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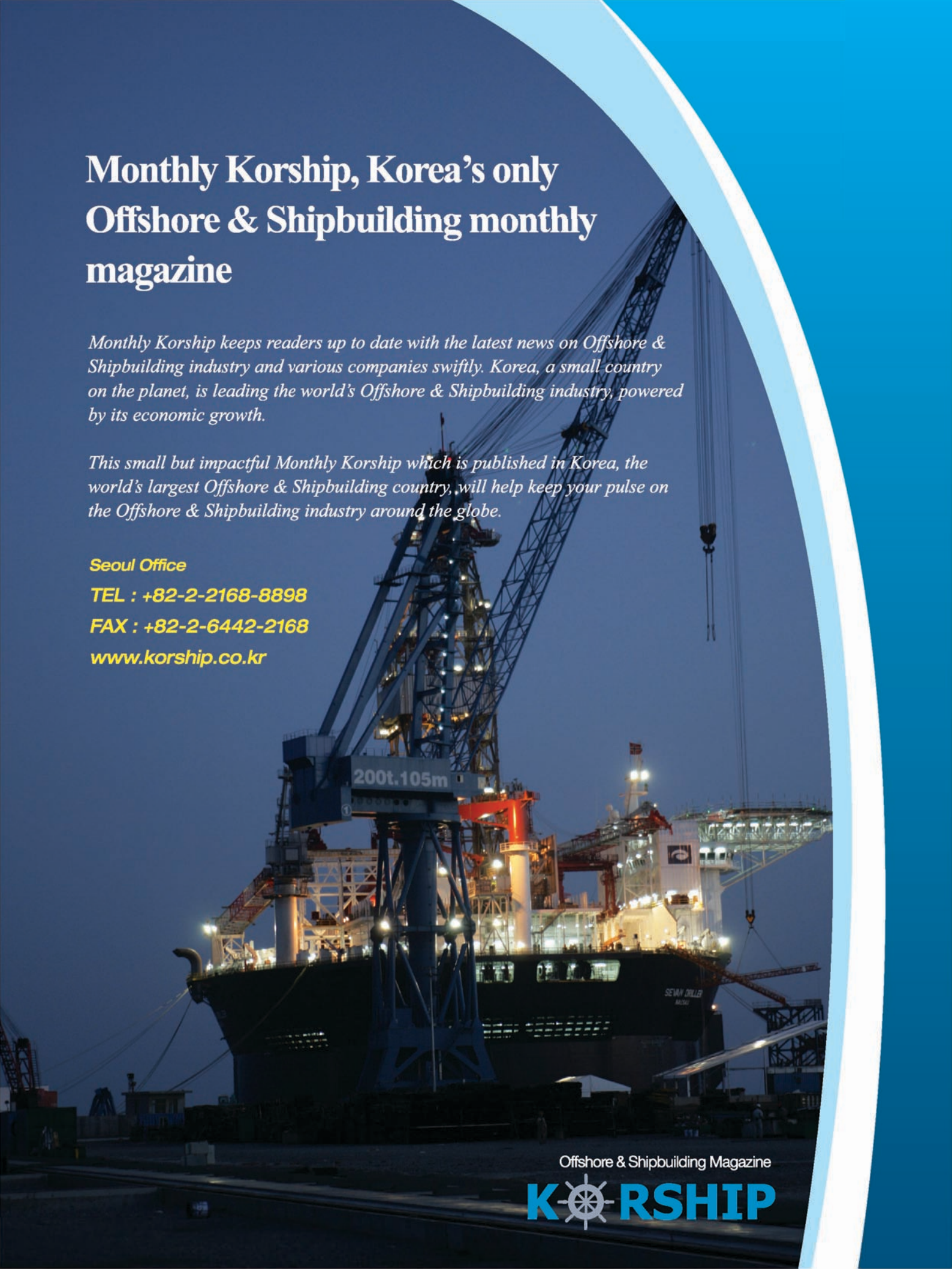
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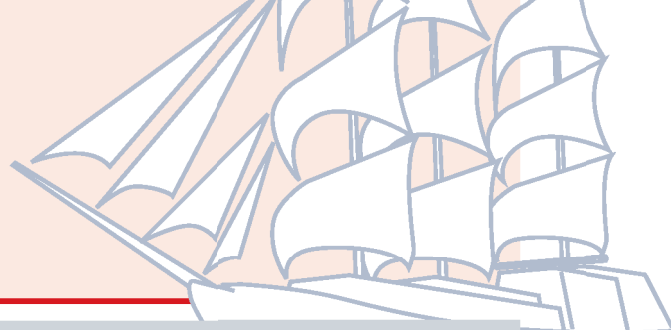
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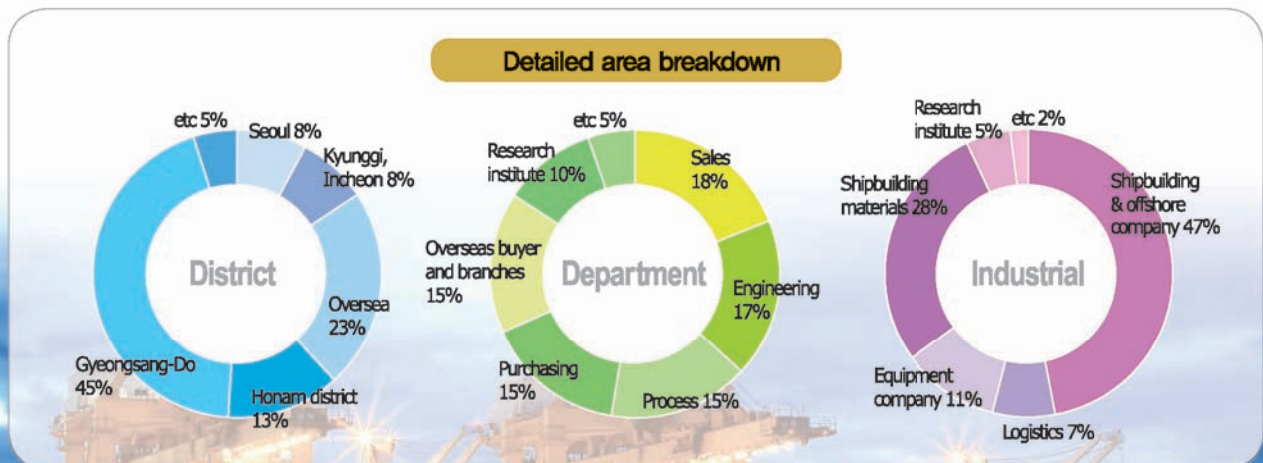
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Pursuit of Innovative Growth in Domestic Shipbuilding Industry

- Focusing on large vessel repair & retrofit industry

< Editor's Note >

There is a heightened interest in repair and retrofit of large vessels in the midst of rising fleet capacity and rapid expansion of retrofit market in response to stringent environmental regulations, unlike the newbuilding market that has been confronted with persistent recession and restructuring. Large vessel repair & retrofit needs to be promoted again to utilize idle facilities, maintain skilled workforce, secure eco-friendly market, safeguard LNG-related technology, acquire shipbuilding technology from repair & retrofit processes, and prevent outflow of foreign currency from national flag carriers. For that, the repair market needs to be restored with a focus on national ocean-going shipping companies, shipping companies sailing into major domestic ports, clients of large shipyards, and eco-friendly marine equipment customers. Competitive advantage, differentiated from Chinese and Singaporean shipyards, will be able to be secured through repair of technologically challenging LNG-related vessels and retrofitting of eco-friendly equipment. Price competitiveness, as well as high quality, should be achieved by using the facilities that have remained idle as a result of restructuring in shipbuilding industry and by tapping into highly skilled workforce. Another new opportunity will be created to bolster innovative growth and competi-

tiveness of domestic shipbuilding industry based on customer satisfaction and technological perfection when the ship repair & retrofit industry is rebuilt and promoted.

*Lee Eun-Chang,
Associate Research Fellow,
System Industry Lab,
Korea Institute for Industrial Economics & Trade(KIET)*

1. Large vessel repair & retrofit industry thrust into limelight again

Vessels are required to undergo interim inspection between regular inspections every 5 years as set forth by the IMO(International Maritime Organization) for safety and reliable operation. The ship repair industry refers to the industry that not only urgently repairs damage but also inspects and repairs the vessels anchored at the dock during interim inspection between regular inspections. As ship inspection and repair occur at shipyards, some shipyards specialize in repairs while others carry out both repair and newbuilding. Korea was once recognized as the world's best and largest ship repair powerhouse. However, most shipyards have discontinued repair of mid and large-sized vessels while focusing on stable and profitable newbuilding markets. Particularly, Korean shipping companies had no choice but to rely on Singaporean or Chinese ship repair yards when Hyundai Mipo Dockyard ceased the ship repair operation in 2004.

The ship repair yard business has rarely been discussed so far due to its weak cost competitiveness. In Korea, only a village called "Kkangkkangi" in Busan Port is famous for repair of small vessels, such as fishing boats or tug boats, along with the area adjacent to Gamcheon Port. It is just that people occasionally talk about the need for ship repair yard complex that can be built mainly around major ports. However, there has been a growing interest in rein-

vigorating the ship repair yard business to bring balance to industrial ecosystems amid drastic and prolonged recession in newbuilding market and ongoing restructuring in shipbuilding industry.

The increasing interest in ship repair yard business is driven by these factors:

First, the ship repair yard market is expanding due to the fleet capacity which increased rapidly in the newbuilding market during the ultra-boom years.

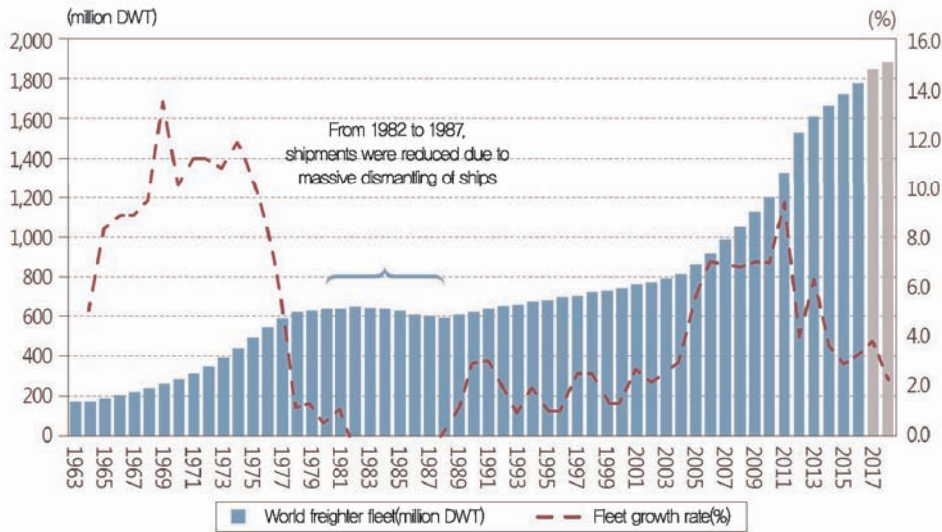
Second, ship repair yard business is considered as a measure to use the idle facilities that can be otherwise disposed of at low prices and to retain the shipbuilding technicians who have the accumulated know-how and skill.

Third, it is important to maintain the marine equipment and ship supply market which has been shrunk rapidly, along with newbuilding, from the perspective of shipbuilding ecosystem.

Fourth, the market for eco-friendly equipment installation and propulsion system retrofitting, as well as ship repair, is being created rapidly amid enforcement of ever-more stringent global environmental regulations.

Fifth, Korean shipping companies can reverse the ship repair costs, which they paid to overseas ship repair yards, back to Korea,

Sixth, technology can be developed for building even better newbuilding vessels based on the information obtained from repair of vessels.



<Fig. 1> Global trend of ship capacity and outlook

<Source: Martin Stopford(2017), "Global Shipping & Shipbuilding Markets Overview & Outlook", Capital Link 1, Clarkson Research>

Orient Shipbuilding already has track records in repairing the LNG carriers in order to operate shipyards. Samkang S&C, which acquired STX Goseong Shipyard, is carrying on its business with an aim of repairing and retrofitting large vessels.

Yeosu Ocean has become capable of repairing medium-sized vessels by expanding the facilities. Therefore, this article was intended to look into current status of global repair & retrofit industry and its outlook and to examine the factors that need to be considered by Korean shipyards in placing their focus again on repair and retrofit of large vessels.

2. Analysis of current global market for ship repair & retrofit

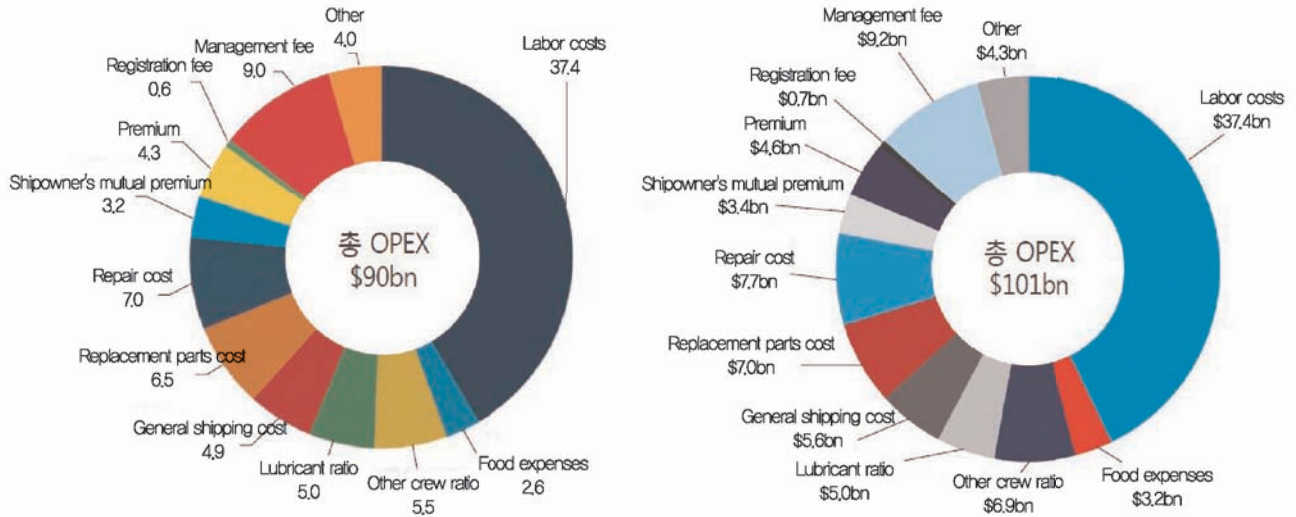
(1) Estimation of global ship repair market size

The size of global ship repair market can be deemed proportional to the number of currently operational vessels(capacity). No significant change in global capacity had occurred since the oil shock. However, global shipbuilding market witnessed rapidly rising capacity amid

ultra-boom of shipbuilding industry and the game of chicken that continued in global shipping market. Global capacity jumped from 1 billion DWT in 2007 to more than 1.8 billion only after a decade. There has been a sharp increase in the number of vessel requiring repair as the newbuilding market that enjoyed ultra-boom is now reeling from severe order drought.

According to Clarkson, global ship repair market was worth USD 7.7 billion in 2016, growing by USD 700 million from 2013 only in 3 years. The average ship repair cost per unit stood at approximately USD 145,000 based on 53,000 units of vessels recorded in 2016.

Ship repair yards are projected to be worth USD 4.34 billion yearly, which can repair vessels, each with a capacity of at least 1,000GT, among major ship types such as bulk carrier, tank carrier, containership, and LNG carrier. The costs incurred to ship repair yard increased by as much as 7.8% from the previous year in 2015, but fell 4.2% in 2016(Kim Hyeong-Gu, et. al(2017)). That is driven by the efforts of shipping companies to save on costs of services or equipment and materials when the market conditions



<Fig. 2> Operating cost structure of shipping industry in 2013(left) and 2016(right)

<Source: Steve Gorden(2014), "Shipping Market Overview: Presentation to Maritime HR Forum 8th", Clarkson Research., Steve Gorden(2017), "Shipbuilding Market : Constant Change", Clarkson Research

Note: Based on about 50,000 units in 2013 and about 53,000 units of cargo carriers in 2016 worldwide>

<Table 1> Global repair market size by major ship type

	Capacity (no. of vessels)	Size of after-market per vessel(Unit: USD 10,000)	Share of ship repair yard (%)	Size of ship repair yard per vessel(Unit: USD 10,000)	Size of ship repair yard(Unit: USD 100 million)
Bunk carrier	11,226	49	34	16.7	18.7
Tank carrier	6,634	67	32	21.4	14.2
Containership;	5,230	56	29	16.2	8.5
LNG carrier	531	103	37	38.1	2.0
Total	23,621				43.4

<Source: Data compiled by the Korea Institute for Industrial Economics & Trade(KIET) based on the Drewry 2015(Kim Hyeong-Gu, et. al(2017)), "Measures for Entry into Global Marine Equipment After-Market", Korea Marine Equipment Association(KOMEA). Re-cited, and data from July issue(2018) of Clarkson World Shipyard Monitor>

worsen. Nonetheless, capacity continues on its upward trend, and as a result, the ship repair market is likely to expand gradually. The largest ship repair market has been formed in the bulk carrier sector which has the largest capacity. The capacity per unit of vessel is the largest in the LNG carrier sector, followed by the tank carrier sector.

(2) Market size in global ship retrofit industry

Ship retrofit market has been formed amid enforcement of ever-more stringent environmental regulations set forth by

the IMO(International Maritime Organization). Such trend was set first in the market for retrofit BWTS(Ballast Water Treatment System). The regulation requiring on-board BWTS, scheduled for enforcement from September 2017, was postponed for 2 years. As a result, retrofit BWTS installation should be completed by the date of regular inspection occurring after September 2019. Clarkson reported that about 4,700 vessels had the BWTS installed onboard, as of November 2016, and predicted that about 29,000 vessels would need to be retrofitted with BWTS. In



In addition, the data published by Clarkson showed that about 5,800 vessels were recently retrofitted with BWTS while 24,000 vessels would need BWTS installed onboard. For the upcoming period less than a year, about 1,100 vessels are expected to have the BWTS installed onboard. Even if 1,000 to 2,000 vessels are to be retrofitted with BWTS by 2019, about 20,000 vessels need to have the BTWS installed onboard. For existing vessels, the market will be opened for retrofit BWTS on about 4,000 vessels yearly in the next 5 years. Despite the variation in BWTS installation costs, depending on the size and type of vessels, the engineering costs and labor cost incurred to shipyard from BWTS installation are estimated at KRW 1 billion to 2 billion.

Therefore, the retrofit BTWS market worth approximately KRW 6 trillion yearly is expected to be formed in the next 5 years. Moreover, the regulation on exhaust gases will be strengthened after 2020. Due to the sulfur oxides included in the fuel, shipping companies need to use low-sulfur oil or install scrubbers on board vessels. Clarkson predicted that about 4,500 vessels will be retrofitted with BWTS by 2025, although only 232 vessels were outfitted with retrofit scrubbers as of November 2017. The market is expected to be created for retrofit scrubbers on 500 vessels yearly, given that scrubbers will be mounted on new-build vessels ordered before 2020 and on the assumption that retrofit demand will arise in full scale from 2019.

Meanwhile, OPEC(Organization of the Petroleum Exporting Countries) predicted that scrubbers would be installed on board about 2,500 vessels by 2020 and 4,500 vessels by 2022. In that case, demand is expected to be created for installation of scrubbers on board 1,000 vessels each year.

A market worth KRW 1-2 trillion yearly is expected to be created, given that engineering costs and labor cost incurred to shipyard from scrubber installation are estimat-

ed at approximately KRW 2 billion. The dock fee can be reduced dramatically when vessels are retrofitted with both scrubber and BWTS compared to when either of two is installed. Therefore, the market worth KRW approximately 7 trillion yearly is expected to be created for retrofit BWTS and scrubber in the next 5 years. The figure suggests that retrofit scrubber and BWTS market can outstrip the ship repair yard market. However, there is an overlap between the two markets because most vessels will be retrofitted with scrubber and BWTS during regular inspection(or interim inspection) of vessels. Retrofitting will have a significant impact on the ship repair yard market for the next 5 years or so. Another way to ensure compliance with the SOx emission regulation, in addition to scrubber, is to convert vessels into LNG-fuelled vessels. Currently, 70% of the 369 vessels that can operate on LNG(Liquid Natural Gas) as fuel are LNG carriers, while cruise ships and offshore support vessels which operate mostly in Europe comprise 13% and 7%, respectively, and other types comprise the remaining 10%. The data published by Clarkson show that the number of vessels that could use LNG as fuel would increase to 1,500 by 2024. The market expansion is expected to be driven by newbuilding vessel, rather than the trend towards retrofitting existing vessels to operate on LNG as fuel, given the inadequate foundation for LNG bunkering, high retrofitting costs, and ever-more stringent regulations curbing CO2 emissions from newbuilding vessels after 2020.

The retrofit market includes the segments that have seen conversion of oil tanker to FPSO and conversion of LNG carrier to FLNG(LNG-FPSO) or FSRU, in addition to engine retrofitting that aim to install eco-friendly facilities onboard or change the fuel used to power the vessels. Offshore plant retrofits, performed mostly by Singaporean shipyard, often involve projects that are huge and take several years to complete. For instance, FPSO retrofitting

<Table 2> Size of global ship retrofit market for major items

	No. of vessels targeted yearly	Annual size of market	Remark
BWTS	4,000 vessels	About KRW 6 trillion	For 5 years between 2019 and 2024
Scrubber	500 to 1,000 vessels	About KRW 1-2 trillion	Short-term boom around up to 2020
Retrofit Offshore Plant	6~9 units	KRW 5-6 billion	

<Source: Compiled by the Korea Institute for Industrial Economics & Trade(KIET) based on various market-related data>

<Table 3> Comparison between ship repair yard business and newbuilding business

	Ship repair yard business	Newbuilding business
Facilities	Small-scale equipment, high turnover rate of dock, long quay wall	Large-scale production equipment and worksite
Sales	On-site sales targeting the shipping routes and ports	Targeting the whole world
Technology	Focus on on-site management	Advanced design, production, and materials management
Production Management	Internal contract and direct-run system; schedule management based on navigation schedule	Based on outsourcing; importance of production schedule management
Collection	Payment made upon completion of works; short-term	Progressive payment based on contract; long-term
Cost Structure	Material costs: 20%, labor costs: 50%	Material costs: 60%, labor costs: 20%
Profitability	About 15 to 25%	About 5 to 15%

<Source: Song Ha-Cheol, et al(2010), "Analyses on the international competitiveness of Korean ship repair yard industry", Journal of Korean Navigation and Port Research, Vol. 34, issue no. 10, pp.799~805>

takes 50-80% of costs compared to newbuilding FPSO. In the FPSO segment, FPSO retrofitting comprises about 60% of all FPSOs or roughly 50% of whole amount. An annual demand for approximately 6-9 retrofit FPSOs worth USD 5-6 billion can be expected, considering that FPSO market will be created for 10-15 FPSOs worth about 10-12 billion yearly.

3. Characteristics of ship repair/retrofit industry & cases in Singapore

(1) Characteristics of ship repair/retrofit industry

Shipping companies can create profits from operation of additional vessels as the time taken for inspection and repair shortens. Usually, it takes 1 to 2 weeks for inspection and repair at shipyards, and 1 to 2 months to complete installation of eco-friendly facilities on board vessels.

It is essential to shorten the time taken for repair and inspection at ship repair yard because the time frame is short and schedule adherence is crucial. In addition, it is very important to form the hinterland for repair of parts and procurement of various materials in order to meet schedule. As ship owners provide important equipment and supplies, labor costs account for as much as 50% of total costs.

The ship repair yards need highly responsive workforce to cope with emergencies at the sites, unlike the newbuilding industry which requires a highly specialized and structured workforce. While large facilities are used to increase productivity in newbuilding industry, the ship repair yard industry does not need large-scale cranes because only the materials for repair have to be lifted.

However, repair ship yards need to increase the turnover



<Fig. 3> Sales(unit: SGD 1 billion) and employment(unit: 10,000 persons) trends in maritime industry of Singapore

<Source: Association of Singapore Marine Industries>

rate of dock and to have a long quay wall for repair of many ships. Ship repair business tend to have more stable and higher profitability, compared to newbuilding business, because ship repair yards receive payment for works that can be often completed in a short time frame and do not have to purchase expensive equipment. Shipping companies have to focus on the routes or ports because ship repair yards are located on the shipping routes. With the exception of emergency repair, fixed customers are very important because the market is predictable based on inspection period.

(2) Cases of ship repair yard industry in Singapore

Singapore is the country that has benefited most from the pullout of large Korean companies from ship repair yard business. Singapore has repaired the U.K. warships since it was a British colony, and has the industry that has been developed while repairing the vessels passing through the Malacca Straits, a key route adjacent to Singapore. Singapore is the second-largest port city in the world, which processed 33.6 million TEUs in 2017, and can use

low-wage workers from neighboring countries. Despite very hot and humid climate, Singapore has not seen any typhoon or monsoon season, which makes it easy to manage the repair schedule. In addition, Singapore is home to Asia Pacific headquarters of major shipping companies in the world as the country provides convenience such as bunkering of ships at low prices and hinterland that facilitates procurement of supplies and many different equipment and materials.

Meanwhile, the adverse impact on maritime business linked to oil prices could not be avoided even by Singapore. As the offshore plant rig market worsens and competition with Chinese rivals become intensified, the sales in maritime industry slid 11.3% year-on-year to SGD 13.060 billion in 2016. Along with that, as many as about 24,000 jobs were lost, compared to 2013. However, the repair and retrofit sector has grown to SGD 4.57 billion, accounting for about 35%, and showing a stable performance. The number of ships repaired in Singapore in 2016 was 3,762, down 9.2% from 4,141 in 2015, and bulk carriers are reportedly being repaired in China due to cost

<Table 4> Major facilities at Admiralty Yard of Sembcorp Marine

Facilities	Dock Type	Dimension	Capacity(DWT)
Premier	Dry Dock(Graving Dock)	384m×64m×8.5m	400,000 tons
President	Floating Dock	290m×48m×8.5m	150,000 tons
King George IV(KG VI)	Dry Dock	303m×39.6m×13.1m	100,000 tons
Republic	Floating Dock	202.3m×42m×10.3m	60,000 tons
KFD	Floating Dock	230m×35m×7.3m	65,000 tons

<Source: Sembcorp Marine>

issues. In addition, shipping companies' efforts to reduce repair costs amid downturn in shipping market have had a negative impact on other vessel segments. Despite the decrease in the number of vessels repaired, steady sales have been achieved through repair of high value-added vessels.

Among the most prominent ship repair yards are included Singapore Sembcorp Marine and Keppel O&M. Sembcorp Marine's sales from ship repair sector reached SGD 471 million(approximately KRW 376.8 billion(KRW 800/SGD, as of December 28, 2017)) In 2017, Sembcorp Marine repaired 390 vessels and achieved SGD 1.21 million(about KRW 1 billion won) in sales per ship.

Sembcorp Marine's ship repair works are carried out mainly in Admiralty Yard(Sembawang Yard) where two dry docks and three floating docks can be used to ensure efficient repair of various types of vessels. The company can repair even cruise ships, using its dry dock with water depth of 13.1m. In addition to the dock, Sembcorp Marine has a 2.7km-long qua wall that allows repair and retrofit of multiple vessels. Major types of vessels repaired by Sembcorp Marine include LNG carriers, cruise ships, tankers, offshore plants, and naval vessels. The competitive edge of Singapore's ship repair yards has sharpened even more by active government support and low labor costs, as well as the advantages such as routes used by any vessels due to the country's location at the entrance

to the Strait of Malacca, presence of large-scale repair yards with extensive experience, world's major ports, shipping routes and hinterland. Singapore government is providing unsparing support to shipbuilding and maritime industry, which it considers as the key industry, including the financial support to buttress beleaguered shipbuilding and maritime industry. Furthermore, Singapore government is investing heavily to induce related industries to be concentrated in the TUAS zone which is to be separated from residential area over the long-term in an attempt to promote stable growth of the industry.

Special benefits are provided to the maritime industry to help maintain labor cost competitiveness. Singapore government imposes lower levy on foreign workers than those in other industries to help domestic shipbuilding and maritime industry maintain labor cost competitiveness, given that Singapore is competing with other countries, such as Malaysia and Indonesia, in the field of ship repair yard. As Singapore government allows recruitment of 3.5 foreigners per Singaporean employee, Singaporean repair ship yards can fully use the cheap labor from India and Bangladesh.

For repair of bulbous bow of 120m bulk carrier, for example, the manpower consists of a Singapore manager with PM function and about 20 Indian workers performing works on 24-hour basis.



<Table 5> Current national ocean-going commercial fleets by major vessel types(as of late 2017)

	No. of Vessels	GT(Gross Tonnage)	Average GT
Bulk Carrier	246	14,827,868	60,276
Ore Carrier	32	3,871,414	120,982
PCTC(Pure Car Truck Carrier)	61	3,664,596	60,075
Full Containership	144	4,545,089	31,563
Crude Carrier	54	6,548,020	121,260
LNG Carrier	25	2,563,231	102,529
Total	562	36,020,218	-

<Source: Korea Shipowners' Association 「2018 Shipping Statistics」>

4. Recommendation for reconstruction of Korea's ship repair & retrofit industry

(1) Market conditions and targeted areas

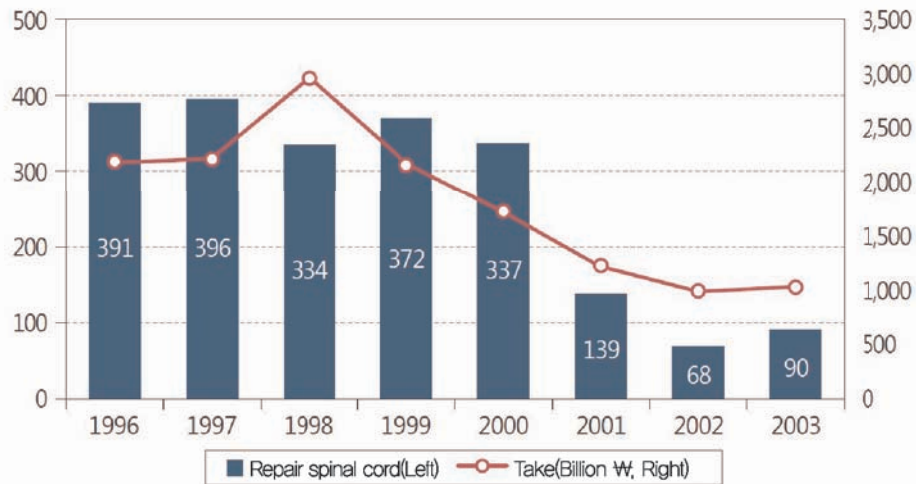
It is no exaggeration to say that there is almost no large-scale ship repair market in Korea except for repair market for small vessels operating in coastal waters. Orient Shipbuilding and Samkang S&C, the ship repair yards, recorded sales of KRW 39.8 billion and KRW 40.7 billion in 2017, respectively. The sales amount related to repair of national flag LNG carriers are considered to have been achieved with government support at policy level(pursuant to the law(October 31, 2016) requiring 20% of national flag LNG carriers to be repaired domestically). At ship repair yards, repair schedules are set in advance. Therefore, sales results can show up at least a year later even if ship repair yards go ahead with sales activities in full scale.

The repair markets that can be opened up in Korea are presented below for each type of vessel. Bulk vessels are more likely to be repaired in China because repair is usually performed at the ports where vessels are chartered or re-delivered or at the location where repair cost is low. However, national shipping companies may have their vessels repaired at Korean yards if there is a price advan-

tage in light of the time taken to bring the vessels to Chinese yards for repair. LNG carriers are repaired at Singaporean shipyards on their way to the Middle East to be loaded with the LNG if the clients are Korean or Japanese shipping companies. Therefore, the demand can be created in Korea. The final destinations of containerships can be Korean ports, and in such a case, the vessels are mostly national flag carriers. Among the vessels, each with average tonnage of more than 30,000 tons, in the fleets owned by national ocean-going shipping companies, bulk carriers tops the list of vessels in terms of quantity, followed by containerships, PCTCs(Pure Car Truck Carriers), crude carriers, ore carriers, and LNG carriers. If some bulk carries and containerships are excluded, Korean ports are more likely to be the final destinations.

Even when the bulk carriers repaired mainly at Chinese yards and crude carriers repaired at yards in Singapore and the Middle East, approximately 260 vessels can be the primarily targeted for repair. If the inspection occurring twice every 5 years is taken into consideration, the market for repair of about 100 vessels yearly may be created.

Meanwhile, Hyundai Mipo Dockyard, which had carried on ship repair business for overseas customers since late



<Fig. 4> Repair performance of Hyundai Mipo Dockyard

<Source: DART(Data Analysis, Retrieval and Transfer) System of Financial Supervisory Service>

1990s, repaired nearly 400 vessels at its 4 docks, reporting KRW 500 to 600 million in sales per unit of vessel. Considering Hyundai Mipo Dockyard's domestic sales comprised roughly 20%, more than 300 vessels for repair are from overseas shipping companies. Given the outlook for growth comparable to that of Busan Port and the increase in global fleet capacity, the market will be able to recover to the previous level. As retrofitting works take longer than repair at the yard, low costs are also important. Modification work is more important than repairing because the operation period in shipyard is longer. However, it may be also important to shorten duration of works and secure technologies. Therefore, quality may be the goal in the market for tanker and containership retrofitting. In addition, it would be necessary to attract customers to retrofit market that will be created in the next 5 years and to maintain business through repair of LNG-related vessels requiring advanced technologies based on the acquired customer base after the retrofit market shrinks drastically. Furthermore, retrofit of vessels into FPSO, FLNG, FSRU, etc., which also require advanced technologies, would help bring the vessels to targeted market.

(2) Differentiated competitiveness over rival countries

Korean needs to sharpen its competitive edge over rival countries because simple presence of market does not mean that the repair and retrofit business can be carried in the nation. That is because bulk carriers market is dominated by China while the market for other vessels and retrofit are dominated by Singapore. China has competitive advantage in terms of price, and Singapore is better positioned than Korea in terms of various aspects such as climate, route, hinterland, and price. Therefore, it is necessary to secure price competitiveness in terms of differentiated technological advantage over China and Singapore, shortened travel time taken for repair and retrofitting works, and price competitiveness in repair and retrofitting process, etc.

First, the market for LNG-related vessels can be targeted to secure technological advantage. For repair of LNG carriers in Singapore, Korean engineers and skilled workers in the field of LNG carriers are needed. Malaysia's MMHE carried out the repair of LNG carriers built by Samsung Heavy Industries(SHI), although the contract has currently expired, and for that, required constant engineer support



from SHI. Korean repair yards can secure adequate manpower in Korea and have sufficient infrastructures and capacity as the nation is a world's leader in newbuilding LNG carrier sector.

Second, ship retrofitting represent the area in which Korea can provide differentiated services bolstered by the leading technologies and quality. Samkang S&C recently announced that it entered into a contract worth about KRW 29 billion(KRW 4.8 billion won per unit) for a retrofitting project aiming to install scrubbers on 6 vessels operated by Singaporean shipping companies. Considering that, Korean yards are expected to be able to win retrofit orders from overseas shipping companies operating in seaways adjacent to Korea. The demand for retrofit has increased, led by blue-chip customers of large shipyards. Retrofit services can be provided for vessels owned by major shipping companies, as well as the vessels built by Korean shipyards. As Korean shipyards have drawings of vessels which they built, along with the manpower who can bring their experience, they will be able to provide engineering necessary for retrofitting works more easily. However, all systems in large shipyards are optimized for newbuilding vessels. Using the docks or quay wall for retrofitting works is inefficient and will result in higher costs. Therefore, if large shipyards perform sales activities and engineering and ship repair yards carry out retrofitting works, Korea may be able to compete with neighboring countries.

Third, strategy has to be mapped out and implemented to create an optimal environment and provide tourism, shopping, and entertainment services to ship owners' inspectors and crews, differentiated from those of competing countries. Inexpensive and premium entertainment would need to be provided to about 10 crews, ship owner's inspectors, etc., who have to stay in concerned area during the repair of vessel. Korea, which has relatively better

climate than Singapore, will be able to provide tourism, shopping, and entertainment experience to crews, ship owners' inspectors, etc., mainly in Gyeongnam Province and Busan.

(3) Efficient installation of facilities for large vessels

For the repair of large vessels, suitable facilities, such as dock, quay wall, and crane, etc., are needed. Unlike the facilities used for newbuilding, ship repair yards require quay wall and crane. Ultra-large cranes used to increase efficiency in newbuilding are not used. Ship repair yards only need to be furnished with facilities capable of lifting the equipment necessary for retrofitting works, along with equipment necessary for repair. More quay walls are needed for repair and retrofit than newbuilding. It is important to put quay walls in place, which are less costly than the quay walls used for newbuilding and allow many vessels to be moored. Docks used for repair and retrofit are not different from those for newbuilding, but have to be configured in such a way that efficiency of repair works can be increased. For LNG carrier with a length close to 300m, dock should be measured more than 300 in length. The Triple-E Class ultra-large containership of Maersk has a length of 400m. Therefore, a 400m-long dock is required to repair a 20,000 TEU containership. For dry dock, it is necessary to consider available floating dock because massive investment of several hundred billion won(Korean currency) is required. The newbuilding price of 400m or longer float dock was priced at KRW 150 billion during the boom period. The 386m-long floating dock of STX Heavy Industries was sold for KRW 30 billion.

About 50 vessels can be repaired yearly with a single dock. Up to 100 vessels can be repaired if a dock provides the efficiency same as that of the dock used by Hyundai Mipo Dockyard in the past.

As it is inefficient to repair small and medium-sized vessels in a large dock, a 200-300m dock would be needed to carry out repair of small and medium-sized vessels. Therefore, 2 ship repair yards with 4 or more docks or at least 2 docks are required for repairing various vessels and ensuring the scale same as that of repair at Hyundai Mipo Dockyard in the past. If even retrofit market is considered, more ship repair yards, docks and quay walls would need to be taken into account.

5. Measures for rebuilding the large vessel repair & retrofit industry

Korea's large vessel repair retrofit industry can be considered from the perspective of innovative growth and competitiveness in shipbuilding industry. In addition to response to the vessel retrofit market emerging in the short and mid-term, utilization of idle facilities and maintenance of skilled shipbuilding workforce, Korea also has to maintain its unrivalled competitiveness in the fields of LNG-related vessels and propulsion systems and prevent leakage of technology. As the profitability also needs to be considered, measures should be mapped out to promote growth of industry based on minimal investment. As for the equipment and manpower, the facilities and manpower of idle shipyard in the wake of restructuring should be used actively. Besides, a system has to be established which allows current experts in ship repair, previous ship repair yard personnel, skilled workers, who emerge from restructuring process of shipbuilding industry, to work in large ship repair industry, while creating the worksite for repair on related land and forming the hinterland enabling the procurement of equipment and materials. From the standpoint of market and competitiveness, basic orders need to be secured for repair and retrofit with a focus on LNG carriers and tankers of national flag carriers and containerships routed through Busan Port. A network of coop-

eration, linking the shippers, shipping companies, and ship repair yards, needs to be built and promoted at policy level, so that markets can be formed directly for large-scale gas carriers, tankers, and containerships, including 25 LNG carriers operated by Korean shipping companies. For overseas markets, one can consider the market for after-sales services of vessels built by Korean shipyards, LNG carriers and LNG-related vessels of neighboring countries, and vessels routed through Korea' major ports, i.e. Busan Port, and major eco-friendly equipment. To build up competitiveness, technologies need to be developed to shorten the time taken for repair and retrofit while focusing on the market for LNG-related vessels and retrofit which require advanced technologies. For that, large shipyards, ports, eco-friendly equipment manufacturers should join aforesaid network of cooperation. If the repair and retrofit clusters are created for medium and large-sized vessels by using the idle facilities and workforce which result from restructuring, both production and employment will be promoted in the ship product and tourism industries, as well as ship repair and retrofit industry. That will ultimately lead to innovative growth and even sharper competitive edge of domestic shipbuilding industry.

<The opinion contained in this article present the author's viewpoint.>



국내 조선산업의 혁신성장 모색

-대형선박 수리·개조산업을 중심으로

〈편집자주〉

장기간 시황침체와 구조조정에 놓인 신조시장과는 다르게 선복량의 증가, 환경규제에 따른 개조시장의 급격한 확대로 대형선박의 수리·개조산업에 대한 관심이 높아지고 있다. 유휴설비 활용과 숙련공 유지, 친환경 시장 확보, LNG관련 기술보호, 수리·개조를 통한 조선기술 확보, 국적선사의 외화유출 방지를 위해 대형선박의 수리·개조산업을 다시 육성할 필요가 있다. 이를 위해 우선 국적 외항선사, 국내 주요 항만에 입항하는 선사, 대형조선사의 고객, 친환경 기자재 고객사를 중심으로 수리시장을 다시 복원해야 한다. 기술력을 요하는 LNG 관련 선박의 수리와 친환경 기자재 개조를 통해 중국·싱가포르와도 차별화된 경쟁이 가능할 것으로 보인다. 조선산업 구조조정으로 발생한 유휴설비와 기량 높은 인력을 최대한 활용하여, 품질은 물론 가격경쟁력도 확보해야 한다. 선박수리·개조산업을 재건하고 육성한다면 고객만족도와 기술완성도를 높여, 궁극적으로 국내 조선산업의 혁신성장을 도모하고 경쟁력을 강화할 수 있는 또 하나의 새로운 계기가 될 것으로 판단된다.

산업연구원 시스템산업연구실 이은창 부연구위원

1. 다시 주목받고 있는 대형선박 수리·개조산업

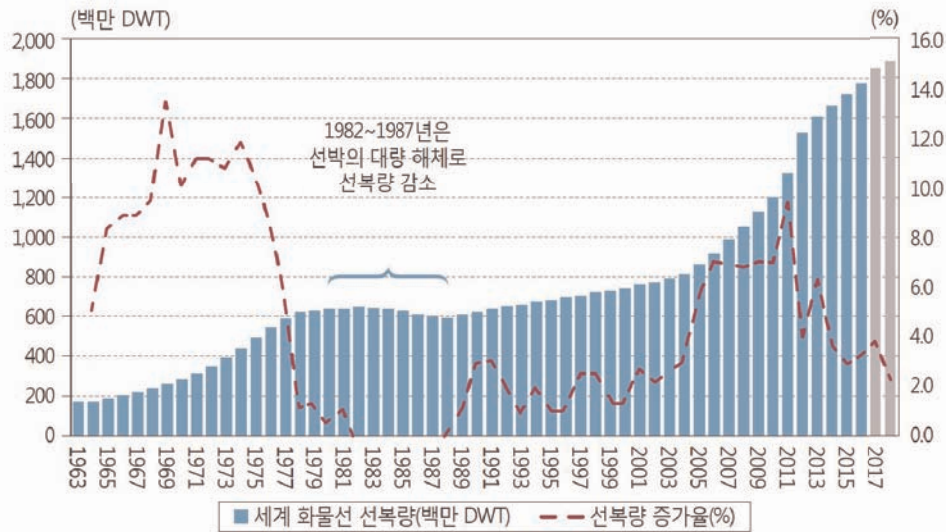
선박은 인명의 안전과 신뢰도 있는 운항을 위해 IMO(국제해사기구)에서 규정한 바와 같이 매 5년마다 정기검사와 정기검사 사이에 중간검사를 받아야 한다. 수리조선산업은 선박의 파손에 의한 긴급한 수리뿐만 아니라 정기·중간 검사 시에 선박을 도크에 안치하여 검사를 진행하고 수리하는 산업이다. 선박의 검사와 수리는 조선소에서 이루어지므로, 수리를 전문으로 하는 조선소도 있고 수리와 신조를 동시에 하는 조선소도 있다. 한 때 우리나라는 세계 최고·최대의 수리 조선 국가로 인정받던 시기가 있었다. 하지만 대부분의 조선업체들이 시황과 수익성이 좋은 신조선 시장에 집중하면서 중대형선박의 수리조선 사업을 중단했고, 특히 2004년 현대미포조선이 수리조선 사업을 중단하면서 우리나라 해운사는 대형선박의 수리를 위해서 싱가포르나 중국으로 가야 했다.

수리조선 사업은 원가경쟁력에서 밀린다는 이유로 지금까지 거의 논의되지 않았다. 수리조선이라고 하면 감천항 주변이나 여선·예인선 같은 소형선박을 수리하는 부산항의 강강이마을이 유명할 뿐 주요 항만을 중심으로 수리조선 단지가 필요하다는 이야기만 종종 나

온다. 하지만 신조 시장이 급격하고 긴 불황에 빠지고 조선산업의 구조조정이 진행되면서 산업생태계 균형화 측면에서 수리조선산업을 되살려야 한다는 목소리가 나오고 있다.

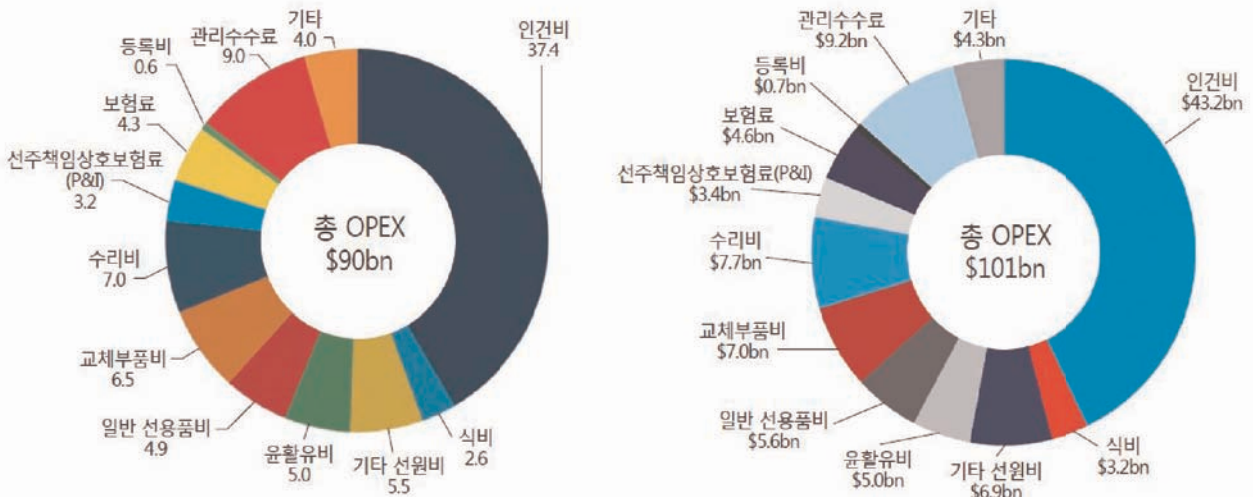
수리조선에 대한 관심에는 다음과 같은 이유가 있다. 첫째, 신조선장의 초호황으로 급격히 증가된 선복량에 의해 수리조선 시장이 확대되고 있기 때문이다. 둘째, 노하우와 기량이 축적된 조선 기술자를 유지하고, 헐값에 매각될 수 있는 유휴설비를 활용하는 방안으로 수리조선을 고려하고 있다. 셋째, 조선산업 생태계 측면에서 신조와 함께 급격히 축소되는 조선기자재와 선용품 시장의 유지를 위한 시장창출도 중요하다. 넷째, 세계적인 환경규제 강화로 선박 수리뿐만 아니라 친환경 설비의 장착이나 추진시스템의 개조를 위한 시장이 빠르게 형성되고 있다. 다섯째, 수리를 위해 우리나라 선사들이 해외 수리조선소에 지불하는 비용을 다시 국내로 환입할 수 있다. 여섯째, 선박의 수리를 통해 얻은 정보를 활용하여 더 좋은 선박을 신조할 수 있는 기술개발이 가능하다.

이미 오리엔트조선은 조선소 운영을 위해 LNG 운반선을 수리하는 실적을 쌓기도 했고, STX고성조선소를 인수한 삼강S&C는 대형선박의 수리와 개조를 목표로 사업을 추진하고 있다. 여수해양도 설비



〈그림 1〉 세계 선박량 추이 및 전망

〈출처: Martin Stopford(2017), "Global Shipping & Shipbuilding Markets Overview & Outlook", Capital Link 1, Clarkson Research〉



〈그림 2〉 2013년(좌)과 2016년(우)의 해운산업 운영비 구조

〈출처: Steve Gorden(2014), "Shipping Market Overview: Presentation to Maritime HR Forum 8th", Clarkson Research., Steve Gorden(2017), "Shipbuilding Market : Constant Change", Clarkson Research

주: 2013년은 약 5만척, 2016년은 약 5만 3,000척의 세계 화물선 기준)

확충을 통해 중형선박의 수리도 가능한 수준이 됐다. 따라서 본고에서는 세계 선박 수리·개조산업의 현황과 전망을 살펴보고, 우리나라에서 다시 대형선박의 수리·개조산업을 중점적으로 추진하기 위하여 고려해야 할 요인들에 대해서 분석하고자 한다.

2. 세계 선박 수리·개조 시장 현황 분석

(1) 세계 선박 수리시장 규모 추정

세계 선박 수리시장은 운항되고 있는 선박(선박량)에 비례한다고 볼 수 있다. 세계 선박량은 오일쇼크 이후 큰 변화가 없다가 조선산업의 초호황기와 해운사의 치킨게임의 거치면서 급속도로 증가했다.



표 1) 주요 선종별 세계 선박수리 시장 규모

	선복량(척)	척당 After Market 규모(만 달러)	수리조선 비중(%)	척당 수리조선 규모(만 달러)	수리조선 규모(억 달러)
벌크선	11,226	49	34	16.7	18.7
탱커	6,634	67	32	21.4	14.2
컨테이너선	5,230	56	29	16.2	8.5
LNG운반선	531	103	37	38.1	2.0
합계	23,621				43.4

〈출처: Drewry 2015(김형구 외(2017), "조선해양기자재 글로벌 After Market 진출방안", 한국조선해양기자재공업협동조합, 재인용), Clarkson World Shipyard Monitor 2018.6 자료를 바탕으로 산업연구원 정리〉

2007년 10억톤(DWT) 규모에서 불과 10년 만에 18억톤 이상이 됐다. 신조시장이 초호황과 수주절벽이라는 천국과 지옥을 오가는 동안 수리를 필요로 하는 선박은 급격히 증가했다.

Clarkson에 의하면 전 세계 선박 수리시장은 2016년 기준 77억 달러 규모로 2013년과 비교하면 3년 만에 7억 달러 성장했다. 2016년에는 5만 3,000척의 선박 기준이므로 평균 1척당 14만 5,000달러를 수리비용으로 지출했다.

주요 선종인 벌크선, 탱커, 컨테이너선, LNG운반선 중 1,000GT 이상 크기를 가진 수리조선 규모는 연간 약 43억 4,000만 달러인 것으로 추정된다. 선사기준 수리조선 비용은 2015년에는 전년대비 7.8%나 증가하였으나 2016년에는 4.2% 감소한 것으로 추정된다(김형구 외(2017)). 상황이 악화되면 선사는 서비스나 기자재 비용을 줄이려고 노력하기 때문이다. 하지만 선복량이 꾸준히 증가하고 있기 때문에 선박수리 시장규모는 점진적으로 증가할 전망이다. 한편, 선종별 선박수리 시장규모는 선복량이 최대인 벌크선시장이 가장 크지만 1척당 규모는 LNG운반선이 가장 크고, 탱커가 그 다음을 이고 있다.

(2) 세계 선박 개조산업의 시장규모

IMO의 환경규제 강화로 선박 개조(retrofit)시장이 형성되고 있다. 가장 먼저 시작된 분야는 선박평형수처리장치(BWTS, Ballast Water Treatment System) 시장이다. 2017년 9월 발효 예정이었으나 2년 유예되면서, 해운사는 2019년 9월 이후부터 도래하는 정기검사일까지 BWTS를 장착해야 한다. Clarkson은 2016년 11월 기준으로 약 4,700척의 선박이 BWTS를 장착했고, 2만 9,000척의 선박에 장착이 필요할 것으로 전망했다. 그리고 최근에는 약 5,800척에 설치됐고 2만 4,000척에 장착이 필요할 것으로 발표했다. 1년 남짓한 시간에 1,100척의 선박에 BWTS가 장착된 것으로 보인다. 2019년까지

1,000~2,000척의 선박에 BWTS가 장착된다고 보더라도 총 2만척 내외의 선박에 BWTS가 장착되어야 한다. 기존 선박에 대해 연간 4,000척의 시장이 향후 5년간 열리게 된다. 선박의 크기와 선종에 따라 BWTS 설치비용이 차이가 있겠으나, BWTS에 필요한 엔지니어링 비용과 조선소 공임은 10억~20억원 수준인 것으로 판단된다. 따라서 향후 5년 동안 연간 약 6조원의 BWTS 개조시장이 형성될 것으로 추정된다. 배기가스에 대한 규정도 2020년 이후 강화된다. 연료에 포함된 황산화물 규제로 인해 선사들은 저유황유를 사용하거나, Scrubber의 장착이 필요하다. Clarkson은 2017년 11월 기준으로 Scrubber가 232척에 장착됐으나, 2025년에는 약 4,500척에 설치될 것으로 전망했다. 2020년 이전에 발주되는 신조선선에 Scrubber가 장착되는 것을 감안하고, 2019년부터 개조수요가 본격적으로 발생한다고 가정하면 연간 약 500척 정도의 시장이 예상된다. 한편, OPEC에서는 Scrubber 장착 선박이 2020년에는 약 2,500척, 2022년에는 4,500척이 될 것으로 전망했다. 이 경우에는 연간 1,000척의 수요가 발생할 것으로 보인다. Scrubber 장착을 위한 엔지니어링 비용과 조선소 공임을 약 20억원으로 본다면, 연간 1조~2조원의 시장이 형성될 것으로 판단된다. Scrubber 장착을 하려는 선박은 BWTS를 동시에 설치할 것으로 보이는데, 이 경우에는 별도로 장착하는 것보다는 도크사용료를 크게 줄일 수 있다. 따라서 BWTS와 Scrubber 개조시장은 향후 5년 동안 연간 약 7조원의 규모로 형성될 전망이다. 단순히 수치로만 본다면 수리조선 시장을 능가하는 규모가 될 수 있다. 물론 개조는 선박의 정기검사(또는 중간검사) 때 대부분 실시될 것이므로 수리조선 시장과 겹치는 부분이 있다. 개조는 수리조선 시장에 약 5년간 큰 변동을 줄 것이다. Scrubber 외에 SOx 규정을 만족하기 위한 방법으로는 LNG연료추진 시스템으로의 개조도 가능하다. 현재 LNG연료 사용이 가능한 369척의 선박 중 70%가 LNG운반선이고, 주로 유럽에서 운영하는

〈표 2〉 주요 품목별 세계 선박 개조시장 규모

	연간 대상 척수	연간 시장 규모	비고
BWTS	4,000척	약 6조 원	2019~2024년까지 5년간
Scrubber	500~1,000척	약 1조~2조 원	2020년 내외로 단기간 활황
해양플랜트 개조	6~9기	50억~60억 달러	

〈출처: 각종 시장자료를 활용하여 산업연구원 정리〉

〈표 3〉 수리조선 사업과 신조선 사업의 비교

	수리조선	신조선
시설	소형장비, 높은 도크회전율/긴 안벽	대형 생산 장비 및 작업장
영업	항로, 항구 위주의 현장영업	전 세계를 대상
기술	현장관리 위주	설계·생산·자재 고급 관리
생산관리	내주 및 직영체계, 운항일정에 따른 일정관리	아웃소싱 위주, 생산 일정관리 중요
대금회수	작업 종료 시 입금, 단기	계약기준 진도 배분, 장기
원가구성	자재비 20%, 인건비 50%	자재비 60%, 인건비 20%
수익률	15~25% 내외	5~15% 내외

〈출처: 송하철 외(2010), "한국 수리조선산업의 국제경쟁력 분석", 한국항해항만학회지 제34권, 제10호, pp.799~805〉

크루즈선과 페리가 13%, 해양지원선이 7%, 그 외 선박이 나머지를 차지하고 있다. Clarkson에서는 LNG연료 사용이 가능한 선박이 2024년에 1,500척까지 증가할 것으로 보고 있다. 하지만 LNG병커링 기반 부족, 고가의 개조비용, 2020년 이후 신조선박의 CO2 규제 강화를 고려한다면, 기존에 운항하던 대형선박을 LNG연료 추진선으로 개조하려는 움직임보다는 신조선박에 의한 시장 확대가 예상된다.

개조시장에는 선박에 친환경설비를 장착하거나 사용연료를 바꾸기 위한 기관부 개조 외에도 유조선을 FPSO로, LNG운반선을 FLNG(LNG-FPSO) 또는 FSRU 등으로 바꾸는 시장도 있다. 싱가포르 조선사가 주로 수행하는 해양플랜트 개조시장은 프로젝트별로 규모가 매우 크고 수년 동안의 수행기간을 필요로 한다. FPSO를 예를 들면, 개조 FPSO는 신조에 비해 50~80% 수준의 비용이 소요된다. FPSO시장의 척수 기준으로 약 60%, 금액 기준으로 약 50%가 개조수요로 추정된다. 향후 연간 10~15기, 약 100억~120억 달러의 FPSO 시장이 있다고 전망한다면 6~9기, 50억~60억 달러의 개조시장을 기대할 수 있다.

3. 선박 수리·개조산업의 특성과 싱가포르 사례

(1) 선박 수리·개조산업의 특성

선사는 검사·수리 기간을 단축할수록 추가적인 선박 운영을 통한 수익창출이 가능하다. 통상적으로 조선소에서 수행하는 검사와 수리는 1~2주, 친환경설비 장착에는 1~2개월 정도의 기간이 필요하다. 짧은 기간이므로 일정준수가 핵심이고 수리조선사는 기간을 단축시키는 것이 핵심경쟁력이다. 또한 일정준수를 위해 부품의 수리나 각종 자재의 조달을 위한 배후단지 조성도 매우 중요하다. 중요 기자재 및 선용품은 선주가 제공하기 때문에 전체 원가에서 인건비가 차지하는 비중이 약 50% 내외로 상당히 높다. 신조선업은 고도로 전문화되고 체계화된 인력이 필요하다면, 수리조선은 현장에서 대처가 중요하기 때문에 긴급상황에 대응할 수 있는 현장 대응 역량이 높은 인력이 필요하다.

신조선의 경우에는 대형설비를 활용하여 생산성을 높인다면, 수리조선산업은 수리를 위한 자재만 올리면 되므로 대형크레인이 필요하지 않다. 다만 도크회전율을 높이고 다수의 선박 수리를 위해 긴 안벽이 필요하다. 짧은 일정의 작업이 종료되면 입금이 되고 고가의 장비를 구매할 필요가 없어, 신조선업에 비해 안정적이고 수익률도 높은 편이다. 운항노선에 따라 선박을 수리하는 곳이 정해져 있기 때문에 항로나 항구 위주의 영업을 해야 한다. 긴급수리를 제외하고는 검사기간으로 시장이 예측가능하기 때문에 고정고객도 매우 중요하다.



(2) 싱가포르 수리조선산업 사례

우리나라 대형업체들이 수리조선 사업에서 철수하면서 가장 혜택을 받은 국가가 싱가포르이다. 싱가포르는 영국식민지였을 당시부터 영국 군함을 수리했고, 싱가포르 인근 핵심 항로인 말라카해협을 지나는 선박을 수리하면서 산업이 발달했다. 싱가포르는 2017년에 3,360만TEU를 처리한 세계 2위의 항만도시이기도 하고, 주변국의 저임금 노동자 활용이 가능하다. 기후가 매우 덥고 습도가 높긴 하지만 태풍이나 오랫동안 비가 내리는 일은 없어서 수리일정을 관리하기 편한 장점도 있다. 또한 저렴하게 선박의 병커링이 가능하고 선용품이나 각종 기자재 조달이 쉽도록 배후단지가 조성되어 있는 등 여러 가지 편의적 요소로 세계 주요 해운사의 아시아태평양 본부가 대부분 싱가포르에 있다.

한편, 유가 등과 연동된 해양사업의 타격은 싱가포르도 비껴갈 수 없었다. 해양플랜트 Rig시장 악화와 중국과의 경쟁심화로 2016년 해양산업 매출액은 130억 6,000만 SGD로 2015년에 비해 11.3% 감소했고 매출급락과 비례하여 고용도 2013년 대비 2만 4,000여 명 감소했다. 그러나 수리 및 개조분야는 45억 7,000만 SGD로 약 35%를 차지하고 있고 안정적 추세를 보이고 있다. 물론 2016년 싱가포르에서 수리한 선박은 3,762척으로 2015년 4,141척에 비하면 9.2% 감소했고, 벌크선은 비용문제로 상당부분 중국에서 수리를 하는 것으로 알려졌다. 또한 다른 선종에서도 해운시황 약세로 수리비용을 절감하려는 해운사의 움직임이 부정적 영향을 주고는 있다. 그러나 수리척수 감소에도 불구하고 고부가가치 선박의 수리를 통해 일정수준의 안정적 매출을 올리고 있다.

대표적인 싱가포르의 수리조선사로 Sembcorp Marine과 Keppel O&M이 있는데 Sembcorp Marine의 수리사업 부문 매출은 2017년 4억 7,100만 SGD(약 3,768억원(2017.12.28. 기준 800원/SGD))을 기록, 2017년 한 해에 390척의 선박을 수리했고, 1척당 121만 SGD(약 10억원)의 매출을 올린 것으로 나타났다.

Sembcorp Marine의 수리사업은 27기의 드라이도크와 3기의 플로팅 도크로 다양한 선종과 선박을 효율적으로 수리할 수 있는 Admiralty Yard(Sembawang Yard)에서 주로 진행된다. 수심이 13.1m인 드라이도크를 활용하여 크루즈선박의 수리도 활발하게 수행하고 있다. 도크 외에도 2.7km의 안벽이 있어 다수의 선박수리와 개조가 가능한 구조를 가지고 있다. 주요 수리선종은 LNG운반선, 크루즈선, 탱커, 해양플랜트, 군함 등이다.

싱가포르의 수리조선 산업이 경쟁력을 갖게 된 배경에는 말라카해협을 끼고 있어 다수의 선박들이 지나는 항로, 오랜 기간 경험이 축적된 대형 수리조선소, 세계 주요 항만과 해운노선, 배후단지를 갖고 있다는 점 외에 정부의 강력한 지원과 저렴한 인건비 요인 등이 있다. 싱가포르정부는 조선해양산업을 싱가포르의 산업기반을 형성하는 핵심산업으로 판단하여 지원책을 아끼지 않고 있는데, 어려움에 빠진 조선해양산업에 재정적인 지원은 물론이고 장기적으로 주거지역과 분리하여 안정적 성장을 도모할 수 있도록 관련산업을 TUAS 지역으로 집중하기 위해 대규모 투자를 진행하고 있다.

인건비 경쟁력 유지를 위한 부분에서도 해양산업에 대한 특혜가 있다. 주변 말레이시아나 인도네시아와 같은 국가들과 수리조선에서 경쟁하고 있는 상황을 감안하여 인건비 경쟁력을 유지하도록 다른 산업에 비해 외국인 노동자에 대한 고용세(levy)를 저렴하게 적용하고 있다. 또한 싱가포르 직원 1명당 3.5명의 외국인을 고용할 수 있어서, 인건비가 저렴한 인도, 방글라데시 인력을 충분히 활용하고 있다. 120m 벌크선의 구상선수 수리작업을 예로 들면, 프로젝트 근로자 구성이 PM역할의 싱가포르 관리자 1인과 24시간 공사를 수행하는 20여 명의 인도인으로 구성된다고 한다.

4. 우리나라 선박 수리·개조산업 재건을 위한 제언

(1) 대상시장 점검과 타깃 분야

연근해에서 운항하는 소형선박 수리시장을 제외하고 우리나라 대형선박 수리시장은 거의 없다고 해도 틀린 말이 아니다. 수리조선 사업을 하고 있는 오리엔트조선과 삼강S&C의 2017년에 매출액은 각각 398억원, 407억원에 불과하다. 이 가운데 국적 LNG운반선 수리 실적은 정책적 조치(2016.10.31. LNG선의 경우 국내에서 20% 수리하도록 조치)에 의한 것으로 추정된다. 수리조선의 경우에는 수리를 위한 일정이 미리 결정되기 때문에 수리조선 업체가 본격적인 영업을 하더라도 최소 1년 이후부터 성과가 나타날 수 있다.

우리나라에서 개척 가능한 수리시장을 선종별로 살펴보면 다음과 같다. 벌크선은 선박의 용선과 반선이 일어나는 항만이나 수리가 저렴한 곳에서 이루어지기 때문에 중국에서 수리할 가능성이 높다. 다만 국적선사의 경우에는 수리를 위해 중국으로 운항하는 기간대비 경쟁력만 있다면 국내 수리도 가능할 것으로 보인다. LNG운반선은 우리나라와 일본 해운사가 고객이라면 주로 중동으로 선적하러 가는 중간에 싱가포르에서 수리를 하므로, 그 수요를 우리나라로

〈표 4〉 Sembcorp Marine Admiralty Yard의 주요 설비

설비명	도크 형태	크기	용량(DWT)
Premier	드라이 도크(Driving Dock)	384m×64m×8.5m	400,000톤
President	플로팅 도크(Floating Dock)	290m×48m×8.5m	150,000톤
King George IV(KG VI)	드라이 도크	303m×39.6m×13.1m	100,000톤
Republic	플로팅 도크	202.3m×42m×10.3m	60,000톤
KFD	플로팅 도크	230m×35m×7.3m	65,000톤

〈출처: Sembcorp Marine〉



〈그림 3〉 싱가포르 해양산업 매출액(10억SGD) 및 고용인력(만명) 추이

〈출처: Association of Singapore Marine Industries〉

가져올 수 있다. 컨테이너선의 경우에는 우리나라 항만이 마지막 중착지인 선박이 대상이 될 수 있는데 주로 국적선사의 운항선박이다. 국적 외항선사가 보유한 선대 중 평균 톤수가 3만톤 이상인 선종을 살펴보면 벌크선이 가장 많고 컨테이너선, 자동차운반선, 원유운반선, 광탄선, LNG선 순인데 일부 벌크선과 컨테이너선을 제외한다면, 대부분 우리나라 항만이 최종 목적지일 가능성이 높다. 중국에서 대부분 수리하는 벌크선과 싱가포르·중동에서 수리해야 하는 원유운반선을 제외하더라도 260여척이 1차 고객 대상이 될 수 있으며, 5년에 2회 검사를 고려하면 연간 100여척의 수리시장을 생각할 수 있다.

한편 1990년대 말 해외고객을 상대로 수리조선 사업을 수행하던 현대미포조선은 4개의 도크에서 400척에 가까운 수리를 했고, 1척당 평균 5억~6억원의 매출을 올렸다. 현대미포조선의 내수가 약 20%였던 점을 감안한다면, 300척 이상이 해외선사 물량이다. 부산 항 규모의 성장, 세계 선박량 증가 등을 고려한다면, 시장개척을 통

해 과거와 같은 수준까지 시장을 회복할 수 있을 것으로 판단된다. 개조작업은 수리보다 조선소에서의 작업기간이 더 길기 때문에 저렴한 가격도 중요하지만 작업기간의 단축과 기술력이 중요할 수도 있어 특히 품질이 중요한 탱커와 컨테이너선의 개조시장을 목표로 할 수 있다. 또한 향후 5년 내외로 발생하는 개조시장을 통해 수리조선 고객을 발굴하고, 개조시장이 급격히 줄어든 이후에는 확보한 고객과 기술력을 요하는 LNG관련 선박의 수리를 통해 사업유지를 도모할 필요가 있다. 또한 FPSO, FLNG, FSRU 등으로의 개조도 기술력을 요하므로 목표시장으로 가져갈 수 있을 것으로 보인다.

(2) 경쟁국 대비 차별화된 강점 확보

시장이 있다고 해서 우리나라에서 수리·개조사업을 추진할 수 있는 것은 아니기 때문에 경쟁국에 비해 차별화된 강점을 확보해야 한다. 벌크선시장은 중국이, 다른 선박이나 개조시장은 싱가포르가 시장을 점유하고 있기 때문이다. 중국은 가격적인 측면에서 경쟁력 우위



〈표 5〉 주요 선종별 국적 외항선대 현황(2017년말 기준)

	척수	GT(Gross Tonnage)	평균 GT
벌크선	246	14,827,868	60,276
광탄선	32	3,871,414	120,982
자동차운반선	61	3,664,596	60,075
풀컨선	144	4,545,089	31,563
원유운반선	54	6,548,020	121,260
LNG선	25	2,563,231	102,529
합계	562	36,020,218	-

〈출처: 한국선주협회, 「2018 해사통계집」〉

에 있고, 현재로서는 싱가포르도 기후, 항로, 배후단지, 가격 등 다양한 측면에서 우리나라보다 여건이 좋다. 따라서 중국이나 싱가포르와 차별화된 기술적 우위, 수리와 개조를 위한 이동시간, 수리·개조 공정 등에서 가격경쟁력을 확보해야 한다.

첫째, 기술적 우위를 살리기 위해서 LNG선박 관련 시장을 공략할 수 있을 것이다. 싱가포르에서 LNG운반선을 수리하기 위해서는 우리나라의 LNG선박 관련 엔지니어와 숙련공을 필요로 하고 있는 점에 착안할 필요가 있다. 말레이시아의 MMHE도 지금은 계약이 끝났지만 삼성중공업이 건조한 LNG운반선의 수리를 수행했는데, 이를 위해서 삼성중공업 엔지니어의 지속적인 지원이 필요했다. 우리는 이러한 인력을 국내에서 충분히 확보할 수 있고, LNG운반선 신조시장을 주도하고 있는 만큼 관련 인프라와 역량도 충분하다.

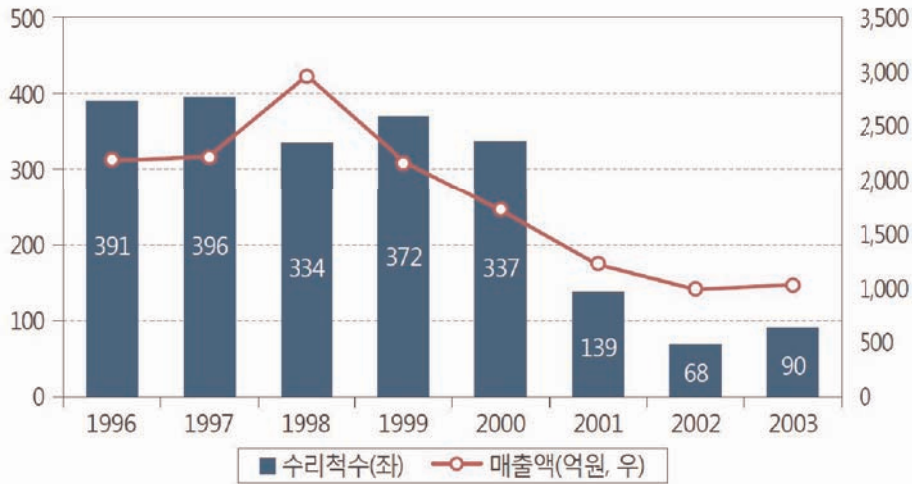
둘째, 우리나라가 차별화된 서비스를 제공할 수 있는 분야는 기술 및 품질이 뒷받침되어야 하는 개조분야로 평가된다. 삼강S&C는 최근 싱가포르선사가 운영하는 6척의 선박에 Scrubber 장착을 위한 개조사업에 약 290억원 규모(1척당 48억 원)의 계약을 체결했다고 밝혔다. 이를 감안하면 우리나라 인근을 운항하는 해외선사의 개조 시장도 가져올 수 있을 것으로 예상된다. 대형조선사의 우량고객을 중심으로 개조에 대한 요구도 증대되고 있고, 우리나라 조선사가 만든 선박뿐만 아니라 주요 고객 선사들이 보유한 선박에 대해서도 개조서비스를 제공할 수 있다. 우리나라 조선사가 제작한 선박의 도면과 건조했던 인력이 국내에 있으므로 개조를 위한 엔지니어링을 보다 쉽게 제공할 수 있을 것으로 보인다. 하지만 대형조선사는 모든 시스템이 신조에 최적화되어 있기 때문에, 개조를 위해서 대형조선사의 도크나 안벽을 사용하기에는 비효율적이고 비용도 높아질 수밖에 없다. 따라서 대형조선사가 영입과 엔지니어링을 수행하고 수리조선사에서 개조를 한다면 주변 국가와의 경쟁도 가능할 것

로 보인다.

셋째, 선주감독관, 선원을 위한 관광, 쇼핑, 엔터테인먼트를 경쟁국가보다 차별화하여 최적의 환경을 조성하고 서비스를 제공하는 전략이다. 선박을 수리하는 동안 1척당 10여명의 선원은 물론 감독관 등이 해당 지역에 머물러야 하는데 가능하면 저렴하면서 고품격의 엔터테인먼트가 가능하도록 하는 것이다. 우리나라는 싱가포르에 비해 상대적으로 좋은 날씨에 경남, 부산을 중심으로 관광·쇼핑·엔터테인먼트가 저렴한 비용으로 가능할 것으로 보인다.

(3) 대형선박 대상 효율적인 설비 구축

대형선박의 수리를 위해서는 그에 맞는 설비가 필요한데 도크, 안벽, 크레인 등이 주요 설비이다. 신조를 위한 설비와 다른 것은 안벽과 크레인인데, 신조에서 효율을 높이기 위해 사용하는 초대형 크레인은 필요하지 않다. 개조에 필요한 설비를 올리거나 수리용 기자재를 들 수 있는 규모면 충분하다. 안벽은 다수의 선박을 수리하기 위해 신조보다 더 필요한데, 구축하는 데 큰 비용이 필요한 신조용 안벽보다는 여러 선박을 계류할 수 있는 수준으로 저렴하게 확보하는 것이 중요하다. 도크의 경우에는 신조와 다르지 않지만, 수리의 효율성을 높일 수 있는 구성이 중요하다. LNG운반선은 300m에 가까운 길이를 보유하고 있으므로, 300m 이상의 도크가 필요하고, Mearsk의 Triple-E Class 초대형 컨테이너선은 길이만 400m에 이른다. 따라서 2만TEU급 컨테이너선을 수리하기 위해서는 400m급의 도크가 있어야 한다. 드라이도크의 경우에는 수천억 원의 대규모 투자가 필요하므로 활용 가능한 플로팅도크를 고려할 필요가 있다. 400m 이상의 플로팅도크는 호황기 때 신조가격이 1,500억원 수준이었으나 386m 크기의 STX중공업 플로팅도크는 300억원에 매각됐다.



〈그림 4〉 현대미포조선의 과거 수리실적
 (출처: 금융감독원 전자공시시스템)

1기의 도크로 1년에 수리가 가능한 선박은 약 50여척이고 과거 미포조선과 같은 효율을 보인다면 최대 100여척까지도 가능할 것으로 보인다. 대형도크에서 중소형 선박을 수리하는 것은 비효율적이므로 중소형 선박까지 수리를 진행하기 위해서는 200~300m급의 도크도 함께 보유해야 한다. 따라서 다양한 선박의 수리와 과거 미포조선과 같은 규모의 수리를 위해서는 4기 이상의 도크 또는 2기 이상의 도크를 보유한 수리조선 2개사가 필요하다. 개조시장까지 고려한다면 더 많은 수리조선사, 도크와 인력을 고려해야 할 것이다.

5. 대형선박 수리·개조산업 재건 방안

우리나라에서 대형선박의 수리·개조산업은 조선산업의 혁신성장 및 경쟁력 강화라는 측면에서 검토해 볼 수 있다. 중단기적으로 출현하는 선박 개조시장 대응, 유휴설비의 활용과 조선 숙련인력 유지 뿐만 아니라 우리나라가 독보적인 경쟁력을 보유한 LNG관련 선박이나 추진시스템의 경쟁력 유지와 기술유출 방지를 위한 부분도 있다. 수익성이라는 측면도 고려하지 않을 수 없으므로, 최소한의 투자를 통해 산업을 육성하는 방안을 마련해야 한다.

설비와 인력 측면에서는 우선 구조조정으로 발생한 유휴조선소의 관련 설비와 인력을 적극 활용해야 한다. 또한 관련부지에 수리를 위한 작업장이나 기자재 조달이 가능한 배후단지도 갖추고, 수리조선업을 수행하고 있는 전문가, 과거 수리조선 인력, 조선산업 구조조정 과정에서 발생하는 숙련공이 대형수리조선 산업에서 일할 수

있도록 연계해야 한다.

시장 및 경쟁 측면에서는 국적선사의 LNG운반선, 탱커 및 부산항을 기점으로 하는 컨테이너선을 중심으로 기본적인 수리·개조 시장의 물량을 확보해야 한다. 현재 우리나라 선사가 운영하는 25척의 LNG운반선을 포함하여 대형 가스선, 탱커, 컨테이너선이 직접적인 시장이 될 수 있도록 화주-선사-수리조선 협력 네트워크를 구성하고 정책 연계를 진행할 필요가 있다.

해외시장으로는 국내 조선사가 건조하는 선박의 A/S시장, 인접국의 LNG운반선 및 LNG관련 선박, 부산항으로 대표되는 우리나라 주요 항만을 주요 기점으로 운항되는 선박, 주요 친환경기자재 제조사 고객을 생각할 수 있다. 경쟁우위 확보를 위한 방안으로는 기술력을 요하는 LNG관련 선박시장과 개조시장을 중심으로 하되, 수리·개조 기간의 단축을 위한 기술개발이 필요하다. 이를 위해 대형조선사와 항만, 친환경기자재 제조사도 협력네트워크에 참여해야 한다. 구조조정을 통해 발생한 유휴설비와 인력을 활용하여 중대형 선박의 수리개조 클러스터를 조성한다면 선박수리·개조뿐만 아니라 선용품 및 관광산업에서 생산과 고용이 유발될 것으로 보인다. 이를 통해 궁극적으로 국내 조선산업의 혁신성장과 경쟁력 강화가 가능할 것으로 판단된다. ⚓

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2020 Fuel surcharges could be reduced, says fuelsave

The fuel surcharges some container shipping companies are intending to pass on to customers as they look to meet the 2020 sulphur cap could be reduced for the mutual benefit of shipowners and operators, as well as their customers, given the technologies available for reducing fuel consumption, says Marc Sima, President and co-founder of Germany's FUELSAVE.

Earlier this month, Maersk said the installation of technologies aimed at reducing shipborne emissions is likely to increase the cost of shipping a single twenty-foot container to \$160, while MSC Mediterranean Shipping Company announced it will introduce a Global Fuel Surcharge.

"As more shipping companies go down the scrubber route we are seeing manufacturers raise their prices – in some cases charging more than US\$3 million for the scrubber alone. This is putting pressure on shipowners to pass on these costs to shippers, which is unnecessary when our solution can provide any scrubber installation with a good return." Sima, however, says there is potential for these fuel surcharges to be reduced. "With a 10% reduction in fuel consumption, ship operators could reduce fuel surcharges and maintain or even increase profitability, leveraging the potential of sustainable efficiency enhancement solutions that are beneficial to both shipowner and shipper."

He added: "It has been reported that 2020 compliance could cost the container shipping sector in excess of \$15billion, but these costs can be slashed by optimizing fuel consumption."

Sima cites the fuel savings a heavy lift ship achieved using FUELSAVE's FS MARINE+ system. The installation reduced fuel consumption by 25% equating to net savings of 16% and a significant reduction in CO₂ and NO_x emissions and particulate matter (PM). Even when cleaner fuels become more prominent and the use of scrubbers are no longer required, Sima says energy sav-



ing technologies will continue to create substantial fuel and efficiency gains for the shipowner, delivering real OPEX savings to increase profitability. He furthered: "Shipowners that take the low sulphur fuel option can especially benefit, since these fuels are even more costly and will continue to rise, which reduces further the amortization period, and which provides an even better return on the investment (ROI) for efficiency enhancement technologies. The more expensive fuels become the greater the fuel saving, and consequently greater reductions in OPEX.

"Shipping companies should look at all the options available for meeting the 2020 sulphur cap. There are solutions available that

not only ensure compliance but can optimise operational expenditure allowing operators to remain competitive and profitable without the need to rollover all the additional costs to the end-customers. Any sustainable technology must have a direct economic and ecological benefit for operators, their customers, and the environment. "Of course, any fuel savings have to be balanced by the amortization period, which should be well within any warranty periods. For FS MARINE+ a typical payback is within three years. We also offer a cast-iron guarantee that the system will have paid for itself within the default five-year warranty period," said Sima. Use of the FUELSAVE technology also prolongs the lube oil replacement intervals, engine maintenance and related service costs, resulting in further OPEX savings for shipowners.

Earlier this month, FUELSAVE introduced a containerised version of its FS MARINE+ technology, designed to provide ship operators with a cost-effective, plug-in and-play version of its engine combustion optimisation and emissions reduction system, which reduces ship preparation costs to a minimum and enables re-use of the system from one ship to another. ⚓

KR upgrades container securing strength assessment software - SeaTrust-LS

Korean Register (KR) - an IACS member classification society - has released the latest version of SeaTrust-LS, its container securing strength assessment software. SeaTrust-LS has been significantly

enhanced by incorporating KR's new 2018 guidance for container securing assessment and reflects practical insights and feedback from world-class lashing makers, SEC Bremen and German


Lashing Robert Böck GmbH.

Achieving optimum container stowage and arrangement is crucial to the safe operation of a vessel as it dramatically affects the trim, stability and longitudinal strength of the ship. Optimum stowage will also maximize the economy of container handling. If the container stowage arrangements do not provide the required secured strength, then the loading and safety of containers can be significantly compromised. Optimal container stowage and arrangement is more critical than ever as the trend for ever-larger container ships persists – with ULCS (ultra large container ships) now carrying stacks of 10 or more container tiers on deck.

This year KR has revised its guidance for container stowage and lashing by conducting ship motion analysis for different sizes of container ships from 1,000TEU up to 23,000TEU. Analysis has included optimizing accelerations, nonlinear analysis for calculating accurate external lashing forces, and CFD (Computational Fluid Dynamics) analysis under various possible scenarios relating to the application of reasonable wind forces.

The latest version of SeaTrust-LS contains all revisions of this latest guidance. The new SeaTrust-LS applies the semi-nonlinear calculation method to consider the twistlock separation effect of external lashing. This ensures the safe securing of external lashing as well as faster computing time for lashing strength assessment. The new software provides a range of useful features, including the calculation of optimal acceleration and wind force, together with 13 route reduction factors enabling container ships to maximize their cargo capacities while ensuring the safety of the ships themselves.

SeaTrust-LS also includes a feature to identify maximum cargo capacity automatically. This function can assist users to easily optimize design stack weight, the lashing bridge design and the container stowage arrangement. This allows the operator to select the best stowage arrangements under specified allowable targets.

SeaTrust-LS incorporates an auto-update feature to enable users to work to the latest software and KR's rules; it also includes a Software Development Kit allowing it to integrate easily with customer's own software. 



Samskip launches new Antwerp/UK shortsea route expanding its European multimodal network



Samskip is launching a new shortsea service connecting Antwerp and Hull, in an expansion of its continent-UK multimodal network that also sees it debut at Belgium's largest port.

The initial schedule offers a twice weekly short sea container service, with its first departure from Antwerp on the 12th October. The service will be operated by a 508TEU capacity vessel, sailing from ATO's multimodal terminal on Tuesday and Saturday and ABP Port of Hull on Thursday and Monday. This new connection is in addition to Samskip's existing shortsea services connecting Rotterdam with Tilbury, Hull and Grangemouth (eight per week) and the recent three times weekly Amsterdam-Hull service. This new Antwerp to Hull routing offers shippers a distinct local alternative.

Richard Beales UK & Ireland Regional

Director commented: "In combination with our daily sailings to/from Rotterdam and following the successful launch of our three times weekly Amsterdam to Hull service in March, we are excited at the prospect of offering a new solution that can meet the requirements of the local and hinterland market in and around Antwerp, especially given the excellent rail and inland waterway links available. "Manufacturers and logistics providers have a new efficient choice that offers an optimal routing, reduces their exposure to increasing road congestion and driver shortages, is cost effective and reduces CO² in the supply chain."

Mr Beales added: "With the current Brexit uncertainty we believe that our spread of dedicated short sea services can offer robust options for companies wanting to prepare by de-risking their supply chain."


Extensive barge services connect to the ATO terminal including five times per week to both Antwerp's deep-sea container terminals via the Scheldt and - via the Albert

Canal - to/from the LCT Liège Container Terminal. Johan Gemels, Managing Director, ATO, commented: "Attracting a major multimodal operator such as Samskip very much aligns with the growth plans of ATO and fits perfectly with our services of handling ships, barges, trucks and trains. We look forward to working in partnership with Samskip to offer a new and competitive option for customers doing business in Antwerp and the UK."

Total container traffic through Antwerp increased by 8.3% in the first half of 2018 over the equivalent period in 2017, according to Port of Antwerp figures. The UK is Antwerp's third largest maritime trading partner, contributing around 15 million tonnes of freight every year. Port Authority CEO Jacques Vandermeiren said: "We welcome Samskip to the port of Antwerp and their strategic decision to use Antwerp as the departure point for their new short-sea service to the UK. Mobility in and around the port remains a serious chal-

lenge and is therefore one of our strategic priorities to ensure further sustainable growth. To create a modal shift that brings the share of truck transport down, it is crucial to offer efficient alternative means of transport and shortsea is clearly one of them. Samskip has excellent expertise in this field and this new short-sea service will

definitely support us in achieving this goal.” ABP Humber Director, Simon Bird, commented: “It’s fantastic news that Samskip has favoured the Port of Hull once again as its premier short-sea departure destination. “ABP has continued to drive substantial investments in its Hull Container Terminal, not only with increasing container storage

space and state-of-the-art equipment, but also continual advancements in training our operational staff to ensure the best possible service and turnaround times for our customers.” 

BIO-SEA bwts selected for a raft of newbuild and retrofit projects

BIO-UV Group has signed an agreement to supply its fully type-approved BIO-SEA ballast water treatment system for retrofit installation to Louis Dreyfus Armateurs’ 3500dwt ro-ro vessel Ciudad de Cadiz. BIO-UV Group will supply a BIO-SEA semi-modular system capable of handling flow rates of 300m³/h. The vessel transports large sections and parts for the Airbus A380. This will be LDA’s 6th BIO-SEA installation and follows newbuild installations to the 83m service operation vessels (SOV) Wind of Change and Wind of Servitude. Turkey’s CEMRE Shipyard is scheduled to deliver Wind of Change next year with the sistership following in 2021. Each ship will operate a skid-mounted BIO-SEA B01-0150 unit.


“We are delighted that LDA has again selected BIO-SEA UV-based BWTS to treat this Ciudad de Cadiz’ ballast water. This, our 6th BWTS project with LDA, is a validation of the performance, reliability and efficiency of the BIO-SEA ballast water treatment system,” said BIO-UV Group President and CEO Benoît Gillmann. In separate agreements, BIO-UV Group will also design, build and supply BIO-SEA units for retrofit installation to a Great Lakes tank barge operated by Canadian shipowner McAsphalt and for three newbuild barges under construction by Dutch shipbuilder Damen for delivery to Russian interests. Following the receipt in June of USCG

type approval for BIO-SEA, which confirmed the technology’s ability to treat freshwaters without limitation, McAsphalt opted for a modular BIO-SEA BO6-0750 unit for retrofit to the 11,800dwt tank barge John. J Carrick.

“BIO-SEA is currently the only ballast water treatment system on the market without any limitations on the time treated freshwater has to be held before discharge overboard. This has a real commercial and operational advantage for vessels operating on the Great Lakes,” said Xavier Deval, Business Director, BIO-SEA. “With competitor systems, Great Lakes’ operators would typically have to wait 72h following treatment before they are allowed to discharge the water. And with a large number of ships trading on the Lakes, this can delay schedules and result in loss of earnings. This was a key concern for McAsphalt and one of the reasons BIO-SEA was selected.”

For the three barges Damen is building for Rosneft, BIO-UV Group will supply three skid-mounted 250m³/h capacity BIO-SEA B02-0250 units. BIO-UV Group has partnered with Damen Green since 2014 and supplied a number of ballast water treat-



ment systems to the Dutch shipbuilding group. “These new orders confirm the strong sales momentum gained by the Group year-to-date and its ambition to ramp up growth in the high-potential ballast water market,” said Mr. Gillmann. 



Fleet Safety wins Safety4Sea Technology Award

Inmarsat's new Fleet Safety maritime data service has been named winner in the Technology category for the highly regarded Safety4Sea Awards, 2018. The award win, by public vote after shortlisting from a judging panel, acknowledged Fleet safety as 'a significant technological breakthrough' that will continue to improve the safety of mariners and vessels worldwide.

Fleet Safety covers the leisure, fishing and coastal markets, in addition to deep-sea merchant shipping, and has been developed for any vessel equipped with Inmarsat's FleetBroadband, Fleet One or Inmarsat C connectivity. Two key features of Fleet Safety are SafetyNet II and RescueNet which are specifically designed to enhance the communications available to seafarers in distress and facilitate swifter action by organisations planning and executing search and rescue operations.

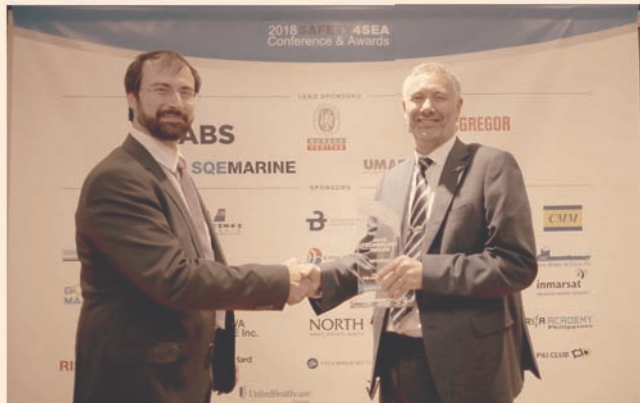
Both features have already been used to save lives since launch in 2017 including

playing an instrumental role in the co-ordination of the rescue of a fishing vessel crew of six after they spent three days adrift 200 nautical miles off Tonga.

Inmarsat has also introduced a new Maritime Safety

Terminal for ships that supports Fleet Safety Voice Distress Calling on a priority basis, meaning that those pressing the distress button are connected to the Maritime Rescue Coordination Centres(MRCCs) immediately. As part of GMDSS, Fleet Safety is free at the point of use.

"The Safety4Sea Awards acknowledge safety excellence and sustainable shipping," said Peter Broadhurst, Inmarsat Senior Vice President Safety and Security.



"Winning in the technology category is fitting recognition of all the hard work that took place behind the scenes to make Fleet Safety a reality. It also celebrates our continuing commitment to real advances in distress communication and accident prevention at sea – the mission we committed ourselves to at the International Maritime Organization (IMO) on our foundation four decades ago." 



Rivertrace to supply Oil Content Monitor for Alfa Laval PureBilge Separator

Producers of water quality monitoring products Rivertrace, have signed an agreement as a preferred supplier of Oil Content Monitors(OCM) for Alfa Laval PureBilge Separator. Alfa Laval's PureBilge is the market leading centrifugal type oily water separator which has high reputation from the market. Rivertrace's Smart Bilge OCM utilises the "Smart Cell" Detector Array Technology, developed by Rivertrace, to analyse all three oil types (HFO, Diesel and Emulsions) simultaneously without the need for re-calibration.

To ensure maximum efficiency and accuracy the Smart Bilge includes as standard, a

manual cell cleaning device, allowing easy routine maintenance. Optical cell fouling is recognised as a leading cause of monitor malfunction or incorrect reading so by enabling a simple manual cleaning device, the "Smart Cell" can remain in optimum operating condition.

Replacement calibrated measuring cells can be purchased for easy change over on board the vessel, as well as calibration check kits which enable the crew to demonstrate the monitor is within factory calibration to PSC Surveyors.

Mike Coomber, Managing Director, Rivertrace said: "We are really proud that



our Smart Bilge has been selected to ensure compliance by one of the leading separator manufactures in the world. We look forward to a long-term working relationship where we can support Alfa Laval's customer focused vision to deliver the highest quality and best value for their customers." 

Synergy group launches nine-language helpline to reduce seafarer suicides and boost wellness at sea

Synergy Group has launched a new counselling service aimed at improving mental health support for sea and shore-based maritime personnel. iCALL is a free psychological helpline for the worldwide maritime community available 24/7 in nine different languages via phone, email and the chat-based nULTA App.

"Numerous studies into the psychological health of seafarers have shown that large numbers of seafarers suffer from obvious manifestations of impaired psychological wellbeing such as social isolation and depression," said Capt Rajesh Unni, CEO and Founder of Singapore-headquartered Synergy Group. "That's why we decided to create a 24/7 counselling centre for anybody who's sailing, not just Synergy personnel. It is also available to shore-based personnel anywhere in the world. "These types of problems can't be wished away when people get off the ship."

iCALL, which is confidential and anonymous, is available in English, Hindi, Marathi, Gujarati, Bengali, Tamil, Telugu, Sindhi and Kutchi. "iCALL currently has 14 counsellors all located at Tata Institute of Social Sciences in Mumbai to ensure peer support, supervision and standard professional counselling services," said Capt Unni. "All the counsellors have at least a Master's degree in Clinical or Counselling Psychology." Prior to the launch of the service, all counsellors received three months of specialist training to help treat issues such as emotional distress, relationship and family concerns, suicidal thoughts, sexual and reproductive health, LGBT issues, violence against women, body image concerns and work-life anxieties.

The foundations of iCALL were put in place when Synergy Group signed a Memorandum of Understanding (MoU) with the Tata Institute of Social Sciences (TISS) in Mumbai, India, in August committing the parties to establishing the new service. iCALL was subsequently inaugurated by Dr Malini V. Shankar, India's Director General of Shipping, when she made the first call to the service last month.

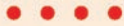
Addressing industry leaders, principals and maritime technology and equipment providers last month at a two-day Synergy seminar in New Delhi, Capt Unni argued that the maritime industry should do far more to address mental health issues. "5.9% of all deaths at sea are proven suicides," he said. "If the suspicious cases of probable suicides – seafarers that went missing at sea – are considered, then this figure jumps to 18.3% which means almost one in five deaths at sea is a suicide. "By any standards, that is terrible. Compare this to deaths



ashore, where only 1% of deaths are attributable to suicides. There is no disputing we have a genuine problem here."

The annual Surabhi Synergy Festival 2018 attracted a raft of industry executives, classification societies and ship management technology providers as well as dozens of Synergy's shore-based staff and crew. Key speakers included Synergy principals Captain Katsuya Abe, President of Nissen Kaiun, Martin Ackerman, CEO of BW LPG, Mr Antonis Vrontassis, Vice President of Navics Tanker Management, and MOL General Managers Akura Sasa and Taku Hisai, Captain MC Madayya, regional manager of Marine Assurance (MA), the organisation within Chevron Shipping Co. LLC responsible for managing marine risk, explained the lengthy vetting processed undertaken by MA before vessels were chartered by Chevron.

Another highlight was the presentation by Mike Holliday, Marine & Offshore Manager for South Asia at Lloyd's Register, who addressed how digitalisation is transforming shipping. "On behalf of Synergy Group, I wish to express our heartfelt gratitude to all our distinguished guests for making this year's Surabhi a truly memorable event," said Capt Unni. "Despite your hectic calendar, to take time away to interrelate with your seafarers and shore staff is evidence of your commitment and care. We are deeply humbled and thrilled to have you on our team." 🚢



Stop wasting money on navigation data and unleash the power of true voyage analytics

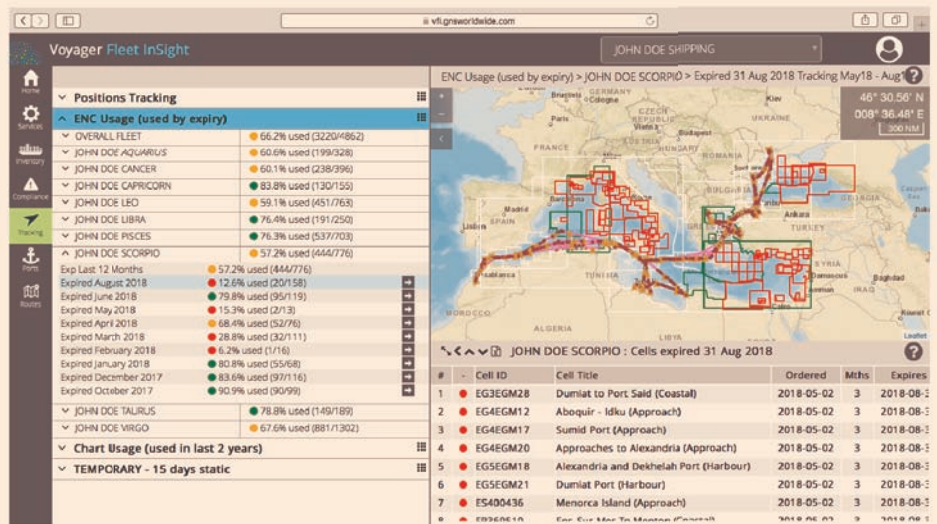
GNS, a leading maritime technology company, has unveiled the latest milestone in its long term programme to improve how shipowners buy and use navigation and vessel data for operations and compliance. In a shipping market used to claims of game-changing functionality, GNS believes owners can finally stop wasting money on un-used navigation data and take real control of vessel performance and compliance.

Voyager FLEET INSIGHT is the culmination of four years of data collection and analysis that is now available to give ship owners and managers the ability to see for the first time exactly what navigation data they are buying, how much they should be paying, where they are wasting their money and where the gaps exist. "This is data that owners and managers say they want at their fingertips but its volume and complexity make it difficult to draw together in a single application to provide effective fleet management tools," says GNS CEO Paul Stanley. "At GNS, we have been using this data in customer workshops for the last two years to take buyers through the detail of what they are spending and where they can save money - the results are startling."

VFI's navigation management functionality has been designed to revolutionize how navigational products are bought, managed and used. The service gives shipping companies complete transparency in terms of the ENC's, paper charts and nautical publications their vessels need, how much they should be paying for them and - for the first time - how much money they may be wasting by buying products they don't need. "The levels of un-needed expenditure on navigation data we see is very significant and the gaps that our data identifies provide a real opportunity to improve index compliance," adds Stanley. "Too often shipping companies lack real-time access to all the navigation, position and voyage data they need in an easy to use format."


Voyager FLEET INSIGHT provides multiple levels of vessel operational functionality. Owners can use it for vessel tracking, monitoring sailing times to estimate more accurate operating costs, build in Port State Control data into KPI monitoring, or track progress against charter party terms by overlaying the approved route on the vessel track.

The service maintains up-to-date lists of the technical library publi-



cations required by each vessel's Flag State, SIRE vetting and other key stakeholders, and enables marine and HSQE managers to take action to close any gaps in vessel inventories. It also provides global Port State Control inspection histories for all vessels to make it easier to monitor and measure actual compliance against KPI performance.

Voyager FLEET INSIGHT's vessel tracking feature enables users to view historical data going back to 2015 which provides both a record of trading as well as being a tool for shore-side incident management. Vessel port call history, anchorage times and sea hours data all have application in operational planning, forecasting and budget management. "When users need to compile yearly operating costs for a vessel, Voyager FLEET INSIGHT's sea hours and port call data enable variable cost elements such as port fees, bunkers and lubricants to be more accurately calculated," says Stanley. "Being able to easily see how much time a vessel has spent steaming and at anchor helps marine managers to identify and plan maintenance in a timely way."

Shipping companies do not have to be GNS customers to benefit from Voyager FLEET INSIGHT – the service is available to all operators globally. It is competitively priced and ideal for all companies looking to get a grip on big data and analytics, reduce navigational costs and enhance compliance management without the need to invest in the development of costly in-house systems. 



Siemens and Bentley Systems Announce Integrated Asset Performance Management (APM) Solution for Power Plants




Siemens and Bentley Systems have announced a joint technology and service solution, consisting of their complementary offerings, to speed up the digitalization of power plants and provide intelligent analytics with a range of innovative offerings and managed services solutions. The new service, to be hosted on Siemens' cloud-based open IoT operating system, MindSphere, will combine Bentley's advanced asset performance software capabilities with Siemens' complementary technology and service expertise to empower power plant owners to take full advantage of digitalization, which helps improve maintenance operations and planning.

Siemens' asset performance management (APM) solution, part of the company's Omniverse digital solutions portfolio, covers

the entire power plant, including the combustion and steam turbines as well as associated generators and pumps, motors, transformers, valves, switchgears, and other equipment that affects plant reliability and performance. Using intelligent models based on predictive analytics, the solution takes data from multiple sources, applies domain and analytical expertise, and then seamlessly integrates into a customer's existing Computerized Maintenance Management System(CMMS)/Enterprise Asset Management(EAM) environment to improve maintenance planning, reduce outages, and increase workforce efficiency. APM service solutions are tailored to each organization's unique needs, based on variable factors such as plant configuration, on-site resources, equipment expertise, and plant operations and maintenance strategy. The scope of options ranges from on-premises installation or cloud-based MindSphere hosting, to turnkey set-up of APM – complete with Siemens asset models – to APM as a service, with a fully inte-

grated managed service solution set up and run remotely by Siemens power plant experts.

Laura Anderson, head of the said, "APM for Power Plants is evidence of the benefits this strategic alliance brings to our customers. By combining Siemens' and Bentley's complementary and proven areas of expertise, this innovative offering will help our customers manage costs, improve reliability, and increase the performance and availability of their thermal power infrastructure."

Greg Bentley, CEO, Bentley, said, "We're excited to be delivering, in this case for power plant owners, operational advantages made uniquely possible by our work with Siemens to leverage IoT and performance digital twins. In effect, we are together advancing APM towards asset performance modeling—where our engineering technologies(ET) compound the value of IT and operations technologies (OT)." 




LS전선, 세계 최대 풍력발전사업 초고압 케이블 공급



LS전선이 세계 최대 풍력발전단지 조성사업에 초고압 케이블을 잇따라 공급하게 되었다. LS전선(대표 명노현)은 덴마크 국영 에너지 기업인 외르스테드(Ørsted, 舊 동에너지)사와 '혼시(Homsea) 프로젝트 2'에 케이블 공급 계약을 체결했다고 지난 10월 1일 밝혔다. LS전선은 400kV 프리미엄급 케이블 등 약

350km의 초고압 케이블을 2021년까지 공급한다.

혼시 프로젝트는 영국 동부 근해에 대규모 풍력발전단지를 조성하는 사업이다. 프로젝트 1, 2가 각각 2019년과 2022년에 완공되면 총 2.4GW(기가와트)의 전력을 생산한다. 약 240만 가구가 사용할 수 있는 규모이다. LS전선은 이미 2016년 외르스테드로부터 프로젝트를 수주, 초고압 케이블을 공급해 왔다. 특히 이번 입찰은 LS전선 외 유럽의 주요 케이블 업체들에만 입찰 기회가 주어진 것으로 알려졌다.

명노현 LS전선 대표는 "케이블의 본고장인 유럽에서 대표적인 신재생 에너지 사업을 연속 수주하였다는 점에서 의미가 크다"며 "유럽은 물론 북미, 아시아 등에서 프로젝트 참여 기회 확대가 기대된다"고 말했다. 또한 LS전선은 세계적인 신재생 에너지 기업인 외르스테드와 협력 관계를 구축함으로써, 외르스테드가 세계 각지에서 수행하는 풍력발전단지 사업에 참여할 수 있을 것으로 보고 있다. 



현대중공업, '오프쇼어 코리아' 전시회서 기술력 홍보

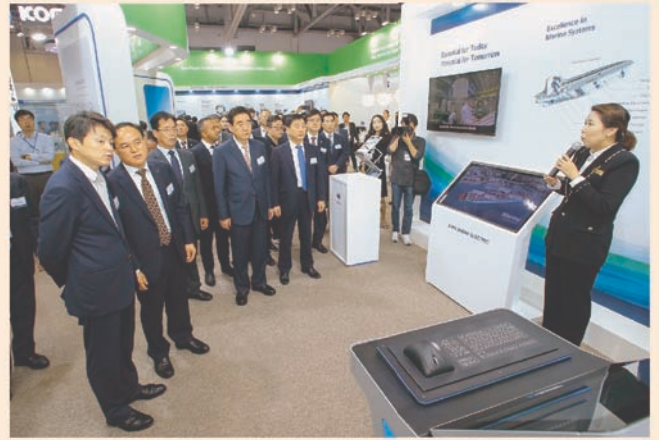
현대중공업그룹이 해양플랜트 국제 전시회에서 신기술들을 선보이며, 침체에 빠진 해양플랜트 분야에서 영업을 나서고 있다. 현대중공업을 비롯한 현대글로벌서비스, 현대일렉트릭 등 현대중공업그룹은 지난 10월 10일(수)부터 12일(금)까지 부산 벡스코(BEXCO)에서 열리는 '제4회 국제해양플랜트전시회(Offshore Korea 2018)'에 참가해 관련 기술과 제품들을 알리는데 주력했다.


현대중공업과 현대글로벌서비스, 현대일렉트릭은 전시기간 동안 180㎡(55평) 규모의 부스를 마련해, 원통형 가스생산설비(SPAR)와 해양설비용 발전엔진 등 10여종의 해양설비와 기자재들을 소개했다. 특히, 둘째 날인 11일(목)에는 현대중공업이 전시장에서 미국선급협회(ABS)로부터 심해형 FLNG(부유식 액화천연가스 생산·저장·하역설비) 하부설비에 대한 기본 인증(API)을 획득해, 본격적인 영업활동에 나섰다. 심해형 FLNG는 수심 1천미터 내외인 해상 가스전에서 액화천연가스(LNG)를 생산하는 해양설비다. 현대중공업이 개발한 심해형 FLNG는 조선 분야의 우수한 선체 건조기술을 적용해, 경쟁사 대비 20% 이상 제작비를 절감할 수 있다.

아울러 현대중공업의 '표준 FPSO(부유식 원유생산·저장·하역설비) 상부설비'도 미국선급협회(ABS)로부터 기본 인증을 받았다. FPSO는 해상에서 원유 생산과 저장, 하역까지 모두 할 수 있는 대표적인 해양플랜트 설비다. 현대중공업이 새롭게 개발한 표준 FPSO는 발주처마다 상이하고 까다로운 요구조건들을 합리적으로 표준화하고, 모듈(Module) 대형화 등의 설계 개선을 통해 기존보다 최대 28%까지 제작원가를 줄일 수 있다.

이와 함께 세계적인 선박 엔지니어링 서비스 전문회사로 급성장하고 있는 현대글로벌서비스는 11일(목) 국내·외 선주, 선급 등을 대상으로 '기술 설명회'를 열고, 친환경선박 개조와 예방진단, 조선·해양 부품사업에서 우수한 기술경쟁력을 알렸다.

현대중공업 관계자는 "해양플랜트의 어려운 상황을 극복하기 위해 기



술경쟁력 강화에 노력하고 있다"며, "이번 전시회가 국내 해양플랜트 산업이 오랜 침체에서 벗어나는 계기가 되길 기대한다"고 말했다. 



세계 최대 운송업체 중 하나인 완하이라인, INTTRA의 통신망에 합류

해양산업의 중심에 선 최대 중립 네트워크, 소프트웨어 및 정보 제공업체 INTTRA가 대만의 최고 해운회사인 완하이라인(Wan Hai Lines)이 통신망에 합류했다고 발표했다. INTTRA는 이제 12대 대표 운송업체와 협력하게 된다.

완하이(Wan Hai)는 INTTRA 통신망의 글로벌 확장을 계속하고 있다. 동사는 시장 점유율

기준으로 아시아 최고의 운송업체 중 하나이며 세계에서 가장 큰 컨테이너식 거래를 하는 업체로서 그의 합류는 매우 중요하다 할 수 있다. 또한 완하이는 아시아에서 가장 광범위한 서비스 공급망을 제공할 뿐만 아니라 최근 몇 년 동안 미국, 남미 및 중동으로 확장했다. 예약, 선적 지시, eVGM, 트랙 앤 트레이스, 선하증권 및 해양 스케줄을 포함하여 INTTRA

의 통신망을 통해 고객에게 완전한 솔루션을 제공할 수 있게 될 것으로 전망된다.


"완하이는 지금까지 EDI 플랫폼을 개발해 왔으며, INTTRA에 합류함에 따라 고객에게 또 다른 서비스를 제공하고 EDI 서비스를 더욱 강화하기를 기대합니다"라고 Randy Chen 완하이라인 부회장이 소감을 밝혔다. 

ABB to boost sustainability and efficiency for pioneering superyacht

ABB will deliver electric, digital and connected solutions for one of the first superyachts built to meet strict new emissions standards. The 80-meter superyacht, built at the Nobiskrug shipyard in Germany, will feature a wide scope of ABB's technologies that will enhance its environmental performance and help the vessel comply with the International Maritime Organization's new "Tier III" regulations. The new regulation comes into force for all superyachts from 2021 onwards and requires nitrogen oxide (NOx) emissions to be 70 percent lower than those permitted under current limits. Due delivery in 2019, the superyacht, known as Nobiskrug's Project 790, is the result of early collaboration between the designers, the shipyard and ABB.

"We prioritized passenger comfort and energy efficiency at an early stage and we believe the solution offered by Nobiskrug and ABB will achieve these goals," says Captain Aaron T. Clark.

The superyacht will be powered by two compact gearless steerable Azipod® C propulsion units with the proven ability to consume 20 percent less fuel than traditional shaftline propulsion systems. Azipod® propulsion extends below the vessel's hull freeing valuable onboard space. Due to its minimal noise and vibration, ABB's propulsion system increases passenger and crew comfort, while 360-degree rotation of the units pro-




vides high maneuverability.

ABB's award-winning power and distribution system Onboard DC Grid™ will help the superyacht achieve additional efficiency by allowing the engines to work at variable speeds and draw on stored energy. Onboard DC Grid™, which had cut fuel consumption by 27% in other applications, is also suitable for integration of next-generation energy sources, including renewables. The vessel will also feature ABB's integrated Power and Energy Management System (PEMS) autonomously controlling load sharing between energy sources.

"ABB was chosen because of its vast experience in the passenger vessel field and global service network. We are convinced of the many benefits of Onboard DC Grid™, Azipod® propulsion and life-long support for this advanced technology yacht," says Holger Kahl, Managing Director, Nobiskrug. "It is evident that supery-

acht owners are taking a closer interest in technical aspects of vessel performance, efficiency and environmental profile," says Juha Koskela, Managing Director, ABB Marine & Ports. "ABB's technology is at the heart of this visionary vessel, helping make it one of the most energy efficient superyachts ever built."

In line with ABB's "Electric. Digital. Connected." vision for seagoing vessels, the superyacht will have the capability to connect to the ABB Ability™ Collaborative Operations Centers infrastructure. This network uses remote equipment monitoring and data analytics to enable predictive maintenance, planned interventions or even remote technical support. 

First of 55 stamco PCTCs installed with naval dome endpoint

Naval Dome has successfully installed its Endpoint maritime cyber defence system to a 57,692GT Pure Car and Truck Carrier(PCTC) operated by Piraeus-based Stamco Ship Management. The vessel, chartered to Wallenius Wilhelmsen Lines, is the first of 55 PCTCs under Stamco management scheduled to be protected by the award-winning multi-layered cyber defence solution. Following preparatory work to tailor the Naval Dome Endpoint to suit the vessel's specific systems and operational profile, installation took one hour to complete during a scheduled port stay in Piraeus, Greece.

Naval Dome will now prepare the bespoke technology for installation to the other vessels in the Stamco fleet. Stamco's head of operations said: "Our commitment to ship safety underpins the decision to protect our customers' assets with the Naval Dome solution. We cannot underestimate the operational, financial and safety implications a cyber-related incident – whether by design or by default – would have on operations, especially given the high-value cargo our ships transport.

"With Naval Dome we are better prepared to prevent any unauthorised access to our ships' systems. A significant advantage of the Naval Dome Endpoint is that it protects our systems and our crews can go about their day-to-day duties without having to intervene."



Naval Dome Chief Technical Officer Asaf Shefi said: "We are delighted that Stamco Ship Management has become one of the first ship management companies to take decisive steps to protect its fleet from cyber attack. The decision should encourage other ship managers to follow

Stamco's lead, since all systems onboard ships are not stand-alone components but a connected network of systems and machinery that can be protected by our technology."

Coincidentally, the Stamco installation coincided with the results from a BIMCO, Fairplay and ABS Advanced Solutions survey in which a high proportion(75%) of the individuals questioned worked for companies that had experienced a cyber-related incident in the last 12 months. It also revealed that half were affected by service disruption while a quarter of respondents' companies suffered financial loss.



An IUMI, Marsh and Global Maritime Forum survey, meanwhile, indicated that cyber attacks and data theft are likely to dominate the maritime agenda over the next ten-years. Cyber related incidents were also found to be the third-highest issue with regard to perceived impact and the lowest related to preparedness. "There is a clear and present danger of ship systems being hacked. If ships remain unprotected, hackers will penetrate critical systems and prevent any further ship operation until they've paid the ransom demand," said Shefi. "Endpoint mitigates against this risk." 🚢

Ever-lasting bearings keep world's largest sloop ever-ready for charter



One of the projects Canada's Thordon Bearings is most proud to be associated with is that of the *Mirabella V*, which has been operating the company's SXL and COMPAC bearings continually for more than 15 years. The M5, formerly named *Mirabella V*, designed by Ron Holland Designs, was built by VT Shipbuilding of Woolston, UK in 2003. The 77m flybridge sloop, with a beam of 14.8m (48.5ft) and a height of 88.5m (290.3ft) to the top of the carbon mast, is the largest single-masted sailing ship ever built.

The single-mast sloop sail design was chosen in order to maximise the

accommodation space, as M5 was built for luxury yacht charters, offering equivalent facilities to those of a similarly-sized motor yacht. The righting moment of the sailboat hull is said to make it more sea-kindly than a motor vessel, which enhances passenger comfort. The high-aspect sail configuration gives a good speed potential, and M5 regularly achieves over 19 knots in 3.5m(11.5ft) wave heights.

Such a tall mast has to be balanced by a deep keel, and maximum draught is 10.2m(33.5ft). To allow M5 to enter harbours such as her original home port of Palm Beach, Florida, naval

architect John Stott of Ron Holland Design specified a lifting keel, weighing 150 tonnes. This was chosen rather than the swing keels normally specified in similar large sailing yacht applications. The keel is raised by powerful hydraulic cylinders, and when fully retracted the draught is reduced to 4m(13.1ft).

Support pads for the keel had to be capable of carrying high loads and offer good wear resistance, as well as being as quiet as possible in operation. During Stott's research into composite bearing materials he discovered Thordon. And working in con-




junction with Thordon's Chief Designer, he specified the company's SXL pads for the lateral guides, and for the front and back guides, which also function as location ram bearings for the keel locking arrangement, Thordon SXL TRAXL bearings with Thorseals were chosen. The Thordon inventory is completed by water-lubricated COMPAC propeller shaft bearings for the motor propulsion plant, which were specified by propeller supplier Rolls-Royce Kamewa. Coinciding with the change of name, the yacht underwent a comprehensive refit at Pendennis Shipyard in Falmouth, UK, in 2013. Work included replacement of MTU main engines with higher-power 1300 bhp Caterpillar units, anew electrical system, redesigned interior, an extended stern and reverse transom, a lighter ballast arrangement and carbon fibre standing rigging. During the DNV 10-year survey which was undertaken at the same time, the Thordon bearings were all found to be in excellent condition, and they remain fully serviceable five years on, with a total of 15 years' service.

George Morrison, Thordon's Regional Manager, said: "The SXL lateral

guides have proven capable of withstanding the high forces and have shown excellent wear resistance, while the SXL TRAXL bearings have proved highly capable of withstanding high

operating pressures and able to absorb impact loads. The Thorseal self-lubricating polymer material has been shown to reduce cylinder wear, while noise is minimised when the keel

lifting mechanism is in operation. This is because there is no metal-on-metal contact.” 

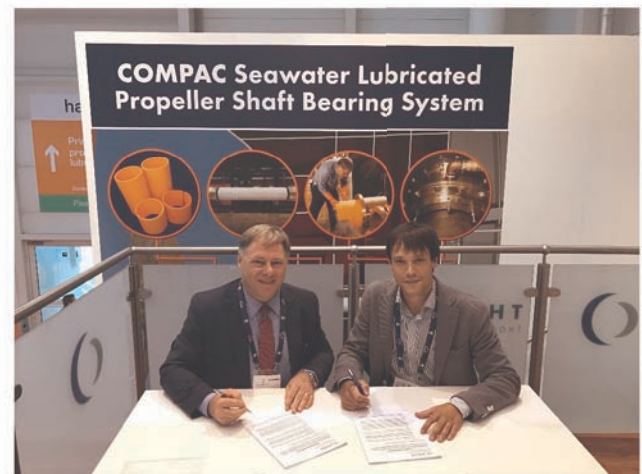
Thordon signs new distributor agreement with Spain's Echetalde

Thordon Bearings confirmed it signed a new sales and distribution agreement during the recent SMM 2018 tradeshow in Hamburg, Germany. The agreement with Spain's Echetalde, signed on 5th September, replaces the agreement with Thordon's previous distributor in the region, Echelan Thor, following the retirement of its founder Pedro Echevarri, after 30 years of working with Thordon products.

Iñigo Arrancudiaga, founding partner of Echetalde and a former employee of Echelan Thor, said: "When Echelan Thor closed, we wanted to continue the company that Pedro founded but the best option for us was to create a new company. So we are delighted that Thordon has continued to work with us and place their trust in Echetalde. It's basically business as usual as Pedro will continue to help us as a consultant, so he will remain part of the team in some way."


Thordon Bearings' CEO Terry McGowan said: "Spain, Gibraltar and Morocco are important market sectors for Thordon Bearings, not only for our established commercial marine business but also for our activities in the hydro-power sector. Echetalde, under the stewardship of partners Iñigo Arrancudiaga and Xabier Arana, whom we've worked with for a number of years now, put forward an excellent succession plan following Pedro's retirement, which means a seamless transition for our distribution network and customers in the region."

Since Echetalde began operating it has been quick to establish itself as Thordon's distributor in the region, having secured contracts to supply a range of non-metallic vertical



pump bearings to Spain's industrial sector. The company has also presented a number of new supply opportunities for Thordon products in the region, a Echetalde partner Xabier Arana explained.

"We are seeing increasing interest for oil-to-water lubricated bearing conversions in the hydro-power, pump and industrial sectors and we are close to securing a number of orders in the maritime sector. We hope soon be in a position to confirm an order for the supply of a complete Thordon bearing package for a tuna fishing vessel. There are a number of opportunities for Thordon Bearings with our customers throughout the region."

Echetalde is based in San Sebastian, Spain, and will carry out sales, distribution and engineering services for all Thordon products across Spain, Gibraltar and Morocco. 

Newport shipping purchases 100 scrubbers for turnkey retrofit services



Newport Shipping Group has purchased 100 scrubbers with options for an additional 100 units from Chinese scrubber manufacturer Weihai Puyi Marine Environmental Technology Co(Puyier). The bulk purchase of scrubbers, which aims to safeguard shipowners against any price hikes or production bottlenecks as demand increases, coincides with the signing of cooperation agreements with engineering services providers Harris-Pye and Goltens.

Newport Shipping Chief Executive Officer Erol Sarikaya said: "Together with our existing global network of drydocks, we can now offer the marine industry its first-ever turnkey scrubber retrofit solution. We are providing shipowners with a true one-stop-shop for equipment procurement, engineering, guaranteed retrofit slots, and attractive deferred payment plans covering up to 60% of the total contract cover over 18-months subsequent to retrofit completion. "Having secured an 8-month lead-time for scrubbers ordered by the end of October, we can guarantee shipowners that their retrofits will be completed well in advance of the 2020 Sulphur Cap implementation date." Engineering will be facilitated by Harris Pye and Goltens, both established marine engineering companies with histories dating back to 1976 and 1940,

respectively.

These companies will provide 3D scanning and engineering services, including basic and detailed design, prefabrication and, where and when required, riding squads to facilitate partial or full in-service retrofits. Goltens VP Sandeep Seth said: "The market is gathering pace as more and more shipowners opt for the scrubber solution as the way to comply with the global Sulphur cap rule. With the agreement we have reached with Newport Shipping, shipowners benefit not only from our Green Technologies' service offering, but drydock availability, a cost-effective means of financing their scrubber retrofits and a scrubber technology

that is proven with more than 50 installations."


Harris-Pye COO Chris David said: "With the global emissions regulation due to enter into force in just over one year, shipowners and operators are realising that exhaust cleaning makes more commercial sense due to the clear payback. Harris-Pye further enhances Newport Shipping offerings by providing a significant scope of in-service work which reduces off-hire time at the shipyard for a more rapid retrofit re-delivery."

Roy Yap, Newport Shipping's COO, said: "Having vetted numerous scrubber manufacturers over the past year, including new entrants to the market; we selected Puyier because of its 10-year track record in exhaust gas cleaning technology. Together with our professional network of partners, Newport makes scrubbers accessible for retrofits in service or at the shipyard." Puyier General Manager Ryan Gao said: "With Newport's bulk purchase of 100+100 scrubbers we are able to pass on any savings to the shipowner while locking in favourable delivery slots. With major scrubber manufacturers offering lead-times of between 16 to 20 months; our established design, supply chain and manufacturing base provide timely 8-month deliveries for Newport



customers.”

Puyier manufactures open, closed and hybrid scrubber systems in both I-type and U-type configuration. It has more than 70 references including major operators as TRF and RCL and another 100 units on order. The system received approval from all the major classification societies following its installation aboard the container-ship COSCO Binghe in 2013 Newport

currently has a pipeline of owners across all major vessel classes for projects totalling 87 of the 100 scrubbers purchased with binding LOIs and contracts. 

LS전선, 바레인 전력청과 1,400억원 규모 초고압 케이블 공급 계약

LS전선

LS전선(대표 명노현)은 바레인 수전력청의 1억 2,555만 달러(한화 약 1,424억원) 규모 초고압 케이블 프로젝트를 턴키로 수주했다고 밝혔다.

이 프로젝트는 바레인 정부가 산업화와 도시화에 따라 필요한 전력을 공급하기 위해 바레인 전역에 신규 전력망을 구축하는 사업이다. LS전선은 프리미엄급인 400kV 초고압 케이블의 공급은 물론, 전기와 토목 공

사 등 엔지니어링 일체를 수행한다.

중동은 전세계 초고압 케이블 수요의 약 20%를 차지하는 중요한 시장이지만, 자유가 로 인해 수년간 대형 인프라 투자가 지연되어 왔다. LS전선은 지난 10여 년간 바레인의 주요 송전망 구축 사업들을 성공적으로 완수한 것이 치열했던 이번 수주전의 성공 요인이 되었다고 밝혔다.

명노현 LS전선 대표는 “침체된 중동 시장에서 세계 톱 수준의 기술력으로 초대형 프로젝트를 수주했다는 점에서 의의가 크다”며 “특히 바레인은 최근 800억 배럴의 해

저 유전을 발견, 국가 차원의 산업 발전에 힘쓰고 있어 추가 수주도 기대된다”고 말했다.

LS전선은 바레인, 카타르, 쿠웨이트 등을 중심으로 초고압 해저와 지중 케이블을 공급하며 중동 시장 점유율 1위를 차지하고 있다. 2012년과 2017년에는 카타르에서 각각 5,000억원과 2,200억원 규모의 국내 최대 해저, 초고압 케이블 수출 계약을 따냈다.



Green Corridor JIP delivers innovative bulk carrier designs for a low emissions future

This collaborative project has demonstrated that there is a cleaner way to ship Australia's largest export commodities to market using LNG as a marine fuel. Woodside will continue to work with industry partners to develop this opportunity.



The Green Corridor Joint Industry Project (JIP) has ended on a high note, delivering a well-received LNG-fuelled Newcastlemax design for transporting iron ore and coal on the Australia - China route in Phase 1a, and upsizing it to the very large ore carrier (VLOC) class in Phase 1b. The project was recently concluded with a signing ceremony in Singapore.

"The Green Corridor project brought together key stakeholders in the iron ore and coal trades, and the partners have made great progress in developing greener, more efficient, and future-proof designs. Innovations delivered will benefit not only ore and coal carriers, but the entire bulk segment," says Morten Løvstad, DNV GL's Business Director for bulk carriers.

When the IMO confirmed the 2020 deadline for the 0.5 per cent global sulphur cap in 2016, key stakeholders serving the Australia-China iron ore and coal trade route, including major Australian miners BHP, Fortescue Metals Group and Rio Tinto, ship owners MOL and U-Ming, together with LNG supplier Woodside, ship designer SDARI, and class society



DNV GL, decided to join forces to develop a suitable LNG-fuelled bulk carrier solution for the route. China Merchant Energy Shipping and Shell Eastern Petroleum joined the project in a later phase.

The result was a robust, commercially viable and safe 210,000 dwt LNG-fuelled bulk carrier design, developed using leading-edge but proven technology. The Newcastlemax design from phase 1a was well received, and Approval in Principal (AiP) was issued by DNV GL in 2017. In Phase 1b, the project concluded work on a dual-fuel



260,000 dwt dedicated ore carrier design based on the same economical and technical principles.

A key accomplishment of Phase 2 was to promote the development of optimized LNG bunkering supply chains to support efficient bunkering of bulkers along the trading route, in order to give the industry the confidence to invest in LNG-fuelled bulk carriers. Woodside and Shell advised on LNG bunkering possibilities in Australia and the APAC region and the related supply chain costs.

Bunkering issues such as compatibility and safety studies for ship-to-ship bunkering have been addressed, and the economic calculation has been updated accordingly to demonstrate a more robust business case for LNG as fuel. Due to the rapid rise in crude oil prices over the past year, the price of low-sulphur marine fuel is now 50 per cent higher than when economics were analysed for Phase 1a in early 2017.

U-Ming President C. K. Ong comments: "U-Ming is very happy to have worked with like-minded partners to find smarter ways to look after the environment, and we will continue to invest to stay ahead of the technological developments. We look forward to the project results being put into




action to ensure sustainability in the Australia - China Green Corridor for the coming decades."

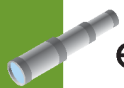
Woodside Chief Operations Officer Meg O'Neill says: "This collaborative project has demonstrated that there is a cleaner way to ship Australia's largest export commodities to market using LNG as a marine fuel. Woodside will continue to work with industry partners to develop this opportunity."

BHP offered this observation on the collective effort: "This project demonstrates how greater connectivity in the maritime ecosystem allows us to resolve the big issues that impact the whole industry, such as higher safety standards and lower shipping emissions."

Morten Løvstad concludes: "DNV GL is very pleased to



have been the project manager and collaborating classification society in such a productive and beneficial project. The cooperation between partners has in itself been invaluable, and the results will help to secure the sustainability of the route for the future." 



Brandenburg Marine Holds its Middle East Forum

– Plans for further expansion in the Far East Market



Brandenburg Marine, the leading, Cyprus based, marine insurance company in the Middle East & Europe, announced plans for further expansion, targeting the Markets in the Far East.

During the "Brandenburg Marine Middle East Forum", held at Radisson Blu Martinez Hotel in Beirut, Lebanon on the 18th of October, Brandenburg Marine, showcased its integrated insurance and brokerage services.

The forum, Organized by Robban Assafina, the MENA Maritime Shipping, Ships, Offshore & Marine Technology magazine, was attended by maritime and marine insurance companies in the region. Major maritime shipping and insurance companies, ship owners, ship management companies and leading Lebanese, Egyptian and Syrian maritime professionals attended the forum to get an insight into the services of the young company.

Brandenburg Marine stressed its commitment to providing its diverse and integrated services to its local and international clients, mainly protection & indemnity and liability insurance, providing the right direction for shipowners to cover their interests before signing contracts, and help reduce insurance costs without compromising the quality of the services provided.

The company also presented an explicit explanation about the main claims dealt with by P&I Clubs, as well as an overview of the market changes. Brandenburg Marine also spoke of the main problems that face shipowners in the charterparties, disputes & the role of P&I Clubs. "Brandenburg Marine Middle East Forum" came in line with the



company's efforts to provide its expertise and legal assistance in handling ship owners or managers claims.

Amgad Wanis, company's CEO, said during the event: "This forum highlights and presents our services to the maritime community in the region, providing the market with a new name in the world of marine insurance. So we hope our presentations was important and useful to the audience. With our presence throughout countries in Europe such as Germany, Romania and Greece, we are trying to expand our clients' base seeking the Far East market including Pakistan, China and Taiwan". 

국내 유일 용접, 절단 전문산업전, '2018 창원국제용접 및 절단기술전' 베일을 벗다!

- 글로벌 용접, 절단, 산업로봇제조사 및 솔루션사 총출동



지난 10월 16일부터 19일까지 4일간 창원컨벤션센터(CECO)에서 국내 유일 용접·절단 전문산업전 'WELDING KOREA 2018(2018 창원국제용접 및 절단기술전)'이 세계적인 3D프린팅/적층제조 전시브랜드 TCT KOREA와 함께 역대 최대 규모인 123개 업체 508부스로 개최됐다. 1989년 1회 개최 이후, 올해로 18화재를 맞이한 이번 전시회는 경상남도와 창원시가 주최하고, 창원컨벤션센터(CECO)가 직접 주관하는 30년 역사와 국내 최고, 최대 규모의 용접, 절단기술 전문비즈니스 전시회로 평가받고 있다

글로벌 산업로봇제조사, 자동화붐으로 WELDING KOREA 대거 참여


가파른 인건비 상승과 생산성 향상이란 요구에 대응하기 위해 많은 생산제조업체들이 용접, 절단 자동화시스템 도입을 검토 중이다. 이런 수요를 알고 있는 현대로보틱스, 스토브리, 다이헨, IGM서비스코리아 등 국내외 유명 산업로봇기업들이 본격적으로 WELDING KOREA에 출품하여 용접 및 절단 자동화의 미래를 선보였다. 이번 전시에는 로봇플러스와 같이 산업로봇을 이용한 자동화 솔루션 업체도 대거 참가하여 낙후한 설비로 인해 고(高)인건비를 부담하고 있는 생산제조 현장에 최적인 용접·절단 자동화 시스템을 데모와 함께 선보였으며, 용접 및 절단 공정 자동화라인 도입을 고민하고 있는 기업들에게 직접 컨설팅도 제공했다.

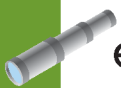


오랜 불황에 힘든 용접·절단업 종사자들의 스트레스를 날려버린 축제의 장

용접·절단 최대 수요 산업인 조선 및 중공업이 본격적으로 턴어라운드 조짐을 보이고 있지만, 여전히 불황에 어두운 그늘에서 힘든 시간을 보내고 있는 업계 종사자들이 즐길 수 있도록 WELDING KOREA에서는 다양한 이벤트도 준비했다.



경남의 유명 용접명장, 여성 용접 기능장, 오스트리아 용접 마이스터의 다양한 시연 및 강연과 용접 이민과 취업 관련 가이드 등 프로그램이 특설무대에서 진행되었다. 여기에 현장업무의 스트레스를 한 방에 날려버릴 하이트 진로와 함께하는 무제한 비어파티와 온 몸을 힐링할 수 있는 오레스트 안마의자가 설치돼 있는 안마존까지 구비해 참가객들의 발길을 모았다. 



PTC, 2018 코리아 CAD 서밋 성황리 개최

- 실시간 시뮬레이션 기반의 3D 설계 트렌드 방향성 제시



PTC코리아(지사장 박혜경)는 지난 10월 18일 그랜드 인터컨티넨탈 파르나스 호텔에서 '2018 코리아 CAD 서밋'을 성황리에 개최했다고 밝혔다. 이번 행사에는 스마트 커넥티드 제품 설계에 관심있는 엔지니어 및 크레오(Creo) 사용자 200여 명이 참석한 가운데 3D 설계에 대한 최신 기술 정보를 공유하며 뜨거운 관심을 나타냈다.

코리아 CAD 서밋은 디지털 엔지니어링에 대한 최신 기술을 다루는 업계 최대의 연례 컨퍼런스로 올해는 스마트 커넥티드 설계의 혁신을 담은 시뮬레이션의 미래에 대한 주제로 개최됐다. PTC는 이번 컨퍼런스를 통해 제품 혁신의 속도를 높이고, 기존 설계를 다시 활용하거나 추론에 의존하는 대신, IoT 기술을 통해 성능 목표를 실제 제품의 운영 정보에 반영함으로써 더 나은 제품을 빠르게 개발할 수 있는 방안을 제시했다.


PTC코리아 박혜경 지사장은 환영사를 통해 "소비자들의 니즈를 충족시키기 위한 기업의 노력이 제품 설계 트렌드의 변화를 이끌고 있다. PTC는 디지털 설계와 실제 제품을 연결하여 더욱 빠르고 스마트하게 설계 과정을 고도화시킬 수 있도록 지원하고 있다. 지난해 증강현실을 접목한 CAD 소프트웨어로 설계

혁신을 선보이는데 이어 올해에는 실시간 시뮬레이션 기반의 디지털 검증을 통한 설계 트렌드의 새로운 방향성을 제시했다"고 말했다.

이번 행사에서 다루진 주요 내용은 ▲스마트 커넥티드 제품 설계 전략 ▲CREO 5.0 기술 체험 ▲실시간 시뮬레이션 기반 설계 기술의 미래 ▲유동해석 솔루션의 효과 입증 사례 ▲위상 최적화를 통한 제품 혁신 가속화 ▲CREO 제품 로드맵이다.

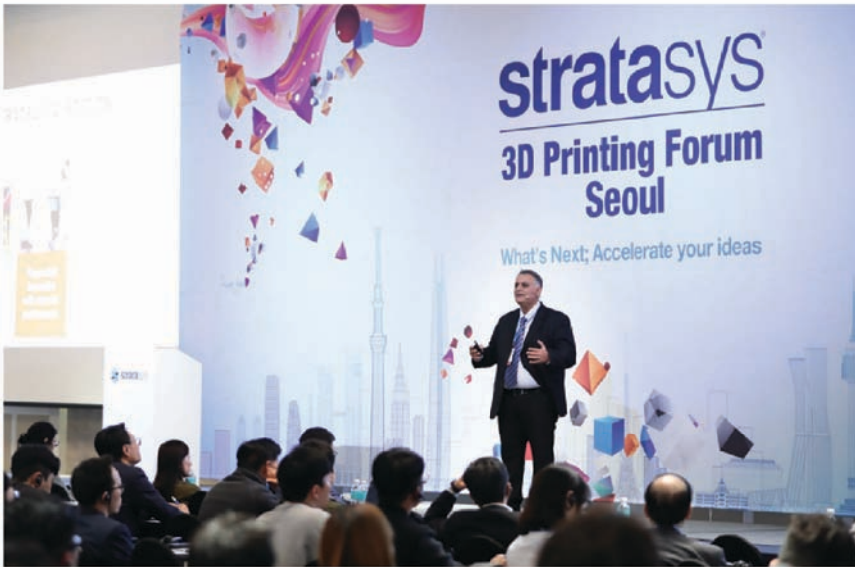
3D CAD 소프트웨어 크레오(Creo®) 5.0은 디지털 트윈 솔루션을 현실화한 세계 최초이자 유일한 기술로, 제품의 면면에 증강현실을 적용하여 물리적 세계와 디지털 세계를 연결한다. 기능적으로는 실시간 시뮬레이션 기술을 통해 디지털 검증을 프론트 로딩하여 제품 품질을 초기에 확보할 수 있게 해주며, 위상 최적화(Topology Optimization) 기술을 통한 설계 최적화 및 신뢰성 높은 유동해석을 지원한다.




이와 함께 PTC는 엔지니어링 시뮬레이션 분야의 선두 주자인 앤시스와의 파트너십을 통해 크레오와 '앤시스 디스커버리 라이브(ANSYS Discovery Live)'를 통합 제공함으로써, 설계 엔지니어가 CAD와 시뮬레이션의 경계를 없애고 제품 개발 프로세스 전반에 대한 통찰력을 확보할 수 있도록 지원한다. 

스트라타시스, 3D 프린팅 및 적층 제조 컨퍼런스 '3D 프린팅 포럼 2018' 개최

- 국내외 3D 프린팅 전문가 및 다양한 산업 분야의 디자이너, 엔지니어, 마켓 리더 참여해
3D 프린팅의 최신 활용 사례 및 정보 공유



3D 프린팅 활용 사례 등의 최신 3D 프린팅 산업 관련 기술 및 동향 정보를 제공했다. 뿐만 아니라, 다양한 3D 프린팅 샘플들을 산업 분야별로 전시하여 국내외 고객 및 사용자의 3D 프린팅 및 적층 제조 기술 활용에 대한 이해를 도왔다. 또한, 이번 행사에서는 향후 출시되는 스트라타시스의 신규 재료 및 새로운 메탈 프린팅 기술을 소개하고 국내에서는 최초로 이를 활용한 파트를 전시하여 참석자들과 업계 관계자들에게 3D 프린팅 기술을 활용한 아이디어의 가속화에 대한 인사이트를 제시했다. 특히 이번 포럼에는 고객들이 필요로 하는 것들을 파악하고 지원하기 위한 별도의 부스를 마련하여 참가자들로부터 큰 호응을 받았다.

스트라타시스 코리아 황혜영 지사장은 "3D 프린팅 기술은 Industry 4.0 시대의 스마트 팩토리를 구성하는 필수 기술의 한 축이 되었다"며, "스트라타시스는 다양한 산업 분야에서 요구되는 기업의 특수한 니즈를 적극 반영한 최상의 적층 가공 기술 솔루션을 제공하기 위해서 노력하고 있다"라고 전했다. 



하기 위해 마련됐다. 올해로 5회째를 맞는 '스트라타시스 3D프린팅 포럼'에서는 국내 대표 기업의 3D 프린팅 실무자 및 전문가들이 참여해 3D 프린팅의 최신 기술 동향과 다양한 3D 프린팅 활용 사례를 공유했다.

'3D 프린팅 기술을 이용한 아이디어 가속화'라는 주제로 진행된 이번 포럼은 국내외 3D 프린팅 인사이트와 사용자 경험을 공유하는 다양한 세션들로 구성되어 ▲응용 적층 가공 기술의 미래, ▲스트라타시스의 미래 제품 개발과 제품 로드맵, ▲석기 시대부터 인공 지능 시대까지의 재료, ▲스트라타시스 메탈 솔루션: 공정 가속화를 위한 메탈 적층 제조, ▲자동차 산업에서의

3D 프린팅 및 적층 제조 솔루션의 글로벌 선도 기업인 스트라타시스는 서울 르 메르디앙 호텔에서 국내 최대 규모의 3D 프린팅 및 적층 제조 컨퍼런스 '스트라타시스 3D프린팅 포럼 2018'을 개최했다고 10월 24일 밝혔다. 스트라타시스 3D 프린팅 포럼은 6000여명의 국내외 3D 프린팅 전문가와 다양한 산업의 디자이너, 엔지니어를 포함한 마켓 리더가 참여하여 3D 프린팅 동향 및 경험과 의견을 공유

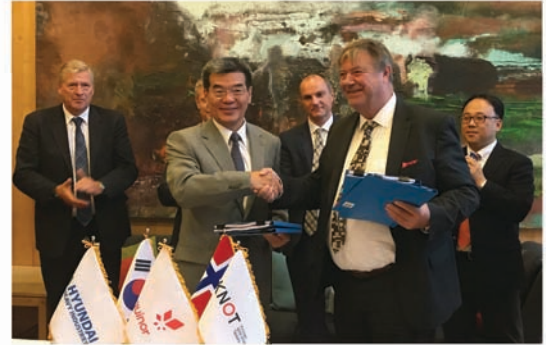
HHI secured an order worth USD 210 million for 2 shuttle tankers

Hyundai Heavy Industries(HHI) won an order for 2 shuttle tankers, meeting its annual order target of 129 vessels and USD 10.4 billion(based on 3 shipbuilding units of Hyundai Heavy Industries Group). HHI announced that it recently signed a contract worth USD 210 million with Norway-based KNOT to build 2 units of 153,000-ton shuttle tankers. These vessels will be built at Ulsan headquarters of HHI from the first half of 2019 and delivered to the ship owner from June 2020 on a staggered basis.


The latest contract brings total number of vessels ordered to the 3 shipbuilding units of Hyundai Heavy Industries Group to 129 units worth USD 10.4 billion up to the third quarter of this year, which accounts for 79% of the combined new order target of USD 13.2 billion. That is the highest figure in 5 years after 2013 when Hyundai Heavy Industries Group reported order intake of 200 vessels worth USD 13.9 billion. And it represents an increase by 60% in terms of order value, compared to 103 vessels worth USD 6.2 billion recorded in the same period of the previous year.

By type of vessels, Hyundai Heavy Industries Group won orders for 31 units of high value-added vessels including 16 LNG carriers, 12 LPG carriers, 3 ethane carriers, along with 47 containerships and 47 tankers. Particularly, Hyundai Heavy Industries Group signed the contract at higher prices for vessels, compared to the previous year's level, amid recent recovery in shipbuilding industry which raises the expectation for increased profitability.

An official from HHI said, "Our focus on high value-added vessels, such as LNG carriers, amid recovery in shipbuilding market has result-




ed in good results. As we are currently receiving inquiries from ship owners about LNG carriers, we expect that we would exceed our annual new order target."

These shuttle tankers will measure 279m in length, 48m in width, and 23.6m in height and have the scrubber ready option to comply with ever-more stringent environmental regulations. Moreover, these vessels will apply the DC grid to maximize the cargo pump efficiency, along with thruster(a device to maintain the position of vessel during the loading of oil at the sea), the main feature of shuttle tanker. Meanwhile, Norway-based KNOT has placed orders for a total of 9 shuttle tankers at HHI to date since it ordered its first shuttle tanker to the shipbuilder in 2011. 

SHI clinched an order for a LNG carrier

Samsung Heavy Industries(SHI) announced that it secured an order worth KRW 211.8 billion from a ship owner of Oceania for a LNG carrier with a capacity of 174,000m³.

Including this order, SHI has won orders for 41 vessels worth USD 4.9 billion so far this year.

삼성중, LNG선 1척 수주 삼성중공업은 오세아니아 지역 선사로부터 17만 4천m³급 LNG선 1척을 약 2,118억 원에 수주했다고 밝혔다. 삼성중공업은 이번 계약을 포함해 올해 총 41척, 49억 달러의 수주실적을 기록 중이다. 



SHI won an order from Hyundai Merchant Marine for 5 containerships

Samsung Heavy Industries(SHI) announced that it received an order worth approximately USD 773 million(about KRW 860.1 billion) from Hyundai Merchant Marine for 5 containerships, each with a capacity of 23,000 TEU. These vessels ordered to SHI will feature the design same as that of containerships of same class, increasing the efficiency of construction.

The latest order will bring the number of vessels ordered to SHI to 39 units worth USD 4.5 billion so far this year.



삼성중, 현대상선의 컨테이너선 5척 수주

삼성중공업은 현대상선으로부터 2만 3,000TEU급 컨테이너선 5척을 약 7억 7,300만 달러(8,601억원)에 수주했다고 밝혔다. 삼성중공업이 이번에 수주한 선박

은 동급 컨테이너선의 설계도면을 활용하기로 해 건조 효율이 높다.

삼성중공업은 이번 계약을 포함해 현재까지 총 39척, 45억 달러 수주를 기록 중이다. 🚢

Hyundai Merchant Marine inked contracts for 20 ultra-large containerships

Hyundai Merchant Marine(President: Yu Chang-geun) entered in to contracts with 3 shipyards for construction of 20 eco-friendly mega containerships. The signing ceremony was held first at Daewoo Shipbuilding & Marine Engineering(23,000 TEU with 7 vessels), followed by Hyundai Heavy Industries(15,000 TEU with 8 vessels) and Samsung Heavy Industries(23,000 TEU with 5 vessels), from 1:30PM on September 28.

The signing ceremony was attended by HMD President Yu Chang-geun, DSME President Jung Sung-rip, HHI President Ga Sam-hyeon, and SHI President Nam Joon-woo.



현대상선, 초대형 컨테이너선 20척 건조계약

현대상선(대표이사 유창근)이 친환경 메가 컨테이너선 20척의 건조계약을 조선 3사와 체결했다. 각 조선사별로 진행된 선박 건조계약 체결식은 지난 9월 28일 오후 1시 30분부터 대우조선해양(2만3,000TEU급 7척), 현대중공업(1만5,000TEU

급 8척, 삼성중공업(2만3,000TEU급 5척) 순으로 개최됐다. 이번 체결식에는 유창근 현대상선 사장을 비롯해 정성립 대우조선해양 사장, 가삼현 현대중 사장, 남준우 삼성중공업 사장이 각각 참석했다. 🚢

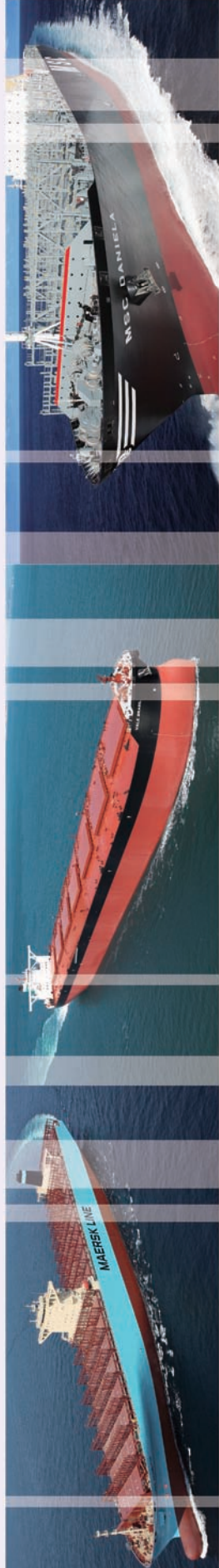
Korea Shipbuilding Orders awarded to domestic shipyards in 2015~2018

Korea Shipbuilding Orders

Data	Type	Number of vessel	Amount	Ship owner	Delivery	Shipyard
Jan	174,000m³ LNG carriers	2 vessels	USD 400 million	Korea Line Corporation, Korea	The end of 2017	Daewoo Shipbuilding & Marine Engineering
	174,000m³ LNG carriers	2 vessels	USD 400 million	Hyundai LNG Shipping, Korea	The end of 2017	Daewoo Shipbuilding & Marine Engineering
	19,200 TEU container ships	3 vessels	USD 450 million	Scorpio Group, Monaco	-	Samsung Heavy Industries
	LNG carriers	2 vessels	USD 416 million	SK shipping, Korea	The end of 2017	Samsung Heavy Industries
	319,000 DWT VLCCs	2 vessels	USD 198 million	Maran Tankers Management, Greece	-	Daewoo Shipbuilding & Marine Engineering
	158,000 tons oil tankers	5 units (2 optional vessels)	USD 330 million	-	2017s	Sungdong Shipbuilding & Marine Engineering
	174,000m³ LNG carriers	1 vessel	USD 200 million	-	-	Daewoo Shipbuilding & Marine Engineering
	74,000 DWT oil products carriers	2 units (1 optional vessels)	USD 46 million	Valies Steamship, Hong Kong	-	STX Offshore & Shipbuilding
	300,000 DWT VLCCs	2 vessels	USD 192 million	Metrostar Management, Greece	The end of 2016	Hyundai Heavy Industries
	1,800 TEU container ships	4 units (2 optional vessels)	-	Cosmotech Management S.A, Greece	-	Dae Sun Shipbuilding & Engineering
Feb	180,000m³ LNG carriers	1 vessel	-	Mitsui O.S.K Lines, Japan	2018s	Daewoo Shipbuilding & Marine Engineering
	38,000m³ liquefied petroleum gas and ammonia carriers	2 vessels	-	Asian ship owner	-	Hanjin Heavy Industries & Construction
	20,100TEU container ships	4 vessels	USD 619.57 million	Mitsui O.S.K Lines, Japan	2017, August	Samsung Heavy Industries
	LR1 tankers	2 vessels	KRW 320 billion	BW, Singapore	2016 ~ 2017	STX Offshore & Shipbuilding
	319,000 DWT VLCCs	2 vessels	USD 198 million	Maran Tankers Management, Greece	The end of 2016	Daewoo Shipbuilding & Marine Engineering
	20,600 TEU container ships	3 vessels	-	CMA CGM, France	The end of 2017	Hanjin Heavy Industries & Construction (HHC)-Phil's Subic Shipyard
	21,100 TEU container ships	6 vessels	USD 950 million	OOCL, Hong Kong	The end of 2017	Samsung Heavy Industries
	10,500 TEU container ships	5 vessels	-	Hapag-Lloyd, Germany	-	Hyundai Samho Heavy Industries
	Pure Car/Truck Carriers	2 vessels	USD 130 million	Norwegian Car Carriers, Norway	The end of 2016	Hyundai Samho Heavy Industries
	11,000 TEU container ships	6 vessels	-	Asian and European ship owners	2016 ~ 2017	H-HC-Phil's Subic Shipyard
2015	156,000 tons oil tankers	2 vessels	-	Maran Tankers Management, Greece	-	Daewoo Shipbuilding & Marine Engineering
	5,200 ton training vessel	1 vessel	-	-	-	Hanjin Heavy Industries & Construction
	74,000 tons LR1 tankers	8 units (4 optional vessels)	USD 375 million	Marshall Islands-based ship owners	The end of 2016	STX Offshore & Shipbuilding
	300,000 DWT VLCCs	10 units (5 optional vessels)	USD 1 billion	The National Shipping Company of Saudi Arabia	2017s	Hyundai Samho Heavy Industries
	19,630 TEU container ships	11 vessels	USD 1.1 billion	Maersk Line A/S, Denmark	2018s	Daewoo Shipbuilding & Marine Engineering
	Tankers	2 vessels	-	Arcadia Shipmanagement, Greece	-	Hyundai Heavy Industries
	300,000 DWT VLCCs	6 units (4 optional vessels)	USD 540 million	John Fredriksen	-	STX Offshore & Shipbuilding
	174,000 CBM LNG carriers	3 units (1 optional vessels)	-	Teekey LNG Partners, Canada	First quarter of 2019	Hyundai Samho Heavy Industries
	155,000 DWT tankers	3 vessels	USD 330 million	-	2018, February	Samsung Heavy Industries
	84,000m³ VLGCs	4 vessels	USD 320 million	China Peace, China	-	Daewoo Shipbuilding & Marine Engineering
Jul	173,400m³ LNG Carriers	1 vessel	USD 195 million	Chandris, Greece	The end of 2018	Daewoo Shipbuilding & Marine Engineering
	14,000 TEU container ships	9 vessels	USD 1.1 billion	Maersk Line A/S, Denmark	2017	Hyundai Heavy Industries
	Product Carriers	4 vessels	USD 144 million	Scorpio Tankers, U.S.A	The first of 2017	Hyundai Mipo Dockyard
	84,000m³ LPG Carriers	2 vessels	-	Asia ship owner	2017s	Daewoo Shipbuilding & Marine Engineering
	74,000 tons LR1 tankers	4 units (2 optional vessels)	-	Greece ship owner	The second half of 2017	STX Offshore & Shipbuilding
	173,400m³ LPG carriers	2 vessels	USD 400 million	BW Group, Singapore	The first half of 2019	Daewoo Shipbuilding & Marine Engineering
	84,000m³ LPG carriers	2 vessels	-	Asia ship owner	2017s	Daewoo Shipbuilding & Marine Engineering
	319,000 tons VLCCs	2 vessels	-	Maran Tankers Management, Greece	2017s	Daewoo Shipbuilding & Marine Engineering
	114,000 tons products carriers	2 vessels	-	Sea Tankers Group	2017, September	Daehan Shipbuilding
	158,000 DWT oil products carriers	2 vessels	-	Ditas Shipping, Turkey	2018s	Hyundai Heavy Industries
2016	40,000 DWT product carriers	2 vessels	-	Greece ship owner	-	Hyundai Mipo Dockyard
	159,000 DWT oil tankers	2 vessels	-	AMPTC, Kuwait	2018s	Hyundai Heavy Industries
	75,000 tons product carriers	4 vessels	USD 170 million	Tsakos, Greece	The first of 2018	Sungdong Shipbuilding & Marine Engineering
	180,000m³ LNG carriers	2 vessels	USD 400 million	SK E&S, Korea	The first of 2019	Hyundai Heavy Industries
	50,000 tons bulk carrier	1 vessels	-	Ilishin Marine Transport, Korea	The end of 2017	Hyundai Mipo Dockyard
	31,000 tons Car ferry	1 vessels	-	Weidong Ferry	The end of 2018	Hyundai Mipo Dockyard
	180,000m³ LNG carriers	2 vessels	USD 367 million	Europe ship owner	-	Samsung Heavy Industries
	2,800 ton convoy	1 vessel	USD 297 million	Korean Navy	The end of 2020	Daewoo Shipbuilding & Marine Engineering
	2,800 ton frigates	2 vessels	USD 324 million	Department of National Defense, Philippines	2020s	Hyundai Heavy Industries
	Patrol killer/medium	3 vessels	USD 173 million	Korean DAPA	2019s	Hanjin Heavy Industries & Construction
Oct	157,000 DWT oil tankers	2 vessels	USD 220 million	Viken, Norway	-	Samsung Heavy Industries
	113,000 DWT oil tankers	2 vessels	-	-	-	-

	Oct	157,000 DWT oil tankers	3 vessels	USD 170 million	Nordic American Tankers Limited, Norway	-	Samsung Heavy Industries
	Dec	14,500 TEU container ships	4 vessels	USD 700 million	IRISL, Iran	2th quarter 2018	Hyundai Heavy Industries
		49,000 tons products carriers	6 vessels				Hyundai Mipo Dockyard
		LNG Bunkering Vessel	1 vessel		Bernhard Schulte, Germany	The end of 2018	Hyundai Mipo Dockyard
	Jan	114,000 tons product carriers	2 vessels		SFL, France	3th quarter of 2019	Daehan Shipbuilding
		50,000 tons oil tankers	1 vessel		Fukujin Kisen, Japan		Hyundai Mipo Dockyard
		RO-RO Ship	2 vessels	USD 117.8 million	CLdN, Luxembourg	The first of 2017	Hyundai Mipo Dockyard
	Feb	50,000 DWT product carriers	1 vessel		Greece ship owner		Hyundai Mipo Dockyard
		300,000 DWT VLCCs	2 vessels		Eneasel, Greece	The end of 2018	Hyundai Heavy Industries
		173,400m³ LNG carriers	2 vessels		Europe ship owner	The end of 2019	Daewoo Shipbuilding & Marine Engineering
	Mar	114,000 tons oil tankers	4 vessels	USD 240 million	Sovcomflot, Russia	3th quarter of 2018	Hyundai Samho Heavy Industries
		21,000m³ LPG carriers	2 vessels		Solvang ASA, Norway	2019s	Hyundai Samho Heavy Industries
	Apr	VLCCs	1 vessel		Neda Maritime, Greece	2019s	Hyundai Samho Heavy Industries
		318,000 tons VLCCs	3 vessels	USD 250 million	Maran Tankers Management, Greece	2018s	Daewoo Shipbuilding & Marine Engineering
		300,000 DWT VLCCs	2 vessels		Sentek Marine, Singapore	The first of 2019	Hyundai Samho Heavy Industries
	May	VLCCs	4 vessels		Oceania ship owner	The first of 2019	Samsung Heavy Industries
		11,200 DWT product oil & chemical tanker	3 vessels		Korea ship owner	The end of 2018	STX Offshore & Shipbuilding
		7,500m³ LNG carriers	2 vessels	USD 100 million	Korea Line, Korea	The end of 2019	Samsung Heavy Industries
2017		114,000 DWT oil tankers	2 vessels		Melrosiar Management, Greece	The end of 2018	Daehan Shipbuilding
	Jun	RO-RO Ship	2 vessels	USD 117.8 million	CLdN, Luxembourg	The end of 2018	Hyundai Mipo Dockyard
	Jul	318,000 tons VLCCs	4 vessels		Maran Tankers Management, Greece	The end of 2019	Daewoo Shipbuilding & Marine Engineering
	Aug	84,000m³ LPG carriers	2 vessels		Vitol		Hyundai Heavy Industries
		300,000 tons VLCCs	5 vessels	USD 420 million	Hyundai Merchant Marine, Korea	The first of 2019	Daewoo Shipbuilding & Marine Engineering
	Sep	81,000 DWT bulk carriers	4 vessels	USD 120 million	Bahri, Saudi Arabia	The first of 2020	Hyundai Mipo Dockyard
		325,000 tons VLCCs	10 vessels	USD 800 million	Polaris Shipping, Korea	The first of 2021	Hyundai Heavy Industries
	Oct	325,000 tons VLCCs	5 vessels	USD 400 million	Polaris Shipping, Korea	The first of 2021	Hyundai Heavy Industries
		LNG carriers	1 vessel		Greece, Maran Gas Maritime		Daewoo Shipbuilding & Marine Engineering
	Dec	300,000 DWT VLCCs	1 vessel		Greece, Eneasel		Hyundai Heavy Industries
		300,000 DWT VLCCs	1 vessel		Korea, Hyundai Glovis		Hyundai Heavy Industries
		VLCCs	1 vessel		Greece, Aeolos		Daewoo Shipbuilding & Marine Engineering
		180,000m³ LNG carriers	1 vessel	USD 190 million			Samsung Heavy Industries
	Jan	174,000m³ LNG carriers	1 vessels		Russia, Sovcomflot	2020s	Hyundai Samho Heavy Industries
		170,000m³ LNG carriers	2 vessels	USD 370 million		The first of 2020	Daewoo Shipbuilding & Marine Engineering
	Feb	84,000m³ VLGCs	3 vessels	USD 220 million	KOTC, Kuwait	2019s	Hyundai Heavy Industries
		12,000 TEU container ships	8 vessels	USD 770 million	Asian ship owner	The first of 2021	Samsung Heavy Industries
	Mar	173,400m³ LNG carriers	2 vessels	USD 370 million	Oceania ship owner	The first of 2021	Daewoo Shipbuilding & Marine Engineering
		180,000m³ LNG carriers	1 vessel				Samsung Heavy Industries
		VLCCs	2 vessels	USD 260 million	Korea Line, Korea	The end of 2019	Daewoo Shipbuilding & Marine Engineering
	Apr	VLCCs	1 vessel		Europe ship owner	The end of 2019	Daewoo Shipbuilding & Marine Engineering
		VLCCs	2 vessels		U.S.A ship owner	First quarter of 2020	Daewoo Shipbuilding & Marine Engineering
		174,000m³ LNG Carriers	2 vessels	USD 370 million		July and October 2020	Samsung Heavy Industries
		152,700 DWT tankers	4 vessels	USD 360 million	Singapore, AET		Samsung Heavy Industries
	Jun	173,400m³ LNG carrier	1 vessel	USD 370 million	Greece, Alpha Gas S.A.		Daewoo Shipbuilding & Marine Engineering
			2 vessels			The first of 2020	Samsung Heavy Industries
	Jul	173,400m³ LNG carriers	1 vessel		Norway, Seatankers Management	2020s	Daewoo Shipbuilding & Marine Engineering

*Note : Based on the press release and public announcements of each shipyards, internal estimation of Monthly KOPSHIP (estimation until Aug 15, 2018)





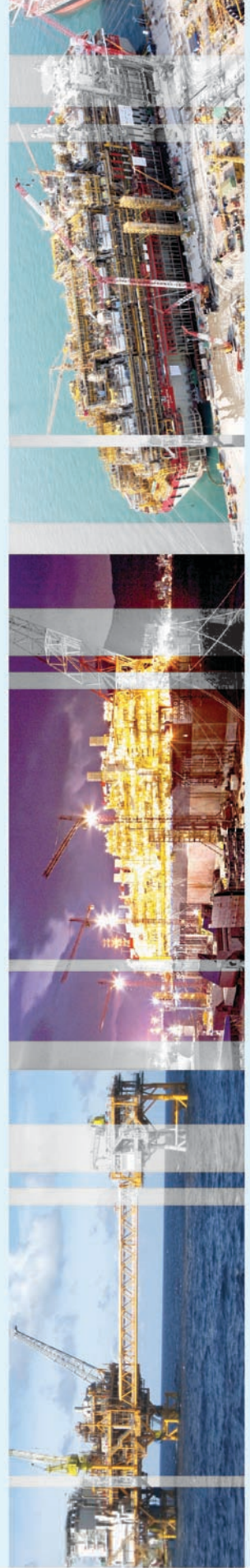
Offshore Plant Orders

Offshore plant orders awarded to domestic shipyards in 2011-2017

Data	Type	Number of vessel	Amount	Ship owner	Delivery	Shipyard	
2011	Jul	Drillship	2 vessels	USD 1.1225 billion	Maersk, Denmark	July 2014	Samsung Heavy Industries
	Aug	LNG-FSRU	1 vessel	USD 280 million	Excelerate Energy, U.S.A	First quarter of 2014	Daewoo Shipbuilding & Marine Engineering
		Semi-submersible Rig	2 units	USD 1.1 billion	Songa Offshore, Norway	Second half of 2014	Daewoo Shipbuilding & Marine Engineering
	Sep	Well Intervention Vessel	2 vessels	USD 420 million	Eide Marine Services AS, Norway	2013	STX Finland
		Drillship	1 vessel	KRW 600 billion	Noble Drilling, U.S.A	Second half of 2014	Hyundai Heavy Industries
	Oct	Fixed Offshore Platform	-	USD 1.4 billion	Chevron, U.S.A	Second half of 2014	Daewoo Shipbuilding & Marine Engineering
		Drillship	1 unit	USD 550 million	Offshore drilling company, Americas	-	Daewoo Shipbuilding & Marine Engineering
		Platform Supply Vessel	1 unit	-	Troms Offshore Supply AS, Norway	First half of 2013	STX OSV
		Offshore Plant Module	2 units	-	-	From 2013 to 2014	STX OSV
		Platform Supply Vessel	4 units	KRW 2 trillion	Island Offshore, Norway	Consecutively from the 3rd quarter of 2013 to the 1st quarter of 2014	Daewoo Shipbuilding & Marine Engineering
		Pipe Laying Support Vessel	2 units	USD 500 million	Odebrecht, Brazil	August of 2014	Hyundai Heavy Industries
	Nov	Offshore facilities (Gas platform and various facilities)	-	USD 900 million	Major multinational oil companies	2nd half of 2014	Hyundai Heavy Industries
CPF (Central Processing Facility)		-	KRW 2.6 trillion	INPEX, Australia	4th quarter of 2015	Samsung Heavy Industries	
Jan	Semi-submersible rig	1 unit	USD 620 million	Odyssey, Norway	by mid 2014	Daewoo Shipbuilding & Marine Engineering	
	LNG-FSRU	-	-	Hoegh, Norway	-	Hyundai Heavy Industries	
Mar	Offshore Platform	1 unit	USD 560 million	DONG E&P AS, Danish	April 2015	Daewoo Shipbuilding & Marine Engineering	
	FFSO	1 unit	USD 2.0 billion	INPEX, Australia	April 2016	Daewoo Shipbuilding & Marine Engineering	
Apr	Drillship	1 vessel	USD 645 million	Enasco plc	Third quarter 2014	Samsung Heavy Industries	
	Semi-submersible Drilling Rig	2 units	USD 1.1 billion	Songa Offshore, Norway	Mid 2015	Daewoo Shipbuilding & Marine Engineering	
May	Drillship	1 vessel	USD 600 million	Seadrill, Norway	Second half of 2014	Samsung Heavy Industries	
	Drillship	1 vessel	USD 655 million	Diamond Offshore Drilling Limited., U.S.A	4th quarter of 2014	Hyundai Heavy Industries	
Jun	Semi-submersible drilling rig	1 unit	USD 700 million	Fred Olsen Energy, Norway	March 2015	Hyundai Heavy Industries	
	LNG-FFSO	1 unit	-	Petroleum Nasional Berhad, Malaysia	June 2015	Daewoo Shipbuilding & Marine Engineering	
Jul	Drillship	1 vessel	USD 645 million	Enasco plc	-	Samsung Heavy Industries	
	Gas Compression Platform	1 unit	USD 420 million	(Letter of Award)	Second half of 2015	Hyundai Heavy Industries	
Aug	LNG-FSRU	8 vessels	-	Excelerate, U.S.A	Between early 2015--2017	Daewoo Shipbuilding & Marine Engineering	
	Drillship	1 vessel	USD 620 million	Rowan, U.S.A	First half of 2015	Hyundai Heavy Industries	
Sep	Drillship	1 vessel	USD 623 million	-	-	Samsung Heavy Industries	
	Drillship	4 vessels	USD 2.06 billion	Transocean, U.S.A	One-by-one from mid 2015	Daewoo Shipbuilding & Marine Engineering	
Oct	Drillship	1 vessel	USD 560 million	Atwood Oceanics, U.S.A	-	Daewoo Shipbuilding & Marine Engineering	
	LNG-FSRU	1 vessel	USD 270 million	Hoegh LNG, Norway	First half of 2015	Hyundai Heavy Industries	
Nov	Drillship	1 vessel	USD 700 million	-	2nd half of 2015	STX Offshore & Shipbuilding	
	offshore platform (Top side)	1 unit	USD 1.77 billion	Statoil, Norway	The end of 2016	Daewoo Shipbuilding & Marine Engineering	
Dec	Gas Production Platform (topside)	1 unit	USD 1.1 billion	Statoil, Norway	Mar 2016	Hyundai Heavy Industries	
	LNG-FSRU	1 vessel	-	BW Maritime, Singapore	2015	Samsung Heavy Industries	
2013	Mar	Floating Production Unit (FPU)	1 unit	USD 1.3 billion	Total, France	First half of 2016	Hyundai Heavy Industries
		Tension Leg Platform (TLP)	1 unit	USD 700 million	Total, France	First half of 2015	Hyundai Heavy Industries
Apr	FFSO	1 unit	USD 1.9 billion	Chevron, U.S.A	-	Hyundai Heavy Industries	
	Semi-Submersible Drilling Rig	1 unit	USD 750 million	Diamond Offshore, U.S.A	Nov of 2015	Hyundai Heavy Industries	

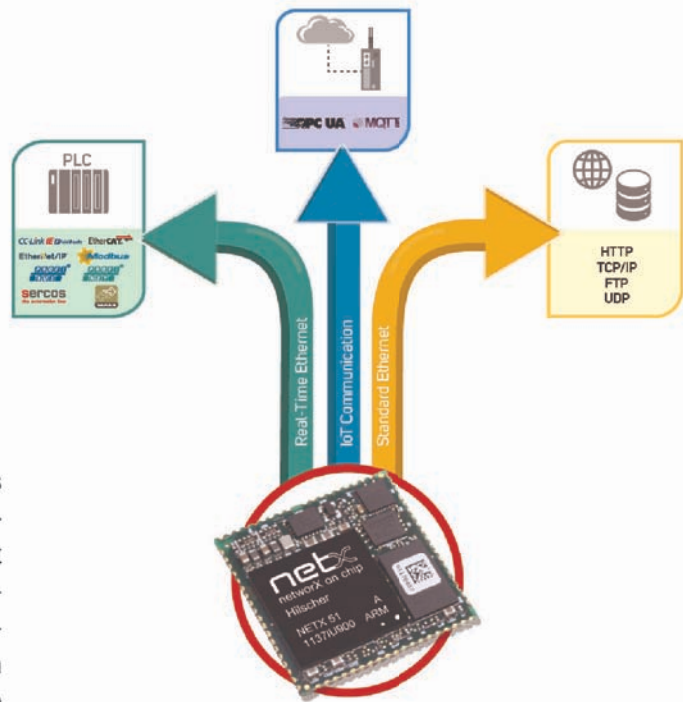
		Ultra-deepwater Drillship	1 unit	USD 515 million	Enesco, United Kingdom	Third quarter of 2015	Samsung Heavy Industries
	Jun	FFSO	1 unit	USD 3.0 billion	Nigeria	Second half of 2017	Samsung Heavy Industries
		Jack-up Rig	2 units	USD 1.3 billion	Statoil, Norway	-	Samsung Heavy Industries
		Ultra-deepwater Drillship	2 units	USD 600 million	Seadrill, Norway	Second half of 2015	Samsung Heavy Industries
	Jul	Semi-Submersible Rig	1 vessel	USD 718 million	Stena, Sweden	First half of 2016	Samsung Heavy Industries
		Ultra-deepwater Drillship	1 unit	USD 570 million	Atwood Oceanics, U.S.A	The end of 2015	Daewoo Shipbuilding & Marine Engineering
		Drillship	1 unit	USD 550 million	-	Dec of 2015	Samsung Heavy Industries
	Sep	Ultra-deepwater Drillship	1 unit	USD 600 million	Ocean Rig, Greece	Dec of 2015	Samsung Heavy Industries
		Jack-up Rig	1 unit	USD 530 million	Maerek Drilling, Denmark	The middle of 2016	Daewoo Shipbuilding & Marine Engineering
		Drillship	2 vessels	USD 1.24 billion	-	Second half of 2015	Daewoo Shipbuilding & Marine Engineering
	Oct	Drillship	1 vessel	USD 520 million	Transocean, U.S.A	The middle of 2016	Daewoo Shipbuilding & Marine Engineering
		LNG-FSRU	1 unit	-	Gas Sayago (Joint venture)	Sep of 2016	Daewoo Shipbuilding & Marine Engineering
		LNG-FSRU	1 unit	-	BW Maritime, Singapore	Early 2016	Samsung Heavy Industries
	Dec	LNG-FSRU	1 unit	-	Mitsui OSK Line, Japan	The middle of 2016	Daewoo Shipbuilding & Marine Engineering
		LNG-FPSO	1 unit	USD 1.45 billion	Petroliam Nasional Bernad, Malaysia	2018	Samsung Heavy Industries
	Feb	Drillship	2 vessels	USD 1.29 billion	Oceania	First half of 2017	Samsung Heavy Industries
	Apr	Central Processing Platform	2 units	USD 700 million	Hess E&P Malaysia, Malaysia	The end of 2016	Hyundai Heavy Industries
	Jul	Fixed offshore platform	4 units	USD 1.94 billion	ADMA-OPCO, UAE	The end of 2019	Hyundai Heavy Industries
2014		Fixed Offshore Platform & Submarine Cable	4 units	USD 1.9 billion	ADMA-OPCO	Second half of 2019	Hyundai Heavy Industries
	Nov	Offshore Platform	1 unit	USD 700 Million	Royal Dutch Shell	-	Samsung Heavy Industries
		FPU	1 unit	-	-	-	-
	Jun	Offshore Platform	2 unit	USD 1.06 billion	Statoil, Norway	The end of 2018	Samsung Heavy Industries
2015	Jul	FLNG	3 unit	USD 4.7 billion	Royal Dutch-Shell	-	Samsung Heavy Industries
	Dec	LNG-FSRU	1 unit	USD 587 million	Maran Gas Maritime, Greece	First half of 2020	Daewoo Shipbuilding & Marine Engineering
2016		FPU	1 unit	USD 1.27 billion	British Petroleum, United Kingdom	Augst of 2020	Samsung Heavy Industries
	Jan	FSRU	1 unit	USD 230 million	Høegh LNG, Norway	May of 2019	Samsung Heavy Industries
	Feb	FSRU	1 unit	USD 230 million	Høegh LNG, Norway	4th quarter of 2018	Hyundai Heavy Industries
	Jun	FLNG	1 unit	USD 2.50 billion	Turkey	-	Hyundai Heavy Industries
	Aug	FSRU	1 unit	USD 290 million	ENI, Italy	-	Samsung Heavy Industries
	Oct	LNG-FSRU	1 unit	KRW 250 billion	Swan Energy, India	First half of 2020	Hyundai Heavy Industries
	Dec	LNG-FSRU	1 unit	-	Marubeni-Sojitz-Pertamina Consortium	-	Samsung Heavy Industries
	Jul	173,400m ³ LNG carriers	1 unit	-	Maran Gas Maritime, Greece	-	Daewoo Shipbuilding & Marine Engineering
					Maran Gas Maritime, Greece	The first of 2021	Daewoo Shipbuilding & Marine Engineering

*Note : Based on the press release and public announcements of each shipyards, internal estimation of Monthly KORSHIP (estimation until Aug 15, 2018)



netIOT Interface – Equip your field device with Industrial Ethernet, Transparent Ethernet and OPC UA / MQTT

hilscher



October 1, 2018 – In today's IoT projects, plant manufacturers want to implement new cloud based value-added services, like predictive maintenance, condition monitoring or others. All these new services are based on

information from the field devices. The question is how device manufacturers can provide such IoT relevant data, that a cloud application or an edge gateway can make full use of it. A field device typically sends its deterministic I/O data via Industrial Ethernet protocol to a PLC, like PROFINET or EtherNet/IP. In addition, the device ideally sends the IoT relevant information via OPC UA or MQTT to an edge gateway or the cloud.

With the netIOT Interface solutions from Hilscher, device manufacturers can easily equip their device with Industrial Ethernet functionality, Transparent Ethernet and at the same time OPC UA server and MQTT client functionality. netIOT Interface is a scalable solution for embedded designs, which ranges from the flexible multiprotocol chip netX, via a ready-to-solder netX chip-carrier up to pluggable modules as a complete communication interface.

The products contain an integrated webserver for firmware update and offer a transparent Ethernet channel, which can be accessed by the host application either in TCP socket mode or in raw Ethernet mode. In raw Ethernet mode, the connection is realized using a separate MAC address and the application is seen as individual device in the network. This allows

New
Product



device manufacturers to implement own IT solutions in the application of their field device, for example an email client, a data storage or an own OPC UA server. Moreover, to exchange IoT relevant data, an integrated OPC UA server and a MQTT client has been added. Thereby the IoT communication as well as standard Ethernet communication takes place on the same cabling in parallel to the Real-Time Ethernet traffic.

With this set of products, device manufacturers always have the right solution for their use case. Most important they can develop IoT ready products and thus access new IoT markets. Second, they can equip existing netX based designs with OPC UA and MQTT by just changing the firmware. And third, device manufactures can develop multi-protocol devices with an easy to use and easy to implement protocol independent object interface. In any case, netIoT Interface is always the right choice to bring IoT to the field level.

힐셔, 새로운 netIoT 인터페이스 솔루션 출시

hilscher

최근 IoT 시장이 성장함에 따라 설비 제조업체들은 예방적 유지보수, 상태 모니터링과 같은 새로운 클라우드 기반의 부가가치 서비스를 구현하고자 한다. 이러한 모든 새로운 서비스는 필드 디바이스의 정보를 기반으로 한다. 문제는 디바이스 제조업체들이 이러한 IoT 관련 데이터를 어떻게 제공하고, 클라우드 애플리케이션이나 edge gateway를 통해 완전하게 활용할 수 있느냐이다. 필드 디바이스는 통상적으로 PROFINET 또는 EtherNet/IP와 같은 산업용 이더넷 프로토콜을 통해서 확정적 I/O 데이터를 PLC로 전송한다. 또한 디바이스는 이상적으로 OPC UA나 MQTT를 통해서 IoT 관련 정보를 edge gateway 또는 클라우드로 전송한다.

디바이스 제조업체들은 힐셔의 netIoT 인터페이스 솔루션을 이용해서 디바이스에 산업용 이더넷, 트랜스퍼런트 이더넷(Transparent Ethernet)과 함께 OPC UA 서버 및 MQTT 클라이언트 기능을 쉽게 추가할 수 있다. 힐셔의 netIoT 인터페이스는 임베디드 설계를 위한 확장형 솔루션으로 유연성이 뛰어난 다중 프로토콜 칩 netX부터 즉시 솔루션 가능한 netX 칩 캐리어 및 플러그형 모듈에 이르기까지 완벽한 통신 인터페이스 형태로 포괄적인 솔루션을 제공한다.

이들 제품에는 펌웨어 업데이트를 위한 웹 서버가 내장되어 있으며, 호스트 애플리케이션이 TCP 소켓 모드나 원시 이더넷 모드로 액세스

할 수 있는 트랜스퍼런트 이더넷 채널을 제공한다. 원시 이더넷 모드에서는 별도의 MAC 어드레스를 사용하여 연결이 이루어지며 네트워크 상에서 애플리케이션을 개별 디바이스로 인식한다. 그리하여 디바이스 제조업체는 필드 디바이스 애플리케이션에서 이메일 클라이언트, 데이터 스토리지 또는 자체 OPC UA 서버와 같은 고유의 IT 솔루션을 구현할 수 있다. 또한 이들 제품은 IoT 관련 데이터를 교환하기 위해 내장형 OPC UA 서버와 MQTT 클라이언트를 추가하고 있다. 따라서, 표준 이더넷 통신은 물론 IoT 통신도 Real-Time Ethernet 트래픽과 동일 케이블 상에서 병렬로 이루어진다.

이러한 다양한 제품들을 통해 디바이스 제조업체들은 사용 사례에 따라서 적합한 솔루션을 선택할 수 있다. 첫째, IoT 기능 제품을 빠르게 개발하고 새로운 IoT 시장에 접근할 수 있다. 둘째, 펌웨어를 변경하는 것만으로 기존 netX 기반 설계에 OPC UA와 MQTT를 구현할 수 있다. 셋째, 디바이스 제조업체들은 사용과 구현이 쉬운 프로토콜 독립형 객체 인터페이스로 다중프로토콜 디바이스를 개발할 수 있다. 힐셔의 netIoT 인터페이스 제품이야말로 필드 차원에서의 IoT 구현을 위한 최적의 솔루션이라 할 수 있다. 🚢

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Portasonic® 2.FL0

Coltraco Ultrasonics

Coltraco Ultrasonics are excited to announce the brand-new generation of flow meter, the Portasonic® 2.FL0. After rigorous research and design, Coltraco are proud to release a more accurate, reliable and flexible ultrasonic flow meter.



1. Accurate - the Portasonic 2.FL0 is accurate to +/-1% accuracy
2. Reliable - the Portasonic 2.FL0 is calibrated to ISO17025 standards
3. Flexible - the Portasonic 2.FL0 has 3 modes of operation, making it suitable to different environments

The Portasonic® 2.FL0 ultrasonic flow meter is used to measure flow rates of clean liquid in pipe. The device comes with clamp on transducers for non-invasive measurement. The Portasonic® 2.FL0 utilizes two transducers, one that acts as ultrasonic transmitters and the other a receivers. There are three principles of operation; V-method, W-method or Z-method which refers to transducer positioning. The software calculates the time it takes for the ultrasonic pulse to pass from the transmitter to the receiver, which is dependent on the flow rate.

With no moving parts and an easy digital set up mean it's a cost effective and time effective maintenance solution. Reduction of maintenance time and cost is a driving factor within any business operation with pipework installed. Accurate flow data provides the chance to make energy saving measures by fine tuning the systems.

Portasonic® 2.FL0 can be used for spot checks, using an internal, rechargeable battery or for extended continuous operation as a 4-20mA flow transmitter with AC power input. The ease of use and accuracy of Portasonic® 2.FL0 allows for improved business continuity and safer buildings and industrial facilities across a variety of industry verticals. With the ability to conduct spot checks at mandated intervals, full integrity of pipework can be ensured. ⚓

- TEL: +44-207-629-8475
- <http://www.coltraco.com>

Navico launches C-MAP embark, the latest in nautical navigation technology

Navico


Navico, the world's largest manufacturer of marine electronics, today announced the launch of C-MAP Embark, a nautical navigation app designed to refresh the planning, cruising and fishing experience with a clear aim in mind — to make it simpler. C-MAP Embark is powered by map data from official hydrographic offices. This data is continuously updated and augmented from thousands of data sources to help complete gaps in coastal and inland water bodies, providing C-MAP Embark users with exceptional clarity where it matters most. Updated monthly, the maps work across multiple platforms to ensure users always have the most current charts on smartphone, tablet or PC. The charts show all the information needed to navigate safely, while displaying a clean and clear, user-friendly view. The maps are also designed to be “smart”— adjusting colour and contrast automatically depending on the light, so boaters will always be able to read them clearly. For fishing enthusiasts, C-MAP Embark features a contour mode, which offers a high-resolution bathymetry view, helping users target the best fishing spots.

“With the launch of C-MAP Embark, we have vastly improved the planning and navigation experience of any cruising, sailing or fishing trip,” said Sean Fernback, CTO, Navico. “By providing users with the right information before, during and after their time on the water, they can be confident in the choices they make and enjoy a more stress-free journey, wherever they decide to go.”

C-MAP Embark maps are intelligently designed to show users the most important information at any given time, so they can discover new places safely and confidently — just like a local. The app will offer helpful tips and provide infor-



mation about local marinas, harbours, beaches, shops and much more. With C-MAP Embark, users can also help other boaters nearby and share exciting new places and routes with friends — simply create a place or a route and press share; it's that simple.

Users travelling to an area without internet or cellular data coverage can upgrade to Premium and download off-line maps and weather to stay safe wherever the on-water journey leads. Planning and tracking can also be synchronised as soon as internet or cellular data is accessed. C-MAP Embark is now offering users a free two-week trial — available to download today from Google Play and the App Store. 

- TEL: +61-402-069-970
- <http://www.c-map.com>

Rivertrace strengthens marine product portfolio with Smart WiO - Water in Oil Sensor

Rivertrace

Water quality monitoring market leaders Rivertrace have expanded their product range with the addition of a new Smart WiO - Water in Oil sensor that continuously monitors dissolved water content



in oil allowing ship operators to proactively limit the risk of engine and machinery corrosion.

Contamination of oil with dissolved water poses a significant corrosion risk to engine machinery. All oil can absorb a certain volume of dissolved water up to a maximum concentration called the 'saturation point'. When the saturation point of an oil is exceeded, any unabsorbed water will fall out of the oil as free water and can cause corrosion inside the engine. The saturation point can change with an oil's age, cleanliness, temperature and other factors including composition, whether the oil is mineral or synthetic and the formulation of additives.

Water in oil content has traditionally been measured by test kits which detect free water in lubricating oil or emulsion from 100.02% humidity. However, any water content values measured exceeding 100% humidity indicate that free water is already present, and the engine is being exposed to corrosion and oil degradation.

To mitigate corrosion risk from water in oil, Rivertrace has introduced the Smart WiO Sensor that uniquely uses capacitive measurement of absorbed water in oil with continuous monitoring. The Smart WiO Sensor continuously monitors water content value as % humidity taking consideration of the oil temperature. The sensor also measures the saturation of the oil independently from the oil type and oil age.

Its intended use is for preventative maintenance protocols and condition-based monitoring for lubricating and hydraulic oil, detecting water presence to avoid costly damage and premature wear with early warnings from pre-set alarms. At 50% humidity the WiO Sensor shows a pre-alarm allowing the crew to take preventative actions to reduce the water content. At 90% humidity the main alarm is triggered alerting crew before any free water is present in the oil.

Gillian Peden, Business Development Manager: "As specialists in water quality monitoring we are expanding our range of products to offer our customers a partner for their maintenance and compliance monitoring needs. Rivertrace is committed to ensuring that the marine industry has the right tools to measure Water in Oil and limit the risk of engine corrosion and premature wear with our solution the new Smart WiO Sensor." 

- TEL: +44-(0)208-686-1728
- <http://www.rivertrace.com>

New
Product

슈나이더 일렉트릭, 맞춤형 엣지 컴퓨팅 구축 위한 '로컬 엣지 컨피규레이터' 출시

슈나이더 일렉트릭

에너지 관리 및 자동화 분야의 디지털 혁신을 선도하는 글로벌 기업 슈나이더 일렉트릭이 포괄적 디지털 소프트웨어 '로컬 엣지 컨피규레이터(Local Edge Configurator)'를 출시했다. 이는 '엣지 컴퓨팅(Edge Computing)' 확산에 따른 최적화된 솔루션이다. 엣지 컴퓨팅은 중앙 집중 처리 방식인 클라우드 컴퓨팅의 한 개인 지연시간, 대역폭 및 처리속도 문



제 등 개선을 위해 등장한 개념이다. 사물인터넷(IoT)의 확산에 따라 데이터는 기하급수적으로 증가하고 있으며, 이를 로컬에서 바로 분석·처리할 수 있는 기술이 바로 엣지 컴퓨팅이다. 은행 등 지점 영업이 필요한 비즈니스 및 산업 현장, 자율주행차 등 다양한 분야에서 이를 활용하고 있다. 슈나이더 일렉트릭의 '로컬 엣지 컨피규레이터'는 엣지 컴퓨팅의 계획·설계를 위한 맞춤형 통합 어플리케이션이다. 또한, 사용자가 직접 원하는 요구사항에 맞춰 제품을 구성·선택할 수 있는 툴이다. 따라서 복잡성을 대폭 줄여 설치를 가속화하고, 비용 절감 및 운영 효율성을 높여 고객에게 더욱 큰 가치를 제공할 수 있다.

가장 중요한 특징으로는 직관적이고 사용하기 쉬운 인터페이스다. 이용자는 플러그 앤 플레이 모델에서 랙(Rack), 단상 무정전 전원 공급장치(UPS), 보안, 배전, 소프트웨어를 포함한 엣지 아키텍처를 직접 설계할 수 있다. 이를 통해 고객이 필요로 하는 민첩성, 단순성을 갖춘 이중화 및 물리적 보안을 저비용으로 설계하여 제공할 수 있다. 간소화된 프로세스를 누릴 수 있는 이점도 있다. 고객의 물리적 환경을 맞춤화하고 사전 검증할 수 있으며, 필요시 참조 사양을 구축해 위험성을 최소화하고 가용성, 이중화 및 표준화를 높여준다. 또한, 새로운 물리적 인프라 솔루션인, 서버, 네트워크 장비, 랙, 스토리지, UPS, PDU, CRAC 등 다양한 장비의 하드웨어 정보를 포함한 라이브러리가 자동 업데이트돼 확인 가능하며, 이를 통해 편리한 사전 설계 디자인이 가능하다.

이 밖에도 새로운 '로컬 엣지 컨피규레이터'는 다음과 같은 특징을 가진다.


수 있어 기존 고객을 위해 배포를 확장하거나 여러 클라이언트에 걸쳐 유사한 아키텍처 요구를 처리하는 작업을 간편하게 수행할 수 있다.

다양한 출하 옵션: 충격 흡수 패키지를 갖춘 시스코 인증 APC NetShelter SX를 이용해 설계되거나 종합적인 Micro Data Center Xpress 솔루션에서 구축되는 경우에는 완전한 통합

시스템으로 출하될 수 있다. 시스템 통합업체 파트너는 이 두 번째 옵션을 통해 완전한 수동 통합에 필요한 시간과 비용을 제한할 수 있고 손쉽게 설치 가능한 제품을 고객에게 제공할 수 있다.

동시 서비스(선택 사항): 파트너는 보증 및 보증 연장, 보안 및 유지 보수 서비스, APC 어드밴티지 플랜(Advantage Plans)을 포함한 추가적 제품 서비스를 도구에서 직접 추가할 수 있다.

전담 프로젝트 관리자: 슈나이더 일렉트릭의 APC 코디네이터는 파트너에게 출하, 인도, 잠재적 지연에 대한 업데이트를 제공할 뿐만 아니라 예약 및 청구서 추적을 비롯해 구매부터 배송까지 물류 및 공급망 프로세스를 안내한다.

슈나이더 일렉트릭 코리아 IT 사업부 권지웅 본부장은 "정보에 대한 실시간 액세스의 수요 증가에 대응해 엣지 컴퓨팅은 데이터가 수집되고 처리되고 공유되는 방식을 혁신하고 있다. 따라서 엣지는 필수 요소가 되고 있고, 시스템 구성 요소의 호환성 및 검증 보장은 점점 복잡해지고 있다"라며 "로컬 엣지 컨피규레이터는 이러한 장애 요소를 제거하고, 파트너로 하여금 통합 솔루션을 쉽게 구축하고 테스트하여 완전히 배포할 수 있게 도와주고, 채널 파트너에게는 경쟁력을 유지하는 데 필요한 역량 및 가치를 제공하고, 엣지를 통해 비즈니스 기회를 극대화함으로써 연결성 및 확실성을 제공할 수 있다"고 말했다. 

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저장 가능한 설계: 파트너는 향후 요구에 대비하여 설계를 저장할

파도, 바람, 그리고 모든 기후 변화에도 안정적인 DNV GL인증 이구스 케이블

한국이구스



해상에서 안전하고 지속적인 전력 및 데이터 공급을 위한 370종 이상의 chainflex® 케이블

오일 리그, 가스 생산 플랜트, 풍력 발전 단지, 항구 시설 또는 선박 크레인과 같은 해양산업에서는 어플리케이션의 안정적인 에너지 및 데이터 전송을 위한 특수 요구사항이 존재한다. 이구스는 해양 산업에서의 e체인 내 케이블 적용을 위해 DNV GL인증을 획득한 유일한 제조업체였다. 이제 이구스의 고객은 370종 이상의 컨트롤, 서보, 모터, 로봇, 버스, 데이터, 엔코더 및 광섬유 케이블로 안전한 해양 어플리케이션 구현이 가능하다. 바다는 풍력 발전 단지와 교역의 통로로써 오랜 세월 세계 경제의 중추 역할을 했다. 하지만 해양 플랜트 산업은 이제 여러 일반 산업과 같은 문제에 직면하게 되었다. 해양 산업에 필요한 비용이 가파르게 상승하면서, 일반 업체와 같이 기술 자동화 부문이 점점 중요해지고 있다는 점이다.


이구스의 chainflex® 케이블은 어플리케이션에 필요한 에너지와 데이터를 안전하게 공급함으로써 안정적인 자동화와 높은 비용 효율성을 달성한다. 이러한 특성은 국제 승인을 획득한 케이블의 사용과 간편한 설치법 및 극한의 환경에서도 유지보수의 최소화를 유지할 때 실현 가능하다.

내유성, 내해수성 그리고 UV내성을 지닌 chainflex® 케이블

재사용 가능 에너지의 확장 적용이나 미래산업에 대한 준비를 하고있는 오프쇼어 회사 및 공급업체는 370종 이상의 DNV GL 인증 케이블을 공급하는 이구스를 최우선 파트너로 고려해야 한다. 해당 케이블들은 해상에서의 안전한 구동을 위해 특별히 설계된 가동형 케이블이다.

chainflex® 케이블은 DNV GL에 따른 엄격한 테스트뿐만 아니라, 약 830평 규모의 이구스 자체 실험실에서도 실제 적용 환경과 같은 조건에서 모든 테스트를 마쳤다. 덕분에 이구스의 케이블은 초저온 내성, UV내성 등의 특성은 물론, 천만 스트로크 보장과 같은 업계 유일의 보증 시스템 제공이 가능해졌다. 또한 내해수성과 MUD NEK606에 따른 내유성을 지녀, 드릴링 플랫폼에 적용시 무유지보수의 실현과 작업의 안정성을 높여 준다. 이구스의 맞춤형 특수 케이블은 가동 거리와 하중에 상관없이 언제나 안정적인 구동을 보장한다.

해양 어플리케이션의 안정적인 구동을 보장하는 chainflex® 케이블 적용 분야에 한계가 없는 chainflex® 케이블 덕분에, 시스템 설계자는 최대한의 자유도를 보장 받으며 어플리케이션 구현이 가능하다. 이구스 케이블은 수중이나 수면 적용, 장시간 햇빛 노출 또는 저온 노출 등의 조건에 상관없이 일정한 품질을 유지한다. 시스템의 지속적인 구

동을 책임져야 하는 조선소, 장비 공급자, 제조업자 및 모든 이해 당사자는 해양 산업에서 그 성능이 입증된 chainflex® 케이블의 사용으로 안전하고 안정적인 구동 환경을 보장 받을 수 있다. 

- TEL: +82-(0)70-4283-6204
- <https://www.igus.kr>

아트라스콧코, SEDEX 2018서 자동화된 반도체 장비 유지보수 솔루션 출시

아트라스콧코

산업용 공구 및 장비의 세계적인 선두기업 아트라스콧코는 국내 최초로 반도체 장비 유지보수를 위한 스마트 PM 솔루션을 선보였다.


아트라스콧코 산업용공구 사업부문은 반도체 제작의 각 장비마다 사용될 수 있는 자동화된 유지보수 시스템 '스마트 PM솔루션(Smart Preventive Maintenance Solution)'과 해당 장비를 제조 하는데 적용 가능한 자동 조립/계측 시스템을 소개하고, 실제로 스마트 PM 솔루션을 직접 체험할 수 있는 프로그램과 더불어 출시 기념 프로모션도 진행했다.

반도체 제조업의 경우 고가의 반도체 장비로 14단계의 과정을 거쳐 완제품을 만들어내는 섬세한 공정 과정에 비해 유지 보수 작업은 작업자가 일반 툴을 이용해 수작업으로 진행된다. 다양한 작업자에 의해 불규칙하게 수행되는 볼트 조립 작업이나 올바르게 사용된 자가의 PM 공구는 잦은 오류나 고장을 일으키는 원인으로 꼽힌다. 또, 작업자의 손목에 가해지는 피로도가 누적되어 조립의 정확성이 감소되어 결국 반도체 품질 저하와 반도체 장비의 사용연한 감소로 이어지게 된다. 아트라스콧코의 스마트 PM 솔루션은 수작업으로 인한 생산성 저하를 막고 장비의 사용 연한을 극대화시키기 위해 개발된 자동 조립/계측 시스템이다. 정교하고 자동화된 공구는 물론, 작업자 기이 드 시스템을 통한 정확한 위치 제어로 웨이퍼 품질 향상과 장비 고장율 감소도 기대할 수 있다.

스마트PM 솔루션은 협동 로봇에 장비 위치 제어 시스템을 연동한 고



정형과 이동 카트에 무선 전동 너트러너를 연계한 이동형이 있으며, 현장 상황에 맞게 최적의 솔루션을 선택할 수 있다. 두 옵션 모두 작업 모니터링과 빅데이터 분석을 위한 데이터 분석 프로그램이 기본적으로 포함되어 각 작업 별 오류 원인 분석이 가능하다.

아트라스콧코 코리아 산업용공구 사업부문은 자동차, 반도체, 전자, 항공, 조선, 건설 등 다양한 산업에 적합한 약 4,000종의 산업용 공구 및 체결 시스템을 제공한다. 조립 과정에서 발생하는 체결 데이터를 실시간으로 확인 및 저장, 관리하여 조립 불량을 사전에 예방하고 품질 향상에 도움을 준다. 

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Registration No. : **Youngdungpo Ra 00220**

Published on **Nov. 1. 2018**

Publisher **Yoseb Choi**

Editor-in-Chief **Chunghoon Lee**

Senior Editor **Myoungkyu Lee**

Designer **Kikeun Park**

Marketing Manager **Sungsu Park
Kijong Seo
Jongki Hong**

Printed by **Hyung-Je Art Printing**

Printed (CTP) by **Hyung-Je Art Printing**

Published by **PROCON**

Address: **Room. 708 ACE Techno Tower, 12,
Dangsan-ro 2-gil, Yeongdeungpo-gu,
Seoul, Korea (Postcode: 07299)**

Tel : +82-2-2168-8898

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International : +82-10-5186-2078
(Myoungkyu Lee)

www.korship.co.kr www.procon.co.kr

E-mail : **korshipeditor@gmail.com**

Price per Copy : **₩10,000**

Annual Subscription Fee : **₩100,000**

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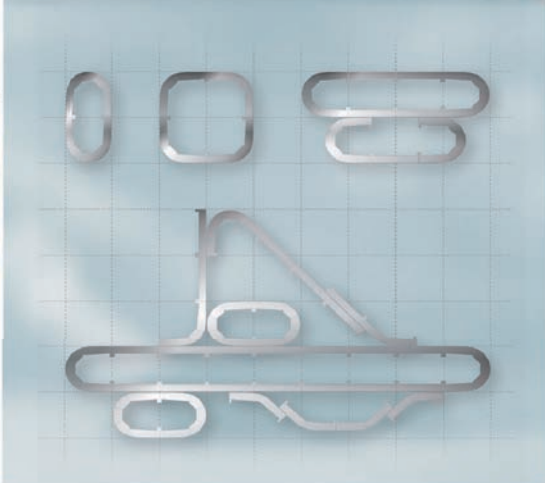
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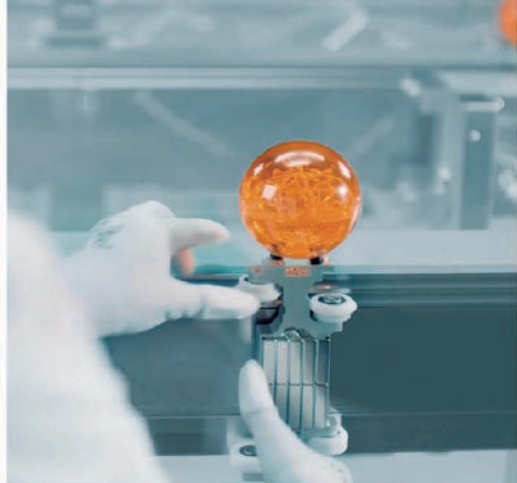
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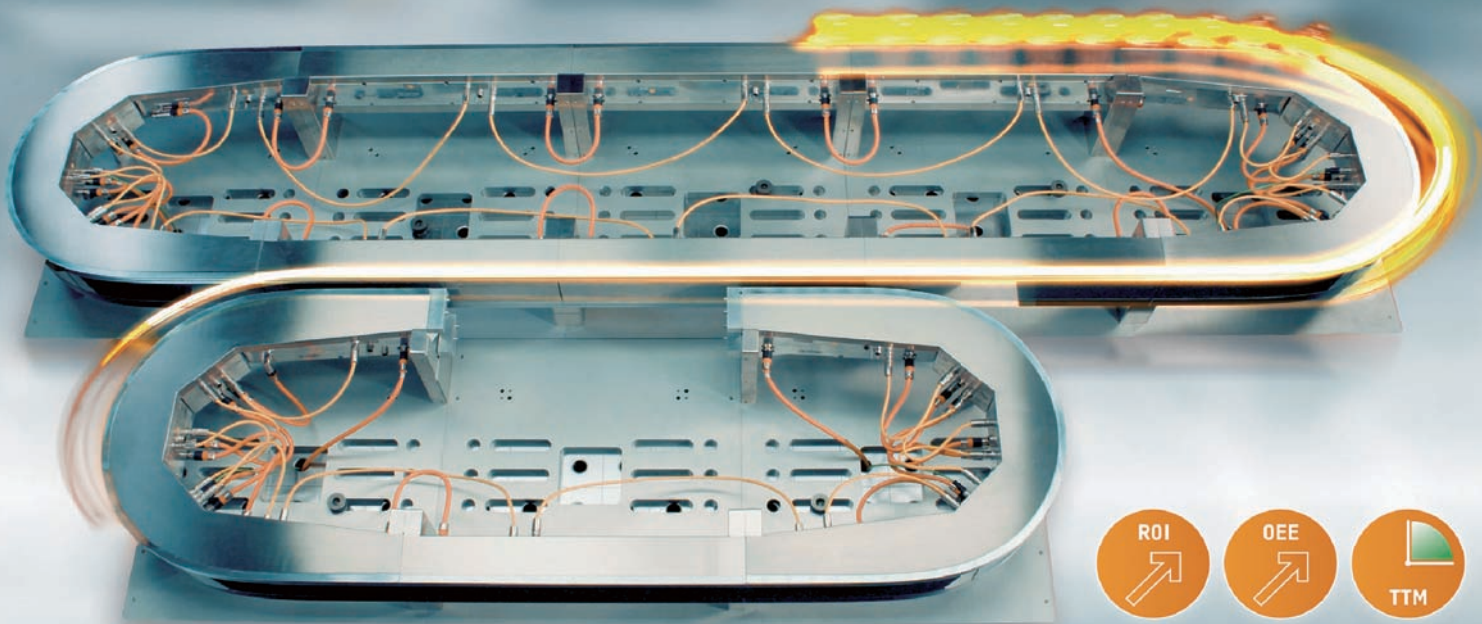


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