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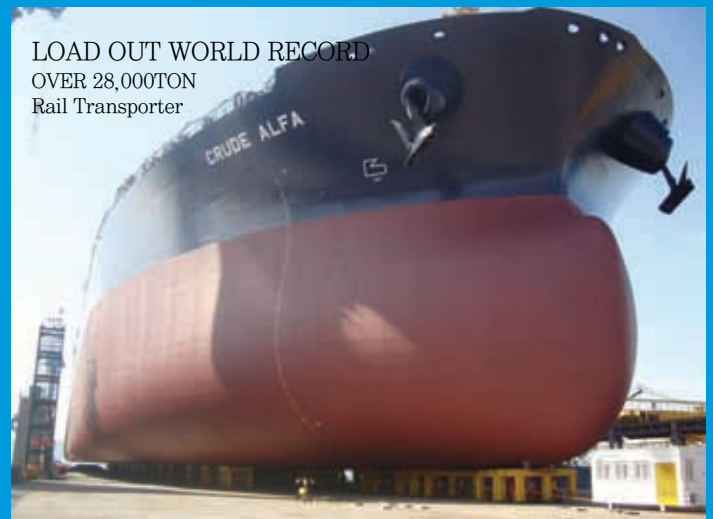


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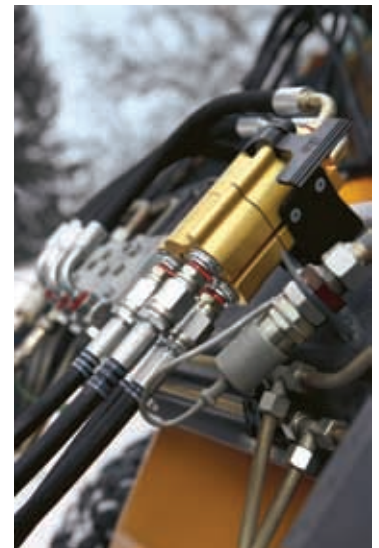
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Motor	HP	125~20,000						
Discharge Pressure	Bar A	4.5~25						
Dimension(W x L x H)	M	1.5x2.6x1.9	2.1x4.4x2.1	2.1x4.7x2.2	2.2x5.2x2.1	2.3x5.8x2.6	4.4x8.0x4.3	6.5x13x7.0
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## SPP delivered 100 vessels in five short years

A naming ceremony has taken place for a 59,000dwt BC with Greek owner Adelfia, named M/V THELISIS, it was the 100th delivered vessel of SPP on November 2. Many People including VIPs presented in naming ceremony and celebrated the 100th delivery. To commemorate this, SPP presented Builder's mark to the owner, which has the implication of the 100th vessel after delivering the first one in 2006.

Having launched as a crane maker, named Dongyang Heavy Industry in 1988, SPP diversified their business as a block maker for domestic major shipyards. By



SPP is presenting the Builder's Mark to the owners of Adelfia on the 100th naming ceremony. From the left, Kwak Han-jung, CEO of SPP, Angelos Loudaros and Kostantinos Mavrommatis, two owners of Adelfia, and Kim In-dong, President of SPP.



The 100th vessel named M/V THELISIS

closing first contract with Turkish buyer Geden for quartet 50,000dwt Product Tanker, it successfully took vigorous step into the shipbuilding arena. In 2006, first two shipyards in Tongyoung and Sacheon was completed respectively and in 2009, an additional shipyard in Gosung was completed. These three shipyards are constructing Tankers, such as Aframax, Panamax, MR, and Bulklers including Kamsarmax, Supramax, Handysize.

Through the strategy of focusing on mid-sized product oil tank carriers and bulk carriers, SPP could take advantage of learning effect and successfully deliver 100 vessels on time, which contain 74 Tankers (68 MR, 4 Panamax, 2 Aframax) and 26 Bulklers (17 Handysize, 9 Supramax).

SPP's main clients are OSG, ST Shipping, Enesel, Avin, and Arcadia, the world-widely influential buyers and they repeatedly placed orders due to the trust in SPP. Since it has begun shipbuilding business, just in 4 years SPP secured 200 contracts in total, 101 tankers and 99 bulklers, in 2008. In the following year of 2009, from the Korean government, SPP was awarded a prize for exports amount of \$1.3 billion during one year. This might be one of very special case to the five year old shipyard.

The main ground of SPP's rapid growth is the working environment laying stress on creativity. Under the harmonious atmosphere between the labor and management, SPP actively accepts and applies the workers' suggestions and ideas that result in brand-new production technology. Especially Gosung shipyard did Load-out from the beginning with Skid Way method using Link plate and Rail Transporter (R.T.P) that are cutting-edge technology applied.

Furthermore, keeping up with the time of high interest on environment, SPP is now accelerating development for eco-friendly technology. Recently it developed new ship-type for 82,000dwt Kamsarmax, maximizing cargo volume from 95,000m<sup>3</sup> to 97,000m<sup>3</sup> and minimizing daily fuel oil consumption (DFOC) more than 4 MT at the same time. Relevant research is being continued and it is expected an epoch-making device raising fuel efficiency will be developed soon.

As previously reported, it is planned SPP Shipbuilding and SPP Plant & Shipbuilding will be merged in this year and will use one corporate name of SPP Shipbuilding. SPP will grow as the most competitive Shipyard in the world with cutting edge eco-friendly technology, carrying on distinction strategy through seeking Niche market and developing value-added ships.

## A German-based shipping company offers 28,800 free bottles of wine to SHI as gift

Peter Doehle, a German-based shipping company, has garnered a lot of attention since it announced that it would send to Samsung Heavy Industries (SHI) 28,800 free bottles of wine made from the grapes harvested in a farm directly operated by Peter Doehle in Chile, so that every employee of SHI can receive one bottle for Christmas gift.

On November 1, Peter Doehle made a shipment of 2 20-foot containers fully loaded with wines to Korea from Port of Valparaiso, Chile, and said that it would bear all expenses involved in the customs clearance, insurance, and others.



The idea to send gift is said to be the brain-child of Jochen Doehle, Chairman of Peter Doehle, to celebrate the first-ever contract for eight 12,600TEU container ships awarded by the company to SHI and maintain the relationship of coexistence and cooperation based on the construction of the world's best quality ships.

Sometimes, ship owners give bicycles, sunglasses, etc, to employees who participated in the related project or provide early delivery bonus if the ship is constructed earlier than schedule. However, it is the first time that all employees of a company are presented with gifts at the same time.

Calicanto wine, shipped on that day, is a red wine representative of Chile which is made through the mixture of the Cabernet Sauvignon of France and Carmenerere of Chile at the ratio of 6:4 and the fermentation for 13 months. It is produced in the farm and brewery run directly by Peter Doehle.

Calicanto wines are mostly sold in Latin America and Europe because the production volume is low, and 2008 vintage Calicanto wine is offered at around \$20. The wines sent to SHI are worth a total of about KRW 700 million. Specifically, each wine bottle is labelled with a sticker showing that the wine was produced specially to promote the cooperation between SHI and Peter Doehle.

Rho In-sik, President of SHI said, "By making excellent quality products and maintaining partnership constantly, we will return our favor to the ship owner who sent these precious gifts to us for the heart-warming year-end."

## STX Europe delivered the Allure of the Seas, the world's largest cruise ship

STX Europe held a ceremony to deliver the world's largest cruise ship, the Allure of the Seas, at STX's Turku Shipyard in Finland on October 28 (local time). This order was completed 1 year after the Oasis of the Seas, the world's largest vessel of the same class, was delivered in October 2009.

The contract to build the Allure of the Seas was awarded in 2007 by Royal Caribbean, a world-famous cruise line. This vessel measures 361m in length and 47m in width, weighs 225,000GT, which is equivalent to 3 and a half soccer fields in length and as high as 16-story building.

The vessel has 2,700 cabins and is capable of carrying a total of about 8,500 people including the passengers and crews, and worthy of being called a 'hotel floating on the sea'. About 2,100 employees will be hired from 65 countries to work aboard the vessel as part of effort of the cruise company to provide the best service to travellers from all over the world.

The interior of the vessel includes a 135m-long Central Park, a park in the middle of the ocean, incorporating innovative design and state-of-art technology. The 'park view' cabin overlooks the ocean and the park. The central park will have an open ceiling to ensure direct sunlight, and will include a boardwalk for entertainment, shop-

ping, and restaurants, etc, in the surrounding area.

In addition, other large-scale state-of-art technology facilities include the Aqua Theater which will function as a pool and lounge area and host a variety of performances, a 3D movie theater holding up to 1,400 people like any large movie theaters in New York or London, and a restaurant capable of holding up to 3,100 customers at the same time.

The Allure of the Seas has 18 lifeboats and 2 rescue vessels, etc, for the safety of passengers, as well as provide various entertainments. The lifeboats which are 17m long can accommodate 370 people each, and outfitted with independent engines, GPS, and hygienic system, and so forth. Besides, They are designed in accordance with the international safety rules to have the engine and rudder system to ensure safe return even in case of damage.

The Allure of the Seas will depart Fort Lauderdale in Florida, the United States, in the forthcoming December to travel the Caribbean along with the Oasis.



Allure of the Seas



Gang Deok-soo, Chairman of STX Group said, "The consecutively successful delivery of the Oasis and Allure, the world's best ships of the same kind in terms of size and facility, will cement the dominance of STX Europe in the cruise ship market."

In the first half of this year, STX Europe has successfully turned a profit by achieving KRW 2 trillion and 200 billion in sales and KRW 11 billion in operating profit and received orders for a total of 33 ships, including 2 very large cruise ships, which are valued at \$4 billion in all. On October 26, it entered into the Letter of Intent (LOI) for 2 eco-friendly cruise ferries, continuing to win orders in the cruise ship sector.

## HHI completed world's largest FPSO

Hyundai Heavy Industries (HHI) successfully built a supersize Floating, Production, Storage, and Offloading (FPSO) with the storage capacity of 2 million barrels of oil, which was ordered by French Total in February 2008, and held a naming ceremony on November 11 at its Ulsan Headquarters.

The naming ceremony was attended by

about 300 eminent figures and related officials, including Gang Chang-joon, Chief of Marine Division of HHI, and John Addeh, Vice-President of French Total. This facility was named USAN FPSO after an oil field in Nigeria.

This \$1.7 billion FPSO measures 320m in length, 61m in width, and 32m in height, and is 116,000dwt. It can produce and refine 160,000 barrels of crude oil and 5 million m<sup>3</sup> cubic meters of gas per day.

FPSO consists of a large hull structure for floating/storage and top side structure for production and processing the crude oil. Specifically, the topside structure is complex and difficult to design, and domestic companies which usually have reliance on foreign technology for the design of FPSO have formed consortium with overseas engineering companies.

HHI, however, successfully built this facility for the first time across the country, employing its proprietary technology throughout the whole processes encompassing the procurement, production, installation, and trial operation, and thus has gained reputation for its unrivalled technology and credibility in the global marine equipment market.

Besides, HHI shortened the duration of

design and construction by about 1 months applying the state-of-art technique. It ascertained and eliminated the intervention and potential risks during the installation of module by using the 3D simulation for the first time worldwide, and then, mounted 4 modules and large equipments in the hull of FPSO on the dock.

This facility will be delivered to Nigeria in March 2011 after the trial operation, of electric system, pipes, mechanical equipments, etc, in Ulsan, and installed in USAN oil field 100km southeast of Bonny Island, Nigeria, for the production, refinement, storage, and offloading of crude oil and natural gas.

Meanwhile, HHI has constructed a total of 9 supersize FPSO (capable of storing up to 2 million barrels) so far, commissioned for the first time by Brazilian state oil company Petrobras in 1996 and other clients afterwards such as French Total, U.S. Exxon Mobile, UK BP, etc, and has maintained top position in this field around the globe.

## STX Dalian Shipyard completed the system for the integrated management of shipyard operation

STX Dalian Shipyard recently completed its enterprise-wide project to establish LOONG, a shipyard operation system, in 2 years after the shipyard's establishment. LOONG system is an automation system dedicated to the operation of shipyard, which enables the integrated management of a series of processes ranging from the sales, through design and supply, and production. It allows all employees to share the ship construction plan and process in



USAN FPSO of HHI, the world's largest





real time and increases systematic collaboration.

In addition LOONG ensures swift decision-making for production plans and respective processes, which helps reduce the waiting time, deliver raw materials swiftly, and meet the delivery date.

LOONG system provides the capability to control whole process, including the management of thousands of manpower and maintenance of tens of thousands of parts which are necessary for the construction of ship and even enables effective response to weather changes, and as a result, is expected to help raise the productivity of Dalian Shipyard.

In fact, the productivity has increased remarkably since the LOONG system was completely built. STX Dalian Shipyard successfully launched a total of 18 ships and entered a stable phase for production very fast just in 2 years after its establishment, and is expected to achieve an annual production capacity of more than 30 ships after 2011.

An official from STX remarked, "Importantly, LOONG, a powerful software put into operation recently, will boost the capability of hardware for consistent production system."

## Dongkuk Steel Mill successfully delivered TMCP steel for ships to HHI from its Dangjin Factory

Dongkuk Steel Mill made its first-ever shipment of the Thermo Mechanical Controlled Process (TMCP) back plate manufactured at its Dangjin factory, the next-generation back plate for ships, to Hyundai Heavy

Industries (HHI) on November 3.

A ceremony was held at the Dangjin factory to celebrate its first delivery, which was attended by Kim Yeong-chul, President of Dongkuk Steel Mill and Cho Joon-jae, Managing Director of HHI.

President Mr. Kim expressed his profound gratitude to customers and emphasized, saying, "Strategic investment was made into Dangjin factory to supply the highest quality products, such as TMCP for ships, to customers. Today, it is meaningful that we have accomplished the first goal, and we will continue to widen the gap in technology between us and late comers such as China."

Dongkuk Steel Mill invested approximately KRW 1 trillion to build Dangjin factory last year, and entered into the commercial manufacturing of products for ships from May last year. November 3 marked the first time that Dongkuk Steel Mill delivered the product, TMCP back plate, which it intended as flagship product.

Dongkuk Steel Mill will take this delivery to HHI as the springboard to make a leap forward and plans to expand the annual production of high quality back plates, such as high quality steel for ships and thermally-treated material, etc, up to 750,000-ton in the period ahead.

Dongkuk Steel Mill has the second largest production capacity of TMCP back plate for ships next to POSCO nationwide. TMCP back plate for ships is produced by using the precise thermal treatment combined with rolling of the material at the same time to achieve higher levels of strength and toughness, unlike the production process of ordinary back plates.

This is the back plate manufactured by the precise control rolling and thermal treat-

ment technology to increase the strength of steel without adding expensive alloy.

TMCP back plate for ships is produced by very delicate process, and POSCO has been the only company that manufactures and supplies it across the country, and only a handful of advanced blast furnace companies in Japan and other countries are producing the TMCP back plate for ships worldwide.

With the delivery this time to HHI, the world's best shipbuilder, Dongkuk Steel Mill demonstrated its back plate technology.

Specifically, this back plate is the next-generation back plate product for which a significant surge in demand is expected along with the soaring demand for low carbon emission and high energy efficiency super-size vessels.

Dangjin factory of Dongkuk Steel Mill has already supplied back plate for ordinary ships since March and moved into full production of TMCP for construction from May. It acquired all certifications for TMCP back plate for ships from 7 major classification societies around the globe, and obtained the quality certifications from 7 major domestic shipbuilders in September.



A ceremony was held at the Dangjin Factory to celebrate its first shipment, attended by Kim Yeong-chul (first from the left), President of Dongkuk Steel Mill and Cho Joon-jae (second from the left), Managing Director of HHI.



## HSHI makes full-fledged inroads into the industrial facility sector

Hyundai Samho Heavy Industries (HSHI) has made a serious advancement into the industrial facility sector.

HSHI announced that having secured an order to build the floodgate facilities of Panama Canal the company was making a full-scale foray into the industrial facility market immediately upon its acquisition of the Society for Protective Coatings (SSPC) QP certificate, one of the certificates essential for this construction, which is first-ever across the country.

The QP certificate of SSPC based in Huston, USA, is a program that evaluates the surface treatment and coating ability for industrial and marine facilities, and intensively examines the standard for organization, manpower, work performance, and

assesses the procedures, technology, equipment, safety, environment, and so forth.

Thomas A. Jones, the chief technical auditor in charge of the review on this certification visited HSHI for 2 days from October 7 to 8 and conducted intensive inspection of 80 items including the coating ability, quality control, safety, environment, and others, and remarked, "I am deeply impressed by the size of company, specifically, its coating facilities and training center."

An official from HSHI said, "The acquisition of the certificate this time will pave the way for strengthening the competitiveness of the company in the industrial facility sector, and we will also obtain American Institute of Steel Construction (AISC) certificate this

year."

HSHI is the world's 4th largest global shipbuilder based on single shipyard, constructed a total of 33 vessels last year and achieved KRW 4 trillion and 200 billion in sales, and has proceeded with the strategy to evolve into a highly competitive heavy industrial company by strengthening its position in the industrial facility sector.

Meanwhile, HSHI received an approximately \$200 million order to build the floodgate facility of Panama Canal from Grupo Unidos Por El Canal (GUPC), the multinational consortium of Latin and Central America, on September 29, and is scheduled to complete the construction by October 2014.

## Cho Young-bin, President of Dassault Systemes Korea, received the Prime Minister's Award in the Excellent Contribution to the Attraction of Foreign Investment

Cho Young-bin, President of Dassault Systemes Korea, received the Prime Minister's Award in the Excellent Contribution to the Attraction of Foreign Investment during the 2010 Foreign-Owned Enterprises Day held on November 3 at Grand Intercontinental Hotel, organized by the Ministry of Knowledge Economy, in recognition of his significant role that he played in attracting foreign investment and promoting the advancement of 3D industry.

That represents the reaffirmation of the

contribution which Dassault Systemes has made to the attainment of successful changes in the shipbuilding industry, as well as automotive, high-tech, electric/electronic industry.

Cho Young-bin, President of Dassault Systemes Korea, said, "We are providing the only solution for stimulating the innovation in the collaboration as part of effort to help shore up the competitiveness of domestic industries, and I am very proud that I am leading Dassault Systemes Korea which is doing its utmost in making investments to foster the talents of Daegu whom

the industries require. Dassault Systemes is focusing on the business in Korea."

He added, "Our success in the shipbuilding industry reflects the strong will of Dassault Systemes eager to help bring



Cho Young-bin, President of Dassault Systemes Korea, received the Prime Minister's Award in the Excellent Contribution to the Attraction of Foreign Investment during the 2010 Foreign-Owned Enterprises Day held on November 3.



about changes in all industries. The positive results which Dassault Systemes have accomplished in other industries so far will be also incorporated successfully into the shipbuilding industry, and I hope that Dassault Systemes will make contribution to the advancement of other industries in Korea.”

By attracting the R&D Center of Dassault Systemes to Daegu, Cho Young-bin, President of Dassault Systemes Korea, laid the groundwork to develop 3D-based technology for the shipbuilding industry in Korea and established a variety of business models for nurturing 3D fusion industry in cooperation with Daegu City.

The R&D Center of Dassault Systemes in Daegu, the company with the best 3D technology as a software company, plans to play a key role in identifying the revenue model for next-generation shipbuilding industry such as cruise, yacht, or leisure boat, etc, the new sector for domestic shipbuilders.

### 3 Ships of HMD were named the Significant Ships Of 2010

Recently, 3 vessels of Hyundai Mipo Dockyard (HMD) were named the Significant Ships Of 2010.

HMD has seen its 23 vessels designated the Significant Ships consecutively over the last 10 years since 2001, gaining the reputation as one of the most prestigious ship builders in the world.

Recently, Naval Architect, a magazine specializing in the shipbuilding and shipping industry of UK, said that it designated 3 ships built by HMD - Glenda Meredith (ship no. 2200), Frisia Bonn (ship no.



Grande Marocco which was named the Significant Ship of 2010

4042), and Grande Marocco (ship no. 8027) - as the Significant Ships Of 2010.

Particularly, Grande Marocco, a 24,400-ton Con-Ro which was delivered to Grimaldi of India on April 29, won the glory of being named the Significant Ship of the Year, although it was the first ship built by HMD. This vessel which measures 210m in length, 32.2m in width, and 37.2m in height can load about 3,500 cars and 1,200 20-foot containers on the 12-story car deck at the same time using 2 cranes.

Furthermore, Frisia Bonn, a 2,000TEU container vessel which was delivered to Hartmann of Germany on March 11, was also named the Significant Ship for its highest quality in the category of medium container ships built to new designs. Since 2002, 3 2,800TEU container ships, 1 1,800TEU container ship, 1 3,500TEU container ship, and 1 4,300TEU container ships have been named the Significant Ships.

Besides, Glenda Meredith, a 46,000-ton PC vessel which was delivered to

Singapore ST on February 3, was named the Significant Ship, the 10th PC vessel among the PC vessels which have been built to date, which reaffirms the dominant position of HMD in the global market for the product carriers and chemical tankers. HMD earned the glory that a total of 23 vessels built by HMD were named the Significant Ships so far, including the Knight, the cable-laying vessel which was designated as the Significant Ship in 2001, 10 PC vessels, 7 container carriers, 2 LPG carriers, 1 Con-Ro vessel, 1 open-hatch cargo ship, and 1 Special Purpose Vessel, etc.

Meanwhile, Significant Ships are selected every year among the vessels built around the globe which are considered to attract the highest level of attention from the industry on the basis of the criteria such as the degree of differentiation from the existing vessels, efficiency, preference of ship owners, etc.



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# Daily News of KORMARINE 2011

(Korea International Shipbuilding and Marine Exhibition)



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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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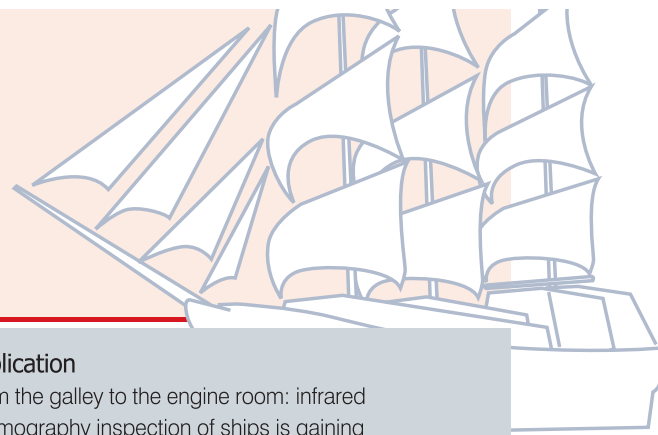


Offshore &  
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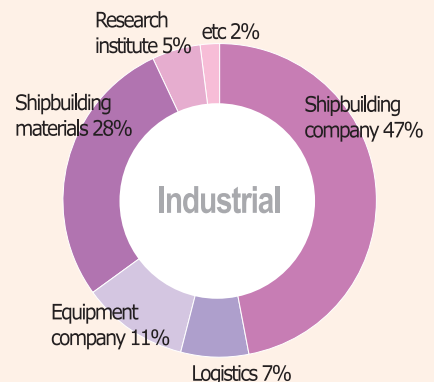
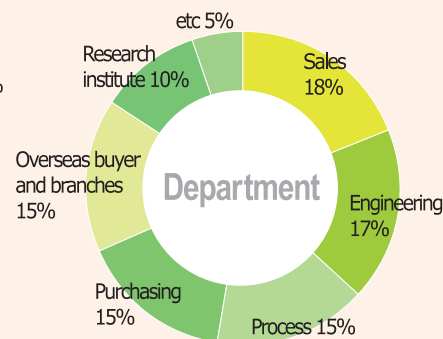
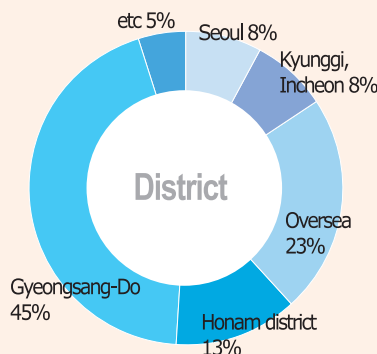
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# Current status of offshore plant market and outlook

The daily demand for oil was recorded at 86.3mbpd as of August, 2010, an increase by 2.1% compared to the annual average in 2009. The production by oil reserve has been declining by 6.7%, and it is necessary to exploit new oil reserves to meet the rising demand for oil. The exploitation of onshore gas field, however, is limited, and for that reason, the exploitation of offshore oil fields, specifically, deepwater oil fields, is expected to expand significantly.

As a result, a surge in demand is expected for drillships and production facilities such as drillship, semi-rig, FPSO, TPL for the exploitation of oil and gas in deepwater in the period ahead.

Domestic major shipbuilders have stepped up efforts to win more orders in the offshore plant sector in a bid to make up for their sluggish performance in the merchant vessel sector and develop the offshore plant sector as the new engine of growth.

## 1. Overview of offshore plant

Offshore structure is a term which collectively refers to the drilling equipment to exploit resources such as oil and natural gas in deeper waters along with the equipments for the production and storage, power generation facilities, offshore airport, and others. Originally, the term offshore structure was used to express drilling equipment, but now means all structures to be installed at sea, including the floating production, storage and offloading (FPSO) unit.

Currently, most offshore structures are the offshore facilities to drill for and produce the oil and gas, and then store, pro-

cess, and load the produced energy resources. The process ranging from the drilling through the production to the storage of oil is categorized as upstream part of production, while the one that includes the subsequent refinement and sales is categorized as downstream part. Most order placements with shipyards are related to the upstream part.

Offshore structures are installed in the sea, and for that reason, fall under the category of both shipbuilding industry and plant industry.

Unlike ordinary shipbuilding industry, the offshore structure industry is differentiated from the shipbuilding industry in

terms of the standard for quality, product specification, application of technologies, and characterized by the fact that a whole range of processes, including the shipbuilding, plant, engineering, and so forth, are employed at the same time particularly when the FPSO unit is constructed.

In addition, the offshore structure industry has high elasticity to the demand which means that the fluctuation in the energy prices would affect the sensitivity of demand significantly.

## 2. Characteristics of offshore plant and market trend

### (1) Drilling facilities (Rig)

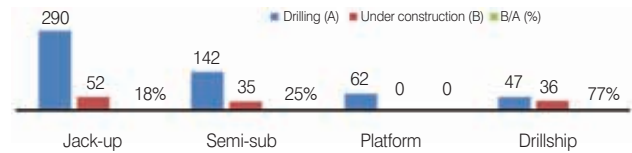
The drilling facilities mostly used to drill the boreholes is classified into several different categories such as jack-up, semi-submersible, platform, drillship, depending on the rig type.

Jack-up units are a fixed structure - although they can be towed to or from the drill site - lowering its legs into the seabed and elevates its hull to provide a stable work deck. They are used for exploration drilling in shallow water at the depth of approximately 150m, but not suitable for operation in deep water.

Semi-submersible drilling rig still floats above the drill site with the lower-hull, a large structure to make the entire rig buoyant, being submerged below the water line. It is not self-propelled, but can be towed by a tugboat to the drill site and used in deep water.

Drillship, equipped for drilling, combines the mobility and the capability of carrying out deep-sea drilling, and has been in higher demand recently. Specifically, drillship, a type of a maritime vessel, can perform the drilling in deep water because it is self-propelled like tugboat and can move to the drilling site on its own. The drillship can be confronted with the fatal problem during the drilling because this type of vessel can be shaken a lot by waves, in contrast to the semi-submersible drilling rig which is less affected by wave loadings because the weight of the submerged buoyancy apparatus ensures stable support. To overcome such a problem, dynamic positioning is very crucial, and the drillship outfitted with a dynamic positioning system is considered the state-of-art vessel.

As of the end of 2009, there were 290 jack-up units, the highest number among the drilling facilities, followed by the semi-submersible, platform, and drillship. Drillship has been found to have the highest ratio of the planned newbuild construction to the number of the currently drilling facilities.



Data: Rigzone

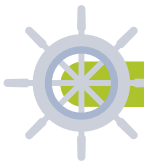
Fig.1 Drilling vs planned newbuild construction

There are about 514 jack-up units around the globe, and currently, 290 jack-up units have been deployed for drilling operations. 52 additional jack-up units will be built and are scheduled to be delivered. There are no newbuild jack-up units to be built by domestic shipbuilders among the volumes scheduled for delivery. Most have been constructed at the shipyards in Singapore, United Arab Emirates (UAE), and others. Presently, there are 225 semi-submersible rigs worldwide. 142 semi-submersible rigs have been deployed for operating in deepwater, and 35 additional semi-submersible rigs are planned to be built and delivered. Most newbuilds will be under construction by Singapore and China, and domestic shipyards plan to build and deliver 5 newbuild semi-submersible rigs (3 units of newbuild semi-submersible rigs by Daewoo Shipbuilding & Marine Engineering (DAME), 2 units by Samsung Heavy Industries (SHI)).

There are 250 platforms across the globe, and 62 platforms have been put into actual drilling operation. However, no newbuild drilling platforms are planned. Offshore platform structures are classified into the fixed and floating structures. Fixed structures include the jacket platform and gravity type







platform while the floating structures include the guyed tower and tension leg platform (TLP) and others. Most are held in position off the coast, and their use has been declining as the marine exploration and resources exploitation have expanded from the shallow water to deep water.

Currently, there are 47 drillships around the globe. Most have been deployed for drilling operations, and 36 newbuild drillships are planned to be built. Most planned newbuild drillships will be constructed by domestic 3 major shipyards. During the period of 2010 and 2011, 14 drillships and 17 drillships have been completed or will be completed. This year has not seen a lot of additional orders for drillships because quite a few orders have been received from 2007 to 2008.

**Table 1. Newbuild drillships scheduled for delivery based on country, producer, and year**

Type		2010	2011	2012	Total
Korea	Samsung Heavy Industries	8	10	4	22
	Daewoo Shipbuilding & Marine Engineering	3	4	1	8
	Hyundai Heavy Industries	1	2	-	3
	Subtotal	12	16	5	33
Netherlands	Gusto Engineering	1	-	-	1
Singapore	China & Singapore Yard	1	-	-	1
China	STX Shipyard, Dalian	-	1	-	1
	Subtotal	2	1	-	3
	<b>Grand Total</b>	<b>14</b>	<b>17</b>	<b>5</b>	<b>36</b>

Most volumes scheduled for delivery will be built at the domestic shipyards. 22 newbuild drillships are slated for construction by SHI, the largest volume, cementing its dominant position in this sector.

Recently, China has received the orders for 3 drillships via the joint venture with Singapore which has the competitive edge in the jack-up unit and semi-submersible sector. However, China has yet to achieve competitiveness in this sector.

**(2) Production/Storage facilities**

Production/Storage Facilities are designed to store and transport the produced oil or gas. Equipments necessary for the production, as well as the working space and living quarter, are put into place on the square-shape platform, and based on the method of supporting the platform, the production/storage facilities are classified into the fixed type and the floating type.

The fixed type is fixed to the seabed, stable enough to withstand the force of the ocean and wind, and includes jacket, gravity base structure (GBS), jack-up platform, and so forth. Most fixed types have the structures suitable for the operations in shallow water of the coast, and the demand for the fixed type has been diminishing amid the recent active exploitation of oil in deep water and the development of the floating structures.

The floating type can float on the sea in exerts of the upward buoyant force and held into the position by various mooring systems (a system to anchor the structure to the ocean floor just like anchoring the ship), and includes floating production unit (FPU), tension leg platform (TLP), spar, floating produc-

tion storage & offloading (FPSO), and others. Not subject very much to the limit of water depth, the floating type is relatively easier to move and install compared to the fixed type, although it is more disturbed by the wave than the fixed type. The jacket, consisting of the cylindrical steel material and truss structure, is fixed to the seabed by driving the pile. It is a platform installed off the coast which records the water depth of up to 412m. Stable in waves, this structure is often used off the coast of rough sea with high waves.

GBS is designed to withstand the waves, anchored to the sea floor with the dead weight of concrete, and installed mostly in the shallow water.

Jack-up units are sometimes built as production plants which have the same structures as those of drilling facilities. The jack-up unit groups include semi-submersible platforms such as semi-submersible drilling rig. Larger than drillships, they are called semi-submersible or FPU. Though they have better capabilities to produce oil than ship types, they do not have sufficient storage capacity, and as a result, the oil is transported by pipelines to onshore facilities.

A TLP has the structure similar to that of semi-submersible, but is the leg which withstands the tension instead of mooring and has different point to be held into position. It is capable of carrying out operations in deep water just like semi-submersible.

Spar, a structure which is evolved more than TLP, consists of one single huge cylindrical column and is supported by the moorings which spread out like the spokes of a wheel.

Finally, FPSO unit, a vessel type structure, has both functions of ship (mobility and storage) and production and provides the function of offloading oil and carrying it up to the vessel, and for those advantages, have drawn the largest attention in the category of plant. FPSO can move from location to location, but is known to rarely move from the working area of the sea because it is designed to withstand a 100-year return waves and the cost is incurred from the connection with underwater production facilities. Recently, the development of natural gas exploitation technologies has led to the gradual expansion of the market for LNG FPSO.

Meanwhile, the number of FPSO registered with Clarkson as of late June, 2009, is estimated at 149 (including 3 LPG FPSO units). Among them, 34 were constructed from 2000 to 2008, and 16 out of those 34 units were built by domestic 3 major shipbuilders. Domestic builders built only 4 FPSO units out of 29 which were constructed in 1990s, but have cap-

tured a significant share of market since 2000. Specifically, domestic shipyards have won nearly all orders for FPSO units which have been awarded since 2006, except the those that have been placed entirely with shipyards in China under the support of Chinese government.

FPSO unit is a facility for producing oil, but the global move toward LPG FPSO has been spread since SHI signed an exclusive contract in July 2009 with Royal Dutch Shell, a global oil and gas company headquartered in the Hague, Netherlands, to supply LPG FPSO over the long-term.

The order backlog of FPSO units currently stands at a total of 15. Among them, 12 units will be built by domestic 3 shipbuilders and another 3 units will be under construction at the shipyards in China, and 13 units are scheduled for delivery by next year. Particularly, 5 units out of 13 units slated for delivery are LNG FPSO, which will be built in whole by domestic shipbuilders under the contracts, raising the prospect that additional orders will be placed with domestic shipyards if the cur-

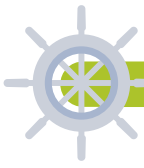
**Table 2. FPSO construction (2000-2008)**

Type	No. of Units	Producers
Korea	16	Hyundai Heavy Industries (7), Samsung Heavy Industries (7), Daewoo Shipbuilding & Marine Engineering (2)
China	13	Dalian New Yard (4), Waigaoqiao S/Y (3), Yantai Raffles (3), Beihai Shipyard (1), Cosco Dalian (1), Dalian Shipbld. Ind. (1)
Japan	2	I.H.I (1), Kawasaki H.I (1)
Spain	2	Izar S.A (2)
Singapore	1	Keppel Shipyard (1)
<b>Total</b>	<b>34</b>	

Data: Clarkson

**Table 3. Newbuild FPSOs scheduled for delivery based on country, producer, and year**

Type		Order backlog	Period of delivery			
			2010	2011	2012	2013
Korea	Samsung Heavy Industries	10	5	3	1	1
	Daewoo Shipbuilding & Marine Engineering	1	-	1	-	-
	Hyundai Heavy Industries	1	-	1	-	-
China	Hantong Shipyard	3	3	-	-	-
<b>Total</b>		<b>15</b>	<b>8</b>	<b>5</b>	<b>1</b>	<b>1</b>



rent trend towards LNG FPSO expands in the period ahead. There was a rapid growth in the installation of FPSO by as much as 121% from 1999 to 2009. The expansion of FPSO fleet was the largest, followed by semi-submersible, TLP, and Spar.

Floating storage and regasification units (FSRUs), a facility to store and regasify the liquefied natural gas (LNG), have not been deployed very widely to date and are not expected to see a huge demand amid the emergence of LNG FPSO, although it was deemed to have great potentials for growth. Only 2 FSRUs have been registered with Clarkson (in 1981 and 2004, 1 unit respectively), which were built by Keppel Shipyard of Singapore.

### 3. Status of oil and natural gas energy

According to British Petroleum (BP), oil accounted for 35% of total energy consumption across the globe, while natural gas, the third largest source of energy worldwide, accounted for 24% of total global energy consumption. The share of oil in total energy consumption declined by 3% from 2001, though the share of natural gas remains at the same level of 2001.

The global production and consumption of oil has slipped. By contrast, the production and consumption of natural gas have risen steadily around the world. In 2008, the global consumption of oil was 3.93 billion tonnes of oil equivalent (TOE), a decrease by 0.6% from the previous year, while that of natural gas reached 2.73 TOE, an increase by 2.5% from the previous year.

Estimates put the global proven oil reserves at 1 trillion and 258 billion barrels and the global proven natural gas reserves at 185 trillion m<sup>3</sup> as of late 2008. The Mid East region holds 60% of global proven oil reserves and 41% of global proven natural gas reserves, the largest on the planet. The proven

reserve of oil and natural gas rose by 17.7% and 25%, respectively, from 1998.

As of late 2008, the global reserve/production (R/P) ratio for oil and natural gas now stand at 42 years and 60.4 years. Meanwhile, R/P ratio for oil and gas is estimated at 78.6 years and more than 100 years in the Mid East which holds the largest proven reserves.

According to Douglas-Westwood, offshore oil production is expected to account for 35% of total global oil production in 2010, an increase by 33% from the current period. Specifically, the share of deep-water oil production increased to 3% of total global oil production in 2002 and 6% in 2007, and is expected to reach 10% by 2012. In addition, deep-water oil production is expected to be only sector accomplishing the growth.

The share of offshore gas production is expected to jump to 41% by 2020 from the current 31%. The production of offshore gas will culminate by around 2026 (The oil production is expected to reach the peak in 2016.), and the deep-sea offshore gas exploitation is considered very likely.

So far, only large-scale gas fields have been exploited for producing gas from offshore fields to avoid the enormous cost of gas field exploitation and transportation facility construction facilities because gas produced from deep sea has to be transported by pipelines to the onshore gas facilities.

However, the development of LNG FPSO has enabled direct liquefaction and storage of the produced gas and transportation up to the vessels without need for the installation of pipe, which raises the expectation of more active exploitation of small-to-medium gas fields in the upcoming period.

### 4. Future prospect

With the oil and gas being exploited increasingly in deep water, the demand curve for multi-functional offshore structures is expected to shift upward steadily. Currently, maritime exploration and drilling have been carried out 10,000 feet deeper into the sea compared to 2005. The results of analysis on the data related to the jack-up units, semi-submersible drillship, and drillship suggested that the deep-sea water oil exploitation were likely to speed up, given that the average maximum drilling depth of drillships deployed for the forthcoming 3 years from 2009 was 32,000ft although pre-1980 average maximum drilling depth of drilling facilities was 22,000ft.

Investment in new oil fields and gas fields will continue until



**Table 4. Orders for offshore structures placed with 3 major domestic shipyards**

(Unit: \$1 million)

Type	2007		2008		2009	
	No. of order	Amount	No. of order	Amount	No. of order	Amount
Samsung Heavy Industries	13	6,366	11	8,366	1	675
Daewoo Shipbuilding & Marine Engineering	6	4,907	6	4,083	3	1,602
Hyundai Heavy Industries	1	520	1	1,600	2	3,460
<b>Total</b>	<b>20</b>	<b>11,793</b>	<b>18</b>	<b>14,049</b>	<b>6</b>	<b>5,737</b>

new source of energy which can replace the oil and gas emerges. According to Douglas-Westwood, \$137 billion will be invested from 2009 to 2013 for the exploitation of deep-water resources, and a whopping \$330 billion will be invested from 2010 to 2014 for the operation and maintenance of offshore facilities.

Large domestic companies are expected to spearhead the inroads into the “high-tech” and “high value-added” sector in the market for offshore structures. Unlike the market for the merchant vessels which is fiercely competed with Chinese counterparts, domestic shipbuilders have far stronger competitiveness in the offshore structure market than Chinese shipbuilders. That is why 3 domestic major shipbuilders have stepped up efforts to win more orders in the offshore sector, aiming to make up for their sluggish performance in the merchant vessel market which has remained in the doldrums since the outbreak of the financial crisis in 2010.

The Offshore & Engineering Division of Hyundai Heavy Industries (HHI) plans to achieve \$4.2 billion in newshipbuilding order intake for 2010, equivalent to 24% of its total goal (\$17.7 billion) and larger than \$4.03 billion target that the Shipbuilding Division of HHI is set to achieve. SHI has the share of offshore projects which is 51% of its total backlog and plans to win \$8 billion in newshipbuilding order this year. Meanwhile, DSME has the share of offshore plants that stands at 35% in its entire backlog and plans to achieve \$10 billion in newshipbuilding order.

Those 3 domestic major shipbuilders aim to win contracts worth a total of \$12 billion in the offshore sector, which falls

**Table 5. Orders for offshore structures (2007-2010.3)**

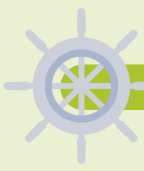
(Unit: \$1 million)

Company	Date	Details of order	Amount
Samsung Heavy Industries	2010.3.9	LNG-FPSO 1unit	n.a
	2009.1.16	LNG-FPSO hull 1unit	675
	2008.11.20	Drillship 2unit	1,445
	2008.9.16	LNG-FPSO top side 1unit	550
	2008.8.25	Drillship 1 unit	655
	2008.8.18	Drillship 1 unit	702
	2008.7.7	Drillship 1unit	705
	2008.6.30	Drillship 1 unit	679
	2008.5.2	Drillship 1unit	942
	2008.3.17	Drillship 2 units	1,366
	2008.1.25	Drillship 2 units	1,322
	2007.12.24	Semi-sub 2 units, Drillship 2 units	2,409
	2007.9.6	FPSO 1unit	455
	2007.7.26	Drillship 1 unit	589
	2007.7.2	Drillship 1unit	612
	2007.6.29	Drillship 1 unit	595
	2007.6.19	FPSO 1 unit	470
	2007.4.30	Drillship 1 unit	661
	2007.4.12	Drillship 1 unit	585
	2007.3.12	Drillship 1 unit	616
2007.2.14	FPSO 1unit	404	
Daewoo Shipbuilding & Marine Engineering	2009.12.18	Semi-sub 1 unit, drillship 2 units	1,602
	2008.8.7	Semi-sub 1 unit	709
	2008.7.31	Drillship 1 unit	760
	2008.6.16	Drillship 1 unit	674
	2008.5.23	Drillship 2 units	1,372
	2008.4.14	Drillship 1 unit	568
	2007.12.28	Drillship 1unit	646
	2007.12.27	FPSO 1 unit	2,073
	2007.9.14	Drillship 1 unit	624
	2007.7.24	Semi-sub 1 unit	632
2007.6.18	Drillship 1 unit	502	
2007.2.26	Semi-sub 1 unit	430	
Hyundai Heavy Industries	2010.2.9	Cylindrical type FPSO 1unit	1,100
	2009.11.3	Offshore gas platform 1 unit, Underwater production facility, etc	1,400
	2009.10.21	LNG offshore plant construction	2,060
	2008.2.28	FPSO	1,600
	2007.7.25	Offshore platform construction	520

Data: KDB Research Institute

short of the level recorded in 2007. The contract amount for offshore structures increased from \$11.8 billion in 2007 to \$14 billion to 2008 before decreasing to \$5.7 billion in 2009 in the aftermath of global financial crisis.

As of November, 2010, the 3 domestic major shipbuilders, however, have already achieved or come closer to their annual target that they set at the beginning of the year.



## Outlook of domestic shipyards and orders for offshore plant in 2011

Recently, Jeon Jae-cheon, an analyst of Daishin Securities Research Center speculated that the order placements with domestic shipbuilders for offshore plant would reach \$19 billion in 2011, a 63% (based on dollar) increase from 2010, indicating that the oil demand has been steadily on the rise along with the slow recovery of economy and the projects that had been postponed in 2009 would proceed ahead. Furthermore, he predicted that the expansion of the market for LNG FPSO, the new product, in 2011 would help increase the size of total order placements.

While the 2011 annual order volume is expected to reach the 2008 level, the composition of ship types ordered will be very different from 2008. In 2008, deepwater drillships accounted for 78% of total offshore plant orders. Daishin Securities Research Center anticipates orders in 2011 will be equally allocated across all platforms (Deep-water drillships, oil FPSOs, LNG-FPSOs and other offshore plants).

It may take a long time for the annual order volume of deepwater drillships to return to the level of 2006 to 2008 because many projects have not still found charterers. However, the order placement for deepwater drillship is expected to increase in 2011 compared to 2009 when the oil spill in the Gulf of Mexico resulted in the order being dried up.

The market for offshore plant market will expand based on the trend for the following reasons: As of end-Aug, global daily crude oil demand stood at 86.3bpd (+2.1% yoy), 2.1% higher than the 2009 annual average. Meanwhile, oil production per well decreased to 6.7%p.a., pressuring oil producers to develop new reserves. Since prospects for land-based oil development

and production in regions other than the Middle East are quite limited, Daishin Securities Research Center anticipates off-shore drilling (especially at deep-water wells) will become more common. According to PFC Energy, the proportion of ultra-deep-water drilling (below 5,000ft) in the Gulf of Mexico is projected to increase from 11% in 2005 to 52% in 2020.

Therefore, over the long-term, drillships, semi-rigs, and related facilities (FPSO, TLP) are expected to receive increased investment over the long-term for the exploitation of the oil and gas fields in deep waters. Orders volume for other types of off-shore plants, such as pipe-laying vessels which support the installation of offshore wind power generator, wind farm installation vessels, and floating storage regasification units (FSRU), will also increase.

### Deep-water drillship orders to steadily recover in 2011

Order placements for deep-water drillships (including drillships and semi-rigs) exhibited stagnant growth in 2009. Following the

Table. 1 Offshore plant order estimates type

Type	Early Oct 2010			2010F			2011F			Comparison 2011/2010
	Orders received	Ships	Price per ship	Orders received	Ships	Price per ship	Orders received	Ships	Price per ship	
Drillship & semi-rig	252	1	252	1,352	3	451	4,400	8	550	225%
LNG FPSO	1,175	1	1,175	2,300	1	2,300	7,000	4	1,750	204%
Oil FPSO	2,912	2	1,456	2,912	2	1,456	5,200	4	1,300	79%
Others	4,139	14	296	5,439	18	302	2,900	10	290	-47%
<b>Total</b>	<b>8,478</b>	<b>18</b>	<b>471</b>	<b>12,003</b>	<b>24</b>	<b>500</b>	<b>19,500</b>	<b>26</b>	<b>750</b>	<b>62%</b>

Source: Dashin Securities Research Center

Table. 2 Deep-water drillship projects with bidding underway or suspended

Orderer	No. of ships	Ordered amount (estimate)	Progress	Bidders	Comments
Transocean	1-2 ships	\$550mn	Bidding postponed until Sep 2010	SHI and DSME	-Order placement delayed in the wake of the BP oil spill at the Gulf of Mexico -Charterer being searched for
Atwood (US)	1 ship	\$550mn	Contract expected to be signed by end-2010 or 1H11	Korea's three major shipbuilders and Singaporean shipyards	
Petrobras	28 ships	\$15bn/28 ships	Package #1, #2 : Bid is underway Package #3 : Bid to begin in 2 11	Brazilian shipyards	-Korean shipbuilders may have access to portions of the vessel orders -Delivery: 2013-2018
Transocean	1 ship	\$600mn-\$900mn	Expected in 2011	DSME and HHI DSME is highly likely to succeed in the bid	-Charterer: BP -Order placement expected to be delayed in the wake of the BP oil spill at the Gulf of Mexico

Source: Upstream, ODS-Petrodata, organized by Daishin Securities Research Center

oil spill in the Gulf of Mexico in Apr 20, 2010, order placements came to a near halt for 2 years. However, deep-water drillship orders are expected to stage a steady recover starting in 2011.

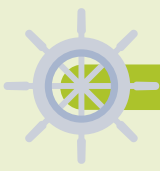


Surging oil prices in 2004 caused deep-water drillship orders to sharply increase between 2006 and 2008. However, many of the orders were from speculative buyers trying to take advantage of the rising oil prices. During the period, more than half of the drillships were unchartered at the time of the order placement. As of late Jul 2010, 10 out of the 25 drillships scheduled for delivery between 2010 and 2011 remained unchartered (40%; based on Dryship data). Therefore, order placements for deep-water drillships are unlikely to stage a full-fledged recovery before vessels in the existing order backlog find charterers in 2011.

Following the oil spill in the Gulf of Mexico in Apr 2010, some of the drillship project orders were suspended. Since the incident, market insiders have been closely following how the situation unfolds and awaiting the direction of new regulations. The suspension of deep water drilling (500 feet and below the surface) will be lifted in the US, by late Nov 2010. Therefore Daishin Securities Research Center expects order placements for deep-water drillships to resume, with a slow recovery in order placements possible in 2011 (yoy), compared to 2010.

Globally, Brazil is the only country to show highly vibrant demand for deep-water drillships. Currently, the bidding for 28 deep-water drillships is underway in three phases (1st package of 7 ships, 2nd package of 2 ships and 3rd package of 19 ships). The bidding for the first two packages is currently in progress, with only local (Brazilian) shipyards invited to bid. The results of the bidding process will be announced in Nov 2010, after the upcoming presidential election.





The bid for the third package has not started. Orders for the 19 ships included in the third package will be placed through charter contracts instead of direct orders. Despite the regulations that mandate newbuild ship orders be awarded to local (Brazilian) shipyards, overseas shipyards could win portions of the contracts, given the limited shipbuilding capacity of Brazilian shipyards. Consequently, Korea's large shipbuilders will have access to a minimum of twelve deep-water drillships in 2011. However, under the charter contract, the 19 ships included in the third package do not have to be delivered as newbuilds. Part of the order is likely to be filled with ships in the existing order backlog.

### Outlook for FPSO order placements in 2011

Fresh orders for FPSO, the oil production facility, dried up in 2009. However, order volume for FPSOs steadily increased from the first half of 2010, showing signs of a recovery. Generally, the majority of FPSO orders (65%) are filled by converting existing oil tankers. The remaining 35% are delivered as newbuilds. Over the past decade, an average of 3.8 FPSO ships per annum were

delivered as newbuilds.

In 2010, offshore oil field development projects began or resumed in greater numbers than preceding years, on the back of rising oil prices and a steady economic recovery. According to the International Maritime Associates (IMA), a total of 178 FPSO projects are currently underway which are either in the bid, design or planning stage, much more than the 159 FPSO projects initially in progress at the beginning of 2010.

Considering the 12 month period from the beginning of the bidding process to the conclusion of the contract, the number of projects with settled contracts will increase in 2011. FPSOs are being installed and operated in deeper waters as of late, indicating that the FPSO has become complex and large and the projects which demonstrate the capabilities of Korea's 3 large companies are increasing in number.

### LNG FPSO - a new market opened

Of all vessel types, LNG FPSOs are expected to provide the largest contributions to the increase in off-shore plant order place-

Table. 3 FPSO projects currently in the bidding process

Production facility method	Field (Region)	Operator	Depth (m)	FID	First oil production	Storage capacity (mn bbl)	Progress
FPSO or platform + FSO	Golden Eagle (UK)	Nexen (Canada)	120	1H11	2014	0.7-0.8	-Bids were submitted in Jul 2010 -Korea's three major shipbuilders and STX Pan Ocean participated -Results of the bid review to be announced in Oct 2010
FPSO	Egina (Nigeria)	Total	1,340	2Q11	Early 2015	2	-Korea's three major shipbuilders/ Technip (China)/ Saipem -Commercial bid to be submitted in Feb 2011 -EPC company to be selected in 2Q11
FPSO	Jordbaer (Norway)	BG	420		2013/15		-Bid submission completed (Jul 2010); bids currently under review -Sevan Marine + Cosco/Teekay Petrojarl + SHI
FPSO	Schiehallion (Quad 204/UK)	BP	425		2013/14	0.8	-Bids were submitted until late Aug 2010 -Selection of a successful bidder : late 4Q10 -FID (financial investor decision) is likely in 1Q11 -HHI and SHI
Ship shape FPU	Shtokman	Gazprom/ Total/Statoil	320-340	2011	2016/17		-Aker Solutions + Technip + SBM + DSME/ Saipem + SHI
FPSO or joint development with Sidon/Tiro	BS-3 (Brazil)	Petrobras/ Panoro Energy	140-195	1Q11	2014		-Brazilian shipbuilder to be chosen
FPSO	Tupi Pilot lara or Iracema	Petrobras	2,140		2013		-Brazilian shipbuilder to be chosen

Note: By the order of the expected timing of contract signing / Source: IMA, Upstream, Daishin Securities Research Center

Table.4 LNG FPSO projects currently in progress

Orderer	Region where the FPSOs will be used	Daily production capacity (mmtpa)	Shipbuilder	Comments
Shell	Prelude (Australia) Greater Sunrise (Australia)	3.5	SHI	No.1 LNG FPSO ordered in 2010/No.2 LNG FPSO to be ordered in 2011 FEED: Technip
Petrobras	Santos Basin (Brazil)	2.3-3.0	TBD	Saipem + SBM/Chiyoda + Technip/JGC/Modec (3 consortiums are pitted against one another, carrying out FEED separately)
Hoegh LNG	In search of gas fields where the LNG FPSOs will be used (PNG, etc.)	1.6	DSME	Generic FEED completed in Mar 2009
Excelerate	In search of gas fields where the LNG FPSOs will be used	n.a.	SHI	Generic FEED completed in Sep 2010
Flex LNG	In search of gas fields where the LNG FPSOs will be used (Nigeria, PNG, T&T, Brazil, etc.)	1.7-1.95	SHI	4 hulls and 1 topside ordered to SHI in 2008
SBM	In search of Gas fields where the LNG FPSOs will be used	2.5	SHI	Generic FEED completed in 2H08 Hull ordered to SHI in 1Q09

Note: PNG (Papua New Guinea); gray area represent projects where only hulls have been ordered; green shadow represents a project where the gas field has been secured  
Source: Inpex, Daishin Securities Research Center



ments in 2011. Although there is no single LNG FPSO currently in operation, the first LNG FPSO order was placed in 2008. LNG FPSOs function in the same manner as land-based export terminals, except over water. Therefore, LNG FPSOs constitute a new market for shipbuilders who are now capable of handling projects that were once exclusive to construction companies.

Going forward, gas field development projects are expected to increase in line with the growing demand for the energy and clean energy. Against this backdrop, demand for LNG FPSOs will increase over the long term. LNG FPSOs make larger gas field projects more affordable and smaller projects, which were once seen as unprofitable, financially feasible.

As of now, a total of six LNG FPSOs have been ordered globally (4 by Flex LNG FPSO in 2008, 1 by SBM LNG FPSO in 2009

and 1 by Shell LNG FPSO in 2010; all orders were received by Samsung Heavy Industries (SHI)). However, most of the LNG FPSO orders are still incomplete: the gas fields where the LNG FPSOs will be installed have not been decided. Therefore, the order from Shell (to be installed at the Prelude gas field in Australia) should be considered the first “complete” LNG FPSO project. Shell is expected to place a second order to SHI in 2011, having already secured another gas field in Greater Sunrise in Australia.

Furthermore, Excelerate Energy completed the FEED process with SHI in September 2010 and is now searching for a gas field to deploy the LNG FPSO. Similarly, Leif Heogh concluded the FEED process with Daewoo Shipbuilding & Marine Engineering (DSME) in March 2009 and is now in search of a gas field. Until recently, securing a gas field had taken a long time. However, with the economy well on the way to recovery and demand for energy continuing to grow, gas fields are expected to be secured within 2011.

The table 4 shows LNG FPSO projects currently in progress. The rows highlighted in grey are projects where only hulls have been ordered because the company is still in the process of obtaining a gas field. Once gas fields are secured, additional orders for topsides will likely be placed. ⚓



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# Takes the lead in certification market of wind power generation

As many Korea's companies related to shipbuilding are making inroads into the wind power generation market, there has been a growing interest in the wind power generation and renewable energies. DNV which has provided specialized services related to the quality, environment, and safety in the shipbuilding/maritime industry since its entry into the Korean market in early 1970s set up Cleaner Energy & Natural Gas Division recently. Cleaner Energy & Natural Gas Division will perform the consulting and certification works related to the wind farm and wind power generation equipment.

## *DNV Korea Ltd.*

DNV (Det Norske Veritas) is an independent foundation with the purpose of safeguarding life, property, and the environment. DNV's history goes back to 1864, when the foundation was established in Norway to inspect and evaluate the technical condition of Norwegian merchant vessels.

Since then, DNV's core competence has been to identify, assess, and advise on how to manage risk. Whether DNV classifies a ship, certifies an automotive company's management system, or advises on how to best maintain an aging oil platform, DNV's focus is to safely and responsibly improve business performance.

As a leading international provider of services for managing risk, the point of managing risk is not necessarily to eliminate risk, but to have an overview of the most critical risks and manage them professionally. DNV's technology understanding blended with competency within risk management has

been used to assess, evaluate and manage the risks involved in numerous high-profile projects around the world.

Many of DNV's services, such as management system certification and corporate responsibility, can be applied successfully in any industry, DNV's main focus industries include the maritime, oil, gas and energy, food and beverage, and health care.

## **DNV in Korea pursues co-growth with shipbuilding industry**

DNV, which advanced into the Korean market based on long tradition and extensive experience, operates DNV Korea, the world's largest representative office in the sector of newbuilding, which reflects the fact that Korea is the world's largest shipbuilding country.

Currently, the company has diversified into a variety of indus-



Kim Byoung-jun, General Manager of DNV Korea

tries from the existing shipbuilding industry, and is providing services in sectors such as maritime & energy (shipbuilding/marine, gas, chemical, etc), business assurance, cleaner energy & natural gas, and software.

### •DNV Maritime & Energy

In late 1970s, DNV first entered Korean market with its Maritime business when Korean maritime business was starting to grow fast. DNV Maritime contributed considerably to the Korean maritime industry growth and also DNV developed with the industry's growth. Since then DNV in Korea expanded its business rapidly establishing Maritime Offices in Seoul, Busan, Ulsan, Koje, and Mokpo.

In 1984, Busan Approval Service Center for East Asia (ACEA) was established as a technical hub outside the main office at Høvik. Since then, ACEA is offering a competent and reliable service to our customers by providing technical supports from plan approval to consultancy & advisory services.

In 2001, DNV Academy in Korea opened training facilities in Busan and started to offer its training program to our customers. Currently, four training facilities in Busan, Ulsan, and Tongyeong are operating to provide trainings to our partners in yards, owners, and manufacturers.

DNV Advisory Centre in Korea was newly established as of April 2010 and the center will offer variety of services not only in maritime consulting but also in energy segments promoting DNV Korea as a total 'Risk Management' solution provider in maritime and energy industries.

More specifically, the Maritime & Energy Division of DNV Korea is currently providing services in the sectors listed

below:

- Classification: Duties related to the classification pursuant to the new shipbuilding and offshore structure
- Certification of Materials and Components (CMC): Inspection of marine equipments and parts
- Ship in Operation (SiO)
- Certification and quality assurance service
- Advisory Service: Various consulting service related to all aspects of shipbuilding and energy industry
- DNV Academy in Korea: Provision of practical education program related to the shipbuilding and energy industry

### •DNV Business Assurance

Since 1992, Business Assurance in Korea has operated in Seoul, serving local clients nationwide. In addition, its major works include the identification, evaluation, and improvement of key risks including the ISO management system certification, climate change/verification of greenhouse gas (GHG) emissions, product certification, safety and health risk management, and others.

### •DNV Software

DNV Software in Korea was established in 1997, and is currently located in Busan. Since then, DNV Software is providing software packages for maritime, offshore, energy and process industries. It has made steady efforts to provide more efficient and convenient system environment to customers.

The products of DNV Software comprehensively consist of various components ranging from the initial modelling to the analysis, encompassing the entire processes from the pre-treatment to post-treatment. They have been used in companies, related research organizations, etc, as well as shipyards.

Major products of DNV Software include the followings:

- Nauticus for maritime: Design of hull, CSR rule check, machinery calculation
- Sesam for offshore: Design and analysis of fixed/floating offshore structures and floating production, storage and offloading (FPSO) units, using GeniE, HydroD, and DeepC packages
- Safety for process: QRA, RBI, performance forecasting

Particularly, there has been an increasing interest in the wind power generation and renewable energies as many Korea's companies related to the shipbuilding industry are making

entry into the wind power generation market.

DNV, in anticipation of such a market trend, set up DNV Cleaner Energy & Natural Gas Division to provide more swift and competitive services in Korea to customers interested in the renewable energy business. DNV Cleaner Energy & Natural Gas Division is providing major services as follows:

- Consulting and certification related to the wind farms and wind power generation equipments
- Carbon capture and storage (CCS), technology
- Technologies related to the liquefied natural gas (LNG)
- Technologies related to power generation and transmission

### **DNV - a leader in the field of renewable energy certification and consulting**

The industry related to the wind turbine still remains at the inchoate stage in Korea compared to advanced countries in Europe and North America, etc. Although the government has provided support and companies in the related sectors have put in massive effort to develop technologies independently, Korea, a latecomer to the wind power generation market, still has a wide gap with advanced countries in the wind power generation sector.

One of the most urgent issues relates to the need for securing the ability to design wind turbines independently. Developers of wind turbines have developed the design by themselves, or contracted out designs to foreign design companies, or acquired wind turbine design technologies by, for example, securing the design ability through merger and acquisition. Presently, many of them have engaged foreign companies by contract to undertake the design, or obtained the design technology by merging and acquiring foreign companies. Domestic wind power companies are globally competitive in terms of construction ability based on the extensive experience and expertise in the shipbuilding and heavy industrial field. They, however, urgently need to develop and secure the best design technologies which suit their unique situations if they are to successfully compete with advanced countries in the global wind power generation sector.

In addition, the advancement of companies into foreign markets is unavoidable, considering the size of market for wind power generation industry, and many companies are mapping out business plans to make inroads into the global market over the long-term. Securing the ability of independent technology will become the biggest challenge of companies



Headquarters of DNV in Oslo, Norway

in taking up a significant share in foreign markets, and the design technology is expected to emerge as one of the crucial factors for sustainable growth of companies.

### **Certification serves as the groundwork for making entry into foreign markets**

The certification based on the international standard and one of the internationally-recognized certification organization is the primary factor, as well as the design technology, for domestic companies in their quest for advancement into foreign markets.

The IEC WT01 Standard defines the certification as the "procedure" by which the third party issues the certificate specifying that the product, production process, or service comply with the amended requirements, or as "the evaluation of conformity". In other words, the certification in the wind power generation industry, as the dictionary defines, relates to the process for validating whether the processes- ranging from design of wind turbine through the production process and performance test of major parts to the installation of wind farm - and final result conform to the international or well-recognized standards.

Considering that the certification evaluates nearly all phases of wind power generation, certification is a crucial procedure to reduce the uncertainty inherent in wind turbine/wind farm development projects and validate their stability to a certain degree for government organizations, electric power suppliers, developers, and private businesses which intend to develop wind farms or install wind power generation systems based on the suitability and stability of investment.



Currently, standard procedures for wind turbines have been crafted mainly by countries in Europe and North America, and the increased awareness towards the need for international standardization has led to the International Electrotechnical Commission (IEC), an international standards organization dealing with electrical, electronic and related technologies, to lead the gradual shift toward international standard. IEC standard is the key part of World Trade Organization (WTO) Agreement on Technical Barriers to Trade ("TBT Agreement"), and about 100 member countries of WTO has recognized that the international standard plays an important role in elevating the efficiency of industry and promoting the development of international trade. Furthermore, even countries with advanced technologies in wind power generation have invested a lot of effort in the standardization of wind power technologies.

Companies poised to make an entry into foreign markets have already acknowledged the importance of certification and poured in effort to develop wind turbines compliant with international standard.

An official of DNV Korea stressed, "Unavoidably, companies seeking to make an inroads into global markets have to develop products which comply with international standards, and the development of technologies and products conforming to international standards will ensure successful entry into foreign markets."

### **Head and shoulders above others in the certification for offshore wind power generation**

DNV is expected to be of great help in many areas for domestic wind power industry which is still in its infancy in terms of technology and faces many technical challenges.

DNV, an independent foundation which specializes in the certification and consulting related to the shipbuilding and energy, was established in 1864 in Norway, and has amassed extensive experience and expertise for about 3 decades in the renewable energy sector, including the wind power generation.

In the wind power generation sector, the company has specialized in the type certification and project certification of wind farms since it started operation in 1970s in Denmark. In addition, it has provided professional consulting services, such as the wind turbine design technology, project feasibility study, assessment of technical, financial, and investment risk of wind turbines and wind farms, and so forth, on the basis of its experience which it built up for several decades in Europe and North America with regards to the certification and technical consulting associated with wind power generation.

The noise and environmental impact of wind turbine have prompted a gradual shift from onshore wind farms toward "offshore" wind farms. Geographic conditions of sea are favorable for the construction of wind farms, and wind farms have been developed in shallow water off the coast so far. However, more wind farms are expected to be installed in deepwater to take advantage of ample wind resources along with the advancement of technology and large-capacity wind turbines.

Domestic technologies for offshore wind power generation are still in the fledgling stage and many challenges have to be overcome. However, technologies which have been amassed in the shipbuilding and heavy industry are expected to lay the cornerstone for domestic companies to stand out in the offshore wind power industry. An official of DNV emphasized, saying "We can provide professional assistance to

domestic companies and government officials in their endeavor to develop offshore wind farms.”

DNV has been prominent in the wind power sector, specifically, the certification and consulting associated with offshore wind power generation, and has carried out approximately more than 75% of all offshore wind power projects worldwide to date. DNV unveiled DNV-OS-J101, the standard for the substructure of offshore turbine, for the first time in 2004. DNV-OS-J101 specifies the standard in detail for the substructure and tower of offshore wind turbines. Recently, DNV revised this standard which now reflects the ideas and requirements of related companies and organizations and also contains the analyses pursuant to IEC 61400-3 standard published recently.

An official of DNV said, “Many domestic companies have shown their interest in the substructure design. At the moment, we have been asked by many different companies for technical consultations on the design and verification of substructure design.”

Moreover, DNV is holding technical seminars on the substructure of offshore wind turbines in response to the rising interest of domestic companies, and plans to expand those seminars.

### Delivery of one-stop service in Korea

So far, it took a lot of time for wind turbine developers to receive consultation and obtain the certification, even if they recognize the need for certification, mainly because major design/business certification organizations are located abroad. Worse, certification procedure became more complicated by difficulties arising from the lack of understanding about the domestic wind power market and the absence of effective communication.

DNV, in anticipation of the rapid growth of Korea’s wind power and renewable energy industry, set up the renewable energy certification and consulting division in Korea.

DNV’s group of experts in the certification for wind power generation and consultants, who stay permanently in Korea, is composed of engineers from home or abroad, and those wind power experts provide professional services more quickly to domestic wind power companies. This one-stop service will allow domestic companies to save the time and cost when they seek to acquire the certification of wind power generation and make their business more efficient.

An official of DNV said, “We provide services based on the



professional network of approximately more than 300 experts in the renewable energy who are currently employed by DNV, and will provide practical help to domestic companies in their advancement into the global market.”

### Type certification and project certification of wind power generation

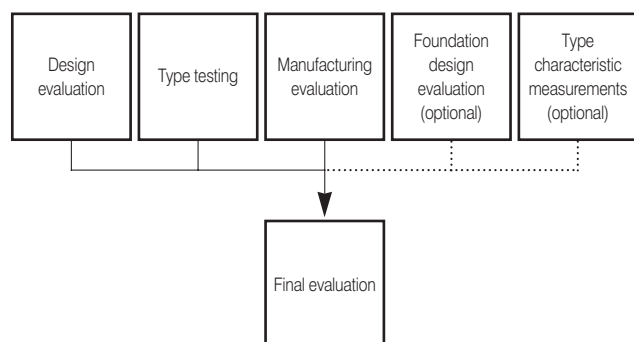
#### *Type certification/Wind turbines*

Type certification is offered according to the following certification schemes: IEC WT 01, DNV, Danish, and Dutch.

The DNV and Danish certification schemes are based on the IEC WT 01 certification system. The Dutch scheme is based on NVN 11400-0. The IEC WT 01 system described in IEC System for conformity testing and certification of wind turbines is based on modules. Each of the modules is concluded by a well-defined statement or certificate.



The wind turbine type certificate is issued when the four mandatory modules are completed: design evaluation, type testing, manufacturing evaluation, and final evaluation. It may also include the following optional modules: foundation design evaluation and type characteristic measurements (acoustic noise, power quality)



### • Design evaluation

The design evaluation is normally carried out as a review of the design documentation submitted by the manufacturer. In addition to documentation review, independent analysis will normally be carried out. Independent load calculations are made using an aerolastic program different from the one used by the manufacturer. For this purpose DNV has two advanced aeroelastic programs available, FLEX5 and HAWC developed by Risø DTU, the Danish National Laboratory for Sustainable Energy. Independent gear rating calculations are carried out by the DNV program NV5053. This program was developed based on the DNV classification note 41.2. If required, FEM analysis is carried out for critical components. DNV and Risø DTU have access to several commercial FEM program systems.

### • Type testing

Type testing is carried out in order to prove the wind turbine performance with respect to power production. Furthermore, safety and function testing and measurements are carried out to verify the load calculations and the blade design. Type testing will normally comprise: safety and function tests, load measurements, power performance measurements, and static and fatigue blade tests. Normally, accredited institutes carry out the main parts of these tests.

### • Manufacturing evaluation

Manufacturing evaluation comprises: quality system evalua-

tion and manufacturing inspection.

The evaluation of the quality system is covered in the Danish and the Dutch certification schemes by requiring the manufacturer to operate a certified quality system according to ISO 9001. In IEC WT 01 there are no requirements for a certified quality system. In that case, DNV Wind Turbine Certification will perform an audit for verification of compliance with the requirements in the ISO 9001 standard.

For the manufacturing inspection, a survey of the manufacturing of one turbine of the type will be carried out.

A final verification report and a type certificate will be issued when the wind turbine type subject to type certification is found to comply with the applicable code/ standards/requirements.

The validity period of a wind turbine type certificate is specified in the certificate and is typically between one and five years. Annual surveys of randomly chosen specimens of each type of turbine are carried out during the validity period of the type certificate. The purpose of this survey is verification of the manufacturer's design procedures, their maintenance, and implementations in relation to the design procedures and design parameters initially approved by DNV.

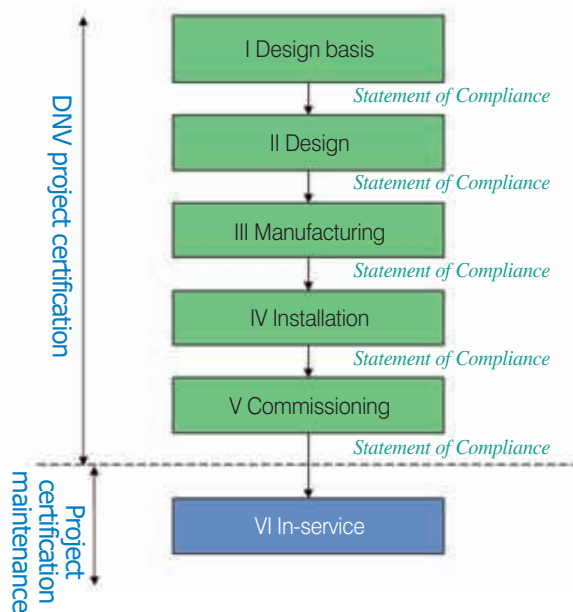
### ***Project Certification/Offshore wind farms***

DNV certified the first offshore wind turbines installed in 1991 in Denmark. Since that time, DNV has certified and is in the process of verifying more than 40 offshore wind farm projects ranging from 5MW to 1GW. To guide these activities, DNV has developed standards for offshore structures, DNV-OS-J101, and is accredited by the Dutch Accreditation Agency. Some of the major offshore wind farms being certified by DNV include London Array (1GW), Greater Gabbard (500MW), and Thanet Offshore Wind Farm (300MW) in the UK and Horns Rev (369MW) in Denmark

In some countries, project certification is a requirement of national agencies for offshore wind projects. However, even when not required by regulation, most project owners pursue project certification in order to gain additional assurance in the design and implementation of their offshore wind project. Due to the size of the investments required for offshore wind farms, third-party verification services are a significant benefit for owners, investors, and insurance providers as a means of reducing risk and protecting investments.

During the project design stage, project certification provides





### Project certification phases

- Phase I: Verification of design basis
  - Phase II: Verification of design
  - Phase III: Manufacturing survey
  - Phase IV: Installation survey
  - Phase V: Commissioning survey
  - Phase VI: In-Service
- Each phase will be completed by a **Statement of Compliance**
  - Phase I-V: **Project certification**
  - Phase VI: **Certificate validation**

an additional benefit by identifying potential issues and thus minimizing the need for design changes at later stages of the project.

DNV's scheme for project certification of offshore wind farms consists of six phases. A type certificate of the wind turbine is required as a pre-requisite. DNV's project certification scheme is consistent with the IEC's project certification scheme for offshore wind projects.

#### •Phase I-II

In general, Phases I and II cover the steps for achieving final design verification, which include site-specific approval of the integrated structural systems consisting of wind turbine, foundation, and soil. The site-specific approval includes verification of external conditions such as soil, wind, and wave conditions.

In addition to review of design documentation, independent analyses can be carried out for critical details. For that purpose DNV has access to several commercial finite element program systems and aeroelastic codes. Structural design verification could cover wind turbine foundations and other structures such as offshore substations.

#### •Phase III-V

Phases III-V involve all the follow-up verification and on-site inspections in connection with the implementation of the pro-

ject. This includes manufacturing and installation surveys of support structures, substations, and wind turbines, and commissioning of these.

Manufacturing surveys take place at the fabrication site. The survey for welded structures is based on a review of welding procedures, welder's qualifications, procedures for Non-Destructive Testing, NDT inspection findings, etc.

Each project phase will be completed with a statement of compliance and after completion of Phases I through V, the DNV Project Certificate will be obtained.

#### •Phase VI

Operations and maintenance surveillance of the wind farm is required in order to maintain the Project Certificate. During this phase it is confirmed that the wind farm project is operated and maintained in conformity with the relevant manuals.

DNV recommends beginning certification early in the project development process, preferably at the time data are collected for soil, wind, and wave site-specific investigations. Involvement by DNV at the early stages of a project helps to ensure that the information required for later certification is collected.

Meanwhile, the basis for Project Certification is proposed to be the DNV Offshore Standard, Design of Offshore Wind Turbine Structures, DNV-OS-J101. 



An employee of HHI conducts the welding in the digital welding system demonstration.

# A novel way of ship welding

## HHI has developed world's first digital welding system

Hyundai Heavy Industries (HHI) has successfully developed the world's first digital welding system, thus taking the lead in setting a new trend for ship welding method. Digital welding system uses digital communication method and control circuit to increase the productivity and welding quality remarkably.

Hyundai Heavy Industries (HHI) announced that it recently developed digital welding system and began to make a transition from the analogue welding method - which it used for about 4 decades - to the digital welding method for ship construction.

Digital welding system dramatically increases productivity and welding quality based on the digital communication method and control circuit, and this is the first time that all related apparatus and instruments such as welder, wire feeder, carriage, cable, etc, became digitalized.

This system enables the worker to monitor the welding voltage and current in real time via the LCD monitor of the welding apparatus, and even the novice welding personnel can produce high quality product and figure out the failure or malfunction in the system.

In addition, the digital welding system ensures the stable feed of wire, regardless of the cable length, and maintains the uniformity of the welding quality, which is in stark contrast to the past when elaborate welding was difficult due to the unstable wire feeding speed if the welding cable is longer.

The industry predicts that the digitalized welding system will narrow the gap in quality which usually stems from the difference in the skillfulness of welding personnel and bring about many changes such as the method of task

performance, inspection by registers of shipping, maintenance of equipment, storage of welding data, and so forth.

Han Yeong-sam, general manager at the Technology Development Department of HHI, remarked, "As ship blocks have become larger and customers have higher expectation of quality than ever, digital welding system will help shore up the competitiveness of company significantly."

Specifically, HHI expects that this system would raise the welding productivity by about 20% which would be equivalent to upwards of KRW 100 billion per year.

Meanwhile, HHI has developed the systems since 2006 and applied for domestic patent for 6 systems, and plans to convert all welding systems to digitalized ones consecutively from 2011 to 2015. 



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FLIR Customer Day 2010 of FLIR Systems Korea, held for 2 days on November 11 to 12

## Closer to customers

### FLIR Customer Day 2010 took place

FLIR Systems Korea held the FLIR customer Day 2010 for 2 days from November 11 to 12 at Sangrok Resort, Cheonan. This event which aimed to strengthen the customer services unveiled the excellent examples of applications of thermal image cameras used in many different industrial sites, capturing the attention of attendants.

FLIR Systems Korea, the Korean office of FLIR System which specializes in thermal image camera, successfully ended the FLIR Customer Day 2010 which ran for 2 days from November 11 to 12 at Sangrok Resort, Cheonan.

This event was held to not only increase the efficiency in the work performance of clients by presenting various examples readily applicable to industrial sites and but also reinforce customer services like inducing the reduction of costs through the prior maintenance and detection of defect.

Lee Hae-dong, General Manager of FLIR Systems Korea said, "FLIR Systems has cemented its dominant position as world's top thermal image camera company based on excellent quality and superb customer services, and has been doing its utmost without being complacent. In this context,

FLIR Customer Day event has been instrumental very much in providing information about various products and embracing the ideas of customers to come closer to them."

This event was attended by delegates from Korea Infrastructure Safety Corporation, Korea Institute of Construction Technology, Hudigm, Yonsei University College of Medicine, Korean Standards Association, Korea Electric Power Corporation, Seoul National University of Science and Technology, Korea Railroad Research Institute, S-Oil, Korea Research Institute of Standards and Science. They made presentations on various themes such as the examples of electric facility check, examples related to the insulation performance of architectural structures, examples pursuant to the energy diagnosis, preliminary research to find out per-



A variety of colorful attractions and events were held in parallel with seminar during the FLIR Customer Day 2010

sons liable to committing crime, preventive maintenance of power generation facilities, machining and polishing temperature measurement, preventive maintenance of refinery using the gas detection camera, and others.

In addition, experts of FLIR Systems introduced excellent examples of application of thermal image cameras used in various industrial fields along with the microscopic thermal image system, A-Series for automation and monitoring, commercial thermal imaging equipments, and others.

Meanwhile, FLIR Systems Korea also staged various events such as giveaway events for customers, belly dance performance, etc, to entertain the attendants, in addition to the seminar.

FLIR Systems, headquartered in Sweden, is the global leader in the field of design, production, and sales of various thermal measurement systems for commercial/industrial applications and for use of public organizations, and provides the best software, service, education and training, besides high quality cameras.

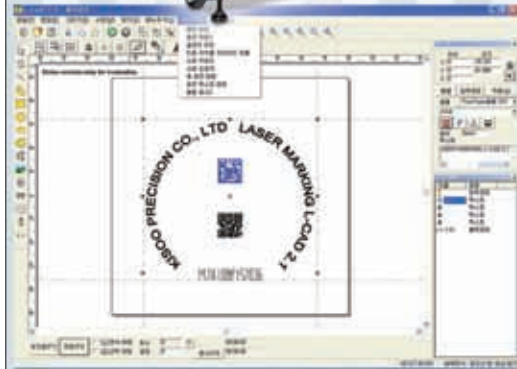
FLIR Systems operates 6 factories in Portland, Boston, and Santa Babara, USA, Stockholm in Sweden, Estonia, and Paris in France. Furthermore, the company currently employes more than 1,900 people who are all experts in the field of infrared thermal imaging. ⚓

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TIA Portal launching show of the Automation Division of Siemens Korea was held on November 11.



Un Min-su, general manager at the Automation Division of Siemens Korea

# Intuitive engineering framework as the basis for modern automation

## TIA Portal launching show took place

The Automation Division of Siemens Korea held a large-scale launching show on November 16 to unveil its new dimensional automation technology. On that day, the Automation Division of Siemens Korea introduced Totally Integrated Automation Portal (TIA Portal), the Intuitive engineering framework as the basis for modern automation.

The Automation Division of Siemens Korea staged a large-scale launching show at Han River Fradia on November 16 to showcase a new dimensional integrated automation technology. Siemens Korea, on that day, introduced Totally Integrated Automation Portal (TIA Portal), a new and extremely user-friendly engineering framework.

TIA Portal enables users to solve automation tasks quickly and intuitively. The completely newly developed software architecture is designed for high efficiency and user-friendliness, and it is suitable both for first-time users and experienced users. The TIA Portal is the basis of all future engineering systems for configuring, programming and commissioning the automation and drives products of the Totally Integrated Automation range from Siemens.

### The new and Intuitive engineering framework

For the development of the TIA Portal framework, Siemens studied typical engineering applications over several years, as well as analyzing and evaluating customer requirements worldwide. As an integral component of the engineering systems from Siemens, the TIA Portal will provide shared services and features, and ensure uniform and consistent system behavior. Thus, for example, all devices and fieldbuses will in future be configured with one shared device and network editor. Project navigation, library concepts, data management, project storage, diagnostics, and online functions are standardized and made available to the user via a shared framework application. This offers a high level of clarity in the overall automation project, comprising controllers, human





The new TIA Portal which Siemens Industry Automation Division unveiled, enables users to solve automation tasks quickly and intuitively.

machine interface (HMI) devices, and drives.

On the other hand, data such as parameters, blocks, tags or messages now only need to be entered once at a single location. Thanks to object-oriented, centralized data management, the TIA Portal ensures data consistency, and automatically avoids input errors. Users can find data and program blocks quickly across the entire project using a project-wide cross-reference system.

Controllers, HMI devices and drives will be configured in future with one and the same application. This reduces interfacing and configuring costs, such as those for connecting controller and HMI configuring, to a minimum. For example, the user simply drags and drops a control tag, such as the signal of an I/O (input/output) module, to the screen of an HMI device. The variables are thus automatically assigned, and a controller-HMI connection is created in the background.

The new Simatic Step 7 V11 engineering software, based on the TIA Portal, is suitable for the new Simatic S7-1200 controllers, the controller families Simatic S7-300 and S7-400, and the PC-based automation system Simatic WinAC. Simatic Step 7 V11 thus enables integrated and scalable engineering for all performance classes in control engineering. Existing configurations with Simatic controllers and HMI components can be transferred to the new software and further used.

The new Simatic WinCC V11 engineering software is also based on the TIA Portal. This is used for machine-level applications with Simatic HMI devices, especially, for example, for

the new Simatic HMI Comfort Panels, and for process visualization with the Supervisory Control and Data Acquisition (SCADA) system Simatic WinCC. Commissioning of inverters of the Sinamics drive family will be integrated in a further expansion stage.

Un Min-su, general manager at the Automation Division of Siemens Korea, commented, "Following the investigation and analysis of requirements of customers around the globe and years of research into the engineering applications, we have successfully developed this product. We expect that this new brand new product will help expand the supply of swift and efficient solutions for the automation sector."

### Shortening the engineering process and duration of development


Meanwhile, the Automation Division of Siemens Korea provided explanations in a press conference held in the afternoon on that day with respect to the concept and necessity of engineering framework, characteristics of the company's TIA Portal, and others.

Even if individual software packages are ideally interconnected, there are limits to their continuity and integration. Only a common working environment - an engineering framework - can achieve complete integration and continuity of the individual products.

The TIA Portal, an engineering framework, is the central connection between the individual products and is contained in each of them.

The central engineering framework is characterized by the followings: automatic data and project consistency; integrated operating concept across all automation tasks; powerful libraries across all automation objects; simplified configuration of connections; and shared services and properties (e.g. configuration, communications, diagnostics).

The Automation Division of Siemens Korea emphasized, saying "The TIA Portal forms the working environment for integrated engineering with SIMATIC STEP 7 and SIMATIC WinCC." He added, "Customers still buy individual products, but experience the TIA portal in their daily work."

As the market is changing dynamically and the industry is coping with customers' requirements that have become increasingly difficult to satisfy, TIA Portal will ultimately help shorten the engineering process and duration of development by enabling the integrated view of all production processes. 



# Moving forward together with clients for mutual growth

## POSCO hosted the Global EVI Forum 2010, promised marketing innovations

On November 17, POSCO hosted the POSCO Global EVI Forum 2010 attended by approximately 900 key domestic and overseas clients and promised new marketing practices to allow growth with clients. That was an announcement in preparation for the stiffer competition in the steel industry and strengthened attacks on the domestic South Korean market by China and Japan. The key element is to develop technologies and supply products earlier by identifying client needs ahead.



CEO Chung Jun-yang at the Nov. 17 POSCO Global EVI Forum

POSCO invited client firms from all over the world and announced their new marketing innovation plans.

POSCO hosted the POSCO Global EVI Forum 2010 inviting clients including about 430 global firms and 900 participants at the POSCO Global R&D Center located in Songdo International City, Incheon on November 17 and promised new marketing practices with their clients' successes in mind.

### Expanding EVI areas to all industries with demand

Until recently, the best marketing strategy was to attain customer successes through the stable supply of steel of excellent quality. However, POSCO revised their marketing strategies used so far because management environment is undergoing rapid changes including the acceleration of competitions due to new building and expansion of domestic and

overseas steel industry, increasing export to South Korea by China and Japan, and so on.

Hence, POSCO produced POSCO EVI (Expanded Value Initiative for Customer) Strategy to expand markets as well as pioneering customer successes by predicting future market environment and proposing the development of new technologies and new products ahead of customers.

The key element of POSCO EVI Strategy is to identify the business needs for the clients of clients as well as POSCO's own clients throughout all industries and provide total solutions by proposing the development of products and technologies ahead of customers. Accordingly, POSCO plans to conduct comprehensive EVI activities focusing on competitive technological developments for aggressive market pioneering by dividing the industries of potential demand into Primary Industrial Sect with higher percentages of steel demand, New Industrial Sect with significant potentials for growth, and Project Industrial Sect for alternative materials and low-cost materials.

Until recently, though the major global steel manufacturers including Nippon Steel, ArcelorMittal, and so on has been engaged in EVI activities focusing on the automobile industry, it was POSCO to expand such activities on all industrial clients comprising consumer electronics, shipbuilding, energy, construction, heavy equipment, and so on for the first time.

### “Mutual trust with customers is important”

POSCO initially plans to make lighter frames and parts for cars for the automobile industry which belongs to the Primary

Industrial Sect with high percentages of demand. The company also plans to develop and implement lighter and thinner steel products for the consumer electronics industry. Furthermore, POSCO plans to carry out the development support projects for the design technologies to optimize ship body structures for the shipbuilding industry.

Regarding the New Industrial Sect including new renewable energy, construction materials, maritime plants, and so on, POSCO will focus on helping to make lighter wind power generator towers and heavy equipment for construction and developing the high-strength products to replace existing materials. Also, the company hopes to retain their existing markets from the threats of alternative materials and low-cost materials by developing eco-friendly modular bridges, high-strength steel pipe files, and so on for the Project Industrial Sect including construction, civil engineering, plants, etc.

During the recent years, the POSCO CEO Chung Jun-yang kept emphasizing enhancing customer value and building mutual trust with customers saying the key element of one of their company's three management principles "Creative Management" is to create customer value and the essence of Marketing 3.0 is to appeal to "the soul of customers" whereas Marketing 1.0 and Marketing 2.0 appealed to the head and hearts of customers, respectively.

He also said during the opening ceremony on November 17, "The only way for us to survive in an uncertain competitive environment is to move forward together with all the management entities on the supply chain in order to achieve mutual growths." He also emphasized adding, "We must allow our very transactions with customers to convey happiness and be the stepping stone for success by serving customers with our souls engraved in our products and services."

About 430 leading global companies representing each industry including Toyota, Sony, Exxon-Mobil, Caterpillar, and so on participated in the event, where POSCO signed about 30 MOU's for providing long-term materials and cooperating through joint technological development with major domestic and overseas clients.

### Expanding EVI areas to consumer electronics, construction, and more

POSCO has leaped enormous advantages by expanding their EVI activities to consumer electronics, construction, and so on since their first EVI involvement with the automobile industry in 2004.



POSCO promised a new marketing practice strategy based on customer success through POSCO Global EVI Forum. The photo shows the complete view and opening ceremony of the EVI Forum.

Until recently, POSCO achieved the net effect of reducing material cost by 20% through the development and mass production of low-cost black resin coated steel after predicting the rapid increase in the demand of steel plates to replace the existing thick plastic thanks to the gradual evolution of cathode-ray tube television sets to high-quality visual electronic devices of flat panel boxes such as LCD, LED, and so on. Due to such joint development efforts, the global market share in visual consumer electronics for South Korean manufacturers leaped from 30% in 2008 to 55% in 2010.

The underground roads at the Cheongra District of Incheon were built with steel pipe support struts instead of H-beam support struts that are widely observed. This type of steel pipe support strut was developed exclusively at POSCO and the technology was transferred to M Steel International, a medium-sized South Korean steel pipe manufacturer. The steel pipe has about 50% higher strength than conventional H-beams allowing for a 20% reduction in construction cost and an earlier completion time by no less than six months. ⚓



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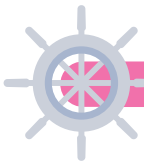
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### MKE set up the roadmap for offshore wind farm project

The Ministry of Knowledge Economy (MKE) held a meeting of Offshore Wind Power Generation Steering Council on November 2 at Yeonggwang Nuclear Power Plant in South Jeolla Province, South Korea, and set up a roadmap for offshore wind power generation. The aim of this endeavor is to turn the wind power generation into an export industry by developing and validating the technology and promoting the advancement into foreign markets on the basis of collaboration between the government and private-sector, so that the country can evolve into the world's top 3 wind power generation countries by 2019.

A large-scale 2,500MW offshore wind farm will be developed in phases in the southwestern coast through the collaboration between the government and private-sector by investing a total of KRW 9.2 trillion in a quest to transform the country into one of the top 3 countries across the globe in terms of offshore wind power generation by 2019.

In the first place, a test-bed for offshore wind farm (which consists of 20 wind turbines made domestically, each with the capacity of 5MW) will be constructed near Buan and Yeonggwang to generate 100MW electricity by 2013. Then, it will be operated as pilot project with the increased

capacity of 900MW (180 wind turbines, each with the capacity of 5MW) by 2016, and offshore wind farm will be erected additionally by 2019 to generate 1,500MW (300 wind turbines, generating 5MW of electricity, respectively).

On November 2, the Ministry of Knowledge Economy (MKE) held a meeting of Offshore Wind Power Generation Steering Council at the Yeonggwang Nuclear Power Plant in South Jeolla



Province, and established and announced a roadmap for offshore wind power generation based on the aforesaid plan.

The announcement of the roadmap for offshore wind power generation is part of follow-up action subsequent to the report of strategy for the nation's advancement of renewable energy industry which was submitted to the Presidential Committee of Green Growth on October 13, and aims to secure the track record in the offshore wind power generation and put forth the plan for implementation in stages to dominate the global offshore wind power market amid the global move toward offshore wind power generation.

## 1. Trend of global offshore wind power generation

Globally, the wind power generation industry has achieved an annual growth rate of 27.3% over the recent 5 years and has been put on the growth path. The size of the market for offshore wind power generation is expected to expand to \$114.5 billion in 2019, jumping from \$63.5 billion in 2009. Also, the global installation capacity (cumulative) is expected to soar to 1,900GW in 2020 from 159GW in 2009.

As of 2009, the United States has the installed capacity of 35.2GW, the largest worldwide, followed by China (26.0GW), Germany (25.8GW), and Spain (19.1GW). South Korea is ranked the 28th with the installed capacity of 0.36GW.

Recently, the trend for offshore wind power generation has spread more widely compared to the onshore wind power generation. The installed capacity of offshore wind power generation across the globe stands at only 2.9GW, for which European countries take up the largest portion, as of 2010. However, offshore wind power facilities capable of generating 2.6GW of electricity have been under construction, and the planned capacity worldwide totals as much as 153.9GW which is a level similar to the global onshore wind power generation capacity (159GW in 2009).

Recently, China, the United States, etc - in addition to Europe which has traditionally been at the forefront of the trend for offshore wind power generation - have been proceeding with the development of offshore wind farms.

Europe, led by UK, Denmark, etc, plans on building offshore wind farms to generate 40GW by 2020 and 150GW by 2030. China has completed the Asia's first offshore wind farm (located in Shanghai with 34 wind tur-



\*Photo: DNV

bines, each with the capacity of 3MW, generating 102MW in total) in 2010 and plans to expand the capacity to 35GW by 2030. In addition, the U.S government has given its first formal go-ahead in 2010 for building the offshore wind farm (Cape Wind, 130 wind turbines, each capable of generating 3.6MW) in its eastern coast and 54GW wind farm is planned to be built by 2030.

The current status of offshore wind power generation by country is as follows:

### •Denmark

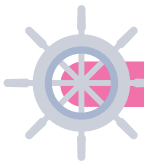
-Dominating the initial market for global offshore wind power generation: SAMSO island (10 wind turbines for offshore power generation) → The island with wind farm has been turned into a global tourism commodity.

-The government takes the leading role in the selection of the land for wind farm construction, feasibility study, and development of wind farm.

-Participating actively in the development of EU Super Grid for offshore wind power generation:

Table 1. Status of offshore wind power generation facilities (as of October, 2010)

	Type	UK	Denmark	Sweden	Netherlands	Germany	China	Japan	Canada	USA	Total
Wind power generation	Currently operational	1,341	862	164	247	72	116	25	-	-	2,938
	Under construction	1,155	-	-	-	448	706	-	-	-	2,568
	Approved installations	2,250	454	1,531	3,250	8,096	2,143	-	396	768	23,593



Installed capacity (862MW in 2010)

**•UK**

- The government has played a leading role in carrying out the 1st to the 3rd round of development plans (from 2001 to 2020).
- World's largest offshore wind farm (100 wind turbines, each with the capacity of 3MW, generating a total of 300MW, as of September 2010)
- Planning to build 32GW wind farm by 2020 (aiming to supply 25% of total electric power supply): Installed capacity (1,341MW in 2010)

**•Germany**

- The government takes the lead in the development of the North Sea, and provides institutional support such as the linkage of systems, etc.
- Germany's first offshore wind farm (Alpha Ventus) began to be operated in April, 2010 (6 wind turbines, each with the capacity of 5MW): Installed capacity (72MW in 2010)

**•USA**

- Presently, there is no wind farm which is operational. However, plans have been established to develop large-scale wind farm (potential capacity of 1,000GW): A consortium was appointed to build offshore wind farm in 10 States located on the east coast of the United States bordering the Atlantic Ocean (10 wind turbines, each with the capacity of 2GW). 54GW wind farm is planned to be built by 2030.
- The wind farm (Cape Wind) off the coast of Massachusetts was approved, the first-ever (130 wind turbines, each with the capacity of 3.6MW in May 2010).

**•France**

- 3GW offshore wind farm (with about 600 wind turbines) is planned to be built in about 10 regions off the coast of France (as of September 2010).
- 20 billion euro is planned to be invested by 2020 to build 6GW wind farm.

**•China**

- Asia's first offshore wind farm (located in Shanghai with 34 wind turbines, each with the capacity of 3MW, generating 102MW in total) was completed (as of 2010).
- Large-scale wind farm is planned to be erected in 4 major Provinces such as Jiangsu and Guangdong: 15GW in 2015 → 35GW in 2030

**2. Current status of domestic offshore wind power generation**

Korea is still in the inchoate stages of offshore wind farm development. However, it is predicted that Korea can reign supreme in global market for offshore wind power generation if the country converges the wind farming with its flagship industries such as shipbuilding/heavy industry, offshore plant, construction, electricity, IT industry, etc.

Offshore wind farms, furthermore, have brighter prospect, considering that they cause less damage to the natural environment and less civil complaints, compared to onshore wind farms, and can be developed in a large-scale, an advantage which is highlighted all the more as Korea has a small territory.

In fact, domestic shipbuilding industry and heavy industry have been striving to develop large-scale offshore wind power generators capable of creating over 5MW electricity in a bid to make inroads into foreign markets, but they need to have a proven track record of actually having built and operated wind farms for a certain period of time if they want to export any wind power generator that have been developed.

Therefore, it is necessary to build the test-bed for offshore wind farm at sea in Korea for the purpose of supporting the accomplishment of track record

Table 2. Comparison of offshore wind farm and onshore wind farm

Limit of onshore wind farm		Strengths of offshore wind farm
<ul style="list-style-type: none"> <li>-Criticism levelled against the damage to environment</li> <li>-Civil complaints arising from the noise and vibration</li> <li>-Difficulties with business due to the delay in the procedures for license/permit</li> <li>-Limit to the establishment of large-scale wind farm</li> </ul>	<p>Large-scale project, construction in deep water</p> <p>→</p>	<ul style="list-style-type: none"> <li>- Minimization of damage to environment and reduction of civil complaints</li> <li>-Large-scale wind farm can be built</li> <li>-Capable of being combined with related flagship industries such as shipbuilding, offshore plant sector, etc (However, cost of investment is higher compared to onshore wind farm)</li> </ul>

**Table 3. Comparison in cost between the offshore wind farm and onshore wind farm**

Type	Turbine	Foundation work	Linkage of systems	Others
Onshore wind farm	70%	17%	8%	5%
Offshore wind farm	43%	24%	24%	9%

in the actual construction and operation of wind power generator made domestically.

Currently, the status of the plan for developing the offshore wind farms in Korea is as follows:

-Local governments: Busan, North Jeolla Province, South Jeolla Province, Jeju, etc

-Power generating companies: 6 electric power generating companies are considering the development of offshore wind farms with Korea Electric Power Corporation (KEPCO) taking the lead.

-Shipbuilding/heavy industry: Mostly, shipbuilding/heavy industry plan to develop offshore wind power generators by the end of 2012.

(Doosan Heavy Industries & Construction has completed the development of 3MW offshore wind farm and is currently testing it. Hyundai Heavy Industries plans to develop 5MW offshore wind farm by 2011, Samsung Heavy Industries 5 to 7MW by 2012, Hyosung Power & Industrial Systems PG 5MW by 2012, and Daewoo Shipbuilding & Marine Engineering 6 to 7MW.)

### 3. Plan for offshore wind farm in Korea

The government selected the sea near Buan and Yeonggwang as the optimal site for offshore wind farm in the southwestern coastal region after conducting the investigation of the entire sea of the country for 2 years from October 2008 in relation to the wind condition, depth of water, system linkage condition, distance from the coast, separation distance from substations, expandability, etc,

The sea near Busan and Yeonggwang was found to be feasible for over

**Table 4. Budget for offshore wind farm**

Type	Government R&D	Turbine	Support Structures	System linkage cost	etc	Total
1st phase	160	2,000	1,000	2,479	397	6,036
2nd phase	130	18,000	9,000	2,224	900	30,254
3rd phase	-	25,500	12,750	16,196	1,854	56,300
Total	290	45,500	22,750	20,899	3,151	92,590

Note: 1st to 2nd phase - KRW 4 billion/MW, 3rd phase - KRW 3.5 billion/MW

300MW large-scale offshore wind farm, considering that it has the wind power class 3 (6.9-7.5m/s), water depth of less than 20m, is spaced 15km apart from substation.

Although the wind condition was found to be favorable in Jeju, the coast in the East Sea, the coast in the South Sea, the economic efficiency related to the expandability and depth of water was limited. Therefore, the government decided to move ahead with the development of small-scale offshore wind farm following the detailed feasibility study on this region.

Meanwhile, the government plans to start with the test-bed for offshore wind farm at sea near Buan and Yeonggwang and build a 2,500MW large-scale offshore wind farm in 3 phases until 2019.

-1st phase: To build 100MW (20 wind turbines, each with the capacity of 5MW) wind farm by 2013, and focus on accomplishing the necessary track record (investment of KRW 603.6 billion through the collaboration between the government and private-sector)

-2nd phase: To construct 900MW offshore wind farm, the pilot project, by 2016 (investment of KRW 3 trillion and 25.4 billion through the collaboration between the government and private-sector)

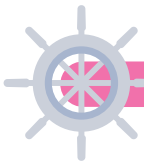
-3rd phase: To build additional offshore wind farm for generating 1,500MW by 2019 (investment of KRW 5 trillion and 630 billion by private-sector)

The electric systems will be connected to Gochang Substation in the 1st and 2nd phase, and Saemangeum Substation in the 3rd phase.

The total investment amounts to KRW 9 trillion and 259 billion, among which KRW 29 billion will be invested by the government into the technological development for offshore structures, etc, and most of other required investment for the development/installation of power generators, installation of support structures, linkage of systems, etc, will be funded by private-sector.

As large-scale investments will be made over the long-term into the development of offshore wind farms and there are many problems to tackle, including the license/permit, Offshore Wind Power





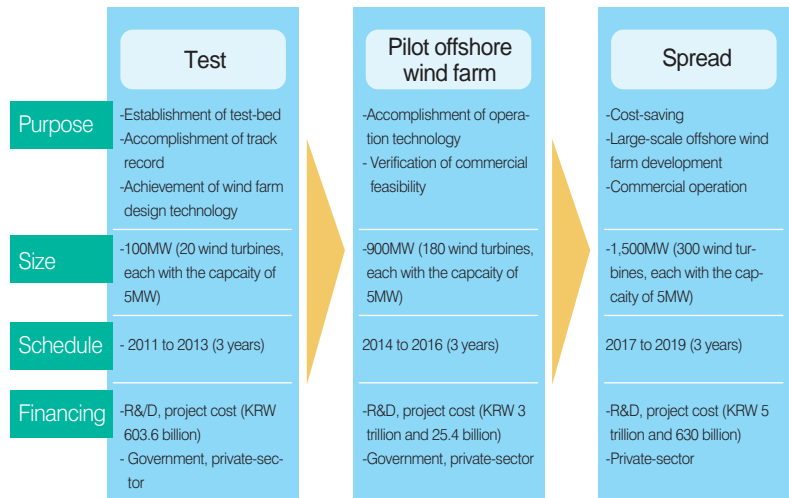
Generation Steering Council was organized and has been operated to facilitate the implementation. Furthermore, Offshore Wind Power Generation Implementation Group was set up in November as a working-level body under the Council, which is in charge of overall related matters in the period ahead.

Meanwhile, MKE plans to establish multifaceted supportive measures in order to help spread the offshore wind farms, like granting higher scores

to offshore wind power generation (1 for onshore wind power generation, 1.5 to 2 scores for offshore wind power generation) when the Renewable Portfolio Standards (RPS) come into effect from 2012, considering that the offshore wind power generation requires more investment than onshore wind power generation. ⚓

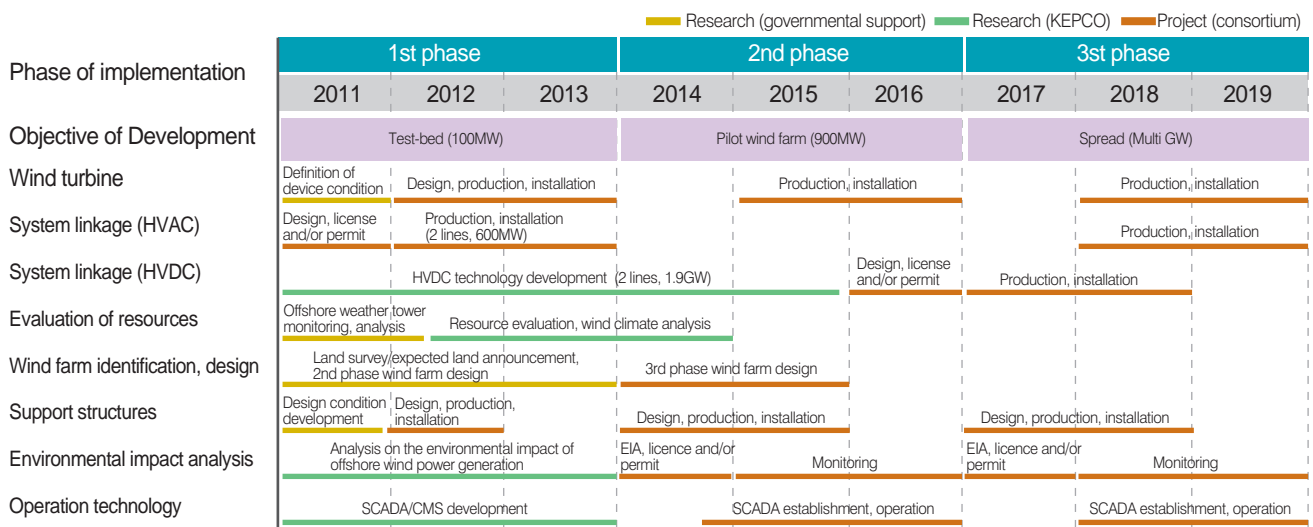


Fig.1 Deployment of offshore wind farm



Note: Linkage with the stimulation of adjacent regional economy to ensure effective implementation of project, like the support for licence/permit, resolution of civil complaints, etc

Fig.2 Plan for offshore wind farm establishment by phase



Note: SCADA -Supervisory Control And Data Acquisition, CMS - Condition Monitoring System, EIA - Environmental Impact Assessment

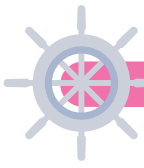
Fig.3 Detailed plan for offshore wind farm establishment



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# Three leading South Korean shipbuilders recording favorable Q3 results

## Increased operation income for HHI and DSME

The three leading South Korean shipbuilders including Hyundai Heavy Industries are reported to have recorded largely favorable results for the third quarter of 2010. According to the recent announcements for the three shipbuilders' third quarter performances, HHI and DSME showed decreases in revenues, but large gains in operation income. On the other hand, SHI recorded an even larger decrease in revenues as well as a small drop in operation income.

Recently, the three leading South Korean shipbuilders, Hyundai Heavy Industries (HHI), Samsung Heavy Industries (SHI), and Daewoo Shipbuilding & Marine Engineering (DSME) announced their third quarter performance results for the year 2010. According to the performance announcements, HHI and DSME recorded large gains in operation income thanks to the drop in the amount of revenue decrease while SHI showed a small decrease in operation income along with a larger increase in revenue decrease.

### HHI made second largest profits in operation income

HHI recorded KRW 5,333.7 billion revenues, KRW 798.8 billion operation income, and KRW 863.4 billion net profits for the third quarter of the year 2010 alone. That is a 7.0%, 50.2%, and 61.7% increase, respectively, from one year ago. Compared to the second quarter of this year, operation income increased by 4% even though revenues dropped a little.

A notable aspect is their operation income reached the second largest ever in the history of HHI only after the KRW 880.9 billion for the first quarter this year. The ratio of operating income to revenues was 15% continuing the overall steady increase since the first quarter of the year 2009, right after the financial crisis, when they recorded



Table 1. A comparison of quarterly performances for HHI (Unit: Billion Won)

	2010 Q3	2010 Q2	2009 Q3
Revenues	5,333.7	5,335.2	4,985.9
Operation income	798.8 (15.0%)	770.7 (14.4%)	531.7 (10.7%)
Net profits	863.4 (16.2%)	910.5 (17.1%)	533.9 (10.7%)

8.6%.

An anonymous person at HHI explained, "Such is the results that we won ship contracts two to three years ago at high prices and also the



new projects at marine and plant business divisions are beginning to affect the revenues. There was also an increase in orders in non-ship-building areas including electric and electronic, and construction equipment.”

Moreover, net profits showed large increases from one year ago thanks to a large gain in operation incomes and an increase in equity method incomes for Hyundai Samho Heavy Industries, Hyundai Oil Bank, and so on.

### DSME recorded performance increases from previous year

DSME also had an improved performance record compared to the same period of the previous year 2009. According to the announcement of DSME for 2010 Q3, they recorded KRW 2,961.1 billion revenues, KRW 347.4 billion operation income, pretax profits of KRW 382.5 billion, and KRW 298.1 billion net profits for the term.

That is a 118.9% and 50.5% increase, respectively, from KRW 158.7 billion operating income and KRW 254.1 billion pretax profits for the same period of previous year. Also, it shows a 77.7% and 93.5% increase, respectively, from KRW 195.5 billion and KRW 197.7 billion for the second quarter of this year.

Though revenues decreased by 4.4% from the same period of the previous year when they recorded KRW 3,971 billion, it was a 4.4% increase from this year's second quarter for which their revenues amounted to KRW 2,835.5 billion. Net profits for the term showed an increase of 55.8% from the same period of the previous year's KRW 191.3 billion and a 111% increase from this year's second quarter's KRW 141.3 billion.

An anonymous person at DSME explained, “The results for the third quarter reflect continued efforts to reduce cost. Our overall work efficiency has improved thanks to stabilizing the company-wide competitive edge regarding cost such as material cost.”

On the other hand, the financial records for DSME for the 2010 fiscal year to include the third quarter show KRW 8,503.8 billion revenues, KRW 707.2 billion operating income, and KRW 547.0 billion net profits. The prospect is that the current trend for the firm will keep continuing for



some time in the coming years as it is expected that the future material cost will not fluctuate greatly.

### SHI gained a small increase in revenues

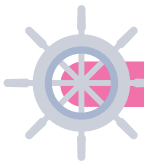
SHI recorded a larger decrease in this year's revenues and a small decrease in operating income. SHI recorded KRW 3,146.3 billion revenues for the third quarter of this year 2010, a 13.1% drop from the same period of the previous year's KRW 3,619.4 billion. The company recorded KRW 3,330.4 billion revenues for the first quarter which was a 20% increase from the same period of the year before, achieved KRW 3,034.8 billion revenues for the second quarter which was a 6.1% decrease from the same period of the year before, and the decrease was even larger for the third quarter.

Operating income was KRW 264.4 billion, a 0.8% decrease from KRW 266.4 billion for the same period of the previous year. Net profits was KRW 258.1 billion, a 16.3% increase from the same

Table 2. A comparison of quarterly performances for DSME

(Unit: Billion Won)

	2010 Q3	2010 Q2		2009 Q3	
		Amount	Percentage of change	Amount	Percentage of change
Revenues	2,961.1	2,835.5	4.4%	3,097.1	-4.4%
Operating income	347.4 (11.7%)	195.5 (6.9%)	77.7%	158.7 (5.1%)	118.9%
Pretax profits	382.5 (12.9%)	197.7 (7.0%)	93.5%	254.1 (8.2%)	50.5%
Net profits	298.1 (10.1%)	141.3 (5.0%)	111.0%	191.3 (6.2%)	55.8%



period of the previous year's KRW 221.9 billion. The industry's analysis is that SHI, the only among the three leading shipbuilders of South Korea to record an increase in revenues for the first quarter of this year, suffered decreases in both revenues and operating income due to the decreased activities in building marine engineering equipment. On the other hand, their revenues (KRW 111.5 billion, 3.7%), operating income (KRW 4.6 billion,

Table 3. A comparison of quarterly performances for SHI against the previous year (Unit: Billion Won)

	2010 Q3	2009 Q3	Percentage of change
Revenues	3,146.3	3,619.4	-473.1 (-13.1%)
Operating income (profit ratio)	264.4 (8.4%)	266.4 (7.4%)	-2.0 (-0.8%)
Ordinary profits	358.2	273.6	84.6 (30.9%)
Aftertax profits	258.1	221.9	36.2 (16.3%)

Table 4. A comparison of quarterly performances for SHI (Unit: Billion Won)

	2010 Q1	2010 Q2	2010 Q3
Revenues	3,330.4	3,034.8	3,146.3
Operating income (profit ratio)	215.7 (6.5%)	259.8 (8.6%)	264.4 (8.4%)
Ordinary income	256.2	281.0	358.2
Aftertax profits	200.3	230.2	258.1

1.8%), and net profits (KRW 27.9 billion, 12.1%) all recorded increases from the second quarter. ⚓

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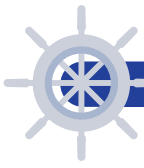
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**Application** - It provides explanations on the function, strengths, weakness of products based on their application to ships.





# Marine dehumidification for cargo care and vessel protection (2)

Materials are damaged when exposed to high relative humidity. Most materials will be preserved and unaffected when humidity is maintained below 50% RH. The only reliable protection, irrespective of weather conditions, is dry air produced by a desiccant dehumidifier.

*Munters Korea Co., Ltd.*

## Protection of ships and equipment

Ships are made of steel and are equipped with pipes, fittings and valuable electronic equipment.

Many areas are below the waterline, which results in major condensation problems. However, protecting steel and equipment by controlling humidity has not been regarded as self-evident. Instead, advanced paint systems have been used to protect the ship and its equipment from corrosion.

There are thus large sums of money to be saved by installing dehumidification systems.

Dehumidified areas reduce maintenance costs.

The advantages are:

- Reduced maintenance and less stringent coating requirements
- No condensation
- No corrosion of steel
- Greater reliability for electrical and electronic equipment

Examples of recommended dehumidified areas are listed below.

### •Void spaces and cofferdams

Since iron and steel begin to corrode when humidity exceeds 60% at the surface of the metal, steel can be protected with dry air. On board a ship, there are many inaccessible spaces where it would be preferable to avoid maintenance and recoating.

Examples of other steel structures that are dehumidified on the inside instead of coated are bridges that are made of steel boxes. The total cost is vastly reduced with dehumidification.

### •Piping tunnels, pump and valve spaces

Keeping these spaces dry protects the equipment and, in principle, neither pipes nor surrounding steel surfaces need to be coated. Control equipment is protected.

### •Stores

Since most materials are sensitive to moisture, it is important that the humidity in stores and areas where spare parts are kept is controlled. A controlled environment also means that condensation problems are avoided and that these areas do not need to be insulated.

### •Electrical and electronic equipment

Ships are fitted with sensitive electrical and electronic equipment. Contact corrosion begins when humidity exceeds 40%. Dry air is the most effective way of protecting this type of equipment.

### •Bow thruster room

The bow propeller is rarely used, which means that the equipment powering the propeller is exposed to high humidity for long periods. The high humidity in this space gives rise to corrosion problems. We also know that the electrical resistance decreases when an electric motor is exposed to humidity.

This can result in starting difficulties and large costs. Installing a dehumidifier can cost about the same as hiring the services of a tug on one single occasion.

And other area of concern:

- Cranes
- Spaces containing firefighting and life-saving equipment

- Steering gear room
- Other spaces containing sensitive equipment

## Dehumidifiers for tank drying

Using desiccant dehumidifiers to dry tanks on board chemicals tankers is becoming increasingly common. The reason for this is that the drying process must be fast. In addition the cargo owners are demanding that the chemicals do not contain moisture and other pollutants on delivery.

Many chemical products are hygroscopic and absorb moisture. In order to avoid contamination, it is important that the tank is sufficiently dry. The moisture content in the air must be below the dewpoint of the surrounding surfaces before the tank is filled with chemicals.

In coated tanks, the coating often absorbs water. To extract the water absorbed by the paint after cleaning the tank, it is important that the air is sufficiently dry so that the least amount of water possible remains in the tank when it is filled with chemicals. The most economical method of achieving this is to dry the holds with air dehumidified to a low dewpoint in a desiccant dehumidifier.

Advantages compared with other systems:

- Faster drying times and no lost time in port
- No condensation
- Less risk of the cargo being contaminated by moisture



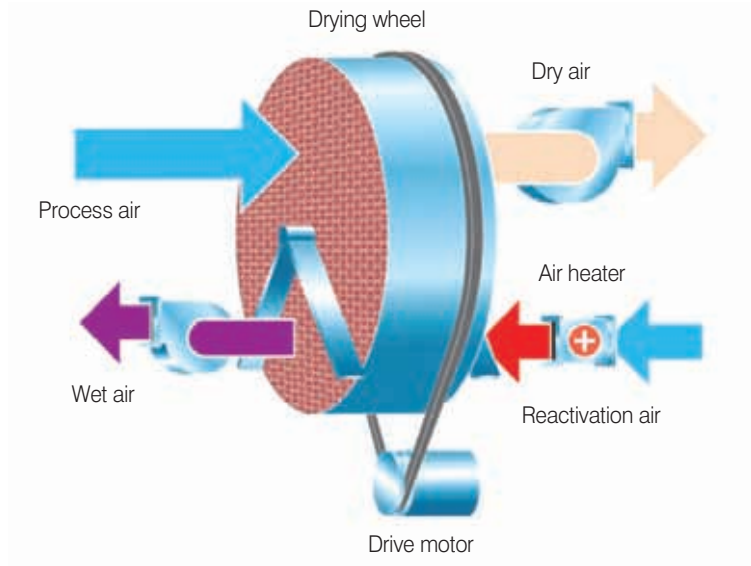
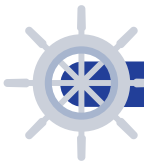
Tank drying equipment inside these housings.

This chemical tanker is one of seven sisterships built for Stolt Parcel Tanker at Danyard. Each is equipped with two desiccant dehumidifiers for rapid drying of cargo holds after washdown.



- Energy-efficient and simple system since surplus heat can be used to power the dehumidifying process





### Environmentally friendly technique *The Munters marine solution*

Since there is always moisture in the air, irrespective of temperature, and since ships operate in both warm and cold climates, it is important to choose a dehumidifying technique which functions well at both low and high temperatures.

Munters' dehumidifiers work according to the absorption technique. This means that the air to be dried passes through a rotor impregnated with a hygroscopic drying agent. The moisture content in the air is reduced as the water is absorbed by the drying agent. The rotor rotates slowly and the moisture absorbed by the rotor is then extracted from the dehumidifier's reactivation zone with heat. This moisture can be vented to the atmosphere or condensed into water and drained away to the bilges.

Since heat is used to reactivate the drying agent, surplus heat from the ship's machinery can be used to extract the moisture from the rotor. This means that the operating cost is very low. The dehumidifiers can also be powered by electricity.

Munters' dehumidifiers are completely freon-free and operate effectively between -40°C and +40°C.

#### •System design

System design and dimensioning are determined from case to case. The systems are easy to install and the dehumidifiers take up little space. Duct systems or large fans are installed for good circulation in the spaces to be dehumidified.

A moisture regulation system can be installed to ensure that humidity is maintained at the correct level.

#### •Broad product programme

Munters has the most comprehensive product programme on the market when it comes to desiccant dehumidifiers.

Consequently, our product range meets most dehumidification requirements. We can also offer different rotor materials for various applications.

#### •Service

Like all other mechanical equipment, the dehumidifiers require service at regular intervals. Filter replacement and routine checks carried out by service personnel on board are a simple matter. Monitoring systems are easy to install. ⚓



# KSV MARINE ENGINE VALVE & SEATRING

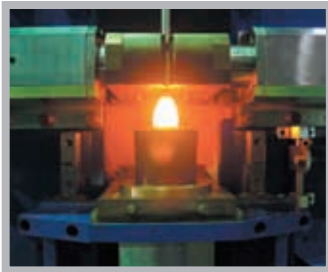
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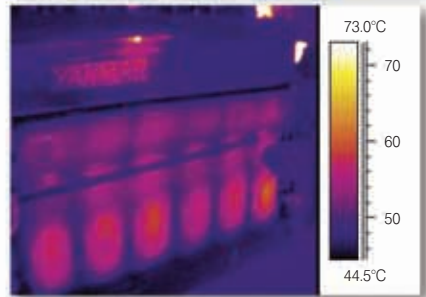
B&W, YANMAR, AKASAKA, NIIGATA, DAIHATSU, HANSHIN, MITSUBISHI, SULZER, FUJI, MAKITA, I.T.O, MATSUI, KUBOTA



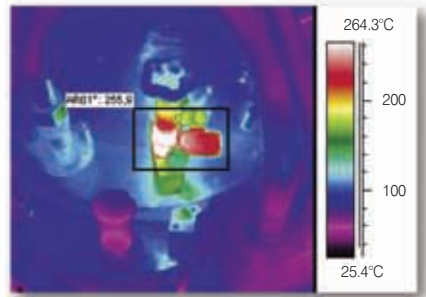
- It carries out microstructure and physical properties test of raw materials for endurance. With the establishment of internal inspection by each part and TQCS (TOTAL QUALITY CONTROL SYSTEM) it carries out thorough processes.
- In accordance with the type and depth of welding materials for SEAT FACE, it keeps impact resistance strength.
- It carries out nondestructive inspection of welding part and forging stress concentrated spot.
- It conducts various surface treatments (Plasma Nitriding, Hard Cr-Coating, HVOF) for functionality improvement.
- Through product marking, it can retrieve production history of all the products.



MS Helene Russ, a 1,700TEU (Twenty Foot Equivalent Unit) container built in 1996, inspected by Thermowind



900kW auxiliary engine



Indicator valve to measure oil level of main engine: not insulated and too hot

# From the galley to the engine room: infrared thermography inspection of ships is gaining momentum

“In the near future, mechanical machinery onboard vessels will also benefit from thermal imaging, especially as a pre-docking strategy to identify and target equipment and systems which need attention as well as to eliminate necessary work.” forecasted Lloyd’s Register, the world’s most important ship classification and certification body, 3 years ago.

Nowadays, infrared thermography can do much more onboard. And FLIR Systems has worked hard to resolve the main obstacles: high camera prices and the difficulty to handle the camera in confined spaces of ships.

*FLIR Systems Korea Co., Ltd.*

Commercial ships are rewarding objects for thermographic inspections: they have huge machinery, vast electrical installations, extended electronic systems, which can hardly be surveyed by visual inspections. Moreover, fire prevention is an important issue and relevant prescriptions are clear: according to the International Convention for the Safety of Life at Sea (SOLAS), the maximum surface temperature of machinery, parts and components in a vessel's engine room should not rise above 220°C. In order to avoid ignition and fire development, all surfaces above 220°C are to be insulated or otherwise protected (SOLAS, Ch.II-2, reg.15.2.10).

Statistics show that the majority of engine room fires are caused by ruptured pipes containing fuel or oil which eventually spray on adjacent hot surfaces. This does not happen often. But an engine room fire will have severe and costly consequences for the ship and its cargo, its crew and last but not least for the shipping company. Smaller deficiencies are numerous, and the piping or cable insulation, as required by the SOLAS

rules, often appears to be missing. Moreover, thermographic inspections with an infrared camera will instantly show the condition of electrical circuits, electronic systems and other installations and parts onboard. And in more general terms, infrared cameras allow fast and secure inspections in line with the tight loading, unloading and delivery times which currently rule the maritime trade.

### From pyrometers to infrared

Thermowind is an infrared consultancy located in the North German harbor city of Bremerhaven. It has gained a reputation as an infrared thermography consultancy for inspections on board of ships, from big commercial vessels to small private yachts.

"Marine engineers believe in pyrometers", says Marco Brinkmann, founder and General Manager of Thermowind, "but we are convincing them that you can do a lot more, and a lot faster and safer with infrared cameras", he says. "It's the only condition monitoring tool that allows to do temperature measurements of objects across their entire surface area quickly and safely. And infrared camera's show exactly what's going wrong where". Onboard inspections on commercial ships include objects like engines, compressors, boilers, pumps, or the insulation condition of elaborate steam and fuel piping systems as well as electrical switchboards; everything that can heat up and break down, from the bridge to the caboose. The results are convincing: "during our inspection rounds", tells Brinkmann, "marine engineers are appalled to see some components at a staggering 400°C."

Thermography offers the advantage of not interfering with the vessel's operation. For good inspection conditions, the engines must work at their normal loads and temperatures. "A three-four hour trip at full speed ahead and loaded is ideal to get a clear picture of the ship's electrical and propulsion systems", says Cristian Ferber, electro technical engineer and Brinkmann's partner.

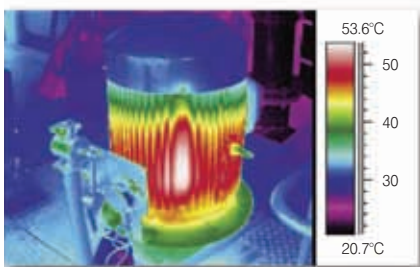
### Measurement and severity criteria

Severity criteria hover around the clearly defined ship engine room maximum temperature of 220° C. Based on this threshold, Thermowind developed its own set of severity criteria:

- Severity 0: OK (measured temp. < 210.0°C)
- Severity 1: to be monitored (210.0°C < measured temp. < 220.0°C)
- Severity 2: unacceptable deviation (measured temp. > 220.0°C)

However, severity criteria are void without careful observation and knowledge of the ship's engines: "if there's some oil-piping right next to a spot detected as a class 1 spot, we give it immediate repair status, downgrading it to Severity 2" says Ferber.

Thermowind uses a FLIR Systems veteran PM280 and a FLIR Systems



Electric engine driving a pump in a tanker engine room





These are thermal imaging cameras of FLIR System. They are P-series, i5 and T-series from the left.

ThermaCAM E-Series camera for its inspections. This handheld camera is very handy to use in cramped machine room corners. Its measurement mode features, such as three movable measurement spots, and its built-in memory for 200 pictures stored in a convenient .jpg format are very useful during surveying work. And the ThermaCAM's sound and color alarm modes are a blessing for inspections based on a threshold temperature, assert both Thermowind inspectors.

Thermowind devotes considerable time to set up a customer report: "we believe that the customer has the right to get an extensive report for his money", says Ferber, "we consider it more than a business card: especially, since the Germanischer Lloyd, a leading technical service provider for the maritime sector, has certified our measurements."

Another specialty of Thermowind is yacht inspection, in particular the search of delamination on yacht's fiberglass reinforced plastic (FRP) or composite wood-FRP hulls. Delaminations can lead to harmful moisture accumulation within the vessel which destroys the material and, if present, the wooden core of the hull.

To survey these anomalies, Thermowind applies lock-in thermography, a method based on thermal wave analysis: the spotted yacht hull surface is carefully heated with lamps. The subsequent measurement of sudden changes in the thermal wave conductivity which is reflected by the heated material shows material deficiencies in the hull. Thermowind combines a specific software from a system integrator with a FLIR Systems ThermoVision A40 M 320 x 240 pixel, fix-mounted camera to do this refined thermographic inspection method.

### More to inspect in less time

As commercial vessel engines become more complex and get steered by a growing number of electrical or electronic components, the need for regular inspection and maintenance rises. Infrared thermography has the advantage of being a non-contact inspection and measurement tool

able to display and store exact temperature values as well as visual evidence.

Moreover, time-saving becomes an important asset in the shipping business; required inspections have to be done at a fast pace. And when something happens to the engines or to other vital installations, the losses by far exceed the investment in such a convincing, time-saving, and hence also affordable inspection tool as an infrared camera. ⚓

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# Instrument applications in the port, on board ships or offshore facilities (1)

The supplier of process automation solutions, Endress+Hauser has been serving the shipbuilding industry for more than 30 years. Its extensive range of solutions complement this experience and allow its to help customer to drive costs down and increase the efficiency of customer's ship operating facilities.

## *Endress+Hauser Korea Co., Ltd.*

Endress+Hauser is a Swiss, family-owned business with more than 7,500 people employed globally today serving its customers in more than 40 countries. For more than 50 years, it has been active as a supplier of process automation solutions in various industries.

Customers can expect more from Endress+Hauser's as a supplier of products in the level, pressure, flow, temperature and liquid analysis ranges. The products, first-class in terms of performance and price, and future-oriented services give Endress+Hauser's customers a competitive edge thanks to the high level of quality, safety and efficiency.

Endress+Hauser has been serving the shipbuilding industry for more than 30 years. Its extensive range of solutions complements this experience and allows it to help customers to drive costs down and increase the efficiency of customers' ship operating facilities.

### **Shipbuilding industry: Every ship and every day bring new challenges**

Shipbuilding includes passenger, container and freight vessels, tankers, floating oil rigs as well as naval ships. Operating conditions and thus the requirements of automation technology, particularly sensor technology/measurement technology, are similar whether at sea or on inland waterways. This also means an equally broad spectrum of measuring tasks to be solved in port terminals.

What is required is as follows:

- Resistance to aggressive sea water
- Reliable measurement even when there are vibrations
- Constant and reliable operation also under high temperature fluctuations from dry cold (in the polar zones) to the moist heat

*(in the tropics)*

- Highest degree of safety in Ex-zones, e.g. on chemicals/liquefied natural gas tankers, in offshore areas (oil rigs, FPSOs etc)
- Mechanical robustness and resistance to flooding
- Reliability through electronic long-term stability
- Highest degree of accuracy in stability-relevant measurements, e.g. in ballast tanks

There is hardly any other means of transport where the standards of cost-effectiveness, functionality and reliability are as high as in ship-operating facilities. To meet these standards, the measurement technology and control must be absolutely reliable.

This requires a reliable, experienced and competent partner who is aware of the demands and tasks posed in shipbuilding day by day. Endress+Hauser represents know-how in measurement technology, customer-oriented solutions and professional project planning and engineering.



### **Application onshore/in the port Loading/unloading goods from the ship**

When loading, unloading and storing liquids in the port, the



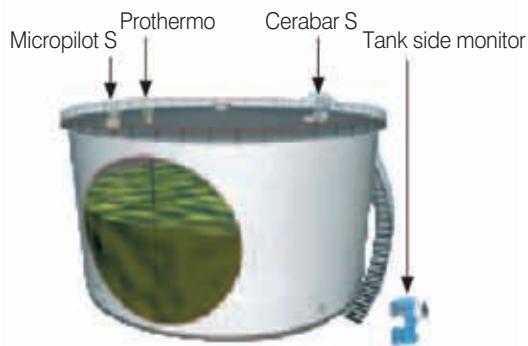
exact quantity and mass must be determined. Endress+Hauser supplies the most accurate of level, flow, pressure and temperature measurements for this purpose.

Requirements of solution are as follows:

- Highest degree of accuracy and reliability
- Low space requirement without inlet and outlet runs (for mass flowmeters)
- Easy installation and connection to higher-level systems (net oil computer)
- Approvals in accordance with API, AGA, NMI, PTB and OIML (custody transfer)



### Tank level monitoring and custody transfer



Different measurements for the exact calculation of incoming and outgoing quantities require measurement technology that works precisely and reliably. The ideal solution is flow measurement combined with highly accurate level measurement on the ship and in the port tank. Changing medium temperatures cause differences in pressure and volume. Different pressure, flow and temperature sensors allow for these differences and facilitate the calculation of accurate mass values.

A slight level change may represent a substantial change in



quantity particularly in level measurement in tanks with large diameters. Micropilot S level radar

produces highly accurate level measurement ( $\pm 1\text{mm}$  for measuring range of 40m) and facilitates safe and reliable level detection in storage tanks. Tank Side Monitor NRF590 provides an exact and, at the same time, comfortable overview of different measurements. All required values can be obtained at the foot of the tank.

### Application on board: Fuel system

#### Reliable operation of a ship's engine

Maritime and inland navigation vessels make high demands on the measurement technology on-board. The instrumentation on deck, in particular, is subjected to extreme mechanical and climatic demands. The pounding of the waves (flooding), salt water and vibrations test the sensors, as well as the tropical climate and ice formation in the polar circle.

The tanks on board a ship are often filled with products displaying the most diverse of characteristics. The products transported in the cargo and service tanks display varying characteristics in relation to density, consistency, reflective properties and conductivity. In addition to level and pressure measuring tasks, it is becoming increasingly important to determine flow, temperature and analysis measured values



on ships to ensure efficient use of the facilities.

Endress+Hauser develops and produces the sensor technology for all of these parameters themselves and thus offer all shipbuilding customers the maximum benefit of a full-range supplier.

#### Bilge/fuel system in the engine room

##### • Bilge

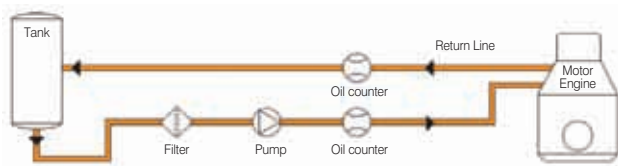
Bilge water (sea water, condensation) collects in the bilge, and is mostly mixed in with oil and fuel residue. The water is separated from the waste oil in an oil separation system. The medium-independent Liquiphant T/M vibration limit switch controls the system and monitors the level limits in the bilge



Liquiphant M  
FTL50

or waste oil tanks.  
 Liquiphant T/M has the following features:  
 -No adjustment required  
 -Protection category IP68 (IP69K)  
 -Unaffected by foam

•Fuel supply pipes between the supply tank (heavy fuel oil) and engine



It is necessary to determine the current fuel consumption to ensure optimal operation of the engine at all times. The new Promass E mass flowmeters are used for this purpose. They deliver a direct signal on the consumption in tons per hour. The mass flowmeters operate independently of pressure and temperature and determine the current consumption with a precision that has never been achieved prior to this.

Promass E has the following features:

- Easy installation
- No moving parts
- Measurement without bypass pipe
- Direct mass measurement



Promass E as oil counter in the supply pipe to the engine

To ensure that the fuel cycle functions perfectly, sufficient fuel must always be available in the relevant tank. Levelflex M guided radar instruments are used in the day fuel tanks to provide information on the level during filling and operation. Liquiphant T/M vibration limit switches have proven effective in protecting from overflow and detecting minimum level in the daily service tanks, and in monitoring leakage of the pipes for fuel to the main and secondary units. Levelflex M has the following features:

- Unaffected by medium characteristics
- Unaffected by pressure and temperature
- Unaffected by tank geometries



Levelflex M  
FMP40/45

<to be continue>

### Nexans has entered into a contract to supply subsea umbilical for Marulk gas field

Recently, Nexans signed a contract with FMC Technologies to undertake the design, engineering, and manufacturing of static subsea control and chemical injection umbilical for the Marulk gas field located on the Norwegian Continental Shelf (NCS). The contract is valued at approximately 10 million Euro.

FMC Technologies is a company which carries out the subsea development of the gas field on behalf of the Marulk Project Group composed of Statoil ASA, ENI Norge AS, and Dong E&P Norge AS.

The field to be developed this time is situated in the Norwegian Sea roughly 30km southwest of the Norne Floating Production Storage and Offloading (FPSO) unit installed at a water depth of 365m. This gas field is composed of 2 formations which are the Lysing and Lange. Both formations contain gas and condensate. In the Marulk gas field, oil will be produced only in the Lysing formation estimated to have the reserves of about 70 million barrels of oil equivalent (BOE).

The control and chemical injection umbilical of Nexans will be extended from the existing Alve template to Marulk, spaced 13.5km apart from each other. Under the contract, Nexans will design, engineer, procure, manufacture, supply, test, and install the customized static umbilical integrating the chemical matters (fluids) and 1.5kV power cables. This project will be carried out at the Halden factory in Norway, which is equipped with special facilities to produce umbilical of Nexans. The delivery is scheduled for the spring of 2011.



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.





## SSME received orders for 39 vessels so far this year

Sungdong Shipbuilding & Marine Engineering (SSME) announced that it received orders for a total of 39 merchant ships, as of November 2, so far this year.

SSME clinched orders for a total of 25 vessels from prominent ship owners and new clients from Greece, Germany, Hong Kong, etc, including Korean ship owners, in the first half of this year. With the momentum continuing to build, SSME has won additional orders worth \$550 million for a total of 14 vessels in 4 months from July, including the Kamsarmax bulk carriers and 3,600TEU container ship ordered by the ship owners of Monaco, Turkey, etc. An official from SSME said, "The delegation of SSME has embarked upon the business trip to the United States and Europe since October, led by Jeong Hong-jun, the President, and has held meetings with prominent ship owners. As a result, we have seen a considerable progress in the negotiation on the contract, and shipbuilding orders are expected to rise until the end of this year."

SSME clinched orders for 19 vessels in 2009 and signed the contract for 9 vessels out of them in the 4th quarter when many other shipyards received zero new orders in the aftermath of economic depression.

SSME successfully secured orders for a total of 39 vessels, worth \$1.7 billion in all, as of late October, and is expected to win orders for more than 40 vessels worth in excess of \$2 billion at the end of this year including the vessels on which the negotiation is going on presently.

An official from SSME remarked, "With the successfully delivery of the *Piera*, the 92,000-ton bulk carrier, which was ordered in late October from the Italian shipowner *Augustea*, SSME reached another major milestone of building 80 vessels."

SSME has delivered a total of approximately 8.5 million dwt so far, which is encouraging very much as it implies that the company has focused on building large merchant ships capable of carrying an average of 105,000 tons per vessel. Specifically, that represents a splendid achievement of SSME in 3

years and 9 months after the company's successful delivery of its first 92,000-ton bulk carrier ordered from the Greek ship owner *Marmaras* in February 2007.

In addition, SSME delivered 180,000-ton bulk carrier ordered from the U.S. ship owner *Navios* on October 29, which is the 81st vessel of SSME.

Thus, SSME has successfully delivered 45 bulk carriers, 27 product carriers, 5 container ships, and 4 crude carriers so far, which totals 81 vessels.



A signing ceremony was held on October 6 at the headquarters of Transocean in Monaco, in which the contract for 1 Kamsarmax bulk carrier was entered into. The photo shows Ruth McLoughlin (left), Director of Transocean, and Jeong Hong-joon (right), President of SSME.

## DSME signed a contract to build 1 offshore platform for processing the gas

Daewoo Shipbuilding & Marine Engineering (DSME) announced that it won an order on November 2 for 1 offshore platform, used in oil and natural gas production, from Chevron, one of the major oil producers in the US.

The contract is valued at \$510 million. This offshore platform will be constructed at the Okpo Shipyard and installed at the local site in Angola in the 4th quarter of 2013. From now on, DSME will carry out the project on the

turn-key basis which encompasses the entire processes ranging from the design through the delivery, production, transportation to the installation.

This platform measures 62.5m in length and 35m in width and weighs 18,758 tons includ-

ing the weight of topside and hull. It will be designed to expand the natural gas processing capacity of the existing facility in Angola's Block 0 oil field.

The existing platform installed in the coast of the Cabinda region at the northern part of Angola produces 100,000 barrels of crude oil and 4 million m<sup>3</sup> of natural gas every day. The new platform will expand gas production additionally by 5 million m<sup>3</sup> a day.

DSME has received orders for a total of 6 offshore platforms from Angola to date, including the orders for Kungulo platform and North Nemba platform placed with DSME in 2000 and 2001, respectively, since it signed a contract to build South Nemba & Lomba platform for Chevron in 1998.

This contract represents the 7th firm order in this region for offshore platform, which cements dominant status of DSME as a successful company building offshore structures in the waters of Angola.

An official of DSME said, "DSME has built collaborative relationship in various ways, like participating in the management of shipyard specializing in the offshore structure for Angola. As the project which aims at the local development of energy is making active progress, we look forward to clinching more orders for offshore structures based on active local management."

Meanwhile, DSME has secured 8 orders for offshore products worth approximately \$4.05 billion so far this year, as of late October, including this contract.

## DSME clinched an order to build an Auxiliary Towing Salvage vessel for the Korean Navy

Daewoo Shipbuilding & Marine Engineering (DSME) entered into a contract late October with Defense Acquisition Program Administration (DAPA) for the detailed design and construction of 1 Auxiliary Towing Salvage (ATS-II) vessel.

The contract is valued at approximately KRW 160 billion (about \$140 million). This vessel will be designed and built at the Okpo Shipyard and is scheduled for delivery to the Korean Navy at the end of 2013 following the trial operation.

This vessel which will be built under this contract will measure 107m in length, 16.8m in width, and 8m in height, and will have a 4,700-ton full load displacement. It can sail at a maximum speed of 21 knots (about 39km/h), lift sunken ship or object off the seabed, rescue ships that ran aground to a safe sea area, tow the vessels unable to operate, and carry out missions like rescuing people.

Specifically, this salvage vessel, powered by four 6,000-horse power diesel engines, is capable of towing large ship. Outfitted with the decompression/submerging system and the Remote Operated Vehicle (ROV), it can effectively carry out works under the sea.

DSME has already developed Amphibious Submarine Rescue ship (ASR) independently based on its submarine construction technology first-ever nationwide and delivered it to the Korean Navy. This Auxiliary Towing Salvage (ATS-II) vessel will be the nation's first of its kind, which will be developed and constructed independently on the basis of the company's surface ship construction technology and related experience.

So far, DSME has received orders for a total of 67 special ships such as warships both at home and abroad, and delivered 61. It will continue to develop technologies and strengthen its design capability in the special vessel sector as it is adamant to achieve its envisioned goal of evolving into the nation's top shipyard specializing in the construction of special vessels.



Bird's-eye view of Auxiliary Towing Salvage (ATS-II) vessel which DSME will build



## STX Europe won orders for 2 cruise ferries

STX Europe announced that on October 26 STX Finland, its subsidiary, was awarded a contract worth 480 million Euro (approximately KRW 750 billion) by Viking Line to build two 57,000-ton (GT) class cruise ferries (including 1 optional vessel), and entered into a Letter of Intent (LOI). This vessel will be built in Turku Shipyard in Finland and delivered in early 2013.

The cruise ferry will measure about 210m in length and have 870 passenger cabins, and can sail at a maximum speed of 23 knots. This vessel can carry up to 2,800 passengers and 200 crew members.

There will be 1,300m lanes for trucks and a car deck with about 500m for

passenger cars, increasing the convenience of passengers using the car and diversifying the onshore transportation routes.

This vessel will operate in the route of the Baltic Sea Area linking Turku, Finland, and Stockholm, Sweden, after delivery.

Specifically, it is designed to meet the stringent environment requirements, dramatically reducing the emissions of various harmful compounds, such as exhaust gas. In addition, this vessel incorporates state-of-art technology minimizing the noise generation and wave formation, which helps ensure effective operation in the shallow and delicate waters of the archipelagic environment of Baltic Sea. Juha Heikinheimo, the president of STX Finland, said "This vessel will become the most innovative and eco-friendly vessel across the globe. We will ensure that this vessel best suits the requirements of passengers, in addition to the eco-friendly features."



Cruise ferry

## SHI received orders worth \$1.08 billion for 2 drillships

Samsung Heavy Industries (SHI) announced that it won orders on November 11 for 2 drillships from Seadrill, a Norwegian company, which is worth a total of \$1.08 billion.

The drillship market was flourishing to an extent that 14 drillships on the annual average were ordered for 3 years from 2006 amid the offshore energy exploitation boom. However, only 2 drillships were ordered and the market became sluggish after the global financial crisis came to a head.

SHI emphasized that the key to its obtainment of the order for large drillship, the first one this year, under such unfavorable circumstances was its strict compliance with the safety standard which became more stringent than ever after the oil spill in the Gulf of Mexico and the highest scores in the safety and eco-friendly technology such as the minimization of volatile organic compounds.

Industrial experts say that the offshore energy exploitation market is on the



Drillship with the same specification as the one delivered to Seadrill in 2008



rebound based on the fact that oil prices have recently reached their prior levels of \$86, the level before the financial crisis broke out, in 2 years, and SHI received this order for large drillship.

In fact, International Energy Agency (IEA) is continually adjusting upward the daily average demand forecast of crude oil, and investment organizations such as J.P. Morgan Chase and Bank of America, etc, predicted that the international oil prices might soar to \$100.

SHI expects that the drillship ordered this time will have the same specification as the 3 other ships which were delivered to Seadrill until this year since 2008, which will significantly shorten the designing period and reduce the cost as a result of the continuous ship construction.

Besides, SHI said that the contract which was entered into with Seadrill included 2 optional vessels and additional orders were very likely.

Meanwhile, SHI has received orders for a total of \$9.1 billion so far this year, including this order for drillship, and secured the works for another 31

months (\$39.9 billion). Specifically, SHI has won orders for 31 drillships out of 51 drillships ordered worldwide since 2000, solidifying its dominant position as top shipbuilder with the highest share in the drillship market.

The drillship ordered by Seadrill to SHI measures 220m in length, 42m in width, and 19m in height, and is a 96,000-ton displacement ship capable of drilling up to 11km below the sea level. In addition, the vessel can carry out drilling even in extreme marine conditions with 16m-high waves and strong winds blowing at a speed of 41m/s, and is an eco-friendly drillship powered by electricity.

## DSME was awarded an order to build 1 Tension Leg Platform

Daewoo Shipbuilding & Marine Engineering (DSME) signed a contract to build 1 Tension Leg Platform (TLP).

DSME concluded a deal for the hull of TLP with a global oil major company on November 16 (local time) during the signing ceremony. The contract is valued at approximately KRW 240 billion. The order will be built at the Okpo Shipyard and delivered in November 2012. After delivery, the TLP will produce about 75,000 barrels of oil per day.

The offshore platform which will be built by DSME under this contract is the TLP, a large floating offshore platform for producing oil. The platform will measure 114m in length, 113.7m in width, and 83.5m in height.

This TLP is a structure used to ensure stable operation in deepwater oil fields at the depth of more than 300m below the sea level. With the hull being connected to the seabed via special high-tensile large pipe, the structure can immediately return to the original position even when it is shaken to the left and right at sea.

Including this order, DSME has received orders for a total of 10 offshore structures such as 9 offshore platforms and 1 Floating Production, Storage and Offloading (FPSO) unit, worth \$5.8 billion in all, from global oil major companies, and has successfully delivered 7 out of them.

An official from DSME said, "DSME and this oil major company have maintained solid cooperative relationship in the offshore plant sector for about 3

decades. We will continue to steadily win orders for offshore products based on the relationship of trust with ship owners."



Nam Sang-tae (right), President of DSME, is signing the contract with the official (left) in overall charge of exploration and production (E&P) project during the signing ceremony held on November 16 (local time) at the headquarters of the oil major company.



## STX OSV received its first shipbuilding order after its listing on the Singapore Exchange (SGX)

STX OSV successfully signed its first shipbuilding contract after it was listed on the Singapore Stock Exchange.

STX OSV announced that it received an approximately KRW 247 billion (NOK 1.3 billion) order on November 18 from Farstad Shipping, a Norwegian-based shipping company specializing in PSV, to build 4 Platform Supply Vessels (PSV). This order will be built in the shipyards located in Norway and Vietnam and delivered consecutively from 2012 to 2013.

3 PSV out of the 4 will be built on the same design as that of STX OSV PSV 08 which were developed by STX OSV Design, the ship design development subsidiary of STX OSV. STX OSV PSV 08 was designed to target the global market, which measures 81.7m in length and 18m in width and can carry up to about 30 people. The remaining 1 unit will be built to the ship design designed newly by Rolls-Royce Marine, the subsidiary of Rolls-Royce of UK, for Farstad Shipping.

Roy Reite, President of STX OSV said, "Farstad Shipping is our important customer, which has placed orders with STX OSV for about 30 vessels over the last 2 decades. Again, we are very proud to work with Farstad Shipping and will do our utmost to build ships that satisfy ship owners."

Meanwhile, STX OSV was successfully listed on the Singapore Stock Exchange (SGX) on November 12 after the initial public offering of stock from November 5 to 10.



Platform Supply Vessel which STX OSV will build

## Subic Shipyard of Hanjin Heavy Industries secured the order for 8 3,800TEU container ships

HHIC-Phill (Subic Shipyard in Philippines), the overseas corporate unit of Hanjin Heavy Industries, announced on November 16 that it won an order for 8 3,800TEU container ships from Delphis of Belgium.

The vessels ordered to Hanjin Heavy Industries is 3,800TEU container ship commissioned by Belgium-based Delphis, a shipping company which specializes in container ships.

This vessel is the latest type of ship capable of sailing at a speed of 21 knots, and will be built at the Subic Shipyard in Philippines and delivered consecutively from the first half of 2013.

Delphis has already ordered 3 180,000-ton bulk carriers and is said to have placed additional order for 8 container ships this time.

Hanjin Heavy Industries emphasized that Subic Shipyard had received

orders to build vessels of various sectors from the beginning of the year, such as bulk carriers, tankers, container ships, etc, rather than being confined to specific type of ship. Specifically, Subic Shipyard which has built up the production capacity and technology based on the unrivalled cost competitiveness has gained reputation from ship owners for its excellent shipbuilding capability, successfully offsetting the risk of being a new shipyard.

An official from Hanjin Heavy Industries said, "With stable production capacity and high

quality ship construction capability, Subic Shipyard has overcome the image of new shipyard just in 2 years after the dock was put into operation. Subic Shipyard is expected to win additional orders from ship owners around the globe, considering that the shipyard has gained recognition for its technology based on its consecutive obtainment of orders for very large ships and diversification of ship types this year.”

Subic Shipyard was completed by Hanjin Heavy Industries in 2008 on a 27,600m<sup>2</sup> land in Subic Bay, Philippines, to build world’s best high efficiency production system.

It is equipped with the state-of-art facilities such as the 370m-long dock no. 5, 550m-long and 135m-wide dock no. 6, the 4km-long quay wall facility, over 1,000m-long assembly plants outfitted with 4 goliath cranes and automation equipments, and others, and can build very large ships and high value-added vessels. Currently, it has stably secured the works for another 3 years.

## STX Dalian Shipbuilding clinched a \$240 million worth of order for container ships

STX Dalian Shipbuilding was awarded an order for 3 containerships of 6,500TEU capacity from an indian ship owner.

STX Dalian Shipbuilding signed a contract to build 3 6,500TEU containers for SCI (Shipping Corporation of India), a state-owned shipping company of India, during the signing ceremony held in Dehli, India, on November 23, which was attended by Bae Dae-gwan (Vice President of STX Offshore & Shipbuilding), Rajeev Gupta (Director of the Ministry of Maritime Affairs and Fisheries of India), Arun Kumar Gupta (Director of SCI), and related officials. The contract is worth a total of \$240 million.

This vessel will measure 299m in length, 24.4m in height, and 40m in width, and will be built at the Dalian Shipyard and delivered consecutively from 2013.

STX Dalian Shipbuilding successfully won this contract amid the noticeable recovery of the global container industry.

In fact, according to AXS-Alphaliner, a shipping consulting company located in France, the global order backlog for container ships rose to 3,790,000TEU last month from 3,730,000TEU in September, which marks a turnaround in 27 months. Alphaliner mentioned that the global container shipping lines are expected to place additional new shipbuilding orders within this year.

Having won this order, STX Dalian Shipbuilding is considered to move into full swing for large-scale orders. Using this contract for container ships as springboard, STX Dalian Shipbuilding, which has focused on the construction of bulk carriers and Pure Car Truck Carrier (PCTC), etc, so far, plans to diversify the types of ships being manufactured.

An official of STX Dalian Shipbuilding, remarked, “STX Dalian Shipbuilding successfully won this new order for container ships, following the contract which was awarded last month to STX Offshore & Shipbuilding for

13,000TEU supersize container ship.”

He added, “We plan to push ahead with even more proactive sales activities to win additional orders as the global container ship market has been put on the path toward recovery recently.”



STX Dalian Shipbuilding entered into a contract to build 3 6,500TEU containers for SCI, a state-owned shipping company of India, during the signing ceremony held in Dehli, India, which was attended by Bae Dae-gwan (Vice President of STX Offshore & Shipbuilding, right), Rajeev Gupta (Director of the Ministry of Maritime Affairs and Fisheries of India, middle), Arun Kumar Gupta (Director of SCI, left), and related officials.





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Korean shipbuilders which were hit hard by the steepest fall in shipbuilding orders last year have received orders worth a total of 4.62 million CGT and \$9.1 billion in the first half of 2010, up 450% and 116%, respectively, from the same period of previous year as the global economy is rebounding slowly.

The outlook of shipbuilding market for the second half of this year has become even brighter with domestic shipbuilders clinching shipbuilding orders consecutively as the shipbuilding market is expected to be in better shape buoyed by the vibrant shipping market conditions while major shipbuilders are placing more orders recently.

According to the statistics of Clarkson, shipyards in Korea 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. 

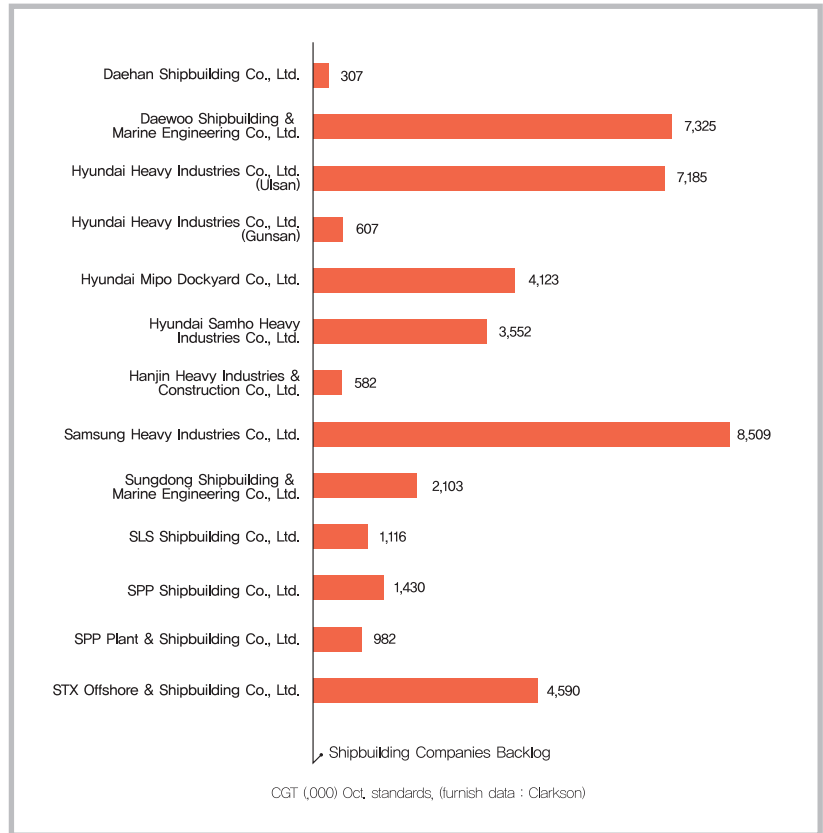
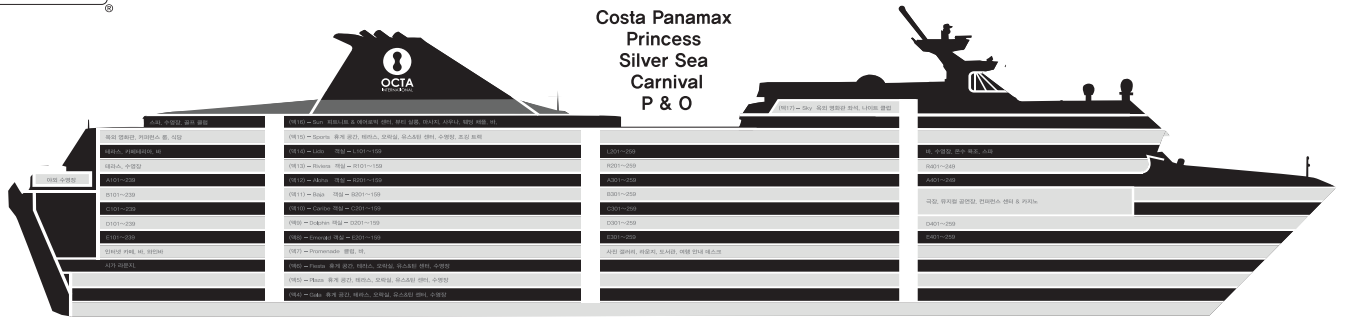


Photo: STX Offshore & Shipbuilding Co., Ltd.

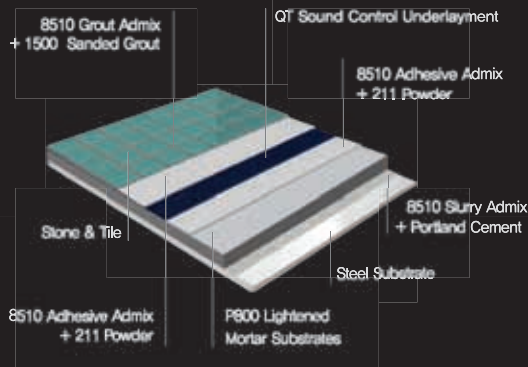




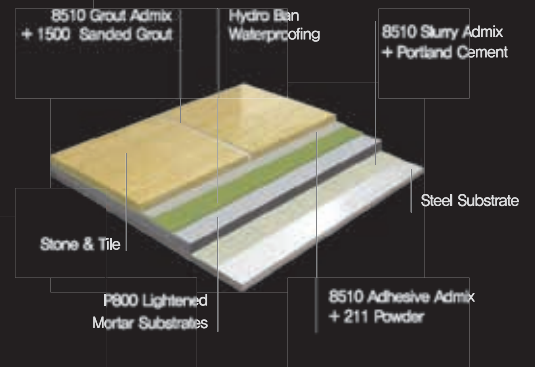
# STONE & TILE INSTALLATION SYSTEM FOR SHIP (CRUISE)



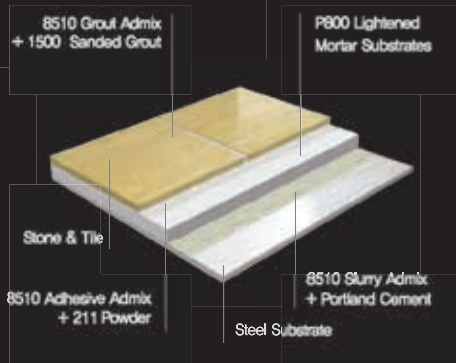
## SOUND CONTROL SYSTEM



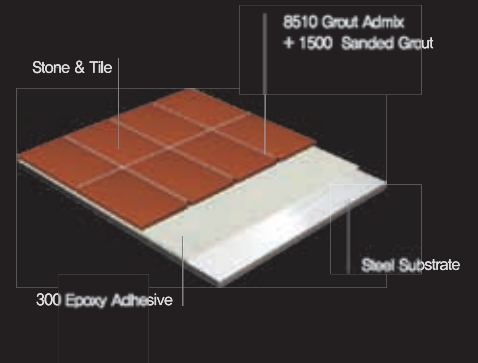
## WATER PROOFING SYSTEM



## COMMERCIAL SYSTEM



## STEEL BONDING SYSTEM



## RINA Certified Product

Admix  
Steel Slurry Coat, Adhesive, Grout



8510 Bonding Admix

Lightened Bed Mortar



P800 Lightened Mortar

Grout



1500 Sanded Grout  
(40 Colors)

Adhesive



211 Powder

Wall, Ceiling, Adhesive



310 Epoxy Adhesive

Waterproofing



Hydro Ban

Sound Control Mat



QT Sound Control Underlayment

Steel Adhesive



300 Epoxy Adhesive

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# Hanjin Heavy Industries and Construction Co., Ltd.

The Hanjin Heavy Industries and Construction (HHIC) started out as the first shipbuilding company in Korea in 1937. For 70 years, the company has spearheaded advances in the shipbuilding industry and contributed to shaping Korea into the world's foremost power in shipbuilding. With a focus on super sized ships, HHIC produces and supplies a wide range of vessels from container carriers to tankers, gas carriers and special vessels, to prominent clients around the world.

Following the construction of large scale shipyard in Subic Bay Freeport Zone in the Philippines which began operating from 2007, HHIC has secured an efficient global production system. Specially, One of the world's ten largest shipyards, the shipyard is fully equipped with cutting-edge production facilities including large docks and goliath cranes to build

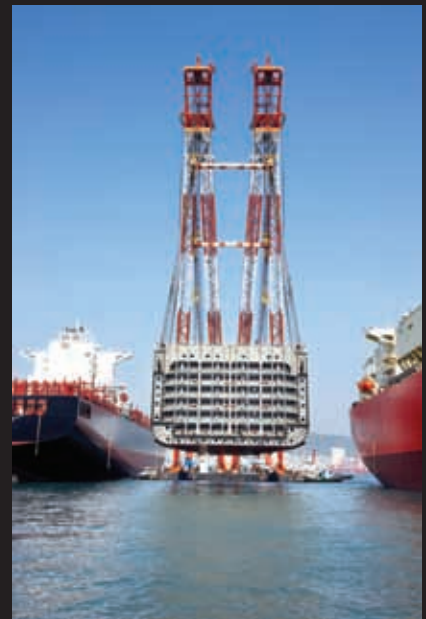
high value-added ships.

In Korea, HHIC operates the Yeongdo Shipyard which is supported by its plants in Yuldo, Ulsan and Dadaepo.

Harnessing its global production network, HHIC will focus on constructing high value-added container ship and LNG carriers while building up a strong presence in areas such as VLCC, offshore plants, and FPSO. Also, the company will develop new and innovative technologies required for high value-added, high-tech vessels to secure global competitiveness. ⚓



Subic Shipyard in the Philippines



Yeongdo Shipyard



## Container carriers



To be named  
12,800TUE container carriers  
365.60 X 48.40 X 29.80 X 13.00 (L X B X D X D, m)

Maersk Kowloon  
8,100TUE container carriers  
300.00 X 40.00 X 24.60 X 12.00 (L X B X D X D, m)



MSC MAEVA  
8,100TUE container carriers  
325.00 X 42.80 X 24.60 X 13.00 (L X B X D X D, m)



Cosco Newyork  
5,100TUE container carriers  
294.10 X 32.20 X 21.60 X 12.00 (L X B X D X D, m)





Gas carriers



STX Knot  
153,000m<sup>3</sup> LNG carrier  
288.00 X 44.00 X 26.20 X 11.50  
(L X B X D X D, m)



Hanjin Muscat  
138,000m<sup>3</sup> LNG carrier  
280.00 X 43.00 X 26.20 X 11.30  
(L X B X D X D, m)



Ulsan Gas  
4,000m<sup>3</sup> LNG carrier  
108.00 X 16.10 X 8.00 X 5.00 (L X B X D X D, m)



Hanjin Pyeongtaek  
130,697m<sup>3</sup> LNG carrier  
268.00 X 43.00 X 27.00 X 11.00 (L X B X D X D, m)

## Tankers



To be named  
DWT 320,000 MT VLCC  
333.00 X 60.00 X 30.50 X 21.00 (L X B X D X D, m)



Dubai Princess  
DWT 114,000 MT crude oil tanker  
250.00 X 44.00 X 21.40 X 13.60 (L X B X D X D, m)



QUDS  
DWT 45,000 MT chemical tanker  
183.20 X 32.20 X 18.90 X 10.97 (L X B X D X D, m)



Slot Yosu  
DWT 37,000 MT chemical tanker  
176.80 X 29.60 X 15.15 X 11.56 (L X B X D X D, m)





### Bulk carrier



To be named  
DWT 180,000 MT bulk carrier  
292.00 X 45.00 X 24.75 X 16.50 (L X B X D X D, m)



Hanjin Roberts Bank  
DWT 135,000 MT bulk carrier  
267.00 X 43.00 X 23.10 X 16.00  
(L X B X D X D, m)



Keoyang Noble  
DWT 48,000 MT woodchip carrier  
222.00 X 32.00 X 22.70 X 10.70  
(L X B X D X D, m)

### Special purpose ships

Ice Breaking Research Vessel  
95.00 X 19.00 X 9.90 X 6.80 (L X B X D X D, m)



Diving support vessel  
115.40 X 22.00 X 9.00 X 7.15  
(L X B X D X D, m)



## Naval ships

Patrol Killer Guided missile (PKG)  
63.00 X 9.10 X 5.00 X 2.50  
(L X B X D X D, m)



Landing Platform Helicopter (LPH)  
199.40 X 31.00 X 20.00 X 6.60 (L X B X D X D, m)



Hovercraft (LSF-II)  
26.80 X 14.30 X 7.50 (L X B X D, m)

## Offshore patrol / Salvage vessels



3,000 ton class salvage vessel  
110.50 X 15.40 X 7.70 X 4.86  
(L X B X D X D, m)



Offshore patrol vessel  
101.90 X 11.50 X 6.00 X 3.50  
(L X B X D X D, m)



1,500 ton class salvage vessel  
98.10 X 14.00 X 6.80 X 4.30  
(L X B X D X D, m)

# Teamcenter Express software

*Siemens PLM Software*



Teamcenter Express

Recently, Siemens PLM Software announced Version 5.3 of Teamcenter Express software with key usability and desktop integration enhancements that improve collaboration and productivity in manufacturing organizations. With enhanced support for the latest versions of Microsoft Office software and Adobe Acrobat software, Teamcenter Express 5.3 is a mainstream collaborative product data management (cPDM) solution aimed at increasing the ability to deliver design-through-manufacturing projects on-time and on-budget. Teamcenter Express is an easy to implement configuration of Teamcenter software, the world's most widely use PLM system.

"The release of Teamcenter Express 5.3 on the latest Teamcenter and Microsoft platforms adds significant capabilities to this comprehensive data management solution," said Peter A. Bilello, President, CIMdata. "Extensive user interface enhancements should result in more efficient completion of common tasks and processes, and expanded integrations with desktop applications including Microsoft Office 2010 and Adobe Acrobat will enable more users to utilize their office automation tool of choice to work directly with a single source of managed product data, leading to improved collaboration and a reduction in errors in manufacturing."

Teamcenter Express 5.3 can help improve the productivity of manufacturing organizations with several usability and user interface enhancements, updated integration with

Microsoft Office 2010 and expanded project scheduling capabilities. These enhancements can help users achieve faster and more consistent completion of common design-through-manufacturing tasks performed from users' desktops across multiple projects.

User interface improvements include a new summary tab layout with faster access to key data and processes, and a new quick search capability inside the Teamcenter Express explorer panel. Enhanced Microsoft Office 2010 integration, expanded support for Adobe Acrobat and a new utility to load multiple files from Windows software folders enable more widespread access to a company's single source of product information. Expanded capabilities in the embedded Structure Manager module enable more comprehensive and efficient management of product structures including the ability to selectively apply and reject recommended changes to a bill of materials.

Teamcenter Express 5.3 includes additional project scheduling capabilities that enable easier access for reviewing project status through a new web client, expanded project planning capabilities including finish date scheduling and critical path analysis, and timesheet reporting and work breakdown structures for improved resource tracking.

TEL : 82-2-3016-2079  
<http://www.siemens.com/plm>

# Energy-saving waste water treatment system and others

*Sunny Tech Trading Co. Ltd*

Recently, Sunny Tech Trading announced that it would expand the application of its energy-saving waste water treatment system and waste solvent recycling system to the shipbuilding.

Facing the growing demand for water resources, increasing waste water discharge, and unstable precipitation throughout the seasons, the government has regulated the ratio of waste water recycling while encouraging the development of innovative water resource facilities. The recycling of waste water has the advantage of not only reducing the discharge of waste water and the cost of waste water treatment but also slashing the quantity and cost of tap water.

Energy-saving waste water treatment system, which was developed by Ding Chi International Enterprise of Taiwan, has acquired multiple patents.

An official of Sunny Tech Trading stressed, saying, "Incorporating core technologies such as MSS catalyst magnesium light stone filtering system, MBS magnesium light stone filtering core, and DCI system, the energy-saving waste water treatment system is an economically efficient system which simplifies the waste water treatment process remarkably and shortens the duration of treatment, bringing the benefit of cost-saving."

Energy-saving waste water treatment system has the following advantages:

*-Non-pharmaceuticals process, Low consumption materials  
-Increase production capacity, reduce the waste mud*



Energy-saving waste water treatment system

*-Reduce waste water emission up to 90%  
-Metals can be recycling  
-Water saving up to 90%  
-Auto PLC control, Easy installation*

*-Saving operation cost*

*-Best solution of environment protection*

The Fig. below illustrates the result of nickel-plated waste water treatment based on the previous method and the energy-saving waste water treatment system.



Previous method: The water containing the nickel has the green color.

Energy-saving waste water treatment system: The water is totally transparent and contains no nickel residue. The cleansing water is recycled in the system.

This product can be used in many fields such as the shipbuilding, PCB, semi-conductor, automotive/aircraft manufacturing, and dyeing of clothes.

The waste solvent recycling system was made by OFRU Recycling, a global manufacturer which specializes in the solvent recycling and waste water treatment facilities. OFRU Recycling has captured a overwhelming share of global market in the painting and color coating sector, and is famous for providing a variety of solvent recycling equipments.

The waste solvent recycling system of OFRU Recycling can recycle all fluids and save the cost of procurement and disposal by up to 90% because it can recycle the raw materials that customers use.

It can be used for shipbuilding, aircraft, semi-conductor, plastic/rubber, printer ink and paint manufacturing, adhesive and coating, and others.

TEL : 82-2-2625-2692  
<http://www.suntt.co.kr>





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

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[fuelsaver@gl-group.com](mailto:fuelsaver@gl-group.com) · [www.gl-group.com/fuelsaver](http://www.gl-group.com/fuelsaver)



# KOMEA (Korea Marine Equipment Association)

## Member List

### AMS CO., LTD.

head office : SAHA-GU, BUSAN  
 homepage add : www.albatros.co.kr  
 main products : universal machine  
 TEL : +82 51-293-8641

### BUMHAN INDUSTRIES CO., LTD.

head office : Changwon Gyeongnam  
 homepage add : www.bumhan.com  
 main products : air compressor, high pressure air compressor,  
 high pressure air dryer & reducing stations  
 TEL : +82 55-251-6070

### BOYANG HARDWARE CO., LTD.

head office : Gimhae Gyeongnam  
 homepage add : www.byhd.co.kr  
 main products : stairway body, ladder, handrail & stormrail, other  
 outfittings, sanitary & furniture hardware  
 TEL : +82 55-345-1951/3

### BY CONTROLS INC.

head office : Gimhae Gyeongnam  
 homepage add : www.bycontrols.com  
 main products : control valves, hydraulic & pneumatic actuator,  
 valve remote control sys  
 TEL : +82 55-345-6110

### BC TAECHANG IND. CORP.

head office :  
 homepage add : www.bcinternational.co.kr  
 main products : water jet power pump, marine tape, petro tape,  
 corrosshield bt  
 TEL : +82 55-333-1985

### CHK CO., LTD.

head office : Gangseo Busan  
 homepage add : www.chkj.co.kr  
 main products : fire damper, junction box, steel furniture, pilot  
 chair, cable box  
 TEL : +82 51-831-9500

### CMR KOREA CO., LTD.

head office : Geumjeong Busan  
 homepage add : www.cmrkorea.com  
 main products : Marine Telephone, Marine CCTV, Anemometer,  
 TEL : +82 51-521-2883

### CAPE INDUSTRIES LTD.

head office : Yangsan Gyeongnam  
 homepage add : www.capeind.com  
 main products : cylinder liner-man b&w, sulzer(wartsila)  
 TEL : +82 55-370-1234

### Emerson Process Management Marine Solutions Korea Co., Ltd.

head office : Saha-Gu, Busan  
 homepage add : www.emersonprocess.com/marine  
 main products : Valve Remote Control Systems, Tank Level  
 Gauge Systems, Marine Tank Management Systems  
 TEL : +82 51-602-5555

### DAEYANG INSTRUMENT CO., LTD.

head office : Saha-Gu, Busan  
 homepage add : www.daeayang.co.kr  
 main products : precision instrument-anemometer rudder angle  
 indicator, engine monitoring system, temperature sensor  
 TEL : +82 51-200-5303

### DAE JIN IND. CO., LTD.

head office : Gangseo Busan  
 homepage add : www.daejinqc.co.kr  
 main products : aluminium/steel/wooden furniture, catering  
 furniture, fire & gas damper a60  
 TEL : +82 51-831-4514

### DAE JIN DAMPHA CO., LTD.

head office : Uiju Ulsan.  
 homepage add :

main products : ceiling panel, wall panel  
 TEL : +82 52-225-2361

### DAECHUN INDUSTRIAL CO., LTD.

head office : Gimhae Gyeongnam  
 homepage add : www.daechun.co.kr  
 main products : multi core tube, stainless steel tube  
 TEL : +82 55-345-2288

### DAIHAN ANCHOR CHAIN MFG. CO., LTD.

head office : Nam-Gu Incheon  
 homepage add : www.dhac.co.kr  
 main products : anchor chain grade 2, anchor chain grade 3,  
 mooring chain r3, (stud & studless)  
 TEL : +82 32-862-0091/4

### DONG KANG M-TECH CO., LTD.

head office : Kangnam-Gu, Seoul  
 homepage add : www.dkmtech.com  
 main products : water jet, (hj212, hj292, hj322, hm461, hm817),  
 night navigator(nn-9000, nn-3000)  
 TEL : +82 2-553-0181

### DONG WOO MACHINERY & ENGINEERING CO., LTD.

head office : Changwon Gyeongnam  
 homepage add : www.hanyang-p.co.kr  
 main products : provision crane, hose handling crane, cargo m/  
 room, center frame  
 TEL : +82 55-295-3261

### DONG-I INDUSTRIAL CO., LTD.

head office : Chin-ju Gyeongnam  
 homepage add : www.e-dongi.com  
 main products : marine gear box, hyd. steering system, power  
 take off  
 TEL : +82 55-755-9928

### DONGHWA ENTEC

head office : Gangseo Busan  
 homepage add : www.dh.co.kr  
 main products : e/r heater & cooler, plate cooler, fresh water  
 generator, charged air cooler, lng cargo handling system,  
 TEL : +82 51-970-1000

### DOOSAN ENGINE CO., LTD.

head office : Changwon Gyeongnam  
 homepage add : www.doosanengine.com  
 main products : marine diesel engine, diesel power plant  
 TEL : +82 55-260-6000

### DONGNAM MARINE CRANE CO., LTD.

head office : Gimhae Gyeongnam  
 homepage add : www.dmcrcrane.co.kr  
 main products : hose handling crane, hose handling crane,  
 provision crane, engine room crane, offshore crane  
 TEL : +82 55-720-3001

### DAEMMSTOFF INDUSTRIE KOREA LTD.

head office : Saha-Gu, Busan  
 homepage add : www.daemmstoff.com  
 main products : KVM Sealing Compound, Mangana Retaining  
 Compound, Durasin Chocking Compound, Panda-90  
 TEL : +82 51-261-7073

### DAEYANG ELECTRIC CO., LTD.

head office :  
 homepage add : www.daeayang.co.kr  
 main products : lighting fixture, main switch board, fan, precision  
 instrument,  
 TEL : +82 51-200-5303

### DAE HEUNG COOLER CO., LTD.

head office : Pocheon Giyeonggi  
 homepage add : www.cooler.co.kr  
 main products : heat exchanger, gas cooler, oil cooler, air cooler,  
 water chiller  
 TEL : +82 31-532-9667/9

### DONG-A VALVE IND. CO.

head office :  
 homepage add :  
 main products : gate valves, globe valves, check valves(swing,  
 dual, single), strainer(basket, y-type)  
 TEL : +82 51-831-1500

### DK TECH CORPORATION

head office :  
 homepage add : www.dklok.com  
 main products : Instrumentation Fitting & Valve-Compression  
 Tubing Fitting, Pipe & Weld Fitting, Needle, Check, Ball, Plug  
 TEL : +82 55-338-0032

### DAE HEUNG MARINE CORP. LTD.

head office :  
 homepage add :  
 main products : rudder, block, bolster  
 TEL : +82 55-346-3663

### DONGJIN M.P. TECH CO., LTD.

head office :  
 homepage add : www.epmp.net  
 main products : parts for marine engine, shaft systems for ship,  
 power generation facility, industrial machines  
 TEL : +82 55-346-0303

### DAECHANG METAL CO., LTD.

head office : Saha-Gu, Busan  
 homepage add : www.dcm.co.kr  
 main products : chain wheel, main bearing support, uec center  
 piece, piston crown  
 TEL : +82 51-264-0831/5

### FINETEC CENTURY CORPORATION

head office : Kangnam-Gu, Seoul  
 homepage add : www.century.co.kr  
 main products : Air Conditioner, Chilling Unit, Air Conditioning  
 Equipment  
 TEL : +82 2-2185-7000

### GENERAL MARINE BUSINESS INC.

head office :  
 homepage add : www.gmbmarine.com  
 main products : ship shore communication sys. emergency  
 shutdown sys. trim/list indicator  
 TEL : +82 52-254-5215

### G.S HIGH TECHER CO., LTD.

head office : Gangseo Busan  
 homepage add : gshightecher.koreasme.com  
 main products : Air vent heads, Auto air vent heads, Pipe  
 coupling, Expansion joint  
 TEL : +82 51-832-0456

### GS-HYDRO KOREA LTD.

head office : Saha-Gu, Busan  
 homepage add : www.gshydro.co.kr  
 main products : Hydraulic Pipe, High Pressure Pipe, Steering  
 Gear Hydr. Pipe  
 TEL : +82 51-266-8221/5

### HY-LOK CORPORATION

head office :  
 homepage add : www.hy-lok.com  
 main products : HY-Lok Tube Fittings, Bite Type (DIN 2353, JIS  
 b2351) Fittings, 37j/Flared Type(SAE J514) Fittings  
 TEL : +82 51-9700-800

### HANKUK MIBOO CO., LTD.

head office :  
 homepage add : www.hankookmiboo.co.kr  
 main products : Spiral Duct, Cold Chamber, Deck Covering  
 TEL : +82 51-263-3621

### HI AIR KOREA Co., Ltd.

head office :  
 homepage add : www.hiarkorea.co.kr



main products : Air Conditioning System, Refrigeration Plant, Package A/C, Ventilation Fan  
TEL : +82 55-340-5000

#### **HAN KOOK FLEXIBLE CO.**

head office :  
homepage add : www.hkflex.com  
main products : Flexible, Expansion Joint, Rubber Compensator  
TEL : +82 51-508-6291/3

#### **HANLA LEVEL CO., LTD.**

head office :  
homepage add : www.hanlalevel.co.kr  
main products : Cargo Tank Monitoring Sys. Tank Remote Sounding Sys. High Level Alarm Sys.  
TEL : +82 51-605-3000

#### **HALLA INDUSTRIAL CO., LTD.**

head office :  
homepage add : www.hallaiq.co.kr  
main products : Refrigeration Pumps (NH<sub>3</sub>, R22, NHO<sub>3</sub>, CO<sub>2</sub>), Volute Pumps, Turbine Pumps  
TEL : +82 51-264-2201/5

#### **HANSHIN ELECTRONICS CO., LTD.**

head office :  
homepage add : www.ehanshin.com  
main products : Public Address System (hpa-9600, hpa-9200, hpa-7300), Marine Telephone  
TEL : +82 51-412-5551

#### **HAN JO CO., LTD.**

head office : Yeongdo Busan  
homepage add : www.hanjom.com  
main products : expansion joint. Fuel Injection Pipe. Air Filter  
TEL : +82 51-414-7201

#### **HAEAN MACHINERY IND. CO., LTD.**

head office :  
homepage add : www.haeon21.com  
main products : Marine Crane, Deck Machinery(Outfitting), Special Equipment  
TEL : +82 55-345-2024

#### **HYUNDAI LIFEBOATS CO., LTD.**

head office :  
homepage add : www.hdboat.com  
main products : Life Boat & Rescue Boat  
TEL : +82 52-237-4850/4

#### **HYUNDAI MARINE MACHINERY CO., LTD.**

head office :  
homepage add : www.hmmco.co.kr  
main products : Hyundai-Atlas Incinerator. Hyundai-Jowa 15ppm Bilge Separator, Auxiliary Blower, Ventilation Fan  
TEL : +82 32-583-0671

#### **HYUNDAI ELEVATOR CO., LTD.**

head office :  
homepage add : www.hyundaelevator.co.kr  
main products : Elevator, Escalator, Auto. Parking System  
TEL : +82 31-644-5114

#### **HYUNDAI WELDING CO., LTD.**

head office :  
homepage add : www.hdweld.co.kr  
main products : Covered Electrode ARC Welding Consumables, Sub-Merged ARC Welding Flux & Wire  
TEL : +82 2-6230-6010/2

#### **HYUN DAE FITTING CO., LTD.**

head office :  
homepage add : www.hdfco.co.kr  
main products : Flange, Stainless Steel, Duplex Stainless Steel, Forged Carbon Steel  
TEL : +82 51-831-0891

#### **HYUN JIN CO., LTD.**

head office :  
homepage add : www.hyunjinn.co.kr  
main products : Control Console, Light Signal, Column, Control Panel  
TEL : +82 51-263-9841

#### **HYUNJIN MATERIALS CO., LTD.**

head office : Gangseo Busan  
homepage add : www.hjmco.co.kr  
main products : Marine Engine Uses-Camshaft & C/Flange, Connecting Rod, Cross Head  
TEL : +82 51-602-7700

#### **HOSEUNG ENTERPRISE CO., LTD.**

head office : Gangseo Busan  
homepage add : hoseung.koreasme.com  
main products : Package Unit for Engine Room, Portable Tank, Ventilator, Cable Box  
TEL : +82 51-831-2233/4

#### **HOCHANG MACHINERY INDUSTRIES CO., LTD.**

head office :  
homepage add : www.hoc21.com  
main products : Deck Machinery, Hose Handling Crane, Provision Crane, Cell Guide  
TEL : +82 52-255-2000

#### **HAE WON INDUSTRY CO.**

head office :  
homepage add : haiwon1.koreasme.com  
main products : marine diesel engine parts(water seal, inflatable ring, water metering ring, compact seal, cr-liner)  
TEL : +82 51-831-4600

#### **HODU INDUSTRIAL CO.**

head office :  
homepage add :  
main products : ups & rectifier sys. hull stress monitoring sys. waste compactor  
TEL : +82 51-291-9512

#### **I.M.E. CORPORATION**

head office :  
homepage add : www.promarine21.com  
main products : engine valve & seat, all type engine  
TEL : +82 55-346-1127

#### **IL SEUNG CO., LTD.**

head office : Gimhae Gyeongnam  
homepage add : www.ilseung.co.kr  
main products : Sewage treatment plant. Biological type, Frash water generator. Plate. tubular type,  
TEL : +82 55-345-4114

#### **IL-SUNG IND. CO.**

head office :  
homepage add :  
main products : Hot water calorifier, Silencer(for m/e, g/e, fan), Mist eliminator, Washable air filter  
TEL : +82 51-312-4056

#### **JUNG GONG IND. CO., LTD.**

head office :  
homepage add : www.jung-gong.com  
main products : Ordinery window & side scuttle, Heated window, Fire resistant window & side scuttle, Window for passenger ship, Window box, Roller blind  
TEL : +82 51-261-2911

#### **JUNG-A MARINE CO., LTD.**

head office :  
homepage add : www.jung-a.co.kr  
main products : Accommodation ladder, Wharf ladder, Window wiper  
TEL : +82 51-831-4147

#### **DONGHWA PNEUMATIC TECHNOLOGY CO., LTD.**

head office :  
homepage add : www.jptec.co.kr  
main products : marine reciprocating air compressor, industrial air compressor, screw type air compressor  
TEL : +82 51-831-3227

#### **JUNGSAN ENTERPRISE CO., LTD.**

head office :  
homepage add : www.jungsan.com  
main products : Bolt & Nut (Exhaust valve, Cylinder cover, Connecting-rod, Main bearing & etc.)  
TEL : +82 52-254-3290

#### **JHK INC.**

head office : Gimhae Gyeongnam  
homepage add :  
main products : Container Fixed Fitting, Car Lashing Equipment  
TEL : +82 55-346-2225

#### **JONGHAP MACHINERY CO., LTD.**

head office : Yongsan Gyeongnam  
homepage add : www.jonghap.biz  
main products : sewage treatment plant, welding positioning equipment sys. parts former  
TEL : +82 55-383-2300

#### **JS CABLE LTD.**

head office : Cheonan Chungnam  
homepage add : www.jsable.co.kr  
main products : offshore & marine cable, power cable, speciality cable, nuclear cable  
TEL : +82 41-559-4800

#### **KANGRIM HEAVY INDUSTRIES CO., LTD.**

head office : Changwon Gyeongnam  
homepage add : www.kangrim.com  
main products : boilers, marine & industrial, inert gas system(i.g.s.), i.g.g. & n<sub>2</sub>generator  
TEL : +82 55-269-7701

#### **KANGRIM INSULATION CO., LTD.**

head office : Saha-Gu, Busan  
homepage add : www.kangrim.com  
main products : lng & lpg carriers tank & pipe cryogenic insulation, lng receiving terminal tank & pipe cryogenic insulation  
TEL : +82 51-220-6001

#### **KUNSUL CHEMICAL IND. CO., LTD.**

head office : Jin-Gu Busan  
homepage add : www.jebi.co.kr  
main products : marine & heavy duty, protective coatings  
TEL : +82 51-892-4221/7

#### **KYUNG EUN CERAMICS CO., LTD.**

head office : Gimhae Gyeongnam  
homepage add : www.ke-ceramics.com  
main products : ceramic back-up tape  
TEL : +82 55-345-7761

#### **KUKDONG ELECTRIC WIRE CO., LTD.**

head office : Jincheon Chungbuk  
homepage add : www.cablekukdong.co.kr  
main products : shipboard cable, lan utp cable, power cable, rubber cable, pvc cable  
TEL : +82 43-530-2000/1, +82 2-2140-3061

#### **KUMKANG PRECISION CO., LTD.**

head office : Saha-Gu, Busan  
homepage add : www.kkmarine.co.kr  
main products : marine valve, valve for engine, air reservoir tank  
TEL : +82 51-262-4890

#### **KUMOH MACH. & ELEC. CO., LTD.**

head office : Gijang Busan  
homepage add : www.komeco.net  
main products : eng. & t/c tacho system, vibration measuring system, d/g engine control panel  
TEL : +82 51-724-5070

#### **KEYSUNG METAL CO., LTD.**

head office :  
homepage add : www.keysungmetal.com  
main products : valves for marine & offshore plant, cryogenic valves, strainer  
TEL : +82 51-831-3391

#### **K. C. LTD.**

head office :  
homepage add : www.iccp-mgps.com  
main products : I.C.C.P. System, Anti-fouling System(M.G.P.S.), Shaft Earthing Device  
TEL : +82 51-831-7720

#### **KSP CO., LTD.**

head office :  
homepage add : www.kspvalve.com  
main products : Engine Valve, Flange  
TEL : +82 51-831-6270/7

**KTE CO., LTD.**

head office :  
 homepage add : www.kte.co.kr  
 main products : Marine Switchboard(high, low), Marine Control Console, Alarm Monitoring System, Thruster  
 TEL : +82 51-265-0255

**KOKACO CO., LTD.**

head office :  
 homepage add :  
 main products : Exhaust Valve & Valve Seat Grinding Machine, Nozzle Lapping Machine  
 TEL : +82 51-403-4114/6

**KONGBERG MARITIME KOREA LTD.**

head office :  
 homepage add : www.km.kongsberg.com  
 main products : IAS, DP, K-Chief 500, Auto Chief c20, K-Gauge, K-Bridge, MIP, MBB  
 TEL : +82 51-749-8600

**KEYSTONE VALVE(KOREA) LTD.**

head office : Anseong Gyeonggi  
 homepage add : www.tycovalves.com  
 main products : Butterfly Valve, Ball Valve, Safe Valve  
 TEL : +82 31-670-2500

**KEON CHANG IND. CO., LTD.**

head office :  
 homepage add : www.keonchang.co.kr  
 main products : marine equipment, ladle turret, roll stand assy, side trimmer & chopper, bloom c c, screw conveyor, etc.  
 TEL : +82 51-203-0161

**KWANG SAN CO., LTD.**

head office :  
 homepage add : www.kwangsan.com  
 main products : heating coil, sus spool, air vent head, expansion joint  
 TEL : +82 51-974-6301

**KEUMYONG MACHINERY CO., LTD.**

head office : Buk-gu, Daegu  
 homepage add : www.keumyong.com  
 main products : exhaust valve complete with valve spindle, axial vibration damper  
 TEL : +82 53-608-8110/6

**KWANG SUNG CO., LTD.**

head office :  
 homepage add : ikwangsung.com  
 main products : t-girder, panel, stair, handrail, inclined ladder,  
 TEL : +82 55-338-9973

**KUK DONG ELECOM CO., LTD.**

head office : Saha-Gu, Busan  
 homepage add : www.kukdongelecom.com  
 main products : marine & offshore light fixtures, explosion-proof lights, flood & search lights, mgf packing system  
 TEL : +82 51-266-0050

**KYUNGSUNG INDUSTRY CO., LTD.**

head office : Gangseo Busan  
 homepage add : www.e-clamp.com  
 main products : clamp, sus corner, anchor strip  
 TEL : +82 51-831-4960

**LS CABLE LTD.**

head office :  
 homepage add : www.lscable.co.kr  
 main products : marine shipboard & offshore cable, bare conductor wire, (pvc/pe/xlpe/rubber) power & control cable  
 TEL : +82 2-2189-9114

**LEE YOUNG INDUSTRIAL MACHINERY CO., LTD.**

head office : Ulju Ulsan  
 homepage add : www.leeyoung.co.kr  
 main products : engine casing, corr. bhd, upper deck, built-up longitudinal, chain locker, lashing bridge  
 TEL : +82 52-231-5800

**MIN SUNG CO., LTD.**

head office : Sasang Busan

homepage add : www.minth.co.kr  
 main products : cable tray, hatch, electric cable box  
 TEL : +82 51-305-8862

**Mt.H CONTROL VALVES CO., LTD.**

head office :  
 homepage add : www.mth.co.kr  
 main products : crankcase relief valve, main starting valve, pneumatic control valve, safety relief valve  
 TEL : +82 51-974-8800

**MSL COMPRESSOR CO., LTD.**

head office : Pocheon Gyeonggi  
 homepage add : www.mslcomp.com  
 main products : breathing air compressor, h.p air compressor, n2 gas booster  
 TEL : +82 31-853-7000

**MYCOM KOREA CO., LTD.**

head office :  
 homepage add : www.mycomkorea.com  
 main products : screw compressor unit, reciprocating compressor unit, condensing unit, brine chiling unit  
 TEL : +82 55-294-8678

**MYCOM KOREA CO., LTD.**

head office :  
 homepage add : www.mycomkorea.com  
 main products : screw compressor unit, reciprocating compressor unit, condensing unit, brine chiling unit  
 TEL : +82 55-294-8678

**Myung Sung Engineering Co., Ltd.**

head office : Mokpo Jeonnam  
 homepage add :  
 main products : rudder & rudder stock, rudder horn, stern roller  
 TEL : +82 61-276-7650

**Marine Radio Co., Ltd.**

head office :  
 homepage add : www.mrcorea.com  
 main products : public address system, auto tel. exchanger sys. communal aerial sys. marine clock system  
 TEL : +82 51-414-7891

**NK CO., LTD.**

head office :  
 homepage add : www.nkcf.com  
 main products : ballast water system, co2system, deck foam system, dry power system  
 TEL : +82 51-204-2211/3

**ORIENTAL PRECISION & ENGINEERING CO., LTD.**

head office :  
 homepage add : www.opco.co.kr  
 main products : deck house, funnel & engine room casing, life boat davit, engine room crane  
 TEL : +82 51-202-0101

**OSCG CO., LTD.**

head office : Sasang Busan  
 homepage add : www.oscg.net  
 main products : cable gland(eexd & e), adapter / reducer, flexible connectors  
 TEL : +82 51-305-3910

**PANASIA CO., LTD.**

head office : Gangseo Busan  
 homepage add : www.pan-asia.co.kr  
 main products : cargo monitoring sys. tank level gauge sys. high & overflow alarm sys.  
 TEL : +82 51-831-1010

**SARACOM CO., LTD.**

head office : Yeongdo Busan  
 homepage add : www.saracom.net  
 main products : gmdss, ship sound signal appliances, navigation equipment, fire detection system  
 TEL : +82 51-600-9000

**SAMGONG Co., Ltd**

head office :  
 homepage add : www.sam-gong.co.kr  
 main products : oil purifiers, ships accommodation ladders, ships

windows  
 TEL : +82 51-200-3040/1

**SAMYOUNG MACHINERY CO., LTD.**

head office : Daedeok Daejeon  
 homepage add : www.sym.co.kr  
 main products : cylinder head, cylinder liner, piston  
 TEL : +82 42-625-4064

**SAMYUNG ENC CO., LTD.**

head office :  
 homepage add : www.samyungenc.com  
 main products : ais(si-30)-auto. identification sys. dsc vhf radio telephone(str 6000a)-gmdss equipment  
 TEL : +82 51-601-6601

**SUH HAN INDUSTRY CO., LTD.**

head office :  
 homepage add : www.suhhani.co.kr  
 main products : cable tray others-steel, galvanized steel, stainless steel, aluminium  
 TEL : +82 51-204-1920

**SEOHAE MARINE SYSTEM CO., LTD.**

head office :  
 homepage add : www.seohae-ms.com  
 main products : hatch-pontoon type, folding type, side rolling type, etc. lashing equipment-2/3tier  
 TEL : +82 51-204-8408

**SUNBO INDUSTRIES CO., LTD.**

head office :  
 homepage add : www.sunboind.co.kr  
 main products : tank top unit, engine room unit, package unit  
 TEL : +82 51-261-3454

**SUNG KWANG BEND CO., LTD.**

head office :  
 homepage add : www.skbend.com  
 main products : pipe fittings-butt. welding / socket welding / thread type/ flange  
 TEL : +82 51-3300-200

**SUNG MI CO., LTD.**

head office :  
 homepage add : www.sung-mi.co.kr  
 main products : fire retarding doors, fire retarding wall, ceiling panel  
 TEL : +82 55-329-1117

**SUNGSIN INDUSTRIES CO., LTD.**

head office :  
 homepage add : sungsin.koreasme.com  
 main products : hatch coaming, t-bhk block, fore mast & port, water separator  
 TEL : +82 54-776-6441

**SUNG IL CO., LTD. (SIM)**

head office :  
 homepage add : www.sungilsim.com  
 main products : pipe spool fabrication, induction pipe bending, marine engine pipe  
 TEL : +82 51-831-8800

**ESAB SeAH CORP**

head office :  
 homepage add : www.esab.co.kr  
 main products : welding consumable, welding equipments  
 TEL : +82 55-289-8111

**SEUN ELECTRIC CO., LTD.**

head office :  
 homepage add : www.seunelectric.co.kr  
 main products : battery charger and dist. board. full auto. charging sys. .lcd display monitor  
 TEL : +82 51-208-4641

**SE-WON INDUSTRIES CO., LTD.**

head office :  
 homepage add : www.sewon-ind.com  
 main products : high velocity p/v valve, gas free vent cover, flame screen  
 TEL : +82 51-728-4191

**SAEJIN INTECH CO., LTD.**

head office :

homepage add : www.sjhind.com  
main products : emergency towing system, telescopic radar post, deck fittings(mooring fitting), industrial m/c & etc.  
TEL : +82 55-328-1770

#### **SE JIN IND. CO., LTD.**

head office : 61-68 Ungnam-dong, Changwon-si, Gyeongsangnam-do.  
homepage add : www.sejin89.co.kr  
main products : piping, h.f.o supply unit, purifier module each kind  
TEL : +82 55-239-4700

#### **SPECS CORPORATION**

head office :  
homepage add : www.specs.co.kr  
main products : system division-oil mist detector, portable level temp/oil  
TEL : +82 31-706-5211

#### **SHIN DONG DIGITECH CO., LTD.**

head office :  
homepage add : www.shindong.com  
main products : satellite tv sets-satellite communication equipments, draft buoy(1m, 1.6m, 2.4m discus buoy)-ocean information technology division  
TEL : +82 51-467-5001

#### **SIL LA METAL CO., LTD.**

head office :  
homepage add :  
main products : propeller(f.p.p.), c.p. propeller blade & hub, propeller shaft, inter shaft  
TEL : +82 51-831-5991/8

#### **SHINMYUNG TECH CO., LTD.**

head office :  
homepage add :  
main products : air & electric winch-0.2ton ~ 10ton, air motor-1p ~ 25p, davit (all)-0.2ton ~ 5ton  
TEL : +82 55-363-7091

#### **SHINSUNG DIESEL KIKI CO.**

head office :  
homepage add : nozzle.koreasme.org  
main products : for marine engine-nozzle, plunger assy, delivery valve assy  
TEL : +82 51-264-8829, 262-8869

#### **SHIN SHIN MACHINERY CO., LTD.**

head office :  
homepage add : www.sspump.com  
main products : centrifugal pumps, gear pumps, screw pumps, submersible pumps  
TEL : +82 51-727-5300

#### **SHINA METALTECH CO., LTD.**

head office :  
homepage add : www.shinametal.com  
main products : white metal bearings-marine metal bearing, automotive metals  
TEL : +82 52-298-2100/4

#### **SHIN YOUNG HEAVY INDUSTRIES CO.,LTD**

head office :  
homepage add : www.syhico.com  
main products : oil & gas system, hydraulic system  
TEL : +82 61-800-3700

#### **S & W CORPORATION**

head office :  
homepage add :  
main products : cam & camshaft, valve spindle & seat ring, piston pin  
TEL : +82 51-205-7411

#### **S.A. MART CO., LTD.**

head office :  
homepage add : www.samartkr.com  
main products : control lever, control cable, hydraulic steering system, auto pilot system, stern drive system  
TEL : +82 32-815-6314

#### **STX ENGINE CO., LTD.**

head office :  
homepage add : www.stxengine.co.kr

main products : marine diesel engine, military diesel engine, gas engine, gas turbine  
TEL : +82 55-280-0114

#### **SIMULATION TECH INC.**

head office : Geumcheon Seoul  
homepage add : www.simulationtech.co.kr  
main products : Emergency Shutdown System, Grease Extractor/de-Oiler, Operator Training Simulator  
TEL : +82 2-3281-0960

#### **SHINHAN MACHINERY CO., LTD.**

head office :  
homepage add : www.shinerpia.com  
main products : deck house, engine casing & funnel, fore/after-end block & others  
rudder, living quarters  
TEL : +82 52-231-3525

#### **SAMGONG INDUSTRIAL CO., LTD.**

head office : Pyonghaek Gyeonggi  
homepage add : www.samgong.com  
main products : inflatable rubber products  
TEL : +82 31-654-4805/6

#### **SIN YOUNG ENTERPRISE CO., LTD.**

head office : Gimhae Gyeongnam  
homepage add : www.sy-ind.com  
main products : main hole, access hatch, bollard  
TEL : +82 55-346-0034

#### **SUNG JIN GEOTEC CO., LTD.**

head office : Namgu Ulsan  
homepage add : sgtkor.co.kr  
main products : bulbous bow, stern block, hull block, module, lng/lpg tank  
TEL : +82 52-228-5801

#### **STACO CO., LTD.**

head office : Gangseo Busan  
homepage add : www.staco.co.kr  
main products : Wall Panel, Ceiling Panel, Unit Toilet, Cabin Door, Furniture,  
TEL : +82 51-831-7000

#### **STX ENPACO CO., LTD.**

head office :  
homepage add : www.stxenpaco.co.kr  
main products : turbocharger, diesel engine parts, marine equip.  
TEL : +82 55-282-1131

#### **SEOUL ELECTRIC CABLE CO., LTD.**

head office : Eum-seong Chungbuk  
homepage add : www.seoulcable.com  
main products : offshore & shipboard cables, travelling cables, high voltage power cables  
TEL : +82 43-879-7200

#### **SMECO**

head office :  
homepage add :  
main products : piston, piston liner, piston skirt  
TEL : +82 41-864-3030

#### **SURO PROPELLER & MACHINERY CO**

head office : Yeongdo Busan  
homepage add : www.suropump.co.kr  
main products : Propeller(d : 2500mm), Shaft (l : 6m), Pump  
TEL : +82 51-415-0444

#### **SHIN-A ENTERPRISE CO., LTD.**

head office : Saha Busan  
homepage add : www.shina-ent.com  
main products : navigation equipment, communication equipment, monitoring system equipment  
TEL : +82 51-204-6221/5

#### **TK CORPORATION**

head office :  
homepage add : www.tbend.co.kr  
main products : Elbow, Reducer, Tee, Cap  
TEL : +82 51-831-6550

#### **TAE YOUNG TRADING LTD.**

head office : Junggu Seoul

homepage add : www.marine-material.com  
main products : Receptacles & Wire Accessories, Floodlight, Deck Light, Reflected Lamps  
TEL : +82 2-2272-1960

#### **TANKTECH Co., Ltd.**

head office :  
homepage add : www.tanktech.co.kr  
main products : High Velocity P/V Valve, Local Fire Fighting Sys. Tank Cleaning Machine  
TEL : +82 51-979-1600

#### **TECHMARINE S/W CO., LTD.**

head office :  
homepage add : www.techmarine.net  
main products : Loading Computer System  
TEL : +82 51-467-7003

#### **FRIEND CO., LTD.**

head office : Gangseo Busan  
homepage add : www.tsdream.co.kr  
main products : cable tray, heating coil, strainer  
TEL : +82 51-974-7900

#### **TMC CO., LTD.**

head office : Cheonan Chungnam  
homepage add : www.tmc-cable.com  
main products : marine cable, optical fiber cable  
TEL : +82 2-771-3434

#### **WARTSILA ACCOMMODATION SYSTEMS KOREA, INC.**

head office : Goseong Gyeongnam  
homepage add : www.waskorea.co.kr  
main products : unit toilet, unit cabin, wall panel, ceiling panel, door  
TEL : +82 55-673-7315

#### **WOOCHANG IND. CO., LTD.**

head office :  
homepage add :  
main products : steel door, ventilator, mooring fitting, h/c fitting, hand rail  
TEL : +82 55-331-1651

#### **WHA YOUNG CO., LTD.**

head office : Miryang Gyeongnam  
homepage add : www.whayoung.co.kr  
main products : Supply Unit Assy, Collector Block Assy, Fuel & Exh. Movement, Fuel Pump Assy  
TEL : +82 55-359-1100

#### **WILSON WALTON CORRPRO KOREA**

head office :  
homepage add : www.wvckorea.com  
main products : i.c.c.p system, m.g.p.s, s.g.d  
TEL : +82 51-831-0131

#### **YOUNG KWANG MACHINE CO., LTD.**

head office :  
homepage add : www.ykme.co.kr  
main products : package unit, group unit, module unit for industrial plant  
TEL : +82 54-776-5456/9

#### **YOOWON INDUSTRIES LTD.**

head office :  
homepage add : www.yoowonind.com  
main products : steering gear, auto filter, deck machinery  
TEL : +82 51-205-8541

#### **YOUJEON STEEL CO., LTD.**

head office : Changwon Gyeongnam  
homepage add : www.youjeonsteel.co.kr  
main products : Marine Engine Parts-Engine Bed  
TEL : +82 55-297-2121



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**DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD. (DSME)**

- Address : 85, Da-dong, Jung-gu, Seoul, Korea • Tel : +82-2-2129-0114 • Fax : +82-2-2129-0077~8 • <http://www.dsme.co.kr>
- Products : LNG Carriers, LNG-RVs, LNG-FPSOs/FSRUs, LPG Carriers, LPG-FPSOs, ULCCs, VLCCs, Suezmax/Aframax/Panamax Tankers, Shuttle/Chemical Tankers, Product Carriers, Containerships, Capesize/ Kamsarmax/ Supramax Bulk Carriers, Ore Carriers, VLOCs, Ro-Ro Ships, PCTCs, Passenger Car Ferries, FPSOs, FSOs, FPUs, Drill Ships, Semi-Submersible Drilling Rigs, Fixed Platforms, Submarines, Submarine Rescue Vessels AUVs, Destroyers, Battle Ships

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**SAMSUNG HEAVY INDUSTRIES CO., LTD. (SHI)**

- Address : 1321-15, Seocho-Dong, Seocho-Gu, Seoul, Korea • Tel : +82-2-3458-7312 • Fax : +82-2-3458-7319
- <http://www.shi.samsung.co.kr>
- Products : Arctic Shuttle Tankers, VLLCs, Crude Oil Tankers, Container Vessels, LNG/LPG Carriers, FPSO, FSO, Drillships, etc., LNG FPSO, Offshore Platforms, TLP, SEMI, Cruise Ships & Ferries, Steel Structures, Bridges & Building, Cargo & Material Handling Equipment

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**SLS SHIPBUILDING CO., LTD.**

- Address : 227, Danam-dong, Tongyeong, Gyeongnam, Korea • Tel : +82-55-640-3301/3340 • Fax : +82-55-649-2114 • <http://www.slsship.co.kr>
- Products : 43,000DWT Stainless Steel Chemical Tanker, 44,000DWT Chemical Tanker, 45,000DWT Chemical Tanker, 51,000DWT Product/Chemical Tanker, 49,700DWT Product Oil Tanker, 41,000DWT Product/Chemical Tanker, 40,000DWT Product/Chemical Tanker, 58,000DWT Supramax Bulk Carrier

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**HYUNDAI MIPO DOCKYARD CO., LTD. (HMD)**

- Address : 1381, Bangeo-dong, Dong-gu, Ulsan, 682-712 Korea • Tel : +82-52-250-3031~3040 • Fax : +82-52-250-3056 • <http://www.hmd.co.kr>
- Products : Product/Chemical Tankers, Containerships, Self-Unloading Bulk Carriers, Multipurpose Cargo Carriers, Drillships, Cable Layers, Pipe Layers, FPSOs, Car Ferry & Passenger Ships, LPG Carriers, Pure Car / Truck Carriers, General Cargo Carriers, Ro-Ro Vessels

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**HYUNDAI SAMHO HEAVY INDUSTRIES CO., LTD. (HSHI)**

- Address : 1700, Yongdong-ri, Samho-eup, Yeongam-gun, Jeollanam-do, Korea • Tel : +82-61-460-2114 • Fax : +82-61-460-3701
- <http://www.hshi.co.kr>
- Products : Tankers, VLCCs, Product Carriers, Chemical Tankers, Containerships, LNG Carriers, LPG Carriers, Pure Car Carriers, Bulk Carriers, Other Vessels

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**HYUNDAI HEAVY INDUSTRIES CO., LTD. (HHI)**

- Address : 1, Jeonha-dong, Dong-gu, Ulsan, Korea • Tel : +82-52-202-2114 • Fax : +82-52-202-3470 • <http://www.hhi.co.kr>
- Products : Bulk Carriers, Containerships, Tankers, VLCCs, Product Carriers, Multi-purpose Cargo Ships, OBO Carriers, Pure Car Carriers, LPG Carriers, Ro-Ro Ships, Chemical Tankers, Offshore Rigs/Barges, LNG Carriers, Other Vessels

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**HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD.**

- Address : 29, 5-ga, Bongnae-dong, Yeongdo-gu, Busan, Korea • Tel : +82-51-410-3240 • Fax : +82-51-410-8477 • <http://www.hanjinsc.com>
- Products : Container Carriers, Product/Chemical/Crude Oil Tankers, LNG/LPG Carriers, Cable Ships, Supply Boats, Semi-Submersible Drilling Rigs, Dredgers, Naval Ships, Special Purpose Ships, Bulk Carriers

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**STX OFFSHORE & SHIPBUILDING CO., LTD.**

- Address : 100 Wonpo-dong, Jinhae, Gyeongnam, Korea • Tel : +82-55-548-1122 • Fax : +82-55-546-7928 • <http://www.stxship.co.kr>
- Products : Crude Oil Tankers, Product Oil Tankers, Chemical Tankers, Bulk Carriers, Container Ships, LNG/LPG Carriers, Pure Car & Truck Carriers, Ferries & Passenger Ships, Naval Ships, Special Purpose Ships, Offshore and offshore support vessel, Etc

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**DAESUN SHIPBUILDING & ENGINEERING CO., LTD.**

- Address : 12, 4-ga, Bongrae-dong, Yeongdo-gu, Busan, Korea • Tel : +82-51-419-5090~1 • Fax : +82-51-416-7965 • <http://www.daesunship.co.kr>
- Products : Container Ships, Bulk Carriers, Tankers, MPC & General Cargo Ships, Gas Carriers, Ro/Ro ships, Tug Boats, Fishing Boats/Vessels, Special Purpose Vessels



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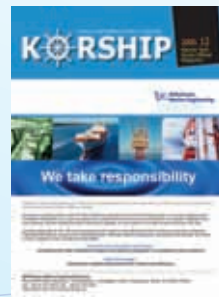
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