the automation strategy, introducing for instance the use of digital or wireless communication technologies, or even a modular design that saves engineering costs, eases commissioning and reduces equipment weight and footprint size. Selection of the automation supplier early on in the process is crucial for the end user as this can have a profound effect on the way the vessel is operated and maintained throughout its lifetime. A poor selection of strategy at this stage may limit the potential to gain an overall understanding of the condition of installed equipment on an on-going basis. This will limit the potential to maintain the vessel effectively and to maximise production.

## Best practice

Best practice in the construction of FLNG vessels can be determined by looking at practices that have been adopted on FPSO projects and also on LNG plants, tankers and terminals.

A trend in major projects of this type is to adopt the PEpC (Procure, Engineer, Procure commodity items, Construct) approach to engineering the project, rather than the traditional EPC (Engineer - Procure - Construct) method of project development and implementation. The PEpC approach allows for early selection of key process equipment suppliers, including the process automation supplier, to ensure business, project, and operational strategic alignment.

The PEpC approach was developed by the Construction Industry Institute and includes four phases: Procure critical and strategic items first (including the automation technology), Engineer (by contractor partnered with the automation supplier), procure commodity items and finally Construct. In addition to the long term operational benefits, the PEpC




DeltaV AMS Suite

approach typically delivers overall project benefits in excess of 10 to 15% or more in time savings, and 4% to 8% cost savings when compared with the traditional EPC process.

Major automation vendors such as Emerson Process Management will offer a fully integrated team that can be embedded in the project process. This team will span several disciplines, taking in the ICSS, instrumentation and valves, fiscal metering systems, hull and topsides controls, boiler management, power management, power distribution and more. The supplier project team should be able to fully integrate all the systems, from propulsion to sensors, and should be involved at all phases of the project, from conception through to operations and maintenance.

Another reason that the automation supplier should be involved early on in the project is that they are in the best position to advise on the use of new technology. They can also advise a project team how work practices can be adapted to fully capitalise on the benefits these latest technologies offer.

One such new technology that is being adopted on many LNG and FPSO projects is the use of digital and wireless communications to minimise engineering time, cost and weight. There are substantial labour and hardware installation saving opportunities associated with a digital architecture compared to a traditional DCS installation. For instance, wiring savings, are a combination of reduced material and labour costs for installing wire, cable tray, conduit, marshalling cabinets, junction boxes, terminal blocks, and IS barriers. In addition, a reduction in wiring means less weight.

A digital plant architecture consists of intelligent field devices, such as transmitters, valves, and pump-motor monitors, networked with digital automation systems and software. Digital busses run throughout a vessel, carrying vital process and equipment information from the devices to enable process control, asset optimisation, and safety functionality. These digital plant networks create a data rich environment enabling unprecedented knowledge about overall plant performance.

The use of a digital plant architecture enables project automation costs to be significantly reduced, with typical savings of 30% or more versus the installed costs of a traditional installation. These savings result from reduced specification and procurement costs, material and labour savings, smaller control room footprint, and streamlined design and engineering.

But project savings are only the tip of the iceberg. The most dramatic savings accrue once the vessel becomes operational, and they continue to accumulate throughout the life of the vessel. These follow-on savings are heavily impacted by early automation decisions and represent enormous financial reward for shareholders.

The trend on FPSO vessels is towards a modular construction that enables major parts of the vessel to be constructed and commissioned in parallel, bringing them together at the construction site. This benefits the engineering contractor and end user in many areas. Modularisation enables shorter construction times as the acceptance testing can be performed at the construction sites.

A modular construction is only possible when using a node based control and safety system such as Emerson's DeltaV system. A node based system can be implemented in multiple locations with engineers locally supporting the skid manufacturers but combining all skids to one system after mechanical completion. The ICSS for the hull can be implemented separately from the topsides. The topside can also be supplied in modules using engineers resident in the country supplying the skid or module. The number of modules may change dependent upon process size and com-

plexity. A node based system helps engineering contractors to run multiple systems in parallel around the globe, and merge them into one system at the shipyard or construction site.

Emerson has pioneered work on a Modular Safety Concept (MSC) which is made possible due to the design of the DeltaV system. The safety function on each module operates independently, but will also be integrated with the ICSS for the whole vessel. Safety data will be passed along a dedicated dual redundant fibre network to a centralised control room.

The MSC will increase safety onboard thanks to a Zone 2 approval that allows the Fire & Gas (F&G), Process Shut Down (PSD) and Emergency Shut Down (ESD) systems to remain in operation if gas is detected in the area or in the local equipment room. It will also reduce the total installed cost significantly, thanks to the faster start-up and independent testing of each module and the reduced commissioning time at the shipyard. In addition, the MSC will increase flexibility for the implementation of late changes in the project. The MSC has received approval in principle from Det Norske Veritas (DNV), one of the worlds leading risk management bodies.

A pre-commissioned topside Local Equipment Room (LER), shipped directly from the automation supplier, can also increase flexibility and support a short execution time in a very effective manner. The hull ICSS can be supplied directly to the yard and implemented independently of the package units. The LER can be shipped to the OEM for each module for hook-ups and testing of the complete unit for both LV and MV Power Distribution and Management Systems (PDMS) and ICSS. This minimises work at the construction yard.

Another new technology that will enable many benefits when applied to an FPSO, or FLNG project is called electronic marshalling. This is a technology that is dramatically cutting engineering and delivery times, reducing footprint and making commissioning easier. Whereas traditionally, in a wired system, field wiring from each device would be landed in a cabinet and then individually hard wired across to a controller that was suitable for that type of input, this is no longer required. With electronic marshalling, field wiring is still landed in a cabinet, a module is installed that is suitable for that particular kind of I/O then the cross-assignment of the incoming signal to the database tag in the ICSS is done electronically over a digital bus communicates with the controller. No individual hard wiring is required. This approach drastically reduces installation time and can also shave time off the overall project schedule as all the cabinets are a standard design and are not required to be individually engineered. Electronic marshalling aids and supports the increased modularisation demanded for time and cost efficient engineering of FPSO's.

In order to save weight and space, best practice on FPSO projects has been to include one Centralised Control Room (CCR) for all on-board systems, including topsides and hull. The CCR has a number of operator stations that control and monitor both topside & hull. All alarms and events from the assigned process units are communicated to the operator stations and real-time information is presented in graphical displays and group displays. The CCR works best when all controls are managed by a common system with one database, when the ICSS is node based and when the CCR can be connected via copper or fibre connections to all cabinets and modules onboard. The cabinets, HMI station or Maintenance Station can be mounted anywhere on the network which gives a high degree of flexibility.

Because of the wide range of equipment required for an FPSO vessel, no supplier is able to offer all the requirements. So suppliers with strategic alliances with other vendors are often preferred. Emerson for instance has an alliance with Wärtsilä, who offer propulsion systems, power-generation, power-distribution and vessel-automation systems. Emerson and Wärtsilä have been providing a single point of contact to the FPSO segment for several years. Between them they offer true system integration, turnkey delivery and extended engineering services.

The last major piece of the automation puzzle is the digital instrumentation and valves. In order to fully capitalise on the digital architecture these devices need to support predictive diagnostics. There are other factors that need to be considered of course. These include the suitability of wireless enabled devices. With the need for faster installation and commissioning and reduced weight, wireless instrumentation is being readily adopted. Wireless networks, such as those based on the IEC 62591 (WirelessHART) standard, provide an interoperable, adaptive, flexible approach to wireless and are installed and proven in installations around the globe.

If a digital architecture is implemented during the project then the end user will be able to use diagnostic and asset management software such as Emerson's AMS Suite to identify deteriorating equipment or process conditions and potential problems. Maintenance engineers can

predict how long it will be before equipment will fail or a potential safety or security issue will develop. Remedial action can be scheduled on the basis of actual conditions rather than a pre-determined schedule, thereby safely maintaining production at optimal levels. By resolving problems before they interfere with production, the unscheduled breakdowns and work stoppages that are typical of a reactive maintenance regime can be avoided.

Digital field technology enables equipment failures and process deviations to be predicted, giving sufficient warning to prevent an abnormal situation from developing. For example, Emerson's DeltaV system offers Abnormal Situation Prevention (ASP) using PlantWeb and AMS Suite applications to find problems while they are developing and guide the user to processes that will resolve them, so responses are controlled and predictable.

## Summary

Having decided that a digital automation system is right for you, how do you choose a supplier - Today, speed to market is a critical factor for many LNG projects. Specifying an established automation supplier with proven engineering and project management skills, and an industry leading digital plant architecture, featuring digital systems and intelligent field devices - will avoid many of the pitfalls that can cause unexpected delays. Well known international organisations will have the greatest experience with different types of installations, and will include globally co-ordinated local support as part of the offering. Many of the techniques and technologies used in the LNG and FPSO industries are specialised, and in response, some companies have established centres of excellence to offer a higher level of support.

A complex vessel demands a high degree of process automation sophistication in order to meet the data management requirements for it to operate safely and efficiently. Digital plant architectures, such as Emerson's PlantWeb, and Emerson's globally structured Project Execution organisation can meet these requirements, while reducing costs, improving performance, and providing for future innovation. Emerson's state-of-the-art technologies and applications ensure data is received in real time and in easy-to-use formats, enabling operators to resolve problems in a collaborative environment while achieving optimal and unbroken production. This is Emerson's vision of the intelligent vessel.

### Emerson Process Management with great deal of experience on LNG and FPSO projects

Emerson Process Management has a great deal of experience on LNG and FPSO projects. The company has a long term alliance with Qatargas that names them as the preferred supplier of digital automation solutions for their oil, gas and LNG facilities. As automation supplier Emerson engineer, project manage, install, commission, and provide long term support.

Emerson works with the operators of existing plants to maximise their returns. They contracted with Atlantic LNG - owned by a consortium of operating companies including BP, British Gas, Repsol, Suez and National Gas Company of Trinidad and Tobago - to analyse the economic and operating performance of process and mechanical equipment at the company's Liquefied Natural Gas plant in Point Fortin, Trinidad and Tobago. By using Emerson's AMS Suite: Equipment Performance Monitor, part of the PlantWeb digital plant architecture, Atlantic LNG will be able to optimise and gain maximum economic return from available assets such as methane, ethylene and propane centrifugal compressors, gas turbines, oil and gas heaters, and heat exchangers. Atlantic uses AMS Performance Monitor to support its existing maintenance management programme to maintain equipment availability and reduce unexpected downtime.

The embracing of AMS Performance Monitor will enable Atlantic LNG to be proactive with its maintenance management decisions. Throughout the seven year duration of this project, Emerson will provide a team of dedicated engineers to handle the day-to-day evaluation

of Atlantic LNG's performance results, including impartial consultancy and expertise to analyse and interpret the performance data and results. This team will work alongside reliability engineers from Atlantic LNG to identify performance degradations, implement proactive maintenance, provide notification of changes in asset performance, and assess the financial impact of performance upon their process.

As well as onshore LNG experience Emerson also has experience offshore. One such project was the Golar Freeze, a floating storage and re-gasification unit (FSRU). This vessel was an LNG carrier that was converted into a floating terminal. It makes use of Emerson's PlantWeb digital plant architecture for process control, power management, and safety instrumented systems.

Emerson's offshore expertise extends to FPSO vessels also. They applied a modular construction concept when automating the worlds largest FPSO vessel, the Yuum K'ak' Naab (converted Berge Enterprise). This vessel operates in the gulf of Mexico and is capable of processing 600,000 bopd and 120 MMcfd of gas. The fast track project left the yard on time, 20 months after the start of production. This schedule was achieved in part due to the high degree of modularisation. This enabled construction work to take place in multiple locations at the same time.

Another FPSO project that Emerson worked on was a vessel used on Total's Akpo field development. The Akpo field is located 200 km off the coast of Nigeria. The Akpo FPSO processes and stores oil for delivery to tankers or via pipelines to refineries. The hull has a storage capacity of two million barrels of oil, and the FPSO will produce 225,000 barrels of oil per day. Emerson's Main Automation Contractor responsibilities included development, installation, configuration, testing, and commissioning of the systems controlling the vessel topsides, hull, subsea and radar tank gauging. In addition, Emerson was responsible for integrating the safety system. Emerson collaborated with Total on Front End Engineering and Design (FEED) and proposed a phased delivery of automation equipment. Initial phases were used to validate the design. Emerson's experience in international project management was used to provide co-ordination and consistency between contractors in Europe and Korea. Emerson was involved in installation, commissioning and start-up, on site, in Nigeria.

Emerson was also involved with an FPSO project for BP in Angola. The project covered the automation of a floating production, storage and offloading vessel that is being used to develop the Greater Plutonio deep water offshore oil fields off Angola. Emerson was awarded the initial order for this project in 2003 and work started immediately on the long lead activities which included Front End Engineering Design. This work scope included interface management planning, general project execution planning, and definition of engineering standards to be adopted including FOUNDATION fieldbus standards.

A further order followed for the ICSS work scope for the FPSO topsides. Emerson provided project management and engineering services to design, implement, test and deliver the ICSS. The order also made provision for commissioning support on the vessel in Korea. Further orders followed for a Marine Automation Control System for the hull, Process Information Management System (PIMS) functionality and an Operator Training System.

A key service provided by Emerson was the synchronisation and management of the consistency between the topsides and hull systems. In the early stages of the topsides commissioning, the topsides and hull systems were merged into a single integrated control and safety system for the entire vessel.

During commissioning, Emerson provided the expertise necessary to troubleshoot the hardware and software supplied and as most of the topsides process equipment and control systems were built in modules, there were several months when these modules were located on the quay side waiting to be lifted and installed on the deck of the FPSO. BP identified that significant testing could be completed on the quay prior to full integration and Emerson provided temporary workstation hardware and software licences to enable parts of the system to be separately energised. This approach saved several months additional commissioning time.

The current contract makes provision for Emerson to provide long term support for the Block18 FPSO through to 2016. This includes the provision of hardware and services, spares services and engineering support in order to maintain a high level of performance. BP is currently looking at remote access options and it is likely they will employ the DeltaV Remote Client product to allow operations staff based in the UK to monitor the Block 18 asset.

# Successful shipbuilding & offshore applications (1)

## Drill String Compensator isolation valve test monitoring system

**National Instruments Korea (NI Korea) is a leader of measurement and automation solutions, and helps engineers in the field of shipbuilding/maritime and heavy industry develop easy-to-use and convenient systems founded on the graphic-based programming program software and module hardware. The shipbuilding/maritime solutions of NI Korea enable various deployment of applications to various fields, ranging from measurement through control to design.**
**Here, we introduce some examples of NI's successful applications to the shipbuilding/offshore fields, which use various hardware equipments, including LabVIEW, the graphic-based programming language.**

*National Instruments Korea Ltd.*

- *Author: Choi Jae-seok*
- *Organization: Khan Co., Ltd.*
- *NI products: LabVIEW, PXI-1031, PXI-8108, PXI-5122*

Kahn accomplished satisfactory results by using hardware equipments of National Instruments (NI), including NI LabVIEW, to develop a software and monitoring system capable of analyzing and monitoring the data collected through the measurement of pressure transferred to the Drill String Compensator.

### Challenges

- Simplify the cable installation and test equipments which have to be installed for testing the Drill String Compensator (DSC)
- Develop programs optimized for DSC test
- Prevent any injury or loss of life which can happen in the data acquisition area by using the remote connection based on wireless technology

### Solution

Test equipments based on existing system pose inconvenience of having to lay cables from the monitoring area to the data acquisition area.
However, this wireless technology based solution obviates the need for laying cables from the monitoring area to the data acquisition area, and can prevent any injury or loss of life from the exposure to potential hazards in the data acquisition area.
Besides, it enables convenient and remote operations such as the modification of configuration, system fault, software replacement, etc, which may happen during the test without need for physical access to the place where the equipment is installed. Thus, we choose NI PXI architecture which provides the industry's highest bandwidth and lowest latency and, with various flexible IO modules for future maintenance.

### Application

A software and monitoring device system is aimed to be developed, which can analyze and monitor the data gathered during the test period through the real-time measurement of pressure transferred to the DSC installed in the upper side portion of Derrick on drillship and semi-submersible rig.

## Main Points

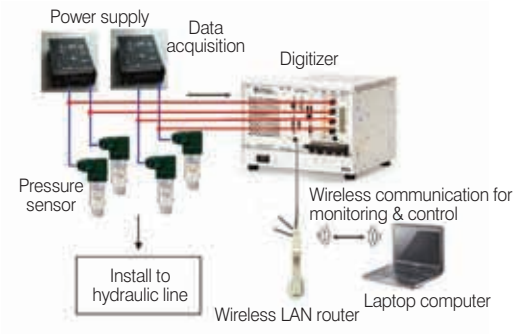



Fig.1 Diagram of overall system structure

Fig.2 PXI chassis installed at the site

Fig.3 Wireless router installed at the site

Fig.4 Pressure sensor connected to PXI chassis

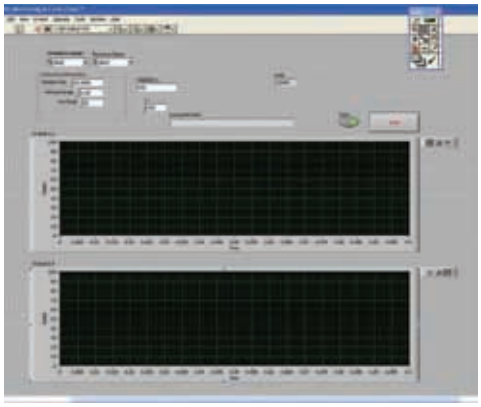


Fig.5 Real-time data monitoring

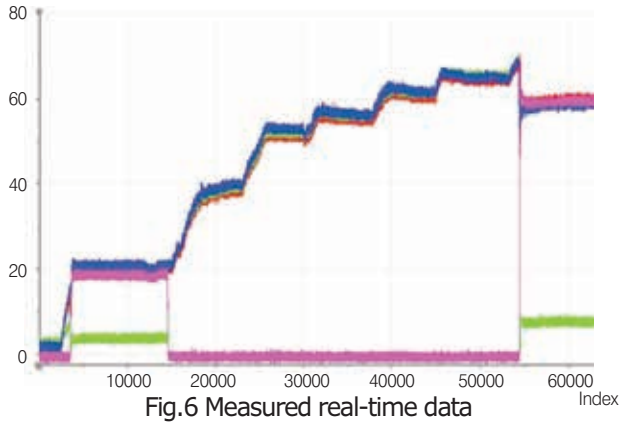



Fig.6 Measured real-time data

## Conclusion and benefits from the development of solution

Remarkable time-saving can be expected for the installation and configuration. PXI system is a hardware suitable for high performance embedded computer, rugged environment-based industrial sites and can minimize manpower input for installation. It can prevent any injury or loss of life from potential hazards.

With the interface optimized for test, the configuration can be made conveniently. Using LabVIEW, a graphic-based programming language, it facilitates data collection and analysis with intuitive interface.

## Reason for selecting NI solution

- Proven software and equipments
- Ease-of-Use in both programming and installation of PXI hardware modules
- Stable industrial computer system and high-performance high-speed data acquisition hardware with streaming performance


# HEMPASIL X3

## Double award-winning fuel-saving technology

Guaranteed to save ship-owners money on fuel, HEMPASIL X3 is the world's most advanced fouling release system. It uses HEMPEL's unique hydrogel technology for unparalleled antifouling capability. Recognised as a major fuel-saving breakthrough for the maritime industry, Hempasil X3 is the proud winner of two industry awards.

Find out more, and see what you could save at hempel.com

*Hempasil X3 is the winner of the Seatrade award for "Protection of the Marine and Atmospheric Environment" and Ingenioren's PRODUKTPRISEN 2009*

HEMPEL

# Monthly KORSHIP, Korea's only shipbuilding magazine in English, serves as the window to the world's shipbuilding industry building a bright future on the horizon at sea.

Monthly Korship provides succinct overview on special features and strength of both current and new products put on the market, and keeps you updated on the shipbuilding orders and construction of ships at major domestic shipyards.

New Order - It is a clean roundup of news on orders placed with shipyards. New shipbuilding orders are reported in detail, along with photos capturing the moment of shipbuilders and clients signing contracts and summary illustrations of order backlog.

Major Performance Gallery - It provides detailed overview on the specification of products with photos.

New Product - It provides updates on new products.

# HHI was awarded 2 additional drillship orders

On January 19, Hyundai Heavy Industries (HHI) clinched a $1.03 billion (KRW 1.14 trillion) order to build two new deepwater drillships for Noble Drilling Holding, a leading offshore drilling contractor for the oil and gas industry. The agreement also includes an option Noble Drilling can exercise to order two additional same class drillships.

The vessels, measuring 229 meters in length and 36 meters in width with a maximum drilling depth of 3.6km, are scheduled to be delivered by September 2013.

Drillship is a vessel used for offshore drilling of new oil or gas and the most typical high value-added ship type. There has been an upward shift in the demand for drillships amid the rising oil prices and the expanded investment in resource exploitation as the economy rebounds recently. Specifically, the renewed surge in demand for drillships has resulted from the shift of attention among oil majors worldwide to deepwater drilling to overcome constraints that they encountered in shallow water oil production.

HHI successfully secured all 3 drillship orders placed around the globe in 2011. HHI's drillships have gained reputation in the global market since Deepwater Champion, HHI's first drillship, made a debut with its delivery to the U.S.-based Transocean, the world's top-rated offshore drilling company, in November, 2010.

HHI won favorable evaluation from the ship owner for its differentiated drillships incorporating advanced technologies and design features. Building a good reputation for its drillship construction capabilities fast in the global market, HHI has attracted even more attention from ship owners over a short period of time.

Above all, HHI optimized the size of ship based on the design strictly tailored for drillships, unlike other shipbuilders, and increased the fuel efficiency while reducing the maintenance cost. Specifically, thrusters, the core equipment of drillship, can be repaired on deck, which helps save the maintenance and repair cost and increase the stability of work.

Moreover, HHI's drillships have increased the drilling capability by 20% and can drill as deep as 3.6km into the sea, providing the largest drilling depth capacity among all drillships worldwide, a strength evaluated highly by the ship owner.

An official from HHI said, "We have received many more inquiries from customers after the delivery of our first drillship, and we anticipate additional orders."

Deepwater Champion, the first drillship HHI delivered on November, 2010

# SSME won orders for 6 units of 8,800TEU class large container ships

Sungdong Shipbuilding & Marine Engineering (SSME) announced that it clinched an order on January 29 for a total of 6 units of 8,800TEU container ships: 4 units from the Switzerland-based MSC (Mediterranean Shipping Co., S.A.) and 2 units from the Greek-based Costamare. These large container ships will measure 300m in length, 48.2m in width, and 24.6m in height, and are due for delivery on a staggered basis starting from 2013.

MSC, based in Switzerland and established in 1970, has a fleet consisting of about 430 vessels and is currently ranked second among the top carriers in the world. It is the first time for MSC to place order with SSME.

Last year, MSC visited the shipyard and discussed with the shipbuilder in technical meetings from the Christmas day to the end of 2010 without taking a holiday break.

An official from SSME said, "SSME is in possession of excellent technology for building ships on the yard ground, as manifested in our construction of the world's first 'on-ground build' container ship. In my view, we received

this order because the ship owner was impressed by SSME's superb technology proven by the successful completion of consecutive deliveries of medium and large-sized container ships from 2009 to 2010."
In addition, the 8,800TEU container ship is a type of ship that only large shipyards can build, and the vessels ordered this time will be comparable to 10,000TEU container ship in terms of width and power.
He added, "This contract will lead SSME's enhanced technological capabilities and scale to gain wider recognition in the global market."
Usually, the construction of container ship is a complex procedure, involving many block assemblies, multiple machining processes and tests, compared to that of ordinary merchant ship.
Particularly, these container ships ordered to SSME are specially designed to have large space for the installation of refrigerated containers and ensure larger container loading capacity on deck compared to the standard type container ships, thus requiring highly advanced shipbuilding technology.
Currently, SSME has continued the smooth sailing, holding the naming ceremonies for 4 vessels and delivering 6 units in January alone.

6,500TEU container ship, the world's first vessel built by SSME using the 'on-ground build' method

# DSME received an order for 1 deepwater drillship

Daewoo Shipbuilding & Marine Engineering (DSME) successfully obtained an order to build a deepwater drillship, its first order for 2011.
DSME announced that it was awarded an order on January 31 from U.S.-based Atwood Oceanics, an offshore oil and gas drilling company, to construct a deepwater drillship. The total value of the contract was not revealed according to the agreement of both companies.
The drillship will be built at the Okpo Shipyard of DSME and delivered by the second half of 2013. It will measure 238m in length, 42m in width, and 19m in height, and can drill in water depths up to 40,000 feet (approximately 12,000m).
Specifically, the drillship will be built into DSME-12000 type purely developed by DSME. Most distinctively, this vessel has the optimized design and equipments installed for drilling in ultra deepwater at a maximum depth of 12,000 feet (about 3,600m). For that, the vessel can load protective pipes (casing) and drilling pipes weighing up to 3,200-ton which is 1,000 ton more compared to the existing drillships.
Besides, the vessel will be fitted with dual derrick to enable the drilling and pipe assembly to be conducted simultaneously for each derrick while drilling an oil well. Thus, the duration of the operation can be reduced by over 25%, compared to the drillship with only 1 derrick.
In addition, the drillship will be outfitted with cutting-edge systems, including dynamic positioning system (DPS) for maintaining stable position over the well, 7-ram blowout preventer (BOP) for safe drilling operation, kill & choke manifold for lowering the popping pressure, and so forth.
Having secured this drillship order, the first one for this year, DSME plans to strengthen its sales operation and achieve over $6 billion in new orders from the offshore sector out of its $11 billion order target set for 2011.
An official from DSME said, "With a wave of new orders for offshore drilling facilities from the beginning of this year after a decline in the aftermath of oil spill in the Gulf of Mexico last year and the oil prices remaining around $90, we anticipate more orders for drilling facilities."

Trial operation of drillship, same type with the one ordered to DSME this time

# Rolls-Royce to power ten Littoral Combat Ships for the U.S Navy

Rolls-Royce will supply gas turbines and waterjets for ten of the U.S. Navy's Littoral Combat Ships (LCS) - the Group's largest ever marine naval surface ship contract.

Designed to operate in combat zones close to the shore (littoral waters), each LCS will be equipped with two Rolls-Royce MT30 gas turbines powering four large waterjets, enabling the vessels to reach speeds in excess of 40 knots. At 36mW, the MT30 is the world's most powerful marine gas turbine. Combining this power with Rolls-Royce waterjets makes the LCS highly manoeuvrable, able to operate in shallow waters and to stop and accelerate quickly.

Rolls-Royce is already supplying propulsion equipment on the first two Lockheed Martin vessels and latest announcement extends this with one firm order and options for a further nine ships of the same design.

Andrew Marsh, Rolls-Royce, President - Naval said, "We are delighted that the Lockheed Martin design has been selected for an additional ten vessels in the LCS programme. We have worked closely with Lockheed Martin and other partners throughout the design, build and sea trials of the first vessel, USS Freedom, and are making good progress on the second ship, Fort Worth, which is more than 80 percent complete and remains on cost and on schedule."

"The Rolls-Royce equipment, including the MT30 gas turbines and waterjets, combine to give an effective and efficient propulsion system perfectly suited for these innovative, highly-manoeuvrable, state-of-the-art ships."

The MT30 is derived from Rolls-Royce aero engine technology, building on over 45 million hours of operating experience and reliability. It also has the highest power density of any marine gas turbine - a key factor in naval propulsion where delivering a high power output in a compact space is essential. The MT30 is the latest development of Rolls-Royce marine gas turbines, and has also been selected for the UK Royal Navy's new Queen Elizabeth class aircraft carriers and the U.S. Navy's DDG-1000 Zumwalt class destroyer programme.

The waterjets are among the largest produced by Rolls-Royce and can pump water at a combined rate of 25,000 gallons per second - enough to fill an Olympic style swimming pool in 25 seconds.

In addition to gas turbines and waterjets, a significant range of Rolls-Royce equipment is specified in the Lockheed Martin design, including shaftlines, bearings and propulsion system software.

The US Navy's Littoral Combat Ship is powered by Rolls-Royce MT30 gas turbines

# Nexans signed a contract with Subsea 7 for submarine umbilical cable for Laggan-Tormore gas project

Nexans signed a contract with Subsea 7 S.A. for the design, engineering and manufacture of a total length of 143km of static submarine electro-hydraulic control umbilicals for the Laggan-Tormore gas field development in the North Sea.

The umbilical product will integrate steel tubes for fluids, 3kV power cables and fiber optic cables. This project will be conducted at Nexans' specialized

Submarine umbilical cable

umbilical facility in Halden, Norway, with delivery slated for early 2012.
The submarine offshore production system will be composed of 2 production template manifolds. This system will be controlled by 2 Nexans static submarine electro-hydraulic umbilicals linking the Laggan and Tormore fields located over a distance of 17km apart and linking further 126km to the Shetland shore. The 126km umbilical will be one of the longest across the globe.
Ragnvald Graff, Sales & Marketing Director in the Electric Power Division said, "Subsea 7 S.A. is a very important customer for Nexans. We are very pleased to work closely with Subsea 7 S.A. on this strategic project opening up the western side of Shetland for future development. We have already gained recognition of our specialized capabilities in this field by delivering sophisticated umbilical systems which can operate over long distances in similarly conditions, such as in the Snøhvit and Ormen Lange projects on the Norwegian continental shelf."

# HHI to build largest super semi-submersible vessel

Recently, Hyundai Heavy Industries (HHI) won an order to build a $240 million semi-submersible heavy transportation vessel (SSHTV) from Dockwise of Netherlands.
The vessel is specially designed to transport more than 110,000 tons of offshore oil and gas production facilities including Floating, Production, Storage and Offloading (FPSO) units. After completed, FPSO are usually transported by two or three tug boats from shipyards to operating sites, taking about months to mobilize on the sites. This super-heavy transportation vessel can halve the delivery time, helping move up the installation and commissioning time.
The vessel, measuring 275 m in length, 70 m in width, and 15.5m in depth with a carrying capacity of more than 110,000 tons, is scheduled to be handed over during the last quarter of 2012. Upon completion, the vessel will be the world's largest semi-submersible heavy transportation vessel.
The company's flexibility in new building design, its track record of on-schedule delivery and budget discipline were the key deciding factors in the award of the contract.
Kang Chang-june, COO of the Offshore & Engineering Division, said "As an Engineering, Procurement, Installation and Commissioning (EPIC) contractor for offshore projects, we agree strongly with Dockwise that there is a rapidly emerging need for a vessel of this capacity, given the scale growth of offshore projects. The benefits for our clients of dry transports of integrated structures and of large FPSOs are apparent to yards and offshore operators focused on the future evolution of our markets. As a top class offshore construction yard we are proud that Dockwise has chosen HHI for the construction and timely delivery of this vessel."

3D model of the 110,000ton semi-submersible heavy transportation vessel (SSHTV)

# STXOS clinched order for 4 Kamsarmax bulk carriers

STX Offshore & Shipbuilding (STXOS) was awarded an $160 million order to build 4 units of Kamsarmax bulk carriers.
STXOS announced that it won a contract on February 10 to construct 4 units of 83,000-ton bulk carriers from an Asian ship owner.
The quartet will measure 229m in length, 32.2m in width, and 20.2m in height, and can sail at a maximum speed of 14.1 knots, and will be built at JInhae Shipyard of STXOS. They are scheduled for delivery on a staggered basis starting from the second half of 2013.
The 83,000-ton bulk carrier, developed independently by STXOS, is an upgraded version of conventional Kamsarmax bulk carriers of

81,000-ton class in terms of ship size to maximize cargo capacity, and has attracted the attention of ship owners.
An official from STXOS said, "We have moved into full swing to win new orders for 2011, starting with this order for Kamsarmax bulk carrier. This year, we will do out utmost to accomplish remarkable performance in new orders for merchant ships, offshore plants and others as the global shipbuilding market is expected to be on a slow rebound."

# STX OSV received this year's first order for PSV

STX Offshore & Specialized Vessels (STX OSV), the subsidiary of STX Europe, announced on February 15 that it successfully secured an order for 1 unit of Platform Supply Vessel (PSV) from an international ship owner.
The hull will be built at STX OSV shipyard in Romania and delivered from STX OSV Aukra in Norway by 2012 to the ship owner. The ship design will adopt PSV 09 developed by STX OSV Design.
PSV is a ship specially designed to supply fuel necessary for the drilling operation of offshore plant, food/beverage, drilling equipments/manpower, etc, to the offshore oil platform which drill into the sea floor and extracting crude oil from oil reserves. It is a type of ship that has come into the limelight along with offshore plants as new life has been breathed into deepwater resource exploitation projects recently.
PSV 09 design is optimized for eco-drive in all weather conditions and boasts high fuel efficiency, and highlighted as one of the green ship types that garner a significant share of PSV market.
STX OSV has an backlog of 55 vessels in all, including this order.


Platform Supply Vessel (PSV) to be built by STX OSV

# STX Europe clinched an order to build 1 fisheries research vessel

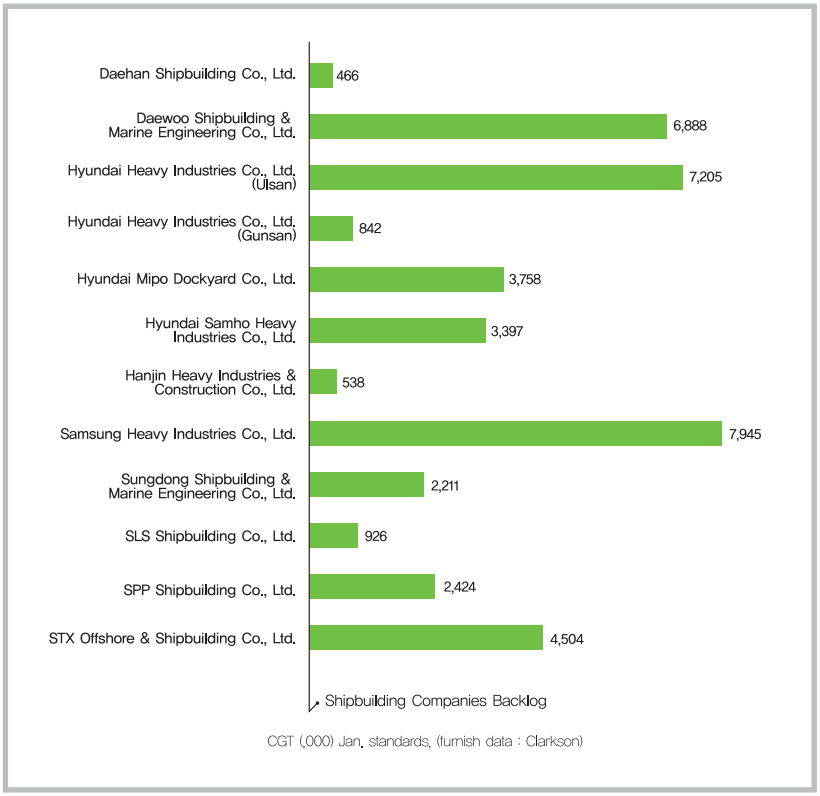
STX Finland, the subsidiary of STX Europe, announced that it signed a contract worth EUR 35 million (approximately KRW 53 billion) with the Ministry of Fisheries and Marine Resources of the Republic of Namibia on February 11 (local time) to build 1 unit of Fisheries Research Vessel.
This fisheries research vessel, which measures about 62m in length and can accommodate for 45 crew members and research personnel, will be built at the Rauma Shipyard of STX Finland and delivered by early 2012.
This vessel is also equipped with the newest engine facilities and power generation system to minimize the maintenance cost. In addition, it features a dynamic positioning system to enable the operation in any African sea and weather condition without restriction.
This newbuilding will be put into operation for the Namibian fisheries research and carry out a wide range of research activities, like monitoring the fish species, fish reserves, etc, and collecting and analyzing the samples.


Fisheries research vessel

An official from STX Finland said, "We have focused on R&D related to the specialized ships after winning an order for polar supply and research vessel from the Ministry of Environment of the Republic of Namibia in 2009. We will do our utmost to further strengthen competitiveness in the fisheries research vessel sector."

Domestic shipbuilding industry which experienced the sharpest decline in order inflow in 2009 has seen strong rebound in new vessel order in 2010 as the year draws to a close.

The strong growth in the shipbuilding industry is attributed to the fact that the order volume for merchant ships rose by about 70% to 27mCGT from 16mCGT over the beginning of the year and shipbuilders have continued to win orders for offshore facilities such as drillships or Floating Production, Storage and Offloading (FPSO) units, the sector in which the domestic shipbuilders have strength.




In 2011, shipbuilder are expected to win more new orders for offshore facilities amid the rising oil prices and the increase in new orders for high value-added vessels such as container ships or LNG carriers in the wake of the resumption of projects which have been postponed. It is a very good news for the domestic shipbuilding industry which have strength in both sectors.

However, domestic shipbuilding industry need to map out new strategies and spur efforts to recapture world's no. 1 title after being overtaken by China in May, 2010, which is slightly ahead of Korea in terms of order volume, shipbuilding volume, and order backlog.

According to the statistics of Clarkson, shipyards in Korea still have enjoyed influx of large volume of orders and been placed high in the global ranking. In consideration of that, let's have an up-close look at the backlog of major Korean shipbuilders such as Hyundai Heavy Industries, Daewoo Shipbuilding & Marine Engineering, Samsung Heavy Industries, STX Offshore & Shipbuilding.

Photo: SPP Shipbuilding Co., Ltd.

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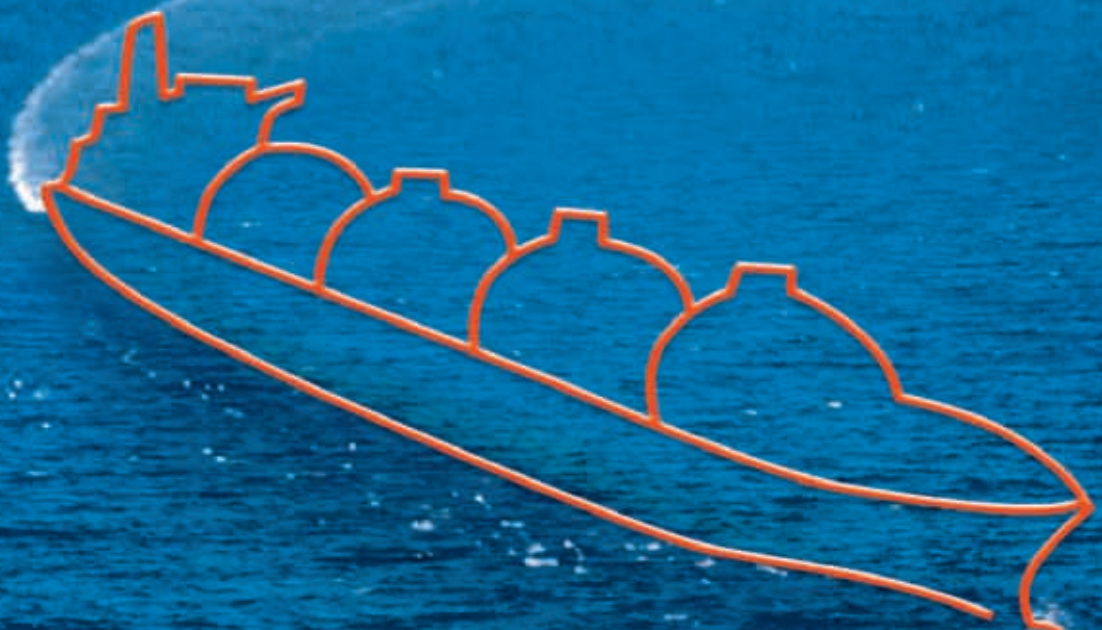

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# Significant Ships of the Year in 2010

'Significant Ships of the Year' are selected annually by the world's most respected shipbuilding/marine magazines such as U.K.-based Naval Architect and U.S.-based Maritime Reporter and Marine Log, etc, among the ships, built worldwide, with excellent quality, performance, design and others.
Here are the ships built at the domestic shipyards among those selected as Significant Ships of the Year in 2010.


Abdelkader, a 170,000m$^3$ LNG carrier
(HHI, Shipowner: Mol)

E.R.Brandenburg, a 180,000-ton bulk carrier
(HHI, Shipowner: E. R. Schiffahrt)

Cap Ines, a 4,600TEU container ship
(DSME, Shipowner: B. Schulte)

Barrcelona Knusten, a 150,000CBM LNG carrier
(DSME, Shipowner: Knutsen)


No. 4160, the same type of ship with CMA CGM Corte Real,
a 13,300TEU container ship (DSME, Shipowner: CMA CGM)


Virgo Star, a 317,000DWT VLCC (DSME, Shipowner: Vela)

Arcturus Voyager, a 320,000DWT VLCC
(DSME, Shipowner: Maran Tanker)


Dar Salwa, a 318,000DWT VLCC (DSME, Shipowner: KOTC)

Methane Julia Louise, a 170,000m$^3$ LNG carrier (SHI, Shipowner: BG)


SAIPEM 12000, a 96,000DWT drillship (SHI, Shipowner: Saipem)


MSC Savona, a 14,000TEU container ship
(DSME, Shipowner: CP Offen)

Expedient, a 150,900CBM LNG-RV (DSME, Shipowner: Exmar)


Frisia Bonn, a 2,000TEU container ship
(HMD, Shipowner: Hartmann)

Glenda Meredith, a 46,000-ton product carrier (HMD, Shipowner: ST)

ARAMON, a 74,000-ton product carrier (SPP Shipbuilding, Shipowner: Roxana)

THALASSINI AXIA, a 59,000-ton bulk carrier (SPP Shipbuilding, Shipowner: Enesel)

New Product

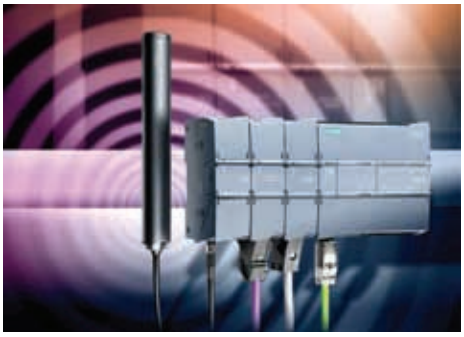
# Foundation Fieldbus module and others

*Siemens Industry Automation Division*

Siemens Industry Automation Division launched the new Foundation Fieldbus module along with the existing Profibus PA that provides unmatched capabilities, a Fieldbus solution based on Profibus DP. Now specific type of Fieldbus desired by any user can be selected in PCS 7 (above V7.1 SP2), the DCS system of Siemens.

The Foundation Fieldbus, which is rolled out this time, features the dualization functions for more stable plant operation, as well the function same as FF module of other companies. Designed to ensure high compatibility with Profibus PA, it supports free configuration, depending on the sub-instruments.

The Foundation Fieldbus supports the system configuration same as the one which Siemens supported in the Profibus PA to facilitate stable plant operation of customers.



Simatic S7-1200

It provides the distinctive capabilities unique to Siemens Fieldbus, including the typical rectilineal configuration which uses AFD (Active Field Distributor), dualization configuration using the AFS (Active Field Splitter), and ring dualization using the AFD, as shown in Fig.1 and 2.

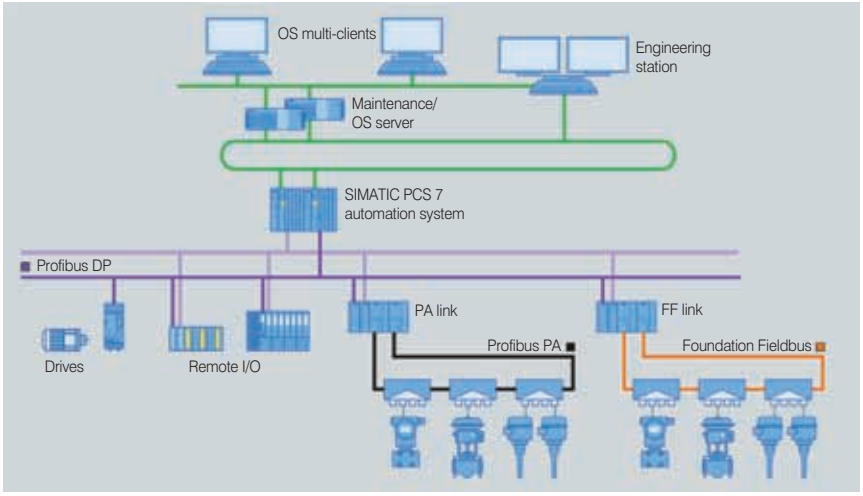



Fig.1 Integration of Profibus PA and Foundation Fieldbus

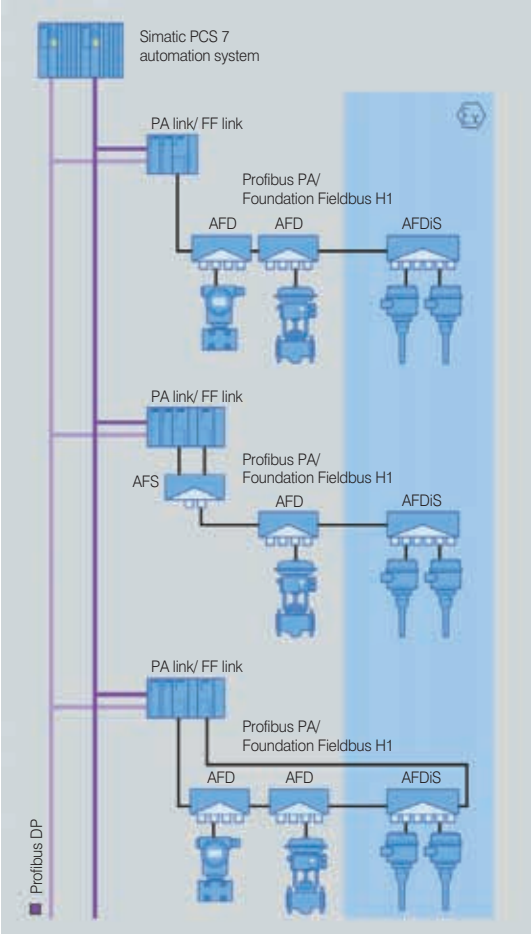



Fig.2 Possible architectures of Profibus PA and Foundation Fieldbus

In addition, AFDiS applicable to the area with combustible gases and dusts was released, which ensures an increased stability of plant operation.

The Siemens Industry Automation Division has added new Profibus, Profinet and telecommunication services to the communication functions of the Simatic S7-1200 controllers. New CPU firmware enables communication with Profinet IO devices. With two new communication modules, the Simatic S7-1200 can be operated as a Profibus master or slave. Three new telecommunication components are available to users when they want to access the controller remotely from a PC or programming device.

The new firmware version 2.0 for the Simatic S7-1200 CPUs has Profinet IO controller functionality and thus implements communication with Profinet IO devices. Thanks to the integral Web server with user-defined Web pages, users can call up CPU information and process data using a standard Web browser. Data archiving is integrated, allowing data from the user program to also be archived during runtime.

There are two new communication modules for connecting the Simatic S7-1200 controllers to Profibus. The Profibus DP master module CM 1243-5 enables the connection of up to sixteen DP slaves, such as Simatic ET 200 distributed I/O modules. S7 and PG/OP communication with other controllers, as well as with HMI (human machine interface) devices and programming devices, is also supported. With the CM 1242-5, the Simatic S7-1200 can be operated as a Profibus DP slave and connected to any Profibus DP master. Both communication modules are simply connected via the S7-1200 backplane bus to the left of the CPU.

The new modules CP 1242-7, TeleService Adapter IE Basic and TeleService Module GSM allow plant operators remote access to Simatic S7-1200 controllers. Distributed stations equipped with Simatic S7-1200 can be monitored, diagnosed, maintained and controlled cost-effectively. The CP 1242-7 is simply connected via the backplane bus of the Simatic-S7-1200 as a GSM/GPRS interface and used for telecontrol. The TeleService Adapter IE Basic and the TeleService Module GSM are available for remote maintenance and diagnostics (teleservice). To use the new telecommunication services, users enter into a standard SIM card contract or a special M2M (machine-to-machine) contract. They then have remote access to the controller using a programming device or PC equipped with the Step V11 engineering software and Internet access. Thanks to wireless access, users are able to detect and correct local faults on-site in good time from a central location.

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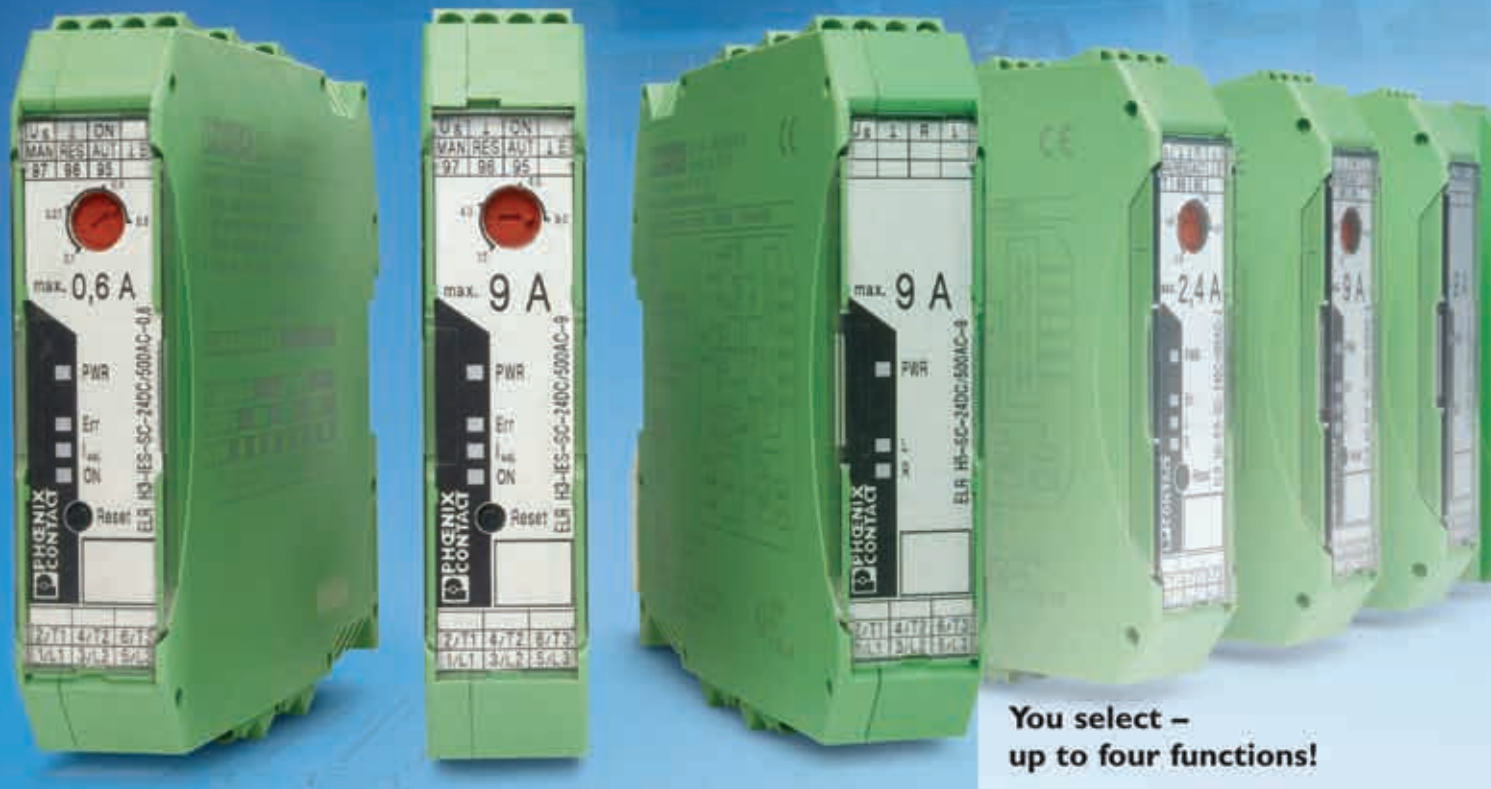


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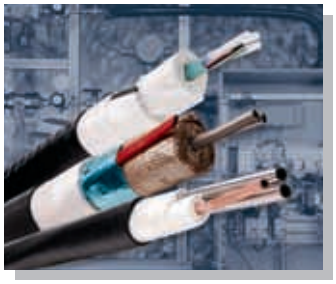

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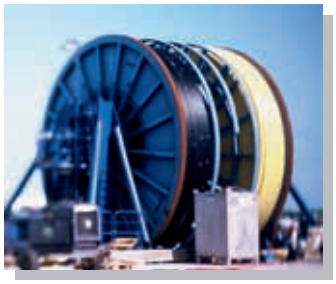

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TEL : +82-51-832-1436

### DK TECH CORPORATION CO., LTD.
Head Office : Kimhae Gyeongsangnam-do
Homepage Add. : www.dklok.com
Main Products : Instrument TuBe Fitting, Instrument Valve
TEL : +82-55-338-0114

### DNP CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.dnpco.kr
Main Products : Fire & Gas Damper, Galley Equipment, AL, Steel Furniture
TEL : +82-51-831-4551

### DOLIM PRECISION.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Cross Head Pin, Main Journal, Crank Shaft
TEL : +82-51-831-8861

### DONG-A VALVE IND.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Marine Offshore valve, Strainer
TEL : _+82-51-831-1500

### DONGBANG SHIP MACHINERY CO., LTD.
Head Office : Jinhae Gyeongsangnam-do
Homepage Add. : www.dongbangsm.co.kr
Main Products : General Steel Poping, Framo & Hydro Piping, Module Unit
TEL : +82-55-545-0882

### DONGHAE INTEC CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.dhintec.co.kr
Main Products : Sleeve, Scupper, Suction Bell Mouth
TEL : +82-51-831-2565

### DONG HUN ENTERPRISE CO.
Head Office : Sasang-gu Busan
Homepage Add. :
Main Products : Ball Valve
TEL : +82-51-314-2610

### DONGHWA ENTEC CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.dh.co.kr
Main Products : E/R Heater & Cooler, Copt, Condenser, Plate Heat Exchanger
TEL : +82-51-970-1000

### DONGHWA M&E CO., LTD.
Head Office : Kimhae Gyeongsangnam-do
Homepage Add. : www.donghwame.com
Main Products : Heat Exchanger
TEL : +82-55-340-6700

### DONGHWA PNEUTEC CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Air Comfressor, Cylinder, Cylinder, Head, Piston
TEL : +82-51-974-4800

### DONGIL SHIPYARD CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. :www.dongilshipyard.co.kr
Main Products : Rescue Boat Davit & Winch, Assembly, Line Hauler
TEL : +82-51-200-1211

### DONGKYUNG INDUSTRY CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.dki21.co.kr
Main Products : Reducer, Gear
TEL : +82-51-832-1602

### DONG NAM ENGINEERING CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. : www.dongnam-eng.com
Main Products : Electric Control Panel
TEL : +82-51-204-3984

### DONGNAM PRECISION IND. CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Multi Core Tube, Sus Cable Tray & Cover, LNG Line Out Fitting
TEL : +82-51-831-3500

### DONG SUNG HIGHTECH.
Head Office : Gangseo-gu Busan
Homepage Add. : www.dshitech.com
Main Products : Shutter Grill, P-Chamber, Diffuser, Frie Damper, Volume Damper
TEL : +82-51-831-9561

### DONGYANG G.T.S.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Compresed Centellen Board, Metal Inserting Gasket
TEL : +82-51-831-6505

### DONGYANG HYDTEC CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.dongyang-hyd.com
Main Products : Rudder & propeller Truck, Block lifter, Gripper Jack System
TEL : +82-51-831-6185

### DONGYANG METAL CO., LTD.
Head Office : Sasang-gu Busan
Homepage Add. : www.dy-metal.co.kr
Main Products : Swing bolt a` ssy, Fittings
TEL : +82-51-814-5157

### DONGYOUNG ELECTRIC CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.dyelectric.com
Main Products : Main Switchboard, Emergency Switchboard
TEL : +82-51-261-9800

### DSB ENGINEERING CO., LTD.
Head Office : Youngdo-gu Busan
Homepage Add. : www.dseng.com
Main Products : Totally Enclosed, Lifeboat, Herged Qrarity Davit
TEL : +82-51-412-5937

### DSE BEARING CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.dsebearing.com
Main Products : Metal Bearing
TEL : +82-51-831-2046

### DSK CO., LTD.
Head Office : Youngdo-gu Busan
Homepage Add. : www.dskworld.com
Main Products : Piston Crown
TEL : +82-51-417-7800

### DUYOUNG INDUSTRIAL MACHINES CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Plate-Baffle
TEL : +82-51-831-2477

### EM SYSTEC CO., LTD.
Head Office : Sasang-gu Busan
Homepage Add. : www.emsystec.com
Main Products : Marine Switch Board, Control Console
TEL : +82-51-302-8761

### FRIEND CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.thefriend.co.kr
Main Products : Marine Cable Tray, Mud Box, Strainer
TEL : +82-51-831-9456

### GEO MAEK SHOT&PAINT CO.,LTD.
Head Office : Saha-gu Busan
Homepage Add. :
Main Products : Deck Machinery Part, Hose Handling Crane
TEL : +82-51-264-3315

### GEORIM ENGINEERING CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.kangrim.com
Main Products : Marine Indutrial Boiler, Exhaust Gas Boiler
TEL : +82-51-831-2929

### GISUNG ENGINEERING CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Air Reserovir, Heat Exchanger
TEL : +82-51-831-4475

### G. M. TEC CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.igmtec.com
Main Products : Duct Equip`t Seat Support
TEL : +82-51-831-5851

### G.S HIGH-TECHER CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.gshightecher.koreasme.com
Main Products : Air Vent Head, Pipe Coupling
TEL : +82-51-832-0456

### G&S PRECISION IND CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Cable Tray, Vent, Hull Outffittings
TEL : +82-51-831-0849

### HAE DONG METAL CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.hdanode.com
Main Products : Zinc Anode, Al Anode
TEL : +82-51-831-3751

### HAE DUK RUDDER & R.STOCK CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.rudders.co.kr
Main Products : Rudder & R.Stock, Rudder Horn, Rudder Carrier
TEL : +82-51-831-0101

### HAE SUNG INDUSTRIAL.
Head Office : Saha-gu Busan
Homepage Add. : www.hsjs.co.kr/
Main Products : Cable Tray, Cable Way Fitting, Cable Coaming
TEL : +82-51-264-8103

### HAEWON INDUSTRIES CO.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : P/Crown, P/Skirt
TEL : +82-51-831-4600

### HAEWON IND. CO., LTD.
Head Office : Sasang-gu Busan
Homepage Add. : www.heawon.net
Main Products : Copper, Copper-Nickel, Monel Fitting & Flanges
TEL : +82-51-312-2161

### HAEYANG FAMILY CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : F.P Propeller, C.P Propeller, Propeller Shaft
TEL : +82-51-831-3550

### HAEYANG METAL CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : F.P Propeller, C.P Propeller, Propeller Shaft
TEL : +82-51-831-4591

### HAEYANG PROPELLER CO., LTD.
Head Office : Gangseo-gu Busan

Homepage Add. :
Main Products : Marine Propeller
TEL : +82-51-831-4599

### HANCHANG TRANS CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.hctr.co.kr
Main Products : Pole Mounted Transformer, Pad Mounted Transformer
TEL : +82-51-831-3470

### HANJULEVEL.
Head Office : Sasang-gu Busan
Homepage Add. : www.hanjulevel.co.kr
Main Products : Level instrument Etc, Vapour Emision Control Sys.
TEL : +82-51-303-0537

### HANLA IMS CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.hanlalevel.co.kr
Main Products : Cargo Tank Monitoring Sys. Tank Remote Sounding Sys.
TEL : +82-51-601-3019

### HANLA IND CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. :
Main Products : Oil Filter unit, Gas Blower
TEL : +82-51-264-2201

### HANMAUM KI-GONG CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.hankg.co.kr
Main Products : Air Cooler Housing, Oil Cooler Housing
TEL : +82-51-831-5211

### HEARTMAN CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. : www.heartman.co.kr
Main Products : Nozzle Tip, Plunger Ass'y, Fuel Injection V/V
TEL : +82-51-262-8869

### H.M.E.
Head Office : Kijang-kun Busan
Homepage Add. : www.hyomyungeng.com
Main Products : Battery Charger, Light Signal Column
TEL : +82-51-709-9000

### HOSEUNG ENTERPRISE CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.hoseung.koreasme.com
Main Products : Tand Package Unit, Pump Package Unit, Cooler Package Unit
TEL : +82-51-831-2233

### HWAJIN ENTERPRISE CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.hwa-jin.com
Main Products : Control Box, Gauge Board System
TEL : +82-512-831-9447

### HWAJIN PF CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. : www.hwajinpf.com
Main Products : Butt-Welding Pipe, Fittings Carbon Steel
TEL : +82-51-204-3001

### HWA SHIN PRECISION CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Life Boat Winch
TEL : +82-51-831-9839

### HYOSUNG STEEL TECHNOLOGIES CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Steel plute cutting, Hy Auto or Manual
TEL : +82-51-831-5093

### HYUNDAI HYCRAULIC CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.hhmc.co.kr
Main Products : TURNING ROLLER, BLOCK LIFT
TEL : +82-51-831-8611

### HYUNDAI ZINC METAL CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. : www.hdz.co.kr
Main Products : Sacrificial Anode, Hot Dip Galvanizing, Ship Manufacture
TEL : +82-51-266-4788

### HYUNJIN MATERIALS CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.hjmco.co.kr
Main Products : Cross Head, Connecting Rod, Piston Rod
TEL : +82-51-602-7700

### ILDO MACHINE ELECT CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. :
Main Products : Heavy Electric Parts
TEL : +82-51-266-6066

### IL - SUNG INDUSTRY CO.
Head Office : Sasang-gu Busan
Homepage Add. :
Main Products : Silencer, Water Air Filter, Air Intet Trunk
TEL : +82-51-312-4056

### IN SUNG INDUSTRY CO.
Head Office : Saha-gu Busan
Homepage Add. :
Main Products : Profile, Steel Coalming Insulation
TEL : +82-51-293-7550

### JAESEUNG ENGINEERING CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Steel Pipe Spool, Sus Pipe Spool, CuNi Pipe Spool
TEL : +82-51-831-8838

### JEILSANKI CO.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products :
TEL : +82-51-831-5398

### JEONG-AM SAFETY GLASS CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.jeong-am.co.kr
Main Products : Tempered Glass, Laminated Glass
TEL : +82-51-831-6161

### JEONG HWA ACCOMMODATION SYSTEM CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.jeonghwa21.com
Main Products : Wooden Furniture
TEL : +82-51-974-8000

### JEONG WOO COUPLING CO., LTD.
Head Office : Kimhae Gyeongsangnam-do
Homepage Add. : www.jwcjoint.co.kr
Main Products : Pipe Coupling, Pipe Repair Clamp
TEL : +82-55-339-7666

### JIN GU ENGINEERING.
Head Office : Kimhae Gyeongsangnam-do
Homepage Add. :
Main Products : Rudder Stock, Stern Tube, Stern Roller, Winch
TEL : +82-55-343-3414

### JIN IL BEND CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products :
TEL : +82-51-832-1919

### JINKWANG ELECTRIC CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Pull Card Switch, Belt Sway Switch, Belt Speed Switch
TEL : +82-51-831-2571

### JINYOUNG METAL CO., LTD.
Head Office : Sasang-gu Busan
Homepage Add. : www.jymct.co.kr
Main Products : Multi Core Tube, Welded Stainless, Steel Tube
TEL : +82-51-313-4001

### JMC HYDRAULICS.
Head Office : Saha-gu Busan
Homepage Add. :
Main Products : Hydraulic Motor For Marine, Hydraulic Control Valve
TEL : +82-51-204-4046

### JNC HI-TECHNOLOGIES.
Head Office : Gangseo-gu Busan
Homepage Add. : www.jnchitec.com
Main Products : Junction Box, Elect panel bard, Tel Booth
TEL : +82-51-974-9500

### JOKWANG I.L.I CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products :
TEL : +82-51-602-0200

### JONGHAP POLESTAR ENGINEERING CO., LTD.
Head Office : Youngdo-gu Busan
Homepage Add. :
Main Products : Diesel Engine Piston, Cylinder, Valve
TEL : +82-51-403-5514

### JUNG GONG IND. CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. : www.jung-gong.com
Main Products : Ordinary Window Side, Scuttle, Heated Window
TEL : +82-51-261-2911

### JUNG - WOO MACHINERY CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Carrier Housing, Split Bearing,Stock, Up.Lower Sleeve
TEL : +82-51-831-5394

### KANG BACK INDUSTRY CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Electric Control Box, Valve & Similar , Equipment
TEL : +82-51-831-9025

### KANGIL CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Pressure Vessel, Deaerator, Heat Exchanger
TEL : +82-51-972-5672

### KANGRIM HEAVY INDUSTRIES CO., LTD.
Head Office : Changwon Gyeongsangnam-do
Homepage Add. : www.kangrim.com/
Main Products : Marine Indutrial Boiler, Exhaust Gas Boiler
TEL : +82-55-269-7701

### K.C. CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.iccp-mgps.com
Main Products : M.G.P.S, I,C,C,P, System Fe Ion, Generator
TEL : +82-51-831-7720

### KEO HUNG MACHINERY.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Deck Crane, Provision Crane, Hose Handling Crane
TEL : +82-51-831-6296

### KEYSUNG METAL CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.keysungmetal.com
Main Products : Valve(Cryogenic, Ball), Strainer
TEL : +82-51-831-3391

### KOC ELECTRIC CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Cast Resin Transformer, Dry Resin Transformer
TEL : +82-51-832-0550

**KOREA HYDRAULIC CO.**
Head Office : Gangseo-gu Busan
Homepage Add. : www.enpos21.com
Main Products : Electtric Motor Pump, Hand Pump, Single/Double Acting Ram
TEL : +82-51-832-1100

**KOREA PHE CO., LTD.**
Head Office : Gangseo-gu Busan
Homepage Add. : www.kphe.co.kr
Main Products : Plate Heat Exchanger, Tank Cleaning Heater
TEL : +82-51-261-2664

**KOREA STEEL SHAPES CO., LTD.**
Head Office : Sasang-gu Busan
Homepage Add. : www.ekosco.com
Main Products : Flat Bars, Equal Angles, Unequal Angles
TEL : +82-51-323-2611

**KOREA TRADING & INDUSTRIES CO., LTD.**
Head Office : Saha-gu Busan
Homepage Add. : www.kticopper.co.kr
Main Products : Copper alloy coil, Plate
TEL : +82-51-293-4423

**KORINOX CO., LTD.**
Head Office : Gangseo-gu Busan
Homepage Add. : www.korinox21.com
Main Products : Cold Mill Stainless, Steel Coil
TEL : +82-51-832-0031

**KORVAL CO., LTD.**
Head Office : Saha-gu Busan
Homepage Add. : www.korval.co.kr
Main Products : Crank Case Relief Valve, Main Starting Valve, Rotary Valve
TEL : +82-51-790-9700

**KSP CO., LTD.**
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Ship Engine Valve Spindle, Flange, Ring Gear
TEL : +82-51-831-6274

**KSV**
Head Office : Youngdo-gu Busan
Homepage Add. : www.ksv-valve.co.kr
Main Products : Valve Spindle, Seat-Ring for marine Engine
TEL : +82-51-415-4466

**KTE CO., LTD.**
Head Office : Gangseo-gu Busan
Homepage Add. : www.kte.co.kr
Main Products : Electrical Equipment (Switchboard & Console)
TEL : +82-51-265-0255

**KUKDONG ELECOM CO., LTD.**
Head Office : Saha-gu Busan
Homepage Add. : www.kukdongelecom.com
Main Products : Naviagtion/Signal LT, EX-Plosion Proof LT, Fluorescent LT
TEL : +82-51-266-0050

**KUKDONG INDUSTRIAL ENGINEERING.**
Head Office : Sasang-gu Busan
Homepage Add. : www.kdie.co.kr
Main Products : Exhaust Gas Pipe With Insulation, Fuel Injection Pipe and Bloc
TEL : +82-51-303-6900

**KUKJE METAL CO., LTD.**
Head Office : Gangseo-gu Busan
Homepage Add. : www.kjmetal.co.kr
Main Products : Manhole Cover, Portable Tank, EXH. Gas Pipe
TEL : +82-51-831-1541

**KUM HAW PRECISION CO.**
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Coupling Flange, Bellows Flange
TEL : +82-51-831-5685

**KUMKANG ENGINEERING.**
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Hand Rail, Storm Rail, Platform, Inc. Ladder
TEL : +82-51-831-0091

**KUMKANG PRECISION.**
Head Office : Saha-gu Busan
Homepage Add. : www.kkmarine.co.kr
Main Products : Engine Parts, (Air Reservoir) & Valve
TEL : +82-51-262-4893

**KWANGIL CORP.,**
Head Office : Sasang-gu Busan
Homepage Add. : www.k-i.co.kr
Main Products : Stainless Steel, HR Coil
TEL : +82-51-324-0006

**KWANG JIN E.N.G CO., LTD.**
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Pipe Piece, Pipe Spool
TEL : +82-51-831-1435

**KWANG JIN IND. CO., LTD.**
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Part of Heat Exchanger
TEL : +82-51-831-4131

**KWANG JIN TECH.**
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Non Asbestos, Teflon, Rubber
TEL : +82-51-973-5566

**KWANG LIM MARINE TECH. CO.,LTD.**
Head Office : Sasang-gu Busan
Homepage Add. :
Main Products : Window Box, (STEEL, AL, SUS) Vent Hole
TEL : +82-51-313-0055

**KWANG SAN CO., LTD.**
Head Office : Gangseo-gu Busan
Homepage Add. : www.kwangsan.com
Main Products : Heating Coil unit, Expansion joint
TEL : +82-51-974-6301

**KWANGWOON CO.,LTD.**
Head Office : Youngdo-gu Busan
Homepage Add. : www.kwang-woon.com
Main Products : Square Window, Side Scuttle, Door, Hatch, Window Wiper
TEL : +82-51-414-9494

**KYEONG SIN FIBER CO., LTD.**
Head Office : Gangseo-gu Busan
Homepage Add. : www.ksfiber.co.kr
Main Products : Rudder Bearing Bush, Insulation
TEL : +82-51-831-0268

**KYOUNGWON BENDING CO.**
Head Office : Kimhae Gyeongsangnam-do
Homepage Add. : www.bending4u.com
Main Products : Hwase Pipe, Chain, Locker
TEL : +82-55-313-1277

**KYUNGIL METAL CO., LTD.**
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Marine Equipment Plating, Head Rest Pipe Plating
TEL : +82-51-831-1677

**KYUNGSUNG INDUSTRY CO., LTD.**
Head Office : Gangseo-gu Busan
Homepage Add. : www.e-clamp.com
Main Products : Svs Corner & Anchor, Strip, Clamp
TEL : +82-51-831-4960

**LHE CO., LTD.**
Head Office : Kimhae Gyeongsangnam-do
Homepage Add. : www.lhe.co.kr
Main Products : Heat Exchanger
TEL : +82-55-340-0624

**MANZU INDUSTRY. CO., LTD.**
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Phosphate Coat, Pipe & Structure Painting, Special Painting
TEL : +82-51-832-0944

**MARINE RADIO CO., LTD.**
Head Office : Youngdo-gu Busan
Homepage Add. : www.mrckorea.co.kr
Main Products : Public Addressor Sys, Common Aerial Sys.
TEL : +82-51-414-7891

**MARINE TECHNICAL ENGINEERING CO., LTD.**
Head Office : Sasang-gu Busan
Homepage Add. :
Main Products : Oily Water Seperator, Bilge Alarm, Air Dryer
TEL : +82-51-831-1118

**MARSEN CO., LTD.**
Head Office : Gangseo-gu Busan
Homepage Add. : www.marsen.com/
Main Products : Cargo Tank Monitoring System, Tank High/Overfill Alarm System
TEL : +82-51-831-2108

**MAX TECH.**
Head Office : Kimhae Gyeongsangnam-do
Homepage Add. : www.maxtech21c.com
Main Products : Engine, Shock Absorper, Gasket
TEL : +82-55-327-9652

**MCM CO., LTD.**
Head Office : Gangseo-gu Busan
Homepage Add. : www.mcm21.co.kr
Main Products : Valve, Junction Box, Switch Cover
TEL : +82-51-832-0505

**MI JIN PRECISION.**
Head Office : Sasang-gu Busan
Homepage Add. :
Main Products : Valve, Tube, Vend, Pipe for ship
TEL : +82-51-315-3143

**MIJOO INDUSTRY CO., LTD.**
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products :
TEL : +82-51-831-1588

**MIRAE ENGINEERING CO., LTD.**
Head Office : Gangseo-gu Busan
Homepage Add. : www.miraeship.co.kr
Main Products : Hull Block, Steel Outfitting, Pipe Spool/Unit
TEL : +82-51-790-5800

**MJ TSR CO., LTD.**
Head Office : Gangseo-gu Busan
Homepage Add. : www.mjtsr.com
Main Products : Rubber Sheets & Hats, All Types of Parts for Shipbuilding & Industries
TEL : +82-51-832-0002

**MODERN INTECH CO., LTD.**
Head Office : Sasang-gu Busan
Homepage Add. :
Main Products : Curtain, Carpet, Upholstery, Mattress for Marine
TEL : +82-51-325-0260

**MT.H CONTROL VALVES CO., LTD.**
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products :
TEL : 82-51-974-8831

**MYTEC CO., LTD.**
Head Office : Gangseo-gu Busan
Homepage Add. : www.imytec.com
Main Products : Heat Exchanger, Pressure Vassel
TEL : +82-51-831-7474

**NAMSUNG SHIPBUILDING CO., LTD.**
Head Office : Saha-gu Busan
Homepage Add. :
Main Products : Rescue Boat Davit & Winch, Assembly, Line Hauler
TEL : +82-51-200-1277

### NAMYANG METAL.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Stair Way Body, Bulk Head Hnlon, Galley Hood
TEL : +82-51-832-1721

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Homepage Add. :
Main Products :
TEL : +82-51-790-7505

### NAVUTEC.
Head Office : Kijang-kun Busan
Homepage Add. : www.navutec.com
Main Products : Fire fighting & Safety, equipment for marine & Offshore
TEL : +82-51-728-5055

### NEW-OHSEUNG CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. :
Main Products : Manifold, Spool piece, Chain compressor
TEL : +82-51-266-5724

### NK CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. :
Main Products : Ballast Water Treatment System, Co2 System
TEL : +82-51-204-2211

### NOKSAN FLANGE CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Flange for ship
TEL : +82-51-831-7956

### OBOK ELECTRIC CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Transformer
TEL : +82-51-832-1751

### OK KWANG ENG CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.okv.co.kr
Main Products : Marine valves, Strainers
TEL : +82-51-326-7741

### OK KWANG METAL CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.okkwang.com
Main Products : Std Flange, Tube Sheet, Forging Material
TEL : +82-51-831-9885

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Head Office : Gangseo-gu Busan
Homepage Add. : www.opco.co.kr
Main Products : Deck house, Engine room Casing, Life Boat
TEL : +82-51-202-0101

### ORIENTAL PRECISION MACHINERY CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.opco.co.kr
Main Products : Crane Component
TEL : +82-51-831-0202

### O.S.C.G CO., LTD.
Head Office : Sasang-gu Busan
Homepage Add. : www.oscg.net
Main Products : Cable grand, Junction box
TEL : +82-51-305-3910

### PACO HITEC CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. : www.pacohitec.com
Main Products : Hydraulic hose, Fitting
TEL : +82-51-266-6994

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Head Office : Jinhae Gyeongsangnam-do
Homepage Add. :
Main Products : Valve, Yoke, Fork, Knuckle, Carrier
TEL : +82-55-552-3840

### PANASIA CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.worldpanasia.com
Main Products : Hi-level Alarm Sys. Tank level Gauge
TEL : +82-51-831-1010

### PI PLUS CO., LTD.
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Homepage Add. : www.pharmaidsolutions.com
Main Products : Rudder stock, Pintle, Intermediate Shaft
TEL : +82-51-831-9338

### POONG JIN METAL CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Emergency Shut-Off Valve, Veneral Bronze Casting Valve
TEL : +82-51-831-8510

### PSM CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.psminc.co.kr
Main Products : Ring Flange, Shaft, Nozzle
TEL : +82-51-970-3000

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Head Office : Kimhae Gyeongsangnam-do
Homepage Add. : www.saejinintech.com
Main Products : Emergency Towing, Arrangement, Universal Swivel Fairlead
TEL : +82-55-328-1458

### SAMBOO METAL CO,, LTD.
Head Office : Gangseo-gu Busan
Homepage Add. : www.samboometal.com
Main Products : Wheel, Shaft, Hyd-Net, Hyd Coupling Bolt, Flange
TEL : +82-51-831-1478

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Head Office : Gangseo-gu Busan
Homepage Add. : www.sam-gong.co.kr
Main Products : Oil Purifiers, Ship˙ Accommodation, Ladders
TEL : +82-51-200-3040

### SAMJOO ENG. CO., LTD.
Head Office : Saha-gu Busan
Homepage Add. : www.sam-joo.co.kr
Main Products : Catering Furniture, Galley Hood, Laundry Equipment
TEL : +82-51-264-6677

### SAMJUNG MACHINERY.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Piston Rod, Cross Head, Inter Shaft
TEL : +82-51-832-0190

### SAM KWANG HI-TEC CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Rectangle Windows
TEL : +82-51-832-0177

### SAMSUNG NONFERROUS METAL CO., LTD.
Head Office : Kimhae Gyeongsangnam-do
Homepage Add. : www.metalsamsung.co.kr
Main Products : Bushing, Liner, Sleeve, Pintle Bush
TEL : +82-55-329-1067

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Head Office : Saha-gu Busan
Homepage Add. : www.cuniship.com
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TEL : +82-51-266-6655

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Homepage Add. :
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TEL : +82-51-832-0211

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Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Winch, Hatch
TEL : +82-51-832-1882

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Head Office : Gangseo-gu Busan
Homepage Add. : www.sea-plus.co.kr
Main Products : Low Pressure CO2, Fire Extinguishing Sys
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Head Office : Gangseo-gu Busan
Homepage Add. : www.sebometal.co.kr
Main Products : Pump Tower for LNG, Vent Mast
TEL : +82-51-970-0200

### SEBO TECH CO., LTD.
Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Windwall, Heat Shield, Manual Hatch
TEL : +82-51-831-4171

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# Daily News of KORMARINE 2011

## (Korea International Shipbuilding and Marine Exhibition)


Monthly KORSHIP, the Korea shipbuilding monthly magazine, will launch daily news service to keep your finger on the pulse of the KORMARINE 2011.
KORMARINE 2011 will be open with great eclat at Busan Exhibition & Convention Center (BEXCO) , and Monthly KORSHIP will keep you updated with the latest news swiftly during the show as the official media of KORMARIE 2011 and we appreciate you cooperation in advance.

KORMARINE 2011 will run from October 26 to October 29 Busan Exhibition Convention Center (BEXCO) .
Our daily news will have a circulation of 10,000 every day during the show.

Contact Monthly KORSHIP or K. Fairs for inquiries or suggestions for the daily news article related to KORMARINE 2011 or advertisement in the print Edition. (Deadline Date: September 20th 2011)

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