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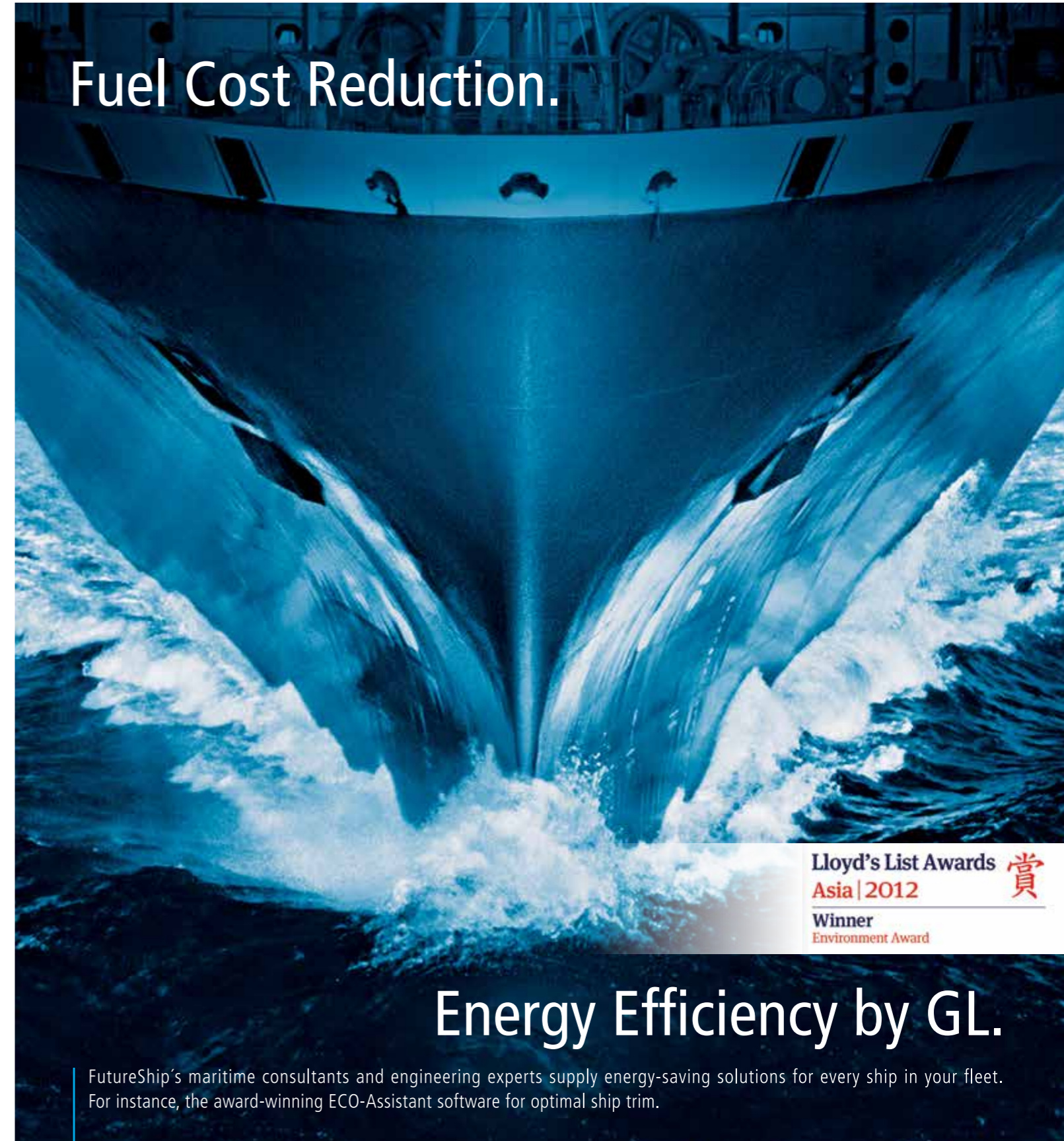
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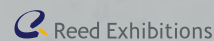
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(Korea International Shipbuilding and offshore Marine Exhibition)

Monthly KORSHIP, the Korea shipbuilding & Offshore monthly magazine, will launch daily news service to keep your finger on the pulse of the KORMARINE 2013.

KORMARINE 2013 will be open with great eclat at Busan Exhibition & Convention Center (BEXCO) , and Monthly KORSHIP will keep you updated with the latest news swiftly during the show as the official media of KORMARIE 2013 and we appreciate you cooperation in advance.

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Our daily news will have a circulation of 6,000 every day during the show.

Contact Monthly KORSHIP or K. Fairs for inquiries or suggestions for the daily news article related to KORMARINE 2013 or advertisement in the print Edition. (Deadline Date: September 25th 2013)

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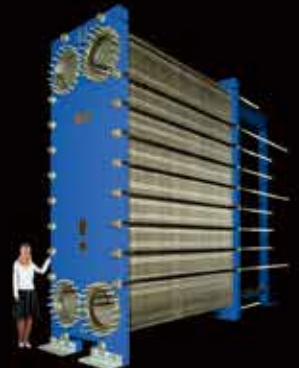
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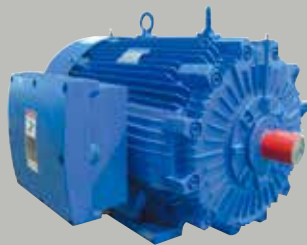


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280M ~ 315M	IIB	110 ~ 132kW	110 ~ 160kW	110 ~ 132kW	75 ~ 90kW
355L	IIB	—	260kW	220kW	—

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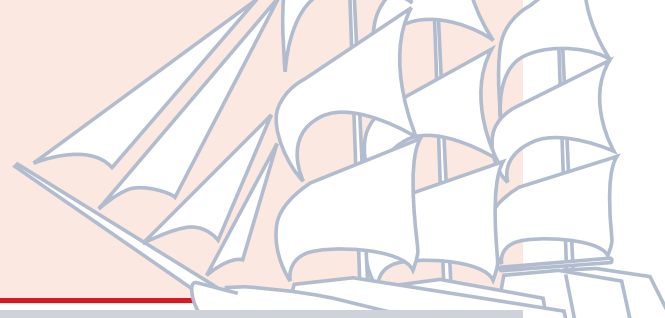


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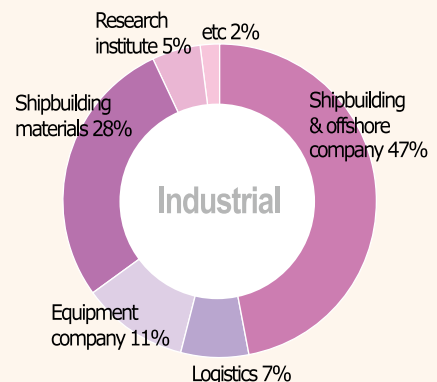
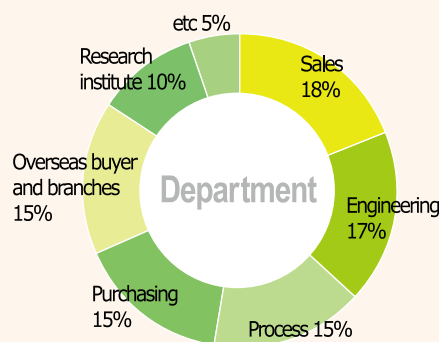
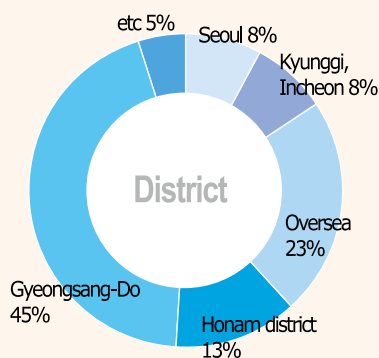
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Emerson expands ultrasonic meter family to provide high-accuracy dynamic flow measurement for LNG

Emerson Process Management announced the new Daniel™ 3818 Liquid Ultrasonic Flow Meter for liquefied natural gas applications.

Measuring LNG volume dynamically using the Daniel 3818 Ultrasonic Meter delivers higher accuracy than static measurement methods and can result in real savings. The 3818 provides a factory-proven linearity within $\pm 0.15\%$ and a meter factor uncertainty of $\pm 0.027\%$ due to its sophisticated multi-plane British Gas design, fast signal processing, and advanced transducer technology. Improvements in measurement uncertainty equate to a reduction in risk of the financial transaction. Additional metering points on rundown lines can also improve process control.

Industry forecasts anticipate increasing amounts of LNG will be traded in short-term (spot) contracts. This implies dynamic measurement of delivered product will be required, as is currently the case for custody transfer of oil shipments. In addition, LNG facilities are using shared or comingled storage tanks which require dynamic measurement to quantify and allocate ownership among multiple parties.

With a completely redundant 4-path, multi-

plane configuration that is the equivalent of two 4-path meters in a single body, the Daniel 3818 Ultrasonic Meter utilizes two independent transmitters - one for each set of four chordal paths. This ensures complete measurement redundancy and the ability to poll each 4-path meter separately. Acoustic processing is performed by specialized electronics designed to achieve high sampling rates, provide stable ultrasonic signals and optimal low flow response, delivering accurate, stable and reliable measurement. Each Daniel 3818 Ultrasonic Meter is calibrated at Daniel's ISO / IEC 17025 certified flow calibration facility using a static zero flow test on liquid nitrogen and a full dynamic test on water. The 3818 is designed to withstand product temperatures ranging from -196°C to $+60^{\circ}\text{C}$ (-385°F to $+140^{\circ}\text{F}$), making it an ideal choice for a wide variety of challenging cryogenic LNG applications. The 3818 offers all the advantages of transit time and inline ultrasonic flow meters. They



are full-bore meters with no internal moving parts to wear or drift, providing for low pressure drop and minimizing the risk of LNG flashing. Also available in large sizes, ultrasonic meters are well suited for high volume LNG transfers which equates to faster tanker loading and offloading.

Capital and operating expenses are positively impacted using the Daniel 3818 Ultrasonic Meter. With an integrated diagnostics software package, the 3818 allows operators access to easy-to-interpret diagnostic information, providing greater visibility to meter performance and product quality and generating alerts when abnormal operating conditions are detected.

에머슨, LNG 동적 유량 측정을 제공하는 초음파 유량계 제품군 확장

에머슨 프로세스 매니지먼트가 LNG에 적용하는 새로운 4-Path Daniel™ 3818 액체 초음파 유량계를 선보였다.

Daniel 3818 초음파 유량계를 사용한 LNG 용적의 동적 측정은 정적 측정 방법과 비교해 보다 높은 정확성을 제공하며 실질적인 비용 절감을 가능하게 한다. 3818 유량계는 정교한 다면식(multi-plane) British-Gas 설계, 신속한 신호 처리, 고급 변환 기술을 특징으로 하며, 공장에서 검증된 $\pm 0.15\%$ 오차 범위의 선형성 및 $\pm 0.027\%$ 의 계기 계수 불확실성을 제공한다. 측정 불확실성의 향상은 재무 거래 상의 위험이 감소되었다는 것을 의미한다. 또한, 런다운 라인(rundown line: 검수관과 제품이 임시 저장

되는 탱크를 연결하는 공정 단위 선에 측정 지점을 추가하는 것은 공정 제어를 향상시킬 수 있다. 관련 업계는 향후 점점 더 많은 양의 LNG가 단기 계약(즉결 계약)으로 거래될 것으로 전망하고 있다. 이것은 석유 수송의 상거래와 유사하며, 전달되는 제품의 동적 측정이 필요함을 시사한다. 더욱이 LNG 시설들은 공유 혹은 공동 저장 탱크를 사용하기 때문에 다수의 이해 관계자들 사이에서 소유권을 정량화하고 할당할 수 있는 동적 측정이 필요하다. 이 초음파 유량계는 단일 본체에 2개의 4-path 계기를 갖춘 것과 동일한, 완전 이중화된 4-path 다면식으로 구성된다. 이 2개의 독립적인 송수신기를 활용하여, 4개의 현 경로로 이루어진 각 세트 별로 하나씩 배치하도록 한다. 이것은 완벽한 측정 중복성과 4-path 계기 각각을 별도로 처리하는 성능을 보

장한다.

또한 Daniel 3818은 Daniel의 ISO/IEC 17025 인증 유량 검교정 시설에서, 액체 질소에 대한 정적 무결함 유량 시험 및 유체에 대한 완전 동적 시험을 사용하는 검교정을 거쳐서 출시된다. 또한, -196°C ~ $+60^{\circ}\text{C}$ (-385°F ~ $+140^{\circ}\text{F}$) 범위의 제품 온도를 견딜 수 있도록 설계되어, 혹독한 작업환경 및 극저온 LNG 분야에 이상적이다.

Daniel 3818은 주황 시간 및 인라인(inline) 초음파 유량계의 모든 장점을 갖추고 있다. 이는 마모되거나 부유하는 내부 가동부가 전무한 전구경식 계기로, 낮은 압력 강하를 제공하고 LNG 기포 발생(lashing)의 위험을 최소화한다. 또한 대형 규격으로도 가용한 초음파 유량계는 대용량 LNG 수송에 매우 적합해 신속한 선적·적재 및 하역을 가능하게 한다.

Daniel 3818은 자본 및 운영 비용에도 긍정적 영향을 미친다. 통합된 진단 소프트웨어 패키지를 장착

한 Daniel 3818은 계기 성능 및 제품 품질에 대한 가시성 향상은 물론, 비정상적인 운영이 감지되면

경보 등을 발생해 이에 대한 용이한 진단을 가능하게 한다.



HHI signed a contract with SEC to build 2,640MW thermal power plant

Hyundai Heavy Industries (HHI) was awarded a contract worth approximately 3.3 billion to build ultra large thermal power plant in Saudi Arabia.

HHI held a contract-signing ceremony for the Shuqaiq Steam Power Plant project on August 4, attended by Lee Jae-seong, President of HHI, Saleh Hussein Alawaji, Chairman of SEC Board of Directors, Ali Bin Saleh AlBarrak, President of SEC, and others.

The Shuqaiq Steam Power Plant, an ultra large heavy oil-fired thermal power plant with a capacity of 2,640MW, will be constructed under the mid and long-term plan of Saudi Electricity Company (SEC) to expand power generation facilities. The construction of Shuqaiq Steam Power Plant will be completed by 2017 in the coastal area off the Red Sea located 135km north from Jizan, the southwestern region of Saudi Arabia. HHI will carry out this project on a turnkey basis, encompassing the entire processes from the design, through the production/supply of equipment and construction, to the commissioning. After participating in the technical bid in November, 2012, to win this contract, HHI beat the fierce competi-

tion from about 10 world-renowned plant manufacturers and was finally selected as preferential negotiator in May last year.

HHI won this contract in less than a year after it was awarded the contract worth USD 3.2 billion from SEC in October last year to build the Jeddah South Thermal Power Plant. This contract attests to the technological prowess of HHI and deep trust of SEC in HHI's outstanding track

records of successfully carrying out many construction projects. Particularly, awarding the ultra-large scale contracts to the same company in a row is unprecedented in the plant industry due to potential disruption to the design manpower recruitment, construction management, material supply, etc. An official from HHI said, "We've seen Middle Eastern countries making vigorous



A contract-signing ceremony was held for the Shuqaiq Steam Power Plant construction project. The photo shows Lee Jae-seong(second from the left), President of HHI, and Saleh Hussein Alawaji(third from the left), Chairman of SEC Board of Directors.

investment in key industries amid high oil prices, steady population increase and economic growth despite global economic downturn. Particularly, Saudi Arabian government puts its primary focus on expanding power generation and desalination facilities to increase welfare of the public, raising the expectations of additional contract."

현대중공업, 사우디 전력공사(SEC)와 2,640MW급 화력발전소 계약

현대중공업이 사우디아라비아에서 약 33억 달러 규모의 초대형 화력발전소 공사를 단독으로 수주했다. 현대중공업은 지난 8월 4일 리야드(Riyadh)에서 이재성 사장과 살레 후세인 알라와지(Saleh Hussein Alawaji) SEC 이사회 회장, 알리 빈 살레 알바라크(Ali Bin Saleh AlBarrak) SEC 사장 등이 참석한 가운데 '슈퀘이크 화력발전소(Shuqaiq Steam Power Plant)' 공사 계약식을 가졌다.

슈퀘이크 화력발전소는 '사우디아라비아 전력공사(SEC)가 발전시설 증장기 확충사업에 따라 건설하

는 총 발전용량 2,640MW급 초대형 중유 연소 화력 발전소다.

슈퀘이크 발전소는 사우디 남서부 지진(Jizan)시에서 북쪽으로 135km 떨어진 홍해 연안에 2017년까지 건설되며, 현대중공업은 이 공사의 설계부터 기자재 제작 및 공급, 건설, 시운전까지 전 과정을 턴키(Turnkey) 방식으로 일괄 수행한다. 현대중공업은 이번 공사 수주를 위해 2012년 11월 기술입찰에 참여한 후 세계 유수의 10여개 플랜트업체들과 치열한 경쟁 끝에 지난 5월 우선협상대상자로 선정되었다. 현대중공업이 지난해 10월 SEC로부터 32억불 규모의 '제다 사우스 화력발전소' 수주에 이어 1년도

채 안된 기간에 이번 공사를 수주한 데에는 현대중공업의 기술력과 공사 수행에 대한 발주사의 두터운 신뢰가 바탕이 됐다. 특히 초대형 공사를 같은 회사에 연이어 발주하는 것은 설계 인력 확보나 공사 관리, 자재 수급 등에서 차질을 빚을 수 있어 플랜트 업계에서 매우 이례적인 일로 평가받고 있다. 현대중공업 관계자는 "중동지역은 최근의 글로벌 경기침체에도 고유가와 꾸준한 인구증가, 경제 성장에 따라 기간산업에 대한 투자가 활발하다"며, "특히, 사우디 정부는 발전 및 담수설비 확충을 최우선 민생 정책으로 추진하고 있어 추후 공사 발주도 기대된다"고 말했다.

STXOS signed a MOU of voluntary agreement with creditors

STX Offshore & Shipbuilding (STXOS) expressed deep appreciation to creditors in relation to the 'MOU of voluntary agreement with creditors', and announced that it would continue to strengthen cooperation with creditors for rapid normalization of business. STXOS and STX Co.,Ltd held the Board Meeting on July 31 and adopted the resolution to push forward the MOU of voluntary agreement between STXOS and its 8 creditor banks. As a result, STXOS will enter into voluntary agreement with creditors in 4

months after its application for voluntary agreement in April this year.

Gang Deok-soo, Chairman of STXOS, said, "I am very sorry to the creditors, subcontractors, and community for putting strain on them amid the liquidity crisis of the company. Although there were many twists and turns, major creditors made hard decision to sign the voluntary agreement and I will do my best to ensure the concerted effort of labor and management to bring the business back to normal." He added,

"We will refocus on winning new orders to spur early normalization of business in the second half of this year after being distracted over the last 4 months due to the process of voluntary agreement."

The voluntary agreement will start with STXOS, the largest affiliate and the centerpiece of STX Group's restructuring, followed by the deal with other 4 affiliates – STX Co.,Ltd, STX Heavy Industries, STX Engine, and POSTECH – which are currently undergoing the due diligence.

STX조선해양, 채권단 자율협약 MOU 체결

STX조선해양이 채권단 자율협약 MOU 체결과 관련해 채권단에 깊은 감사를 표하고, 향후 조속한 경영 정상화를 위해 채권단과의 협력을 더욱 강화해 나가겠다고 밝혔다.

STX조선해양과 (주)STX는 지난 7월 31일 이사회를 열어 STX조선해양과 8개 채권은행단과의 자율협약 MOU 체결 안건을 의결했다. 이에 따라 STX조선해

양은 지난 4월 자율협약 신청 이후 4개월만에 채권단 자율협약 체제에 돌입하게 되었다.

STX조선해양 강덕수 회장은 "회사의 유동성 위기로 채권단, 주주, 협력업체, 지역사회에 큰 우려와 부담을 안겨드려 매우 죄송하다"며 "많은 우여곡절이 있었지만 주요 채권단이 자율협약이라는 어려운 결단을 내린 만큼, 경영정상화를 위해 노사가 힘을 합쳐 각고의 노력을 다해 나가겠다"고 밝혔다. 덧붙여, 그

는 "하반기에는 지난 4개월간 자율협약 추진으로 부진했던 수주활동에 집중하여 조기정상화에 박차를 가할 계획"이라고 말했다.

STX그룹 구조조정 핵심 계열사이자 가장 규모가 큰 STX조선해양 자율협약 체결을 시작으로 현재 실사가 진행중인 (주)STX, STX중공업, STX엔진, 포스텍 4개 계열사에 대한 자율협약도 곧 체결할 계획이다.

KR makes foray into Singaporean and South East Asian markets

Korean Register of Shipping (KR) held the 6th KR Singapore Technical Seminar and the 1st Meeting of KR Southeast Asia Committee in Marina Mandarin Hotel, Singapore on July 25 to highlight technological prowess and improve KR's status. The KR Singapore Technical Seminar featured a presentation by Kim Yeon-tae, head of New Technology Support Team, KR, on EEDI & Eco-ship Design and LNG Fuelled Ships which have emerged as major issue facing the global shipping industry in relation to energy efficiency and eco-friendly technology.

This seminar provided unique platform for about 150 industry experts and officials to exchange high-level information. Particularly, torrents of questions were asked about the themes related to the cost reduction, which reflected the enthusiasm of the industry to tide over the sluggishness in the shipping market. The 1st Meeting of KR Southeast Asia Committee, held in parallel, drew the officials of local shipping companies and shipyards from Singapore, Indonesia, Malaysia, etc., providing a platform to exchange information and strategies to build cooperative

relations and promote coexistence in the region, as well as offer a window into the technology and business conditions of KR. Jeon Yeong-gi, Chairman of KR, said, "KR Singapore Technical Seminar and the KR Southeast Asia Committee are important in improving the status of Korea in Southeast Asian market. We will make constant effort to provide the advanced technology service constantly, and build the networking and intimacy with customers to raise our profile in the Southeast Asian market and expand our boundaries in this region."

한국선급, 싱가포르 및 동남아시아 시장 적극 공략 나서

한국선급(KR)은 기술력 홍보와 이미지 제고를 위해 제 6회 싱가포르 기술 세미나(KR Singapore Technical Seminar) 및 제 1회 한국선급 동남아시아

위원회(KR Southeast Asia Committee)를 지난 7월 25일 싱가포르의 마리나 만다린 호텔에서 개최했다.

이번 기술세미나에서는 한국선급 김연태 신기술지원팀장의 현재 에너지 효율 및 친환경 기술과 관련하여 전 세계 해운 업계의 가장 큰 이슈가 되고 있

는 선박에너지효율설계지수 및 에코십 설계(EEDI & Eco-ship Design), LNG 연료선(LNG Fuelled Ships)의 발표가 있었다.

이번 세미나에는 150여명의 업계 전문가 및 관계자들이 적극적으로 참여하여 수준 높은 정보 교류가

이루어졌다. 특히 경비 절감과 관련한 주제들에 대해 집중적으로 질문공세가 이어져 해운시장의 불황과 이를 타개하고자 하는 업계 관계자들의 열의를 엿볼 수 있었다.

올해 설립되어 이날 동시에 개최된 제1회 동남아시아 위원회에서는 싱가포르를 비롯한 인도네시아 및

말레이시아 등 관련 지역 선사와 조선소의 임원들이 모여 한국선급의 기술력 및 영업현황을 청취하고 지역 내 상생과 협력관계 구축을 위한 방안과 정보를 교환했다.

한국선급 전영기 회장은 "싱가포르 세미나의 지속적인 개최와 동남아시아 위원회의 설립은 동남아시아

시장 내에서의 한국선급의 위상을 제고 하는데 중요한 요소이다. 향후 끊임없는 고급 기술 서비스 제공과 더불어 동남아 시장 내에서의 인지도 상승을 위한 지속적인 네트워킹 및 고객 친밀화 전략으로 이 지역에서의 한국선급의 영역을 확대해나가는데 힘껏 노력할 것"이라고 포부를 밝혔다.



HMD delivered its 700th vessel in 15 years after its launch of shipbuilding business

Hyundai Mipo Dockyard (HMD) held the hand-over ceremony for STI FONTVIEILLE, a 52,000-ton product carrier (PC) of Monaco-based Scorpio Tankers at its headquarters in Ulsan on July 25.

Thus, HMD set a milestone of 700th vessel delivery in 15 years after it delivered 'RAMFORM BANFF', a FPSO, in 1997.

STI FONTVIEILLE is the same type as the vessel that increased fuel efficiency by 30%, compared to the vessel of same kind, as proven by Scorpio Tankers which operated the vessel after taking the delivery from HMD in July last year. Scorpio Tankers placed the orders at HMD for additional 18 vessels this year alone, and has awarded the newbuilding contracts for 39 PCs to HMD out of approximately 50 units that it ordered since last year.

The volume of vessels built by HMD rose drastically in a short period of time: 1 unit in 1997, 4 units in 1998, 8 units in 1999, 20 units in 2001, 46 units in 2005, 60 units in

2006, 70 units in 2008, and 80 units in 2011.

Based on type of vessel, HMD has delivered 406 product/chemical tankers, 101 containerships, 94 bulk carriers, 39 PCTCs (Pure Car and Truck Carriers), 20 LPG carriers, and 40 special purpose vessels including the drillship, etc.

In particular, a total of 28 vessels built by HMD were selected as the Best Ship of Year over the last 12 consecutive years, including 11 product carriers, 6 containerships, 2 LPG carriers, 3 bulk carriers, etc., since the shipbuilder's submarine fiber-optic cable laying vessel was selected as the best ship for 2001.

Along with that, HMD made inroads into the market for refrigerated cargo carriers this year, following its entry into the market



'STI FONTVIEILLE', a 52,000-ton product carrier

for platform supply vessels, combo vessels, juice carrier, etc., accelerating its drive to dominate the high value special-purpose vessel sector and strengthen its competitiveness even amid the sustained downturn in shipbuilding market.

Meanwhile, HMD has won orders for 76 units (worth USD 2.55 billion) so far this year, meeting approximately 80% of its annual new order target of USD 3.2 billion.

현대미포, 조선사업 진출 15년 만에 선박 700척 인도

현대미포조선은 지난 7월 25일 오후 울산 본사에서 모나코 스크피오(Scorpio Tankers)사의 5만2000톤급 PC선인 'STI 폰비에이유(FONTVIEILLE)'호에 대한 인도서명식을 가졌다. 이로써 지난 1997년 FPSO인 람폼반프호 인도 이래 불과 15년 만에 700척이라는 대기록을 달성하게 됐다.

이날 인도된 'STI 폰비에이유(FONTVIEILLE)'호는 '스콜피오'사가 지난해 7월 현대미포조선으로부터 인도해 직접 운용한 결과 기존 동형선 대비 연비가 30% 향상됐다고 알려진 선박과 동형선이다. 한편

스콜피오사는 올 들어서만 18척의 선박을 추가 발주하는 등 지난해부터 발주한 50여척의 PC선 가운데 무려 39척을 현대미포조선에 발주했다.

현대미포조선은 1997년 1척, 1998년 4척, 1999년 8척, 2001년 20척, 2005년 46척, 2006년 60척, 2008년 70척, 2011년 80척 등 단 기간에 건조 척수가 비약적으로 증가했다. 선종별로는 석유화학제품운반선 406척, 컨테이너운반선 101척, 벌크선 94척, 자동차운반선 39척, LPG운반선 20척, 드릴십 등 특수선 40척을 각각 인도했다.

특히 2001년 해저 광케이블 부설선을 시작으로 지난해까지 PC선 11척 컨테이너운반선 6척 LPG운반

선 2척, 벌크선 3척 등 모두 28척의 선박이 12년 연속 최우수 선박으로 선정되는 등 '명품' 선박을 자랑하고 있다.

이와 함께 지속되는 조선시황 침체 속에서도 지난해 해양작업지원선(Platform Supply Vessel), 광석·황산 겸용선(Combo Vessel), 주스 운반선(Juice Carrier) 등에 이어 올해는 냉동/생장 전용 컨테이너 운반선 시장에도 진출, 고부가 특수선 시장 선점을 통한 경쟁력 강화에 박차를 가하고 있다.

한편 현대미포조선은 올 들어 지금까지 모두 76척(25.5억 달러)을 수주함으로써 올해 목표(32억 달러) 대비 약 80%를 달성했다.

Pekka Tiitinen named head of ABB's Discrete Automation and Motion division

Pekka Tiitinen, the global head of ABB's Drives and Controls business, has been appointed to ABB's Executive Committee as head of the Discrete Automation and Motion (DM) division as of Sept. 15, 2013. He succeeds Ulrich Spiesshofer, who is taking over as ABB CEO. Tiitinen, a Finnish citizen, has been responsible for ABB's Drives and Controls business since it was formed in January 2013. Before that he was head of the global Low Voltage Drives business for 10 years, with a very successful track record particularly in China, the US and Europe. During this period he grew the drives business organically, led important technological innovations and improved profitability sustainably. The Drives and Controls business unit is the world's largest industrial drives business, with more than 6,000 employees in 80 countries. From 2006 to 2010, he was also a regional division manager in ABB's Northern Europe region, which comprises 20 countries from Ireland in the west to Russia in the east.

"Pekka has very successfully expanded the global drives business over the past decade, mostly through strong market orientation, excellent technology development and organic growth, and has sustainably

strengthened its profitability at the same time. Pekka was also key in realizing the value of the Baldor acquisition, ABB's largest to date," said Spiesshofer. "He has been instrumental in developing and implementing the DM division's strategy, and we are pleased to have such a successful team leader with a strong track record in this role."

Tiitinen joined ABB as a design engineer in the drives business in 1990 and has held several management roles in the business since 1993. Before joining ABB, Tiitinen worked for Cimcorp Inc. in the robotics industry in the US and in Finland. He has a degree in electrical engineering, specializing in drives and robot automation, from the University of Technology in Helsinki, Finland. In his new role, he will be based in Zurich, Switzerland.

ABB recently conducted the reshuffle of its executives, which has highlighted the importance of individual capability and raised motivation of employees. At the Group level, new CEO and head of Industrial Division were



named from within the company. This year, 3 executive were appointed from the in-house organization under the concerned department of ABB Korea.

In particular, the 3 Senior Vice-Presidents who were newly appointed at ABB Korea have been in service at ABB for more than 2 decades and have successfully carried out many different works in various departments ranging from the engineering, through the marketing, to the sales.

As they have a good grasp of ABB's internal situations, they are expected to provide effective leadership needed to achieve the business strategy which the company is currently pushing forward.

페카 티티넨, ABB 그룹 산업자동화 사업본부 총괄로 임명

글로벌 드라이브 및 제어 사업부문을 총괄해 온 페카 티티넨(Pekka Tiitinen)이 9월15일부터 산업자동화 총괄 임명과 함께 ABB그룹의 최고 경영진(Executive Committee)에 합류하게 됐다. 그는 ABB CEO로 취임하는 울리히 스피에스호퍼(Ulrich Spiesshofer)의 후임으로 발탁된 것이다.

핀란드 국적의 티티넨은 2013년 1월 형성된 드라이브 및 제어 사업부를 총괄해왔다. 그전에 10년간 글로벌 저압 드라이브 사업부를 맡아왔으며, 재임 중 중국, 미국, 유럽에서 특히 높은 사업 성과를 보여줬다. 같은 기간 동안 티티넨은 드라이브 사업을 유기적으로 성장시키고 기술적인 혁신과 수익성을 지속적으로 개선 및 향상시켰다. 드라이브 및 제어 사업부는 80여 국가에서 6000명 이상의 임직원이 소속

된 세계 최대 산업 드라이브 사업이다. 아울러 2006년부터 2010년까지 북유럽 지역의 산업자동화 사업 본부를 총괄했다. 북유럽 지역은 서부 아일랜드에서 동부 러시아에 이르는 20개국으로 이루어져 있다.

ABB 울리히 스피에스호퍼 CEO는 "그는 강력한 시장 지향, 우수한 기술 개발 및 유기적 성장을 통해 지난 10년간 글로벌 드라이브 사업을 성공적으로 확대하고 동시에 지속적으로 수익성을 강화해왔다. 또한 현재까지 ABB 내에서 가장 큰 인수였던 발도르 인수 가치를 넘보다 먼저 간파한 인물이기도 하다.면서 "지금까지 산업자동화 사업본부의 전략 개발과 구현하는데 중요한 역할을 맡아왔고, 성공적인 실적을 보인 훌륭한 리더가 임명된 것에 대해 기쁘게 생각한다."고 말했다.

티티넨은 1990년 드라이브 부문의 디자인 엔지니어로 ABB에 입사해, 1993년 이후로는 다양한 관리 요직을 맡아왔다. ABB 입사 전, 미국과 핀란드에서 산

업용 로봇 업체인 Cimcorp에서 근무했다. 핀란드 헬싱키에 위치한 기술 대학에서 전기공학 및 드라이브 로봇 자동화 전문 학위를 가지고 있다. 이번 임명과 관련해 스위스 취리히에서 근무할 예정이다.

한편 ABB는 최근 임원 임명에서 사내 인사를 단행했는데, 이는 직원들 간에 업무 및 개인 역량 향상에 대한 중요성과 동기를 부여하는 자극제가 되고 있다. 그룹 차원에서 신임 CEO와 사업본부 총괄이 사내에서 임명되었으며, ABB코리아에서도 올해 3명의 경영진이 ABB코리아의 해당 부서의 산하 조직에서 발탁된 바 있다. 특히 ABB코리아에서 새롭게 임명된 3명의 수석 부사장은 20년 이상 ABB에서 근무하며 엔지니어, 마케팅 영업에 이르기까지 여러 부서에서 다양한 업무를 성공적으로 수행했다. ABB의 내부 상황을 잘 파악하고 있기 때문에 현재 진행 중인 사업 전략을 달성하기 위한 효과적인 리더십을 발휘할 것으로 평가된다.



AdvanFort vessels to aid voluntary USCG Amver Program keep watch over maritime emergencies in piracy HRA

Maritime security leader the AdvanFort Company announced that it has volunteered for service in the piracy-infested waters in and around the Gulf of Aden and Indian Ocean as part of the U.S. Coast Guard-coordinated Automated Mutual Assistance Vessel Rescue System (Amver), whose members assist any nearby vessel in distress.

The AdvanFort fleet, which has vessels strategically positioned in key sea lanes surrounding the High Risk Area (HRA), is now "on plot" in the official USCG program, a computer-based voluntary global ship reporting system that is used by search and rescue authorities around the world to arrange for assistance to persons in distress at sea.

"AdvanFort helps ensure no call for help goes unanswered even in the most dangerous waters," said Benjamin M. Strong, director of Amver Maritime Relations at the Coast Guard, in a statement about the unique vol-

untary alliance with one of the leading private maritime security companies.

"The high risk waters of the Gulf of Aden and the Arabian Sea make search and rescue cases challenging to manage," Strong noted. "AdvanFort's participation in Amver gives search and rescue authorities new, specialized vessels to assist them in managing maritime emergencies."

Any commercial vessel of more than 1,000 gross tons that are on voyages of 24 hours or more, regardless of nation or flag, ought to enroll and participate in the Amver program, the AdvanFort president pointed out.

Due to participating merchant vessels regularly reporting their position, those ships near



a position of distress are more readily identified, and thus rescue coordinators are able to compress the search area in cases where a participant vessel is unreported or overdue. By identifying those vessels best positioned to respond to distress calls, other vessels are able to continue their voyage - having met those obligations set down in international law - thus saving fuel, time and cost of payrolls.



Rockwell Automation introduces comprehensive industrial security initiative

Rockwell Automation announced an initiative to help manufacturers reduce security risks to control systems in response to growing cyber-security threats. The initiative will help automation and IT professionals more effectively secure their industrial processes with a combination of control system design and best practices, contemporary technologies and professional services from Rockwell Automation and its strategic partnerships, including Cisco.

"The rapidly evolving nature of the industrial security landscape makes it critical that today's manufacturers view security as an ongoing business imperative, rather than a one-time investment event," said Sujeet Chand, senior vice president and chief technology officer, Rockwell Automation. "A

more secure network infrastructure will allow manufacturers to deploy contemporary technologies and emerging solutions, like mobility, virtualization and cloud computing, while still performing mission-critical automation functions. Rockwell Automation is dedicated to providing the technologies and resources that will help facilitate the design and management of a secure connected enterprise."

The three-pronged Rockwell Automation initiative is designed to achieve a secure connected enterprise through the following:

- *Defense-in-Depth Methodology*
- *Secure Automation Architecture*
- *Enterprise-Ready Industrial Security Solutions*

"Rockwell Automation and Cisco are leading the way in helping manufacturers recognize that

information security spans from the plant floor through the enterprise," said Guido Jouret, vice president and general manager of the Internet of Things business unit for Cisco. "It's important to take what we've learned in the IT space and educate manufactures on the business value associated with taking a consistent and seamless approach to security. Together we're delivering expertise and solutions to help secure their important physical and intellectual assets in a world with dynamic security threats."

The industrial security initiative from Rockwell Automation is based on a multi-layer network design approach that combines resiliency in the infrastructure with security-enabled, end-point devices to help manufacturers establish a sustainable security culture, conduct comprehensive

security assessments, and deploy a robust security infrastructure across both automa-

로크웰 오토메이션, IT-제조현장을 아우르는 산업 보안 전략 수립

로크웰 오토메이션은 증가하는 사이버 보안 위협에 대응해 제조사가 제조현장의 제어 시스템의 보안 위험을 줄일 수 있는 전략을 발표했다. 이를 통해 자동화 및 IT 담당자들은 로크웰 오토메이션과 시스코 간의 전략 파트너십을 통해 안전한 제어 시스템 설계와 최적 성능, 최신 기술 및 전문 서비스를 모두 결합하여 보다 효과적으로 산업 프로세스의 보안을 유지할 수 있다.

로크웰 오토메이션의 수석 부사장이자 CTO인 수지트 찬드(Sujeet Chand)는 "산업 보안 흐름이 빠르게 진화하면서 핵심 문제로 대두되어, 오늘날의 제조사는 보안을 일회성 투자가 아니라 지속적으로 관리해야 하는 업무로 받아들이고 있다."면서 "보다 안전한 네트워크 인프라를 갖추어 제조사는 핵심 자동화 기능을 계속 유지하면서 모빌리티(Mobility), 가상화(Virtualization), 클라우드 컴퓨팅(Cloud computing)

tion and industrial IT assets. Core to the initiative is implementation of a secure net-

과 같은 최신 네트워크 및 정보 기술과 신규 개발 솔루션 적용할 수 있게 된다. 로크웰 오토메이션은 보안이 필요한 기업의 설계, 관리를 지원하는 기술과 자원을 공급하기 위해 전념하고 있다."고 말했다. 로크웰 오토메이션은 기업의 네트워크 및 커넥티비티 보안을 목적으로 다음과 같은 3가지 전략을 수립했다.

- 심층 방어 방식(Defense-in-Depth Methodology)
- 시큐어 자동화 아키텍처(Secure Automation Architecture)
- 엔터프라이즈-레디 산업 보안 솔루션(Enterprise-Ready Industrial Security Solutions)

시스코의 부사장이자 Internet of Things 사업 총괄 매니저인 귀도 주렛(Guido Jouret)은 "로크웰 오토메이션과 시스코는 공장 현장에서 사무실에 이르기까지 정보 보안이 이루어져야 한다는 사실을 제조사가 인식하도록 앞장서고 있다."면서 "IT 환경에 대한 우리 경험을 투자해 보안에 있어서 일관되고 빈틈 없이 접근함으로써 얻어지는 사업성을 제조사에게

work infrastructure based on the use of the standard Internet Protocol (IP).

알려주는 것이 중요하다. 우리는 다양한 보안 위협이 존재하는 세상에서 소비자에게 중요한 물리적, 지적 자산을 보호할 수 있는 전문성과 솔루션을 제공하고 있다."고 말했다.

로크웰 오토메이션과 시스코는 개방형 표준 기술을 이용해 End-to-End 즉, 사무실에서 현장 단말 장치에 이르기까지 제조사가 통합된 보안 환경을 구축하도록 지원하고 있으며, 향후, 양사는 공동 개발한 산업용 이더넷 스위치 및 산업 제어 시스템 보안 제품 포트폴리오를 통해 장애 복구 (Resilient) 네트워크 설계, 접근 제어, 상황별(Contextual) ID 관리, 자산 보호 등에 대한 좀 더 자세한 지침을 제공할 예정이다.

로크웰 오토메이션의 산업 보안 전략은 보안 활성화, 엔드포인트(end-point) 장치와 인프라의 탄력성을 결합하는 다중계층 네트워크 설계 방안을 기준으로 하여 제조사가 지속 가능한 보안 문화를 확립하고, 포괄적인 보안 평가를 수행하며 자동화 및 산업 IT 자산에 강력한 보안 인프라를 배치하도록 해준다.



Ground was broken for the world's first green ship equipment test and certification center

As the International Maritime Organization (IMO) enforces the regulations on greenhouse gas emissions (GHG) from Ships, green ship technology development has gathered speed. The Ministry of Maritime Affairs and Fisheries (MMAF) held the ground-breaking ceremony for the 'Green Ship Equipment Test & Certification Center, the world's first, at the site of Kunsan National University within the No. 2 National Industrial Complex, Gusan City, North Jeolla Province, on July 26.

The Green Ship Equipment Test & Certification Center project, driven forward by Korean Register of Shipping (KR), is supported by the MMAF's R&D fund disbursed from national coffers and financial injection from North Jeolla Province and Gusan City. A total of KRW 30 billion will be injected into this project by 2015 to lay the foundation for the test and certification of eco-friendly ship technology.

Particularly, the Green Ship Equipment Test & Certification Center will be developed as global hub of green ship, so that the green ship certification system developed by this Center can be adopted as international standard model. Eco-friendly vessel, called 'green ship', is high-efficiency vessel that prevents greenhouse gas emissions. The IMO Convention requires newbuilt vessels to reduce greenhouse gas emissions by 15% by 2015, 20% by 2020, and 30% by 2025.

The ground-breaking ceremony was attended by about 200 officials, including Im Hyeon-cheol, Director of Maritime Safety Agency, Kim Wan-joo, Governor of North Jeolla Province, Moon Dong-shin,



Mayor of Gusan City, Chae Jeong-ryong, President of Kunsan National University.

An official from MMAF said, "With the establishment of the world's first green ship equipment test and certification center, the Ministry of Maritime Affairs and Fisheries (MMAF) will develop eco-friendly shipbuilding and equipment industries into future growth engine and spur the development of eco-friendly vessel technology."

세계 최초 '그린십 기자재 시험·인증 센터' 착공
국제해사기구(IMO)의 선박배출 온실가스 규제에 따라 그린십 기술개발 추진이 본격화되고 있는 가운데, 해양수산부는 지난 7월 26일 전북 군산시 제2국가산업단지 군산대캠퍼스 부지에서 세계 최초로 건립되는 '그린십 기자재 시험·인증 센터' 건립 착공식 행사를 가졌다.

그린십 기자재 시험·인증 센터는 해수부 연구개발 국비 및 전라북도, 군산시의 지원을 받아 한국선급이 수행하며, 2015년까지 총 예산 300억 원을 투입

해 친환경 선박기술에 대한 시험·인증 기반을 구축하는 사업이다.

이번에 설립되는 '그린십 기자재 시험·인증 센터'로 향후 중장기적으로 세계적 그린십 허브로 육성시켜 센터가 개발한 그린십 인증체계를 국제적 표준모델로 사용하도록 추진할 계획이다.

일명 '그린십'이라고 불리는 친환경선박은 온실가스 배출을 억제한 고효율의 선박으로, IMO 협약에서 현재 기준값 대비 2015년에는 15%, 2020년에는 20%, 2025년에는 30%의 온실가스 배출을 감축

하여 선박을 건조하도록 정하고 있다.

이날 행사에는 임현철 해사안전국장, 김완주 전라북도지사, 문동신 군산시장, 채정룡 군산대 총장 등 관련 기업 및 관계자 200여 명이 참석하여 그린십 센터 착공을 축하했다.

해양수산부 관계자는 "세계 최초로 추진되는 그린십 기자재 시험·인증 센터 구축을 계기로, 향후 해양수산부는 친환경 조선 및 기자재 산업을 미래 성장 동력산업으로 육성할 것이며, 친환경선박기술 개발에 박차를 가할 것"이라고 말했다.



KR signed technical cooperation in technology and operation with PMA

Korean Register of Shipping (KR) entered into an agreement (MOU) with Panama Maritime Authority (PMA) on August 14 to increase cooperation in technology, research, international activities, etc.

This agreement aims to promote efficiency of ship registration and services contracted out by government, and furthermore, improve the service quality so as to offer better services to the ship owners. For that, KR and PMA pledged to provide support and cooperation for joint technology development and research, technical/personal interchange, exchange of maritime technology information related to the issues of common interest, promotion of international activities, etc.

Kim Gyu-seop, General Manager, Government Services, KR, who attended the event on behalf of KR Chairman Jeon

Yeong-gi, said in his welcome address, "I am delighted that the cornerstone has been laid for mutual development of PMA and KR even amid the downturn in the global shipbuilding and shipping markets. In response, Reynaldo Garibaldi, Manager Supervising the Navigation Safety, PMA, said, I appreciate your welcome and the signing of MOU. This MOU with KR that have global standard technology and infrastructure will pave the way for the advancement of PMA."

An official from KR said, "The opening of SUGUMAR Seoul Office of PMA has brought improvement to civil services.



Furthermore, the MOU on technical cooperation between KR and PMA will result in even quicker services in relation to the issuance various certificates, approval, etc., for the ships with national flag of Panama, and drastically improve the services for shipping companies in the period ahead."

한국선급, 파나마 해사국과 기술협력 및 업무협정 체결

한국선급(KR)은 지난 8월 14일 파나마 해사국(Panama Maritime Authority, PMA)과 기술, 연구, 국제활동 등에 관한 상호 기술 협력 업무 협정(MOU)을 체결했다.

이번 업무협정의 주 목적은 선박등록 및 정부대행 서비스 업무의 전문성과 효율성 및 서비스 품질향상을 도모하여 보다 나은 서비스를 선주들에게 제공하는 것으로 이를 위해 한국선급과 파나마 해사국은 향후 공동 기술개발 및 연구, 상호 기술 및 인

적 교류강화, 공동 관심사에 대한 해사기술정보 교류 활성화 및 국제활동 협력강화 등에 대한 상호 지원 및 협력을 제공할 것을 약속했다.

한국선급 전영기 회장을 대신해 행사에 참석한 김규섭 정부대행 부부장은 "조선·해운 시장의 어려운 세계경제 여건 속에서 파나마 해사국과 한국선급의 MOU 체결을 통해 상호발전을 위한 초석을 마련하게 되어 기쁘게 생각한다"고 환영 인사를 전했으며, 이에 파나마 레이날도 가르발디(Reynaldo Garibaldi) 항행안전과장은 "환영 및 MOU 체결에 감사한다"며 "세계적인 기술력과 인프라를 갖추고 있는 한국선급

과의 MOU 체결은 파나마 해사국의 향후 발전에도 많은 도움이 될 것이라 기대한다"고 말했다.

한국선급 관계자는 최근 파나마 해사국 SUGUMAR 서울사무소의 개설로 민원업무처리가 많이 개선되었으나 금번 한국선급과 파나마 해사국과의 기술협력 업무협정(MOU)을 통하여 파나마 기국 선박에 대한 각종 증서 발급, 승인 등 민원의 더욱 신속한 해결이 가능하게 되어 향후 대 선사 서비스가 대폭 개선될 것을 기대한다고 전했다.

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Offshore wind power market rising to new heights

- Offshore wind power market to see robust annual growth of 17% by 2020

There has been an increased interest in renewable energy, the clean energy source. Offshore wind power has the highest growth potential among the renewable energy sources and represents a segment which domestic shipbuilding heavyweights are seeking to make foray into. On the surface, the shipbuilding industry is a far cry from the wind power business that produces electric power. However, shipyards are scrambling to jump into the wind power sector characterized by low cost and high-efficiency.

Wind power generation is to convert kinetic energy of wind into electric energy. Wind power generator consists of basic frame, shaft, turbine, and blade which gathers the wind. The blade works much like the marine propeller that converts propulsive force of engine into rotary power. The technologies amassed through the construction of ships can be applied to the driving system or control system that determines the performance of wind power generation facilities.

Wind power generation requires lower initial investment cost and shorter construction and installation period compared to other renewable energy sectors. Clearly, wind power has emerged as a future growth engine.



The global installed power generation capacity reached approximately 5,000GW in 2010, among which renewable energy comprised 5.8%. Furthermore, the global installed power generation capacity is expected to rise to 6,941GW by 2020, and renewable energy will account for 11.8%. In addition, the proportion of fossil-fired power generation, which uses coal, gas, oil, etc., is expected to decrease to 62% by 2020 from 66.7% recorded in 2010. Such a decrease is attributed to the fact that the renewable energy production grows at an annual rate of more than 10%, surpassing the growth rate of fossil-fired power generation.

Renewable energy industry market has witnessed robust growth amid the increase in power generation capacity. The renewable energy industry has climbed to a growth path since 2000s, and the global capacity of renewable energy was projected to be 79GW, worth USD 260 billion, last year. The related industry predicts that the renewable energy market will grow 9.8% year-on-year to 87GW, worth USD 271.3 billion, a 4% increase compared to previous year. Such growth of renewable energy market is driven by the upturn in demand for renewable energies among the developing countries, as well as the rising demand in the United States, China, Japan, etc.

As of 2011, the cumulative installed capacity of renewable

energy stood at approximately 447GW, among which the wind power comprises 54.7%. The wind power has reached an advanced level of technology that already completed validation. Moreover, the wind power is highly cost-effective and has the highest investment value among the renewable energies. As there has been a surge in the demand for wind power among the developing countries including Asia, Central and Latin America, etc., the wind power is expected to continue to comprise the largest proportion in renewable energy.

Offshore wind power, the high efficiency renewable energy

According to New Energy Finance, the energy research company, the global offshore wind power market is expected to grow at an annual average rate of 30%, and the global installed offshore wind power capacity will reach 5,761MW by 2015. After significant decline in 2011 in the aftermath of financial crisis that broke out in 2008, the offshore wind power market is recovering this year.

So far, the offshore wind power market has yet to return to robust growth path, but is expected to see a strong growth as the next-generation growth locomotive. U.K., which captures 70% share of global offshore wind power market,

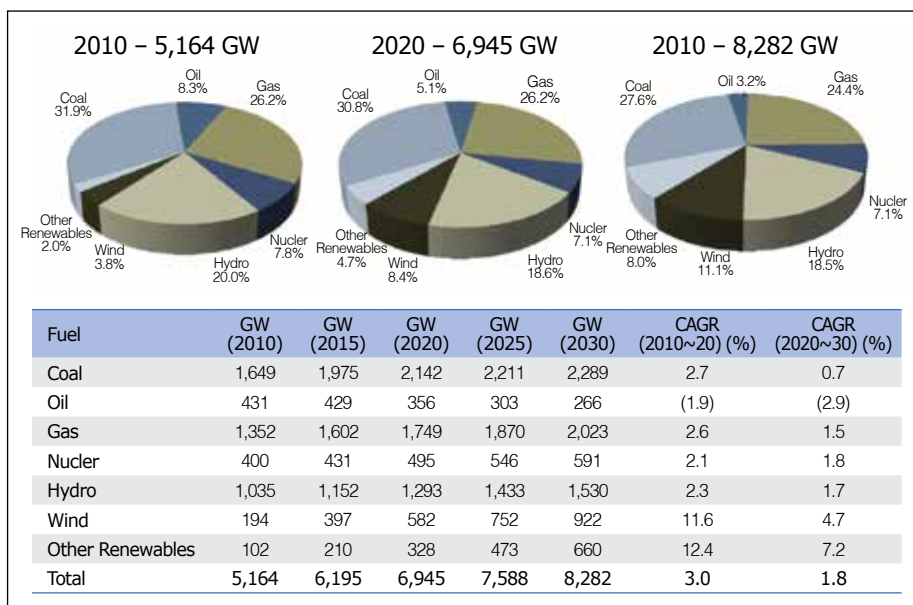


Figure 1. Outlook for the share of renewable energy between 2010 and 2030 (Source: Frost & Sullivan)

installed more than 1GW of offshore wind power capacity last year based on the ample resources in the North Sea, although many offshore wind farm projects were delayed due to the funding problems arising from the financial crisis that began in the United States.

According to the industry, the installed offshore wind power capacity in Europe is expected to reach 13.4GW by 2015, among which 5.3GW will be installed by U.K. and 4.6GW will be installed by Germany. Meanwhile, Asia and North America are expected to add 4.6GW and 1.1GW, respectively.

Offshore wind power is the unlimited energy source and takes on an added importance as strategic energy. However, the high initial investment cost has been the stumbling block hindering the expansion of offshore wind power market. Nonetheless, the unit cost of offshore wind power generation can be drastically reduced by the upturn in production volume and technology development.

	Offshore wind power	Onshore wind power
Average wind velocity	8~12m/s	4~8m/s
Average wind farm size	300MW	15MW
Power generation efficiency	40%	25%
Initial investment cost	\$ 2,500~3,500/kW	\$ 850~1,350/kW

Table 1. Comparison of offshore wind power and onshore wind power

3 major domestic shipyards advance into offshore wind power market

The global offshore wind power market is expected to reach 5GW by 2015 and 9.4GW by 2020. Although Europe is likely to dominate the offshore wind power market until 2015, the demand is expected to rise worldwide, including the United States, China, Japan, etc.

This year, the offshore wind power market, dominated by Europe, is expected to continue strong growth with the installed capacity of 2.2GW. According to the industry, offshore wind power has many advantages over the onshore wind power, but faces the constraints impeding full-fledged growth of demand due to the requirements of technology validation and cost-effectiveness. Therefore, offshore wind power market is expected to take a strong growth path after U.K. or other European countries that dominate the offshore wind power market build adequate track record in achieving technology validation and cost-effectiveness.

The offshore wind power requires advanced technology and extensive track record, compared to onshore wind power, and therefore has relatively high entry barriers. Domestic companies are also actively making inroads into offshore wind power market. Particularly, shipyards that have the shipbuilding and offshore plant technologies are striving to develop technology and capture the market for offshore wind power, the new growth engine. Hyundai Heavy Industries

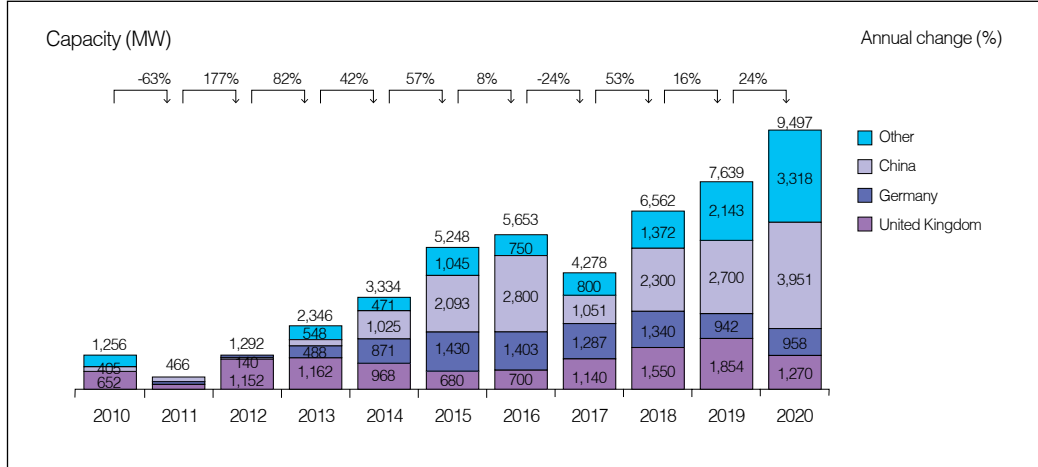


Figure 2. Trends and outlook of offshore wind power market (Source: New Energy Finance)

(HHI) has developed the technologies with steadfastness and is securing a foothold in the power generator market. In 2009, Samsung Heavy Industries (SHI) announced the plan to invest KRW 600 billion spread over the 6 years in wind power business. Daewoo Shipbuilding & Marine Engineering (DSME) acquired DeWind, an overseas wind power company, for USD 50 million.

Domestic shipyards have favorable conditions for brisk business, but have yet to achieve noticeable results, compared to their counterparts in developed countries. Currently, companies in Europe, United States, China, etc., have garnered about 70% share in the global market, including Vestas of Denmark, GE Wind of United States, Gamesa of Spain.

There has been little interest in wind power business across the country, and related laws and regulations have yet to be enacted. The industry pundits opine that domestic companies need to capture the market and sharpen quality competitiveness to overtake global companies in a short period of time.

-Making headway into overseas markets based on the leading technology

Hyundai Heavy Industries (HHI) advanced into the wind power market in 2008. Particularly, HHI successfully commercialized the power generator with an output of 1.65MW in 2 years after its entry into the wind power market by leveraging the propeller technology built up over many years building large vessels. Last year, HHI developed the

5.85MW PMSG (Permanent Magnet Synchronous Generator) used in offshore wind turbine.

Currently, HHI is focusing on developing the low-speed wind power generator capable of producing electricity even at low wind velocity in an attempt to carve out large share of the 2MW wind turbine market currently dominated by European companies while accelerating its drive to develop 5.5MW offshore wind turbine. Moreover, HHI is developing electricity storage system that helps ensure stable power supply. HHI acquired the Germany's gearbox manufacturer in 2011 and strived to secure technology. Targeting the overseas wind power market vigorously, HHI supplied 8 units of 2MW wind turbines to Hamina, Finland, and is operating the manufacturing plant for 2MW wind turbines in Shandong, China. Additionally, HHI entered into a contract to supply 20 units of 2MW wind turbines(40MW in all) to Yeongam wind farm, the largest onshore wind farm nationwide.



Figure 3. PMSG localized by HHI



Figure 4. 2MW wind turbine installed by HHI in Changjuk wind farm, Taebaek, Gangwon Province, in December 2012

-Total offshore wind power system

Samsung Heavy Industries (SHI) mapped out a strategy to build the total offshore wind power system that involves all of its Divisions. For that, SHI is taking a forward-looking approach to make inroads into the wind power market. SHI has shown strong performance at home and abroad. It entered into a contract to install 7MW offshore wind turbine prototypes in Scotland in January last year and won the bid in fierce competition from the other two domestic shipbuilding heavyweights to supply 12 offshore wind turbines to Daejeong offshore wind farm.

In particular, SHI joined hands with Korea Southern Power to install 12 units of 7MW offshore wind turbines with a total output of 84MW in the offshore wind farm off the coast of Daejeong, Jeju Province. SHI plans to complete the construction by late 2014 and start the normal operation from 2015. Meanwhile, Korea Southern Power has established a plan to expand the capacity of Daejeong offshore wind farm up to 200MW.

Additionally, SHI is poised to win the contract to build the world's largest windfarm installation vessel (WIV) again after it was awarded the contract to deliver the similar type of vessel, the largest worldwide, in 2010. In July last year, SHI built



Figure 5. 'PACIFIC ORCA', the world's largest Windfarm Installation Vessel built by Samsung Heavy Industries

PACIFIC ORCA, the offshore windfarm installation vessel, which measured 161m in length, 49m in width, and 10.4m in height.

-Wind power business gathering momentum

Daewoo Shipbuilding & Marine Engineering (DSME) acquired DeWind, the world's leading wind power company, in 2009 and as a result, resolved the issue of the time-consuming validation process and shortened the time taken to enter the market, thus broadening its business opportunity. Specifically, DSME plans to join hands with Korea South-East Power and DeWind to cement its foothold in the North American market and expand its reach to the European and Chinese markets in the period ahead.

Meanwhile, DeWind won the contract to supply 10 units of 2MW wind turbines to the wind farm in Texas, United States, and have secured the orders for 85 wind turbines in North America alone. So far, DeWind won orders for 95 wind turbines from domestic and overseas clients with the total installed capacity of 190MW.

This year, DSME entered into a contract with Korea South-East Power to jointly develop the wind farm and explored the way to further develop the partnership for the construction and operation of the wind farm with a total capacity of 300MW at home and abroad. Currently, Korea South-East Power and DeWind are jointing developing the Novus I wind farm with a capacity of 80MW. The combined capacity of Novus I and Novus II totals 120MW, the largest-scale which domestic wind power generation companies have ever built in foreign countries.



Figure 6. 'D 9.1', the 2MW wind turbines which DSME will supply to the wind farm in Hasa-ri



Figure 7. 3MW offshore wind power test bed of Doosan Heavy Industries & Construction off the coast of Woljeong, Jeju Province

-Development of 3MW offshore wind power generation system

Doosan Heavy Industries & Construction successfully developed WinDS3000TM, the 3MW offshore wind power generation system. This offshore wind power generation system was developed in a state-funded project and localized the core technologies such as blade, gearbox, etc., and particularly is designed to increase reliability and stability. Doosan Heavy Industries & Construction has already installed the nation's first 3MW wind power test bed off the coast of Woljeong, Jeju Province, building up the track record of operation. Only a handful of companies worldwide, such as Vestas of Denmark, Siemens of Germany, etc., have developed the wind power generation system with a capacity of over 3MW and have built up the track record of successfully operating the offshore wind power generation system. Doosan Heavy Industries & Construction plans to make inroads into domestic and overseas offshore wind power markets by fully leveraging its technology and operation know-how.

Offshore wind power capacity added 33% in Europe

European countries are drastically expanding their offshore wind power capacity. According to European Wind Energy Association (EWEA), the offshore installed wind power capacity reached 1,166MW last year, an increase by 33% from 876MW recorded in 2011. This year, the offshore wind power capacity is expected to increase 20% from the previous year.

3,300MW will be added to the offshore installed wind power capacity in Europe if the 14 offshore wind farm projects are completed. Currently, 10 European countries have 1,662 turbines with the production capacity of 4,995MW in 55 offshore wind power plants. U.K. (59%) tops the list of wind power capacity, followed by Denmark (18%), Belgium (8%), Germany (6%), Netherlands (5%), Sweden, Finland, Ireland, Norway, and Portugal.

As the energy capability has become the yardstick of competitiveness, countries worldwide are vigorously pressing ahead with large-scale state-funded offshore wind power



generation projects, such as Round 3 of U.K., Energy 21 of Denmark, Southwestern Coast Offshore Wind Power Development Project of Korea.

According to KOTRA(Korea Trade-Investment Promotion Agency), U.K. has been the most aggressive in wind power generation, currently building the Round 3 offshore wind farm project after launching the Round 1 in 2001. Round 1 is the project to install 13 offshore wind farms with a total capacity of 1.5GW off the coast of U.K. Round 2 has installed a total of 6.0GW (15 places) since 2003. Round 3, which has come into limelight worldwide, is a large-scale project to build 5,000 to 7,000 offshore wind turbines by 2020 and produce 25GW of electricity.

Denmark is the world's first country that built offshore wind farm. In 1991, Denmark constructed a 5MW test plant at Vindeby located west off the coast of Lolland. Currently, Denmark launched the Energy 21 project to install 4GW offshore wind farm by 2030 and increase the share of offshore wind energy to 21%. Moreover, Denmark is proceeding with the Oil Zero Project, aiming to obtain 100% of electricity from renewable energy sources by 2050.

Germany is expected to press ahead with the offshore wind power projects most vigorously over the next decade. In June last year, Germany amended the Renewable Energy Law (EEG-Novelle 2012) and aims to achieve 10GW offshore wind power capacity by 2020. Currently, Germany has approved additional 8500MW of offshore wind power capacity and contracted the installation of 1,700MW of capacity.

- Full-fledged construction of offshore wind farms

In Korea, the Southwest Coast Offshore Wind Power Development Project has been led by the government with an aim to join the ranks of the world's top 3 offshore wind power countries by 2020. KRW 10.2 trillion is scheduled to be injected into this project by 2019 which will be undertaken by major domestic shipyards such as Hyundai Heavy Industries (HHI), Samsung Heavy Industries (SHI), Daewoo Shipbuilding & Marine Engineering (DSME), etc. (reference 'Sep. ISSUE 38 page') The Southwest Coast Offshore Wind Power Development Project will be built off the coast of Uido adjacent to Buan county, North Jeolla Province and Anmado, Yeonggwang county, South Jeolla Province, with the installed power capacity of 2.5GW. Additionally, a wind farm with an installed power capacity of 2350MW will be built in Jeju Province by 2030. For that, Jeju Province is slated to designate

the districts for 7 onshore wind farms with 176MW capacity and 2 offshore wind farms with 350MW capacity this year, and will start the installation of 60MW capacity within this year. Jeju Province entered into an agreement with KEPCO E&C in December 2010 and Korea Southern Power in September 2011 to increase cooperation on the construction of offshore wind farms. KEPCO E&C plans to build a wind farm with a capacity of 150MW off the coast of Hanrim, Jeju, and Korea Southern Power plans to build a wind farm with a capacity of 200MW off the coast of Daejeong, Seoguiipo by 2016.


- Floating offshore wind power generation facility with 7MW capacity

Japan plans to commercialize the floating offshore wind power generation facilities by 2018 in line with its renewable energy business strategy. The installed offshore wind power capacity stands at 25.3MW in Japan as of late last year and is expected to increase to 49.6MW by the end of this year. Particularly, the 7MW floating offshore wind power test plant will be built off the coast of Futaba District, East of Fukushima Prefecture, in Japan by 2015. Japan's government recently announced that it would build 3 additional units of wind power generation facilities and 1 power transformation facility with an injection of JPY 11.5 billion(KRW 138 billion) which is the earmarked part of economic stimulus funding.

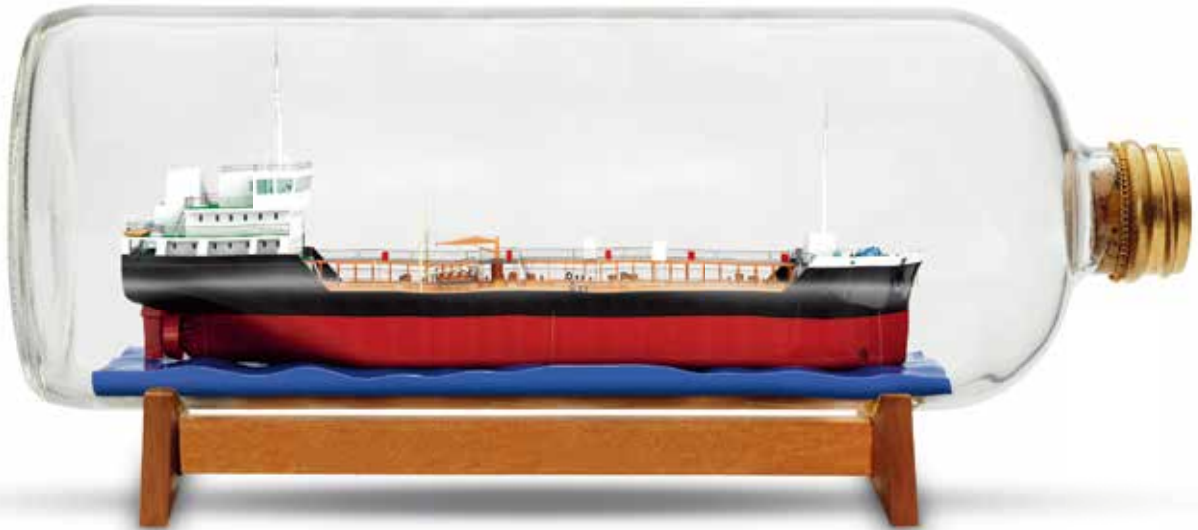
This project will be built in 2 phases. This year, the power generation facility with 2MW capacity will be built in the form of semi-submersible type supported by 4 columns to float above water. Next year, a large-scale wind power generation facility with 7MW capacity will be built. This facility will have the blades, each 82m long, and stand 200m above the water surface.

- Construction of offshore wind power plant with 5GW capacity

China completed the construction of offshore wind power plant off the coast of Rudong, Jiangsu Province, last year and started the production of electricity. This facility has the power capacity of 182MW and supplies 375 million kWh yearly, which is the largest offshore power plant in China.

China plans to build the offshore wind power plant with a capacity of 5GW by 2015, and on the basis of it, will increase the capacity to 30GW by 2020. This plan is also included in the 12th 5-year offshore wind power development plan of Chinese government. 

Ships are not still



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Opening up the era for domestic certification of large-scale wind power generation facilities

The Ministry of Trade, Industry and Energy laid the foundation for spurring the growth of offshore wind industry that forms the backbone of renewable energy development.

The Korean Agency for Technology and Standards (KATS) under the Ministry of Trade, Industry and Energy (MTIE) announced that it designated the 4 organizations – Korea Institute of Energy Research (KIER), Korea Institute of Materials Science (KIMS), Korean Register of Shipping (KR), UL – as the performance test agency for the certification of large-scale wind power generation facility with an output exceeding 750kW on July 30, 2013, and provide official certification services, starting from September 1.

Previously, the certification covered only small-scale (below 30kW) and medium-scale (30kW to 750kW) wind power generation facilities nationwide due to inadequate test facilities and technology for test/certification. The KATS' strategy paves the way for extending the support of design evaluation and performance test even to large-scale wind power generation facility with an output of up to 7MW.

The 'IEC 61400-22', an international standard, provides the basis for the certification of large-scale wind power generation facilities. Therefore, the test results issued by the 4 organizations will be valid internationally, according to the industry sources.

As the performance test agencies for large-scale wind power facilities were named, the reliance on overseas organi-



zations for the test and inspection can be reduced, bringing the savings on time and cost. In addition, an overseas organization (UL) is included in these test performance agencies to promote the sharing of the advanced certification technology in design evaluation and system with domestic organizations and help domestic certification industry make strides in the period ahead.

The 4 organizations designated this time will play disparate roles in the test and inspection of large-scale wind power generation facilities. Korean Register of Shipping (KR) and UL (DEWI-OCC) will be responsible for design evaluation, while the Korea Institute of Materials Science (KIMS)

will carry out the test and inspection of essential parts such as blade and gear box. Moreover, the Korea Institute of Energy Research (KIER) and UL will cover the test/inspection of the systems such as the output/load test, noise test, electric power quality test, etc. Last year, UL acquired DEWI, DEWI-OCC, a Germany-based wind power generation facility test and inspection organization.

The targets of the certification are the large-scale wind power generation facilities manufactured by domestic/overseas wind turbine manufacturers and installed in Korea. Currently, large-scale wind power generation facilities are being manufactured by domestic

Wind farm	Developer	Capacity	Current status and schedule
Saemangeum (North Jeolla)	North Jeolla Province	20MW(turbine undecided)	<ul style="list-style-type: none"> • Completion of basic design(2013.6.) • Turnkey design(2013.7.~2013.12.) • EPC bidding(2014.1.) • Establishment of wind farm(2014.3.~2015.12.)
Tamra (Jeju)	POSCO Energy (64%) Doosan Heavy Industries & Construction (36%)	30MW(Doosan: 3MW)	<ul style="list-style-type: none"> • EPC contract(2012.5.) • Establishment of wind farm(2013.3.~2014.12.)
Hanlim (Jeju)	Korea Power Engineering Company Inc (KOPEC) Daelim Industrial (SPC currently underway)	150MW(turbine undecided)	<ul style="list-style-type: none"> • Installation of meteorological tower(2012.5.) • Completion of feasibility study(2013.9.) • Establishment of wind farm(2013.12~2015.12.)
Dae Jung (Jeju)	Korea Southern Power (49.9%) Samsung Heavy Industries (50.1%)	A total of 203MW (Samsung: 7MW)	<ul style="list-style-type: none"> • EPC contract(2012.9.) • Establishment of wind farm(2013.5.~2016.12.)
South Jeolla	South Jeolla Province POSCO Energy SK E&S	4GW(turbine undecided)	<ul style="list-style-type: none"> • Installation of meteorological tower(2013.3.) • Completion of feasibility study(2014.5.)

Table. Establishment of offshore wind farms nationwide

manufacturers such as Hyundai heavy Industries (HHI), Hyosung, DMS, Daewoo Shipbuilding & Marine Engineering (DSME), etc., and overseas manufacturers such as Vestas (Denmark), Siemens (Germany).

The certification of large-scale wind power generation facilities will bring benefits, such as the preferential support for the distribution project currently driven forward by the Korea Energy Management Corporation, issuance of renewable energy certificate based on Renewable Portfolio Standard (RPS), etc. RPS makes it mandatory for

power generation companies with a certain capacity(over 500,000kW) to produce a specified portion of electricity from renewable energy sources. The cumulative wind energy worldwide stands at 282GW(onshore: 276.6GW, offshore: 5.4GW) as of 2012, and 44.6GW of new capacity was installed(onshore: 42.7GW, offshore: 1.9GW) in 2012 which represents a growth by 19.2% year-on-year. The installed capacity worldwide is expected to increase to 1,000GW (annual growth rate of 17.1%) by 2020. The domestic cumulative installed

capacity stands at 483MW, accounting for 1.7% of the global cumulative installed capacity.

An official from the Knowledge Industrial Standard Office of KATS commented that the designation of the performance test agencies for large-scale wind power generation facilities is an important step forward to increase the safety and reliability for large-scale wind power generation facilities manufactured or imported in Korea, and would help ease the path for domestic wind power industry to make foray into foreign markets. ⚓

Rolls-Royce secures offshore vessel contract in Brazil

Rolls-Royce announced it has signed a contract with the Brazilian shipyard Aliança S/A Industria Naval e Empresa de Navegacao, a subsidiary of Fischer Group, and Brazilian shipowner Asgaard Navegação S.A for the design and delivery of equipment to two offshore vessels for Asgaard. The contract value is about £ 11million to Rolls-Royce.

The two vessels are Oil Spill Response Vessels (OSRV), type UT 535 E, with systems designed to prevent damage from oil spills. They have the capacity to transfer recovered oil for proper onshore disposal.

Anders Almestad, Rolls-Royce, President- Offshore, said "We are very pleased that Asgaard have chosen Rolls-Royce design and integrated systems for their new offshore vessels. Asgaard is a

new customer to us and working closely together with them during the construction of these advanced vessels will be vital. We look forward to a long and fruitful relationship with Asgaard." He added "This order also marks the continuation of a long cooperation between Rolls-Royce and Aliança, and underscores our strength and capabilities in the Brazilian market."

Rolls-Royce will deliver design and equipment packages including propulsion systems, thrusters, DP systems, power electrical systems, automation and control systems, deck machinery and MTU engines. The Aliança shipyard is owned by CBO (Companhia Brasileira de Offshore) and has previously built ten Rolls-Royce vessels for CBO's own fleet. The vessels for Asgaard are due for delivery in 2015, with an option to build two more.

HHI's BWMS obtained certification from the United States

There has been an increased interest in the market for the Ballast Water Management System(BWMS) which all new vessels built from December this year is required to be equipped with.

Hyundai Heavy Industries (HHI) recently announced that its ballast water management system (BWMS) 'HiBallast' was approved as an Alternative Management System (AMS) by the United States. In fact, this HiBallast received the type approval of IMO (International Maritime Organization) in 2011. HHI obtained this certification from U.S. Coast Guard (USCG) to cope with rigorous environmental regulations of the United States.

Ballast water refers to the sea water that is taken into ballast tank in order to keep the stability of ship. HiBallast filters the sea water to remove aquatic organisms equal to or larger than $50\mu\text{m}$ ($1\mu\text{m}=0.001\text{mm}$) and provides sterilization through electrolytic system to prevent disruption to marine ecosystem. This BWMS can sterilize the sea water of 500 to 8000m³ per hour. The special coating on electrolytic electrodes reduces power consumption and extends the life of product.

In June last year, the United States began to enforce a law making the BWMS compulsory for all vessels entering and leaving the port of the United States to protect the nation's marine environment even before the IMO Convention designed to make it mandatory to install BWMS in ships took effect. As a result, all new vessels built from December, 2013, are required




HHI's HiBallast that obtained the U.S. AMS certification

to install the BWMS approved by the USCG, and the existing vessels are required to install the BWMS during the repair after January, 2014.

According to the Ministry of Maritime Affairs and Fisheries, the size of the market for the ship BWMS is expected to increase to approximately KRW 80 trillion by 2019, when approximately 68,000 vessels in the world will be compulsorily equipped with BWMS, from current KRW 1.2 trillion. The price per unit of BWMS is about KRW 200 million for small and medium-sized containership and KRW 3 billion for large oil tankers.

Previously, HHI faced constraints in win-

ning new orders from the shipping companies operating on the U.S. route when its BWMS was not approved by USCG. Now, this AMS certification is expected to drastically increase new orders for HiBallast. Additionally, HiBallast successfully completed the safety assessment of Norway-based DNV classification society, thus proving the safety of system installation and operation.

HHI is also producing the 'EcoBallast' that sterilizes sea water through ultraviolet rays, as well as the electrolysis-based HiBallast, and is on track to obtain the AMS certification for this EcoBallast in the first half of 2014. 

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Smart energy control system designed for shipbuilding and offshore sectors

Schneider Electric introduced the 'StruxureWare', an energy efficiency control solution to overcome current energy crisis, to the Korean market.

Schneider Electric Korea held the "Experience Efficiency 2013 Smart Green City" at the Beyond Museum, Cheongdam-dong for 2 days from August 20 to 21 and unveiled the latest trends and solutions related to energy control technology.

As there has been a heightened interest in energy efficiency and electrical power demand control amid the power shortage crisis that has gripped the country over the last few years, Schneider Electric proposed the 'Smart Green City' to overcome the energy crisis. Additionally, Schneider Electric introduced its 'StruxureWare' solution capable of efficient energy control even in high energy consumption sectors such as steel, plant, shipbuilding and offshore industries.

In this event, Schneider Electric proposed a variety of solutions designed to increase urban efficiency. Particularly, Schneider Electric highlighted high efficiency urban infrastructure beyond the connection of disparate systems through IT (Information Technology). Currently, Schneider Electric is carrying out more than 200 smart city projects around the globe and has successfully reduced energy consumption by up to 30%, cut water waste by 15%, and slashed transportation time by 20% as a result.

The StruxureWare of Schneider Electric

is the energy control solution enabling the integrated resource management throughout entire processes encompassing the collection of energy data such as consumption of electricity, water, gas, along with the comparison of the amount consumed among the sites, analysis/forecast of consumption, investment planning, etc. In particular, the Struxure Ware provides the report function tailored to meet the requirements of customers, allowing the mid-level managers and executives who supervise the energy control, as well as site manpower managers responsible for electricity, security,



Kim Kyung-rog, President of Schneider Electric Korea

StruxureWare

- Enterprise: Manage sustainability strategy.
 - *Better visibility = better decision making.*
- Operations: Analyze operational trends.
 - *Better visibility = efficiency improvements*
- Control: Control facility performance.
 - *Better visibility = fewer problems.*

etc., to easily monitor the situation.

According to the officials of Schneider Electric, a considerable number of users worldwide have already adopted the StruxureWare solution to manage more than 300,000 facilities, thus saving on the energy costs amounting to USD 30 billion and monitoring the carbon emissions of 39.60 million tons. Kim Kyung-rog, President of Schneider Electric Korea, said, "We will see a two-fold increase of demand for energy by 2050 worldwide, and have to reduce carbon dioxide emissions by half. So, efficient energy control requires smart solutions such as StruxureWare of which performance has been validated in many cases." 

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MOTIE laid out the roadmap for offshore plant industry

MOTIE unveiled the offshore plant industry technology roadmap in April that provides guidance to the systematic development of 100 strategic technologies vital for offshore plant industry.



The Ministry of Trade, Industry and Energy Republic of Korea(MOTIE) has mapped out a strategy to increase the new order intake in offshore plant sector to USD 80 billion by 2020 from USD 25.7 billion registered in 2011 and raise the localization rate to 50% by 2020 from 20% in 2011 while increasing the ratio of domestic engineering to 60% by 2020 from 40% in 2011. The offshore plant market is expected to be worth USD 320 billion by 2020, growing rapidly from USD 140 billion in 2010. Particularly, there has been a steady increase in new orders for offshore plants even amid the downturn in

the shipbuilding market.

The 100 strategic technology roadmap unveiled by MOTIE covers 4 major sectors such as drillship/drill rig, FPSO, LNG, FPSO · FSRU, Subsea · OSV, etc. The drilling sector involves 28 technologies, including the pipe handling system, etc., while FPSO sector involves 21 technologies such as the design of FPSO suited for Arctic operations. LNG FPSO · FSRU sector involves 26 technologies such as liquefied system and engineering, etc., and the subsea sector involves 26 technologies such as URF(Umbilical, Riser, Flowline) installation system.

The MOTIE plans to classify the 100 strategic technologies into short-term (within 3 years) category, mid-term (within 5 years) category, and long-term (over 5 years) category based on the difficulty of development, etc.

30 technologies, including the hoisting technology, were classified into short-term category, while 57 technologies such as the eco-friendly basic design and production technology for PSV(Platform Supply Vessel), etc., were classified into mid-term category. Meanwhile, 14 technologies such as IT-based topside integrated management system, etc., were classified into

	2010	2015	2020	2030
Offshore plant	1,452	2,303	3,275	5,039
Maritime platform	372	547	749	1,056
Subsea	450	793	1,165	1,898
Others	630	963	1,361	2,085

Table. Outlook of offshore plant market (Unit: USD 100 million)

long-term category.

An official from MOTIE said, "This technical roadmap will provide guidance to the development of 100 strategic technologies vital for bringing the offshore plant industry to the next advanced level and achieving the localization." This roadmap follows up on the offshore plant industry development strategy announced by the MOTIE last year and involved about 250 experts of industry-university.

The global market for offshore plants is expected to be worth USD 320 billion by 2020, growing rapidly from USD 140 billion in 2010. New orders placed at domestic shipyards stood at USD 21.8 billion last year, increasing sharply from USD 8.9 billion in 2010.

The MOTIE plans to proceed with systematic development of the 100 strategic technologies based on the technology roadmap to foster the offshore plant industry and spur localization.

Drillship & drill rig sector

The MOTIE is on track to build supportive system for systematic and robust technology development and press ahead with the development of integrated technologies for offshore drilling system in a bid to help build up competitiveness of drillship and drill rig sector. As a result, domestic offshore plant industry is expected to be better positioned to make inroads into the market more stably and grow at a more brisk pace.

The hull side of offshore drilling facilities and offshore drilling system have different markets. Currently, the technology roadmap focuses on the development of offshore drilling system, not the hull side which is the forte of domestic shipbuilding industry.

Under the roadmap, the offshore drilling system was divided into the engineering and equipment technology. The engineering technology plays an essential part in the supply and delivery of overall system. Without securing the technology, it is difficult to enter the market even if the equipment-related technology is successfully localized. In addition, the equipment technology sector is associated with 10 sectors of offshore drilling system which have a tremendous impact on domestic job creation and production, and involves about 26 technologies. The followings are the major strategic technologies in the drillship and drill rig sector.

- *Drilling Integration System*
- *Derrick & Hoisting System*
- *Motion compensating system*
- *Drilling control System*
- *Rotating system*
- *Mud system*
- *Pipe handling equipment and systems*
- *Material and equipment handling system*
- *Well control system*
- *Dynamic positioning system & Jacking system*

FPSO sector

To secure the national competitiveness in FPSO, current localization ratio of essential equipment needs to be raised to over 50% from current 20%. To that end, equipment manufacturers are required to have an increased interest in technology development in tandem with investment. Along with the governmental support at the economic and policy levels, domestic shipbuilding heavyweights that construct the FPSO need a paradigm shift and vigorous investment in technology.

Currently, domestic FEED engineering is at the inchoate stage and domestic companies still have long way to go to catch up with global engineering companies in relation to the core engineering technology that includes the top-side process. Domestic companies need to be actively involved in the engineering in the course of EPCI project to accumulate the experience and expand the engineering capability. Additionally, domestic companies have to secure new value-added and sharpen their competitiveness through the convergence with the nation's world-leading IT technology. The followings are the major strategic technologies in the FPSO sector.

- *FPSO engineering package*
- *Main processing system*
- *Engineering package for the risk assessment of FPSO*
- *IT-based FPSO integrated operation and information management system*

FLNG sector

To beat the competition from the China trailing closely and achieve the unmatched competitiveness in global



LNG FPSO & FSRU market, domestic companies need to expand their overall technology and design capabilities for the facilities operating at ultra low temperatures.

LNG FPSO & FSRU is a high-priced facility with the price per unit amounting to USD 300 million to over 2 billion. Domestic shipyards have carved out the largest share in global market for LNG FPSO & FSRU and are strong players in this high value-added sector. However, domestic shipyards have inadequate design capability and do not enjoy high value creation due to the absence of indigenous core equipment operating at extremely low temperatures.

Particularly, domestic shipyards urgently need to secure core technology for gas preprocessing and gas liquefaction, the essential technology of LNG FPSO, which takes the marine environment into consideration, and develop the essential cryogenic equipments. Moreover, domestic shipyards need to secure basic design capability and manufacturing technology for the facility used to measure and transfer the off-

shore oil, large-capacity regasification heat exchanger, cryogenic high-pressure pump, the essential technologies of LNG FSRU. The followings are the major strategic technologies in the FLNG sector.

- *Hull/mooring system*
- *Gas preprocessing and liquefaction system*
- *Cargo containment system & cargo handling system*
- *Operation and maintenance/repair system*
- *LNG regasification system*

Subsea & OSV sectors

By developing the subsea equipments and securing the installation technology, domestic shipyards need to advance into the deepwater sector where little domestic industrial foundation has been laid thus far. Domestic shipyards can lay the foundation for dominating the offshore market in the period ahead by pressing ahead with the government-funded industry-university joint research, although there is

few domestic technology and product that has been launched in the subsea equipment sector.

The production, processing and SURF (Subsea Umbilical, Riser, Flowline) equipments and the engineering technology are important for the production of oil and gas in the subsea sector. Particularly, the subsea production system is the key equipment directly related to the production of oil and gas and incorporates the design technology for manifold. The subsea processing system aims to increase the production volume and recovery rate and is expected to have an expanding market. The followings are the major strategic technologies in the subsea & OSV sectors.

- . *Subsea high precision Manifold*
- . *Subsea URF*
- . *Subsea Separator*
- . *Subsea Multiphase Pump*
- . *Sea Water Injection*
- . *Subsea installation*
- . *Common core technology related to OSV and eco-friendly propulsion system* 

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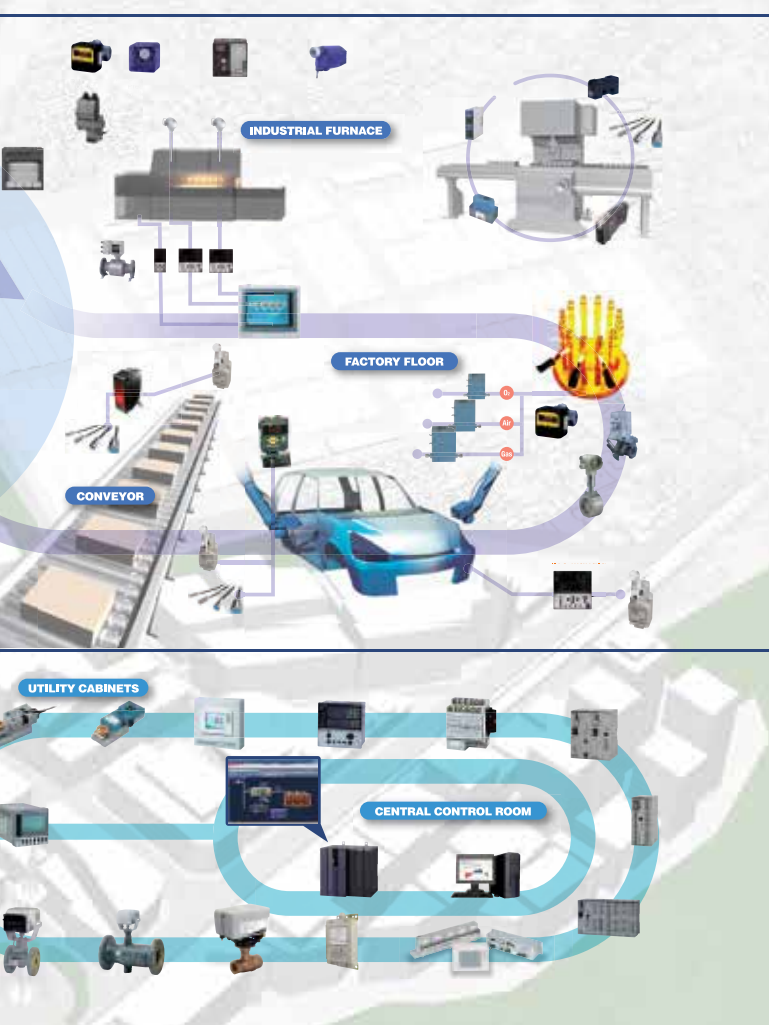


Solutions for Safe Operation 'Energy Saving & Environmental Protection'

-Brand New azbil Bon Voyage!

Since the establishment in 1906, Yamatake has continued to evolve with changing environments, providing high-quality products and solutions. On April 1st, 2012 Yamatake Corporation changed its company name to Azbil Corporation on the occasion of Yamatake's 105th anniversary. The azbil Group strives to realize safety, comfort and fulfillment in people's lives and contribute to global environment preservation through "human-centered automation."

Azbil Korea Advanced Automation division



Azbil is expanding the scope of its business activities, centered on the three core businesses of Building Automation, Advanced Automation, and Life Automation. Azbil develops and manufactures an extensive range of automation products, from automation field devices to control management systems, to solve issues and provide comfort to earth and human at a variety of production sites.

The issues faced by customers in meeting the challenges of an ever-changing business environment become increasingly more complex, with demands for safer ship operation, less energy use, and less environmental impact. Even though the circumstances are difficult, the azbil Group provides comprehensive and immediate solutions for maritime industries based on its advanced measurement and control technologies. Guided by human-centered concept, Azbil creates

value with customers on their site by providing services ranging from consulting to after-delivery maintenance.

• **Experience**

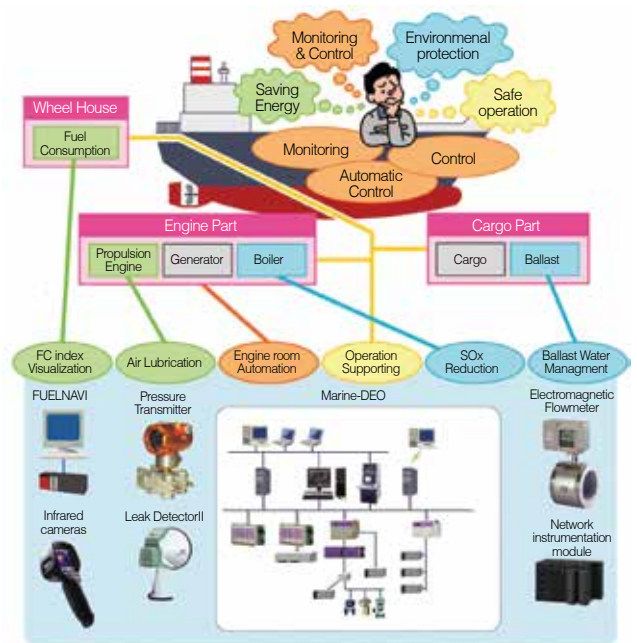
Azbil draw upon its long and varied business experiences with sophisticated ships like liquefied natural gas (LNG) carriers, as well as experience in other industries, to provide optimum solutions.

• **Breadth**

Azbil's comprehensive capabilities, expanding from consulting to engineering to maintenance service, allow the company to offer forward-looking supports to customers.

• **Understanding**

Understanding the changing business environments from customers' point of view is the basic for Azbil's solutions. Azbil works on-site with customers to solve issues and create value offering large selection of devices approved by ship classification societies, from monitoring & control system to field instruments.

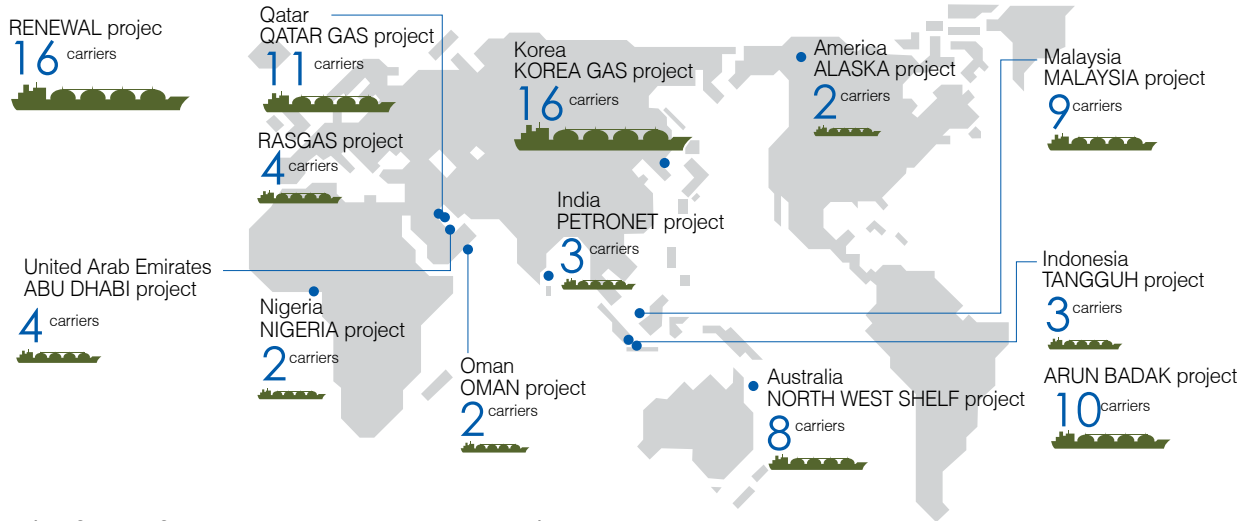


Global no. 1 Market-share manufacturer

Azbil is the top market-share manufacturer of monitoring & control systems. LNG carriers specialize in a freight that is



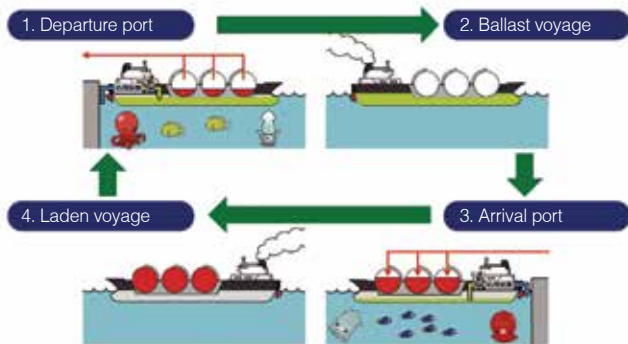
* for LNG carriers only (based on Azbil's survey)



Job reference for LNG carriers Monitoring & Control systems

cooled to -162°C. Since the boiling point of LNG is extremely low, at -162°C, highly advanced technology is required on such carriers. Thus far, the azbil Group has provided monitoring & control system, as well as field instruments, control valves, etc. for more than 100 LNG carriers. Azbil looks forward to making continued contribution to customers' business by supplying quality products and services based on its advanced technologies and a lot of experience.

force and it will be obligatory to install Ballast Water Management System (BWMS) in ship. In connection with this worldwide trend, Azbil wants to introduce some of azbil products for BWMS as effective marine solutions.



Outline of Ballast Water Management System

Environmental Protection Products for BWMS

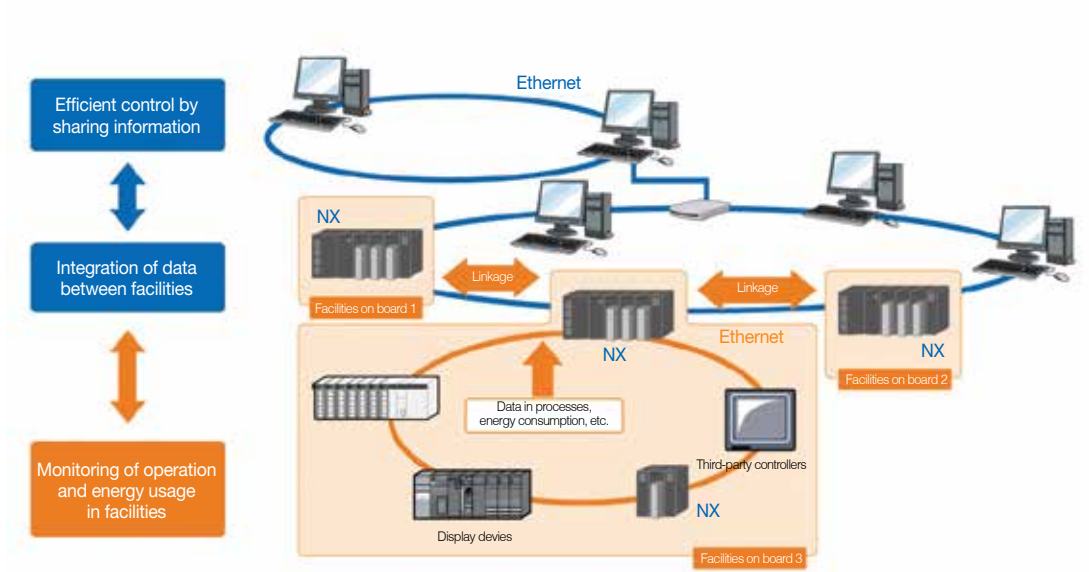
Soon the international convention for the control and management of ships' ballast water and sediments will enter into



Monitoring & Control Systems

• Less piping cost and less space

When installing BWMS devices, customers often face issues such as shortage of installation space. However, MagneW 3000 PLUS+ electromagnetic flowmeter, which is used for managing flow rate in BWMS, needs only short length of straight upstream pipe (=3D) for installation and it makes



customers to install flowmeters in an even narrow space, than ever before. MagneW is the first flowmeter approved by NK ship classification and it contributes to protection of marine environment and ecosystems. Azbil also supplies corrosion-resistant specification product lineup with high durability under marine environment.




Electromagnetic Flowmeter, MagneW 3000 PLUS⁺

• **Better Networks for Better Results**

Network Instrumentation Module NX (new controller, NK approved) helps to simplify wiring work of BWMS facilities and save cost. Ethernet interface is built in each module as standard, allowing high-speed communication with a variety of devices. Full-scale distributed deployment is achieved

through distribution of functions, saving space and reducing wiring of BWMS facilities. Batch management of multiple devices through Ethernet communication improves engineering efficiency. As a result of that, coordinative control between the modules makes BWMS's operation more smoothly.

Besides the products above mentioned, Azbil has a broad range of product line-up to meet customers' needs in the marine industry. Azbil is having an exhibition, Kormarine 2013 in October to communicate with customers. For more information about azbil and Azbil's solutions, visit Azbil's booth and then Azbil will provide the optimal solutions. The azbil Group, a major of manufacturer of measurement and control systems on shore, will provide strong support in furtherance of customers' environmental protection. 

* MagneW 3000 PLUS⁺, NX and other product name are registered trademarks of Azbil Corporation.

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The Wärtsilä Compact Silencer System

The Wärtsilä Compact Silencer System (CSS) is designed to replace conventional single unit engine silencers on board ships and offshore structures. With its light weight and slender design, it offers a minimal 'footprint' while optimizing the entire exhaust system for low noise and reduced back pressure.

Wärtsilä Corporation

Mranal Gupta, Noise Expert, Noise & Vibration Engineering

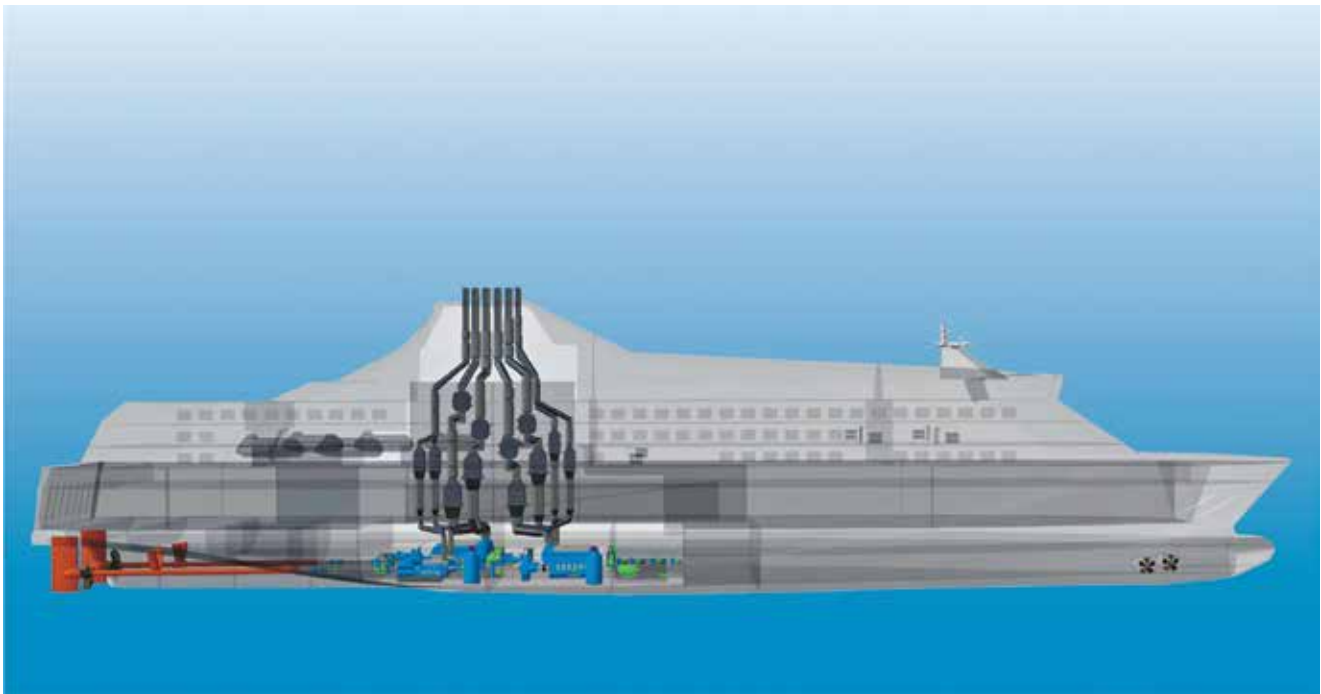


Figure 1. System Integration with Wärtsilä CSS.

With many of the latest technical advancements being targeted towards environmental and comfort related issues, the abatement of noise pollution is garnering increasing awareness. The Wärtsilä Compact Silencer System is a patented technology that enables the design of a complete exhaust system, with attention to detail and the desired noise level onboard as initial inputs.

It is well understood that low noise levels are directly related to well-being and comfort. This is of great importance for ship owners and yards, who set extremely strict noise limits on newbuildings. Agreeing on an accept-

able comfort level is however rather challenging. The design philosophy of the Wärtsilä CSS is to set the desired noise level at the initial stage, however, and this eases the task.

What is CSS?

The slender design of the Wärtsilä CSS features multiple elements along the exhaust pipe, from the engine room to the exhaust outlet. The inten-

tion with Wärtsilä CSS is not to replace one conventional silencer elements, but to effectively design the complete exhaust system. The acoustical properties of the system can be optimized according to the desired sound level requirements on bridge deck, in harbour, etc. The Wärtsilä CSS elements are utilized in the best way so that space and material needed for the exhaust system can be minimized.

The design principle puts the emphasis on the desired noise level on board, rather than the conventional way of subtracting the transmission loss of a standard silencer from the exhaust noise spectrum of an engine, as illustrated in Figure 2. The Wärtsilä CSS building blocks are its elements, which are individual silencers. The Wärtsilä CSS takes into consideration the auxiliary emission control equipment (such as the Selective Catalytic Reducer (SCR), scrubbers, boiler, etc.), and the pipes and other fittings in the exhaust gas line. The Wärtsilä CSS elements are then optimally distributed. To achieve better system integration, it is desirable to be involved from the initial design stages for newbuildings, as an optimized layout with all the necessary equipment can then be proposed.

Another design philosophy of the Wärtsilä CSS is to utilise the available exhaust pipe length for silencing purposes while maintaining minimal pressure losses. This means that all the elements are designed straight through for minimum flow resistance and back pressure, thus resulting in less self-induced noise. The three standard Wärtsilä CSS elements represented in Figure 3, are:

- Reactive element - Quarter-wave resonator, for attenuation of lower frequencies
- Resistive element - Absorptive silencer, for attenuation of higher frequencies
- Composite element – Combination of both reactive and resistive elements

In addition, special elements are also possible and have been designed when deemed neces-

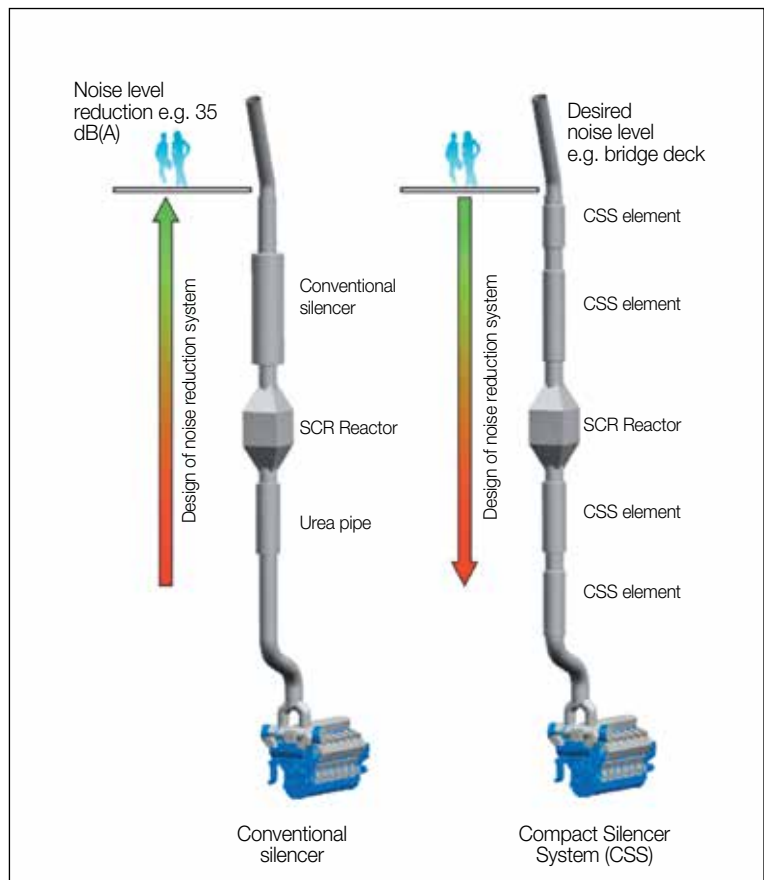


Figure 2. The Wärtsilä CSS design principle illustration.

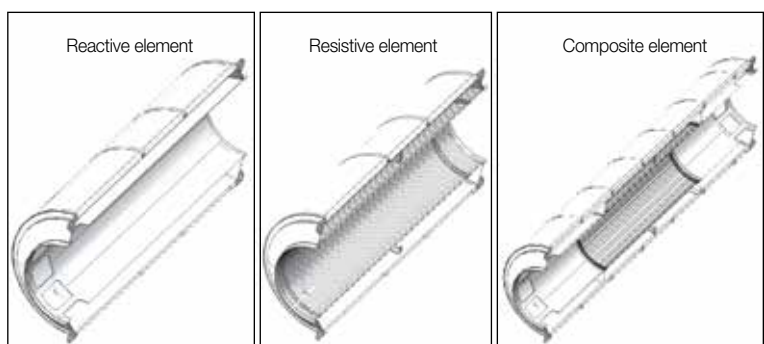


Figure 3. The Wärtsilä CSS element representations.

sary. Continuous development is ongoing to best meet customer requirements.

Theory

The main defining parameters for Wärtsilä CSS are the sound source (IC engine), the exhaust gas mass flow, exhaust gas temperature, exhaust

pipe diameter, the location of the receiver/measurement device. In addition, the ambient conditions and flow velocity are also taken into consideration. For example, a flow velocity of more than 35 m/s might render a reactive element ineffective.

Conventional silencers usually have both absorptive and reactive chambers, but the reactive chamber can generally only be effective at one frequency. With the Wärtsilä CSS, this limitation is overcome by tuning its elements to match the requirements.

The Wärtsilä CSS elements are slender with a standard outer diameter of approximately 1.4 times the pipe diameter (without insulation). This facilitates locating them anywhere, from the engine room to the exhaust outlet chimney, and since they come pre-insulated (Figure 5), these elements are easy to install. Individual transfer matrices of the Wärtsilä CSS elements, and other equipment in the exhaust system, are connected to each other in a cascade. The resulting system is used to calculate the estimated sound pressure level at the desired location, using a 4-pole method.

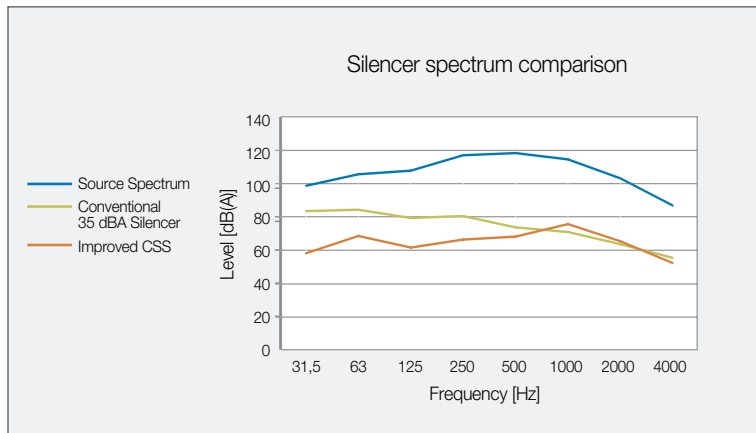


Figure 4. An illustrative comparison of possible noise spectra.

The noise generated by a reciprocating engine encompasses the entire frequency spectrum. As the power output demand increases, the exhaust noise becomes louder, particularly in the low frequency region. The firing frequency of the medium-speed engines is within the low frequency range, and typically dominates the noise spectra. Noise from the combustion and turbocharger is generally in the high frequency area, where conventional silencers are usually effective. Low frequency noise can be somewhat annoying for some individuals. There have been complaints from residents close to harbours regarding disturbance caused by low frequency noise.

Furthermore, it may even excite buildings and other structures and create secondary noise sources, such as rattling windows. In general, low frequency waves travel further than high frequency waves because there is

less energy transferred to the medium. The insulating efficiency of materials usually increases with frequency.

Thus, low frequency noise demands more attention. The reactive and composite elements of the Wärtsilä CSS are optimally designed for the attenuation of lower frequencies. A single reactive element (quarter-wave resonator) is effective at one frequency and its odd harmonics. The resistive element is designed for the optimal attenuation of higher frequencies. To maximize comfort the noise levels have to be brought down to acceptable levels, as shown in Figure 4, using a smart combination of Wärtsilä CSS elements.



Figure 5. A pre-insulated Wärtsilä CSS element.

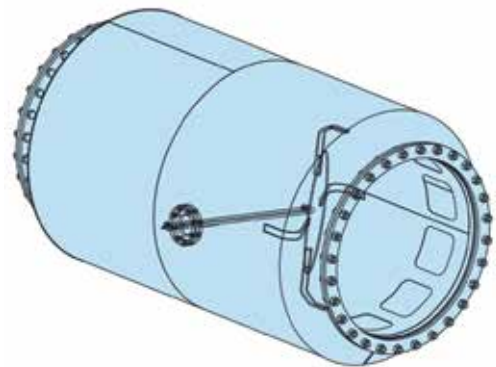


Figure 6. A mixing duct element.

Wärtsilä CSS – the advantages

With years of experience in engine manufacturing Wärtsilä is well aware of engine exhaust noise. Wärtsilä CSS is an exhaust noise silencing system designed to enhance engine perfor-

mance, where the source spectrum is one of the major pre-requisites.

With the Wärtsilä CSS it is possible to target and focus on the characteristic frequencies of the engines, the most important of which is the firing frequency. The Wärtsilä CSS is recommended not only for effective noise suppression, but because it is also good for engine life and performance. Its' biggest advantage, however, is the low back pressure, and the importance of this feature is emphasized with the increasing demand for exhaust after-treatment systems that typically feature high back pressure. The slender design and its minimal 'footprint' offer flexibility in distributing the elements within the exhaust system, as shown in Figure 7.

Application of the Wärtsilä engines, but can be offered also for other engine makes provided that sufficient data is available. The system is modular and elements can be added as needed to attenuate noise. In addition, the element modules can be made in such a way that a few elements are combined into one module for space saving and easy installation at the yard.

Wärtsilä CSS elements come pre-insulated, which further facilitates installation. The modules can also be made in conjunction with other equipment such as SCR, scrubbers, etc. A mixing duct element has already been developed, as shown in Figure 6, which works not only as a urea injection and mixing pipe, but also as a Wärtsilä CSS reactive element targeting the engine firing frequency. This saves space and also reduces pulsations transmitted to the SCR, which again is beneficial for the functionality and life. The Wärtsilä CSS is very flexible and can be adapted to various requirements.

When lower noise levels are desired, the addition of more conventional silencers will result in a significantly higher pressure drop, while their influence on lower frequencies and overall noise levels is insignificant. This higher pressure drop, however, increases the thermal load on the engine and this could even damage it. A higher back pressure will also lead to higher

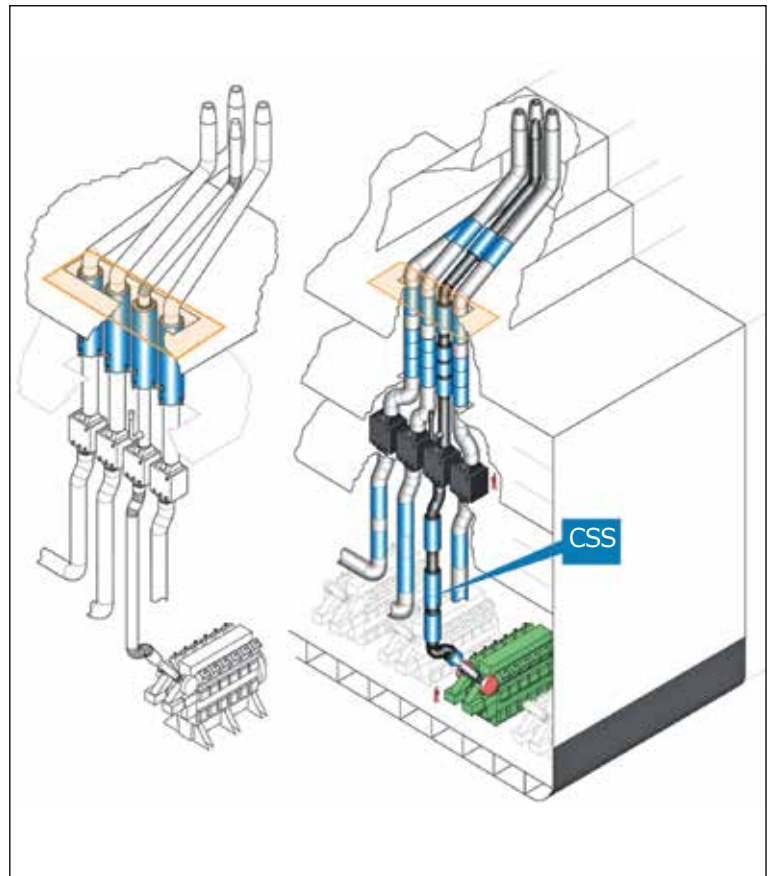


Figure 7. A conventional system vs. compact silencer system.

fuel consumption, since the engine will have to consume more fuel to “push” the exhaust gases through the exhaust gas pipe. After-treatment of the exhaust gas is an added challenge to reducing the noise. When this kind of equipment is added, the back pressure increases. This means that a conventional silencer with a less back pressure is needed, which usually results in lower noise reduction.

The design philosophy of the Wärtsilä CSS accommodates all such scenarios. The number and location of elements in the exhaust gas system is defined by taking into account all equipment. After treatment systems such as SCR, scrubber and boiler attenuate noise only in a certain spectrum of the frequency. With a conventional silencer system, the design of the noise reduction system usually starts from the engine. With the Wärtsilä CSS, the design is reversed, meaning that the noise level acceptability at a certain distance from the ship's exhaust gas pipe outlet is used to dimension the types and number of elements to be used. Therefore, it is possible to better predict the expected noise levels already in the design phase. This leads to better system integration and fewer surprises.

Engine	Feature	Conventional	CSS	Change
12V46	Footprint	3.80 m ²	2.14 m ²	- 44%
16V46		4.91 m ²	2.95 m ²	- 40%
12V46	Length (silencer)	9.0 m	14.6 m	+ 62%
16V46		10.2 m	18.8 m	+ 85%
12V46	Weight	6,895 kg	4,511 kg	- 35%
16V46		9,820 kg	6,155 kg	- 37%
12V46	Pressure drop	898 Pa	175 Pa	- 81%
16V46		700 Pa	221 Pa	- 69%

Figure 8. The Wärtsilä CSS influence; a cruise vessel study with 12- and 16-cylinder engines.

Wärtsilä CSS – a case study

On a cruise vessel with Wärtsilä 46 engines, a study was made to check the influence of replacing conventional silencers with a Wärtsilä CSS having a comparable overall noise reduction (the findings are presented in Figure 8).

References

The Wärtsilä CSS is an innovative concept for silencing the exhaust noise from reciprocating internal combustion engines. The system was first used successfully by Fincantieri and has since been used on a number of vessels. It has become a standard for Grand class vessels built at Fincantieri.

Wärtsilä has successfully implemented Wärtsilä CSS on cruise vessels, ferry and tug projects. Wärtsilä has also retrofitted a number of vessels of different types with Wärtsilä CSS elements to improve their noise characteristics. The Wärtsilä CSS has been offered for other newbuilding projects, and there is increasing demand to enable the use of other emission control systems without exceeding the allowable back pressure limit or de-rating the engine.

Conclusion

The Wärtsilä CSS is highly recommended for projects with low noise limits. It is also recommended where the noise level requirements may not be that stringent, but there is a need to enhance engine performance and limit the back pressure. Significant savings with lower fuel consumption can be expected when using the Wärtsilä CSS. There are also ongoing developments aimed at meeting other customer priorities. Ongoing developments are aimed to delight customers.


The Wärtsilä CSS offers an excellent alternative for retrofits and re-engineering projects where its slender elements can be designed to minimize alterations to the ship's structure.

The Wärtsilä CSS is not only silencers, but rather a complete exhaust system that provides benefits for the ship builder, the owner, and the environment.

Benefits:

- Low weight and centre of gravity – reduced overall weight.
- Space saving - more slender than conventional solutions; reduced footprint.
- Easy installation - pre-insulated.
- Reduced noise level - acoustically more robust by smart use of Wärtsilä CSS elements.
- Better predictability of Performance - reduced risk of exceeding noise level guarantees; system integration.
- Enables use of exhaust gas treatment systems - without compromising engine performance.
- Lower operational expenses - reduced fuel consumption due to lower back pressure.
- Better comfort - low noise levels onboard and in harbour; encompasses entire frequency spectra.
- Environment friendly

Since this was for an existing vessel, the Wärtsilä CSS elements were placed such that there were minimal changes in the layout, as depicted in Figure 9.

With a significant lower back pressure, assuming 5000 running hours at 75% load, a 58 ton/year reduction in fuel consumption was estimated. This resulted in a payback time of 3-5 years. 

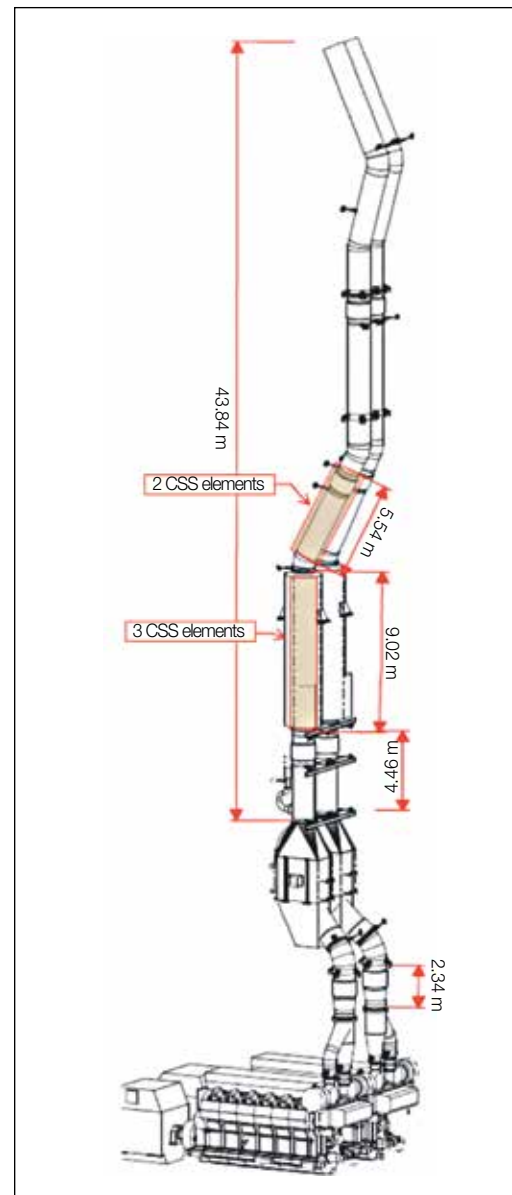


Figure 9. Layout change representation; cruise vessel case study.



CLEAN POWER AND GREATER SPEED CONTROL ONBOARD RO-PAX VESSELS

Ro-Pax passenger vessels typically sail short distances from port to port, allowing cars and passengers to easily access islands and neighbouring land. Meanwhile, operating profiles for the vessels are constantly changing, which sets challenges for energy efficiency and optimized fuel consumption.

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diesel engine to operate at the optimal speed. This reduces fuel consumption and minimizes exhaust emissions.

In addition, when a ship is berthed, VACON NXP Grid Converter technology can be used to connect to a shore supply. Getting the power required to run the ship from the local grid removes the necessity for uneconomical auxiliary generators, thus reducing noise, vibration levels, and eliminates the use of fuel when in the port.

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Advancements in Storage Tank Safety

New overfill prevention system helps increase safety and reduce engineering and maintenance costs for chemical, oil and gas tanks.

Rockwell Automation

The massive storage tanks used for fine chemicals, oil and gas applications are vital and complex, with potential to leak, explode and cause damage if not monitored and managed properly. Storage tanks serve as large containers for powerful and volatile fluids. A faulty fuel gauge can fail to alert operators at an oil storage depot that a fuel storage tank is being filled to a dangerously high level.

Overfill prevention systems regulate storage-tank fluid levels.

In such an instance, large quantities of petrol eventually will overflow from the tank, causing a vapor cloud to form and ignite, followed by a series of massive explosions and a fire that can last days. In response to several global incidents, systematic overhauls to overfill prevention systems have taken place, and industry best practices for managing storage tanks now combine the previously followed API 2350 prescriptive standards and the IEC 61511 functional standards.

In addition, tank farms continue to face typical industry pressures, such as maximizing productivity, lowering maintenance costs and developing an engaged and empowered workforce. These challenges are compounded by stagnant operating expense budgets, knowledge gaps, and increasingly stringent return on investment requirements.

To help overcome these challenges, Rockwell Automation and its Strategic Alliance Partner Endress+Hauser have collaborated to develop



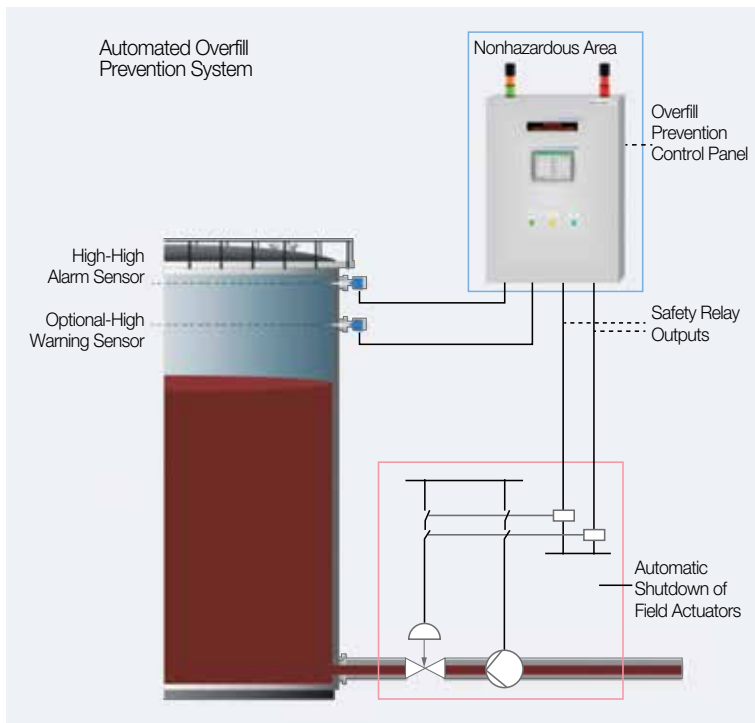
A new, integrated overfill protection system provides compliance to API 2350, IEC 61511 and German WHG safety regulations, leveraging an open control and information system from Rockwell Automation and process instrumentation from Endress+Hauser. The two companies focus on tools for integration, plant-wide advanced diagnostics and overall process system management.

overfill prevention systems with independent safety certification that cut engineering and commissioning time, reduce maintenance, and increase safety integrity and reliability.

Overfill Prevention System Application

Overfill prevention systems regulate storage-tank fluid levels to avoid spillover and dangerously high pressure levels that can damage tanks and cause explosions. Custom-built approaches to overfill prevention are costly because they take longer to implement and are more complicated to maintain.

Further, the risk of fault at the interface between the different supplier's parts



By leveraging the open control platform of the Rockwell Automation Integrated Architecture and process instrumentation from Endress+Hauser, this overfill prevention system provides an integrated solution that addresses the entire safety loop, from measuring and controlling to correcting elements.

typically is higher. A prepackaged system, on the other hand, is based on repeatable designs that have been tested and documented. This standard approach helps reduce project costs and lower implementation risk.

A Preconfigured Overfill Solution

Endress+Hauser developed its preconfigured overfill prevention system with access to the Rockwell Automation system and safety competence. By leveraging the open control platform of the Rockwell Automation Integrated Architecture™ and process instrumentation from Endress+Hauser, this overfill prevention system provides an integrated solution that addresses the entire safety loop, from measuring and controlling to correcting elements.

As a solution package, the overfill prevention system drastically reduces commissioning time and maintenance expenses. Tanks remain in service during installation, as Endress+Hauser devices are pre-integrated and only require onsite parameterizing. Also, Rockwell Automation offers 24/7 on-site and remote support services.

The overfill prevention system incorporates an integrated safety solution using the Allen-Bradley Compact GuardLogix® safety controllers from Rockwell Automation (www.rockwellautomation.com/go/tjguardlogix).

They're scalable for one to 16 tanks per system, provide network communication via Ether-Net/IP™, and seamlessly integrate with the Rockwell Automation PlantPAx™ process automation system (www.rockwellautomation.com/go/prps).


SCADA capabilities via the HMI can be programmed so the measurement device shuts down valves and pumps.

Advanced Sensors and Supervisory Control

Endress+Hauser Liquiphant Failsafe point level switch provides accurate fluid-level measurement for overfill prevention independent of other gauging systems installed on the tank. Supervisory control and data acquisition (SCADA) capabilities provided through the Allen-Bradley PanelView™ human-machine interface (HMI) can be programmed so the measurement device directly shuts down system valves and pumps or directs fluid movements to prevent overfill.

These point level switches provide easy integration via the switching unit with a two-channel output (safety contacts) and locking function or direct integration into a safety programmable logic controller (PLC) and permanent self-monitoring/internal redundancy. Simplified slave device testing is available at the press of a button.

Industry-Leading Safety Protocol

The overfill prevention system is compliant with industry best practices and can be independently safety certified. It's designed to improve the functional operations of the plant while simultaneously helping increase safety, efficiency and productivity. 

For more information

Rockwell Automation and Endress+Hauser Alliance, www.rockwellautomation.com/go/p-eh

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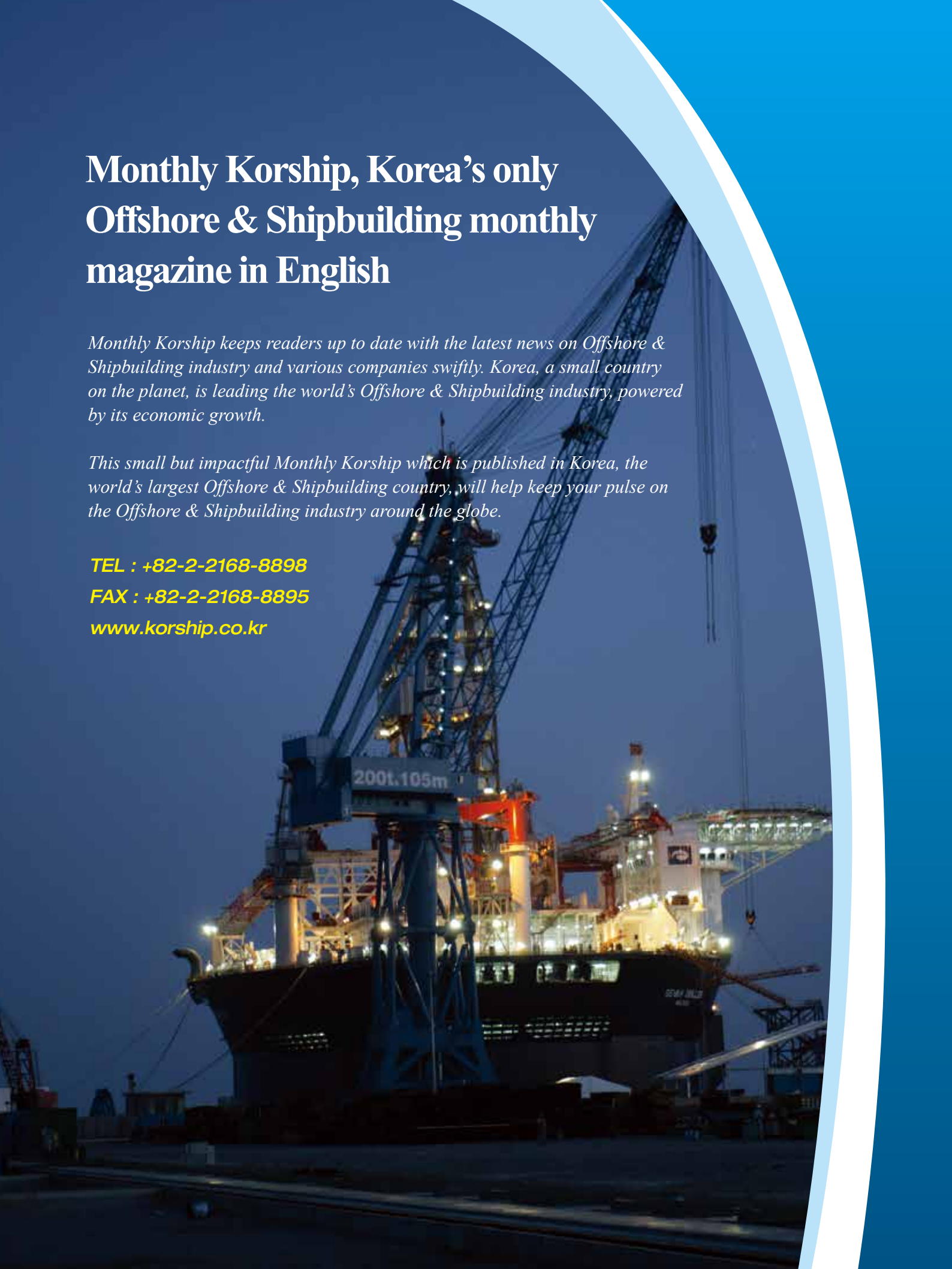
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FLIR M-Series helps to avoid collisions and to ensure passenger safety at the Lisbon ferries

- Thermal imaging: the perfect tool for nighttime navigation and search and rescue situations

The Portuguese capital Lisbon lies next to one of the busiest rivers of Europe: the Tagus. The Lisbon ferry service has the task to bring all of the commuters and tourists safely across the river. Hundreds of people use the Lisbon ferry service every day, both tourists and commuters alike. But on a busy river like this accidents can happen all too easily.

Several ferries are travelling up and down the river all day. But it's not just ferries crossing the river: ships of all sizes and shapes traverse the Tagus. And when darkness or smoke impedes vision this can lead to dangerous situations. To avoid collisions, the new Lisbon ferries have been enhanced with FLIR M-Series thermal imaging cameras.

FLIR Systems Korea

One of the new ferries that have been equipped with a FLIR M-Series thermal imaging camera is the Lisbonense. The ship's captain, Rui Sousa, is very glad with all of the new equipment installed on his ship. "We have everything we need: chart plotter, radar, anemometer, speedometer, there are sensors everywhere making this one of the safest ships on the Tagus."

A key component in the ship's safety is the FLIR M-Series thermal imaging camera. Unlike visual light cameras a thermal imaging camera relies on thermal contrast instead of visual contrast. This allows the FLIR

M-series thermal imaging camera to produce a crisp clear image regardless of lighting conditions. The FLIR M-Series can also see through smoke. The FLIR M-Series thermal imaging camera provides crisp thermal images even if the smoke is so thick that normal eyesight is rendered completely useless.



The FLIR M-Series thermal imaging camera is mounted on a pole for a better situational awareness and a better range performance.



The FLIR M-Series thermal imaging camera enables the captain of the Lisbonense to avoid collisions even if light fog, smoke or darkness impedes vision.

Avoiding collisions

According to Sousa the top of the line equipment aboard the Lisbonense makes his ship about as safe as it can be. "If this ship will ever be involved in a collision it has to be due to some kind of human error, for this ship has contains some really good equipment to help us prevent such an accident."

The Lisbonense is a 47.5 meters long and 16 meters wide steel catamaran that was built by the Portugese ship manufacturer Navalria Shipyards. The two diesel engines provide 850 horsepower each, propelling the ferry to a maximum speed of 13 knots. It can carry 360 passengers and 30 vehicles and has a gross tonnage of 1479 tons.

High vantage point for better situational awareness

The FLIR M-Series thermal imaging camera has been mounted on top of a pole to provide a better overview and enable a better range performance, for the higher the camera is located the better it can enhance the captain's situational awareness. The control unit is seamlessly incorporated in the ship's bridge and a dedicated TFT screen constantly shows the M-Series' thermal imaging footage.

FLIR Systems appreciates the professional and technical capabilities of the FLIR products distributor Observit demonstrated throughout this project. Observit provides complete video processing solutions and covers all of the project aspects from solution design, to installation and training through to sales assistance and service.

The FLIR M626L installed on the Lisbonense includes an uncooled microbolometer thermal imaging detector that produces thermal footage with a resolution of 640 x 480 pixels and a visual lowlight camera to provide the best possible vision in all conditions, presenting the ship's captain with the best possible situational awareness. This enables the captain to avoid collisions even if light fog, smoke or darkness impedes vision.

Man overboard!

But the M-Series is more than just an aid to avoid collision with other vessels. There have been several cases in the past where a passenger for some reason ended up in the water, especially in the summer during the nighttime ferry services, when alcohol consumption can sometimes lead to reckless behavior among the passengers. The strong currents in the Tagus make this a very dangerous situation, especially when the dark conditions make it difficult to spot the person that has fallen overboard. These situations have in past sometimes even had fatal results.

The FLIR M-Series is an invaluable tool in such nighttime man overboard situations. The high quality thermal imaging camera needs no light whatsoever to produce crisp clear images even in the darkest of nights. Since it relies on thermal contrast instead of color contrast a person that has fallen overboard stands out clearly in the thermal image, for the cold water and the warm person provide a very strong thermal contrast.




Rui Sousa, captain of the Lisbonense, on the bridge of his ship. A dedicated TFT monitor constantly displays the FLIR M-Series' thermal imaging footage.

'I'm glad we have the M-Series'

"Luckily such a situation has not yet occurred since the FLIR M-Series thermal imaging camera has been installed, so I have not been forced to use it for that purpose yet", said Sousa. "I hope that it stays that way, that we never have to use the FLIR M-Series thermal imaging camera for that purpose, but if we do have a man overboard situation I am sure that I will be very glad that we have it."



The FLIR M-Series thermal imaging camera's control unit is seamlessly incorporated in the bridge.

The top of the line equipment installed in the Lisbonense helps to prevent accidents and to ensure passenger safety. Every day the captain of the Lisbonense brings hundreds of people safely across the Tagus, secure in the knowledge that when needed, the FLIR M-Series thermal imaging camera is there to help him save the lives of his passengers. 



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DSME won an order for the combat ship, the largest in the history of the Navy of Thailand

Daewoo Shipbuilding & Marine Engineering (DSME) announced on August 8 that it signed a contract to build 1 frigate for the Navy of Thailand after it won a competitive bid that was participated by 13 global warship companies. The contract is valued at USD 470 million, which is the largest single defense contract in the history of the Navy of Thailand. This contract comes only one month after DSME won an order for the warship which is the largest in Norwegian Navy.

The frigate is the combat ship capable of both attack and defense. This frigate to be built by DSME measures approximately 122.5m in length, 14.4m in width with a full load displacement of about 3,650 tons. It will be built at Okpo shipyard in Geoje and is scheduled for delivery to the Navy of Thailand by August 2018. After delivery, it will be deployed in readiness for combat.

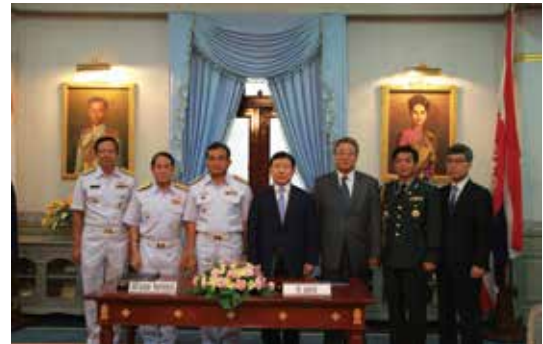
Currently, Thailand is upgrading the quality of warships and pushing ahead with modernization of its combat warship fleets to cope with the maritime conflict and arms race in the South East Asia which have been escalating over marine resources. Therefore, Thailand joined hands with DSME that has the track records in successfully exporting the submarines to Indonesia and proposed the latest frigate model of the same kind, and plans to use this contract as springboard for the modernization of Thailand's Navy.

DSME successfully exported the cutting-edge combat ships after inking the contracts for submarines and combat support ships, thus successfully diversifying its warship types for the export. Particularly, DSME is expected to be better positioned in winning new deals as it clinched the order for the construction of the first warship in the modernization project which the Navy of Thailand pushes forward to replace the aged warships.

Goh Jae-ho, President of DSME, said, "We are witnessing gradual expansion of the defense market in East Asia amid the fierce competition to protect marine sovereignty. It will create an opportunity for us to diversify the warship types and export channels in the defense sector which has emerged as the next-generation growth engine by fully leveraging our world-leading shipbuilding technology that fulfills the requirements of ship owners such as the delivery, price, performance and others." He added, "I express my profound appreciation to Korean government and related organizations that have provided support for us to make foray into foreign defense markets."

대우조선해양, 태국 해군 사상 최대 규모 전투함 수주

대우조선해양은 전세계 13개 함정 전문 업체가 참여한 태국 해군의 호위함(프리트)



Commemorative photographing with the Navy of Thailand after the contract-signing ceremony for the warship

1척에 대한 수주 계약을 체결했다고 지난 8월 8일 밝혔다. 수주금액은 4억 7000만 달러로 태국 해군 역사상 최대 규모의 국방 계약이다. 노르웨이 해군 사상 최대 규모의 함정을 수주한지 불과 한 달여 만에 거둔 성과다.

호위함은 공격과 방어가 가능한 수상 전투함의 일종으로, 이번에 수주한 함정은 길이 약 122.5m, 폭 약 14.4m, 만재배수량 약 3,650 톤 규모다. 앞으로 거제 옥포조선소에서 건조되어 2018년 8월까지 태국 해군 측에 인도 및 실전 배치될 예정이다.

현재 태국은 해양자원 확보 과정에서 점차 심화되고 있는 동남아시아 지역 해상 분쟁과 군비 경쟁에 대비하기 위해 군함의 품질 향상과 현대화 사업을 진행하고 있다. 때문에 인도네시아에 잠수함을 수출한 경험이 있고, 동급 대비 최신 호위함 선형을 제시한 대우조선해양과 손을 잡음으로써 이번 계약을 태국 해군 현대화 사업의 기점으로 삼는다는 계획이다.

대우조선해양 역시 잠수함과 군수지원함에 이어 최첨단 전투함 수출까지 이뤄내면서 수출 함종 다각화에 성공했다. 특히 태국 해군이 추진 중인 기존 노후 함정 대체를 위한 현대화 프로젝트 1번함을 수주함으로써, 향후 추가 수주전에서도 유리한 고지를 선점할 수 있을 것으로 기대된다.

대우조선해양 고재호 사장은 "해양주권 보호를 위한 경쟁이 치열해짐에 따라 동남아 지역의 방산 시장 규모가 점차 확대되고 있다"며, "납기, 가격, 성능 등 발주처의 요구조건을 충족시키는 세계 최고 수준의 건조기술을 바탕으로 차세대 성장 동력인 방산 분야의 선종 및 수출 루트를 다각화하는 기회가 될 것"이라고 강조했다. 또한 고 사장은 "해외 방산 수출을 위한 대한민국 정부와 관계기관의 지원에도 깊이 감사드린다"고 덧붙였다.

HHI secured an order for 6 VLGCs

Hyundai Heavy Industries (HHI) secured an order for 6 units of very large gas carriers (VLGC) from a Norway-based ship owner.

According to foreign media, BW Gas placed an order at HHI for 6 VLGCs (including 2 optional vessels). The details of the shipbuilding order, such as vessel size, delivery schedule, have not been disclosed, but the local industry assumes that the price per unit of vessel might be USD 75 million. Thus, the order for the 6 vessels, including the optional vessels, is assumed to be worth USD 450 million.

These 4 VLGCs are scheduled for delivery to the ship owner by 2015. The VLGC fleet of BW Gas will increase to 40 units if BW Gas exercises all of its options in the contract entered into with HHI.

An official from HHI said, "We have seen a rise in the production of LPG, the by-product of liquefied natural gas (LNG) development projects that have recently gathered momentum. Naturally, there has been an upswing in the demand for LPG carriers. HHI has secured the design technology to keep the temperature inside the tank of VLGC at 50 degrees below zero."

현대중공업, 초대형 LPG 운반선 6척 수주

현대중공업이 노르웨이 선주사로부터 초대형 LPG 운반선(VLGC) 6척을 수주했다. 외신에 따르면 BW가스(BW Gas)는 현대중공업에 VLGC 6척(옵션 2척 포함)을 발주했으며, 이번 수주와 관련해 선박 크기, 인도 예정 시기 등 구체적인 내용은 공개되지 않았으나 현지 업계에서는 척당 선가가 7,500만 달러 수준일 것으로 예측



하고 있다. 따라서 옵션을 포함한 6척의 수주 금액은 총 4억 5000만 달러가 될 것으로 보인다.

이번에 현대중공업이 수주한 4척의 VLGC는 2015년까지 선주에게 인도될 예정이다. 한편 BW가스가 현대중공업과 체결한 옵션계약을 모두 행사할 경우 BW가스의 VLGC 선단은 총 40척에 달하게 된다.

현대중공업 관계자는 "최근 액화천연가스(LNG)개발 사업이 활성화되면서 부산물인 LPG 생산도 늘어나고 있다. 자연스럽게 LPG운반선 수요도 함께 증가하고 있다"며 "VLGC의 경우는 탱크의 온도를 영하 50도 이하로 유지해야 하는데 현대중공업은 이와 관련한 설계 기술을 확보하고 있다"고 말했다.

Dynagas takes delivery of two new ice-class LNG carriers at HHI

Dynagas, the liquefied natural gas (LNG) shipping arm of the George Prokopiou shipping enterprises, has taken delivery of Arctic Aurora, the second of two ice-class membrane LNG tankers, during a ceremony at Hyundai Heavy Industry (HHI) Ulsan shipyard, Korea. The first, Yenisei River, was delivered on 26 July 2013.

The 155,000 cbm (cubic metres) ships are fitted with GTT Mk III containment systems. Propulsion for the ships is provided by a dual fuel diesel generator engine system. Four Wartsila-Hyundai diesel engines in each ship, fuelled either by gas or fuel oil, will power two propulsion motors driving a single fixed pitch propeller. Registered in the Marshall Islands, the ships will operate on charter to Gazprom and Statoil.





With a market leading share in gas ship classification, Lloyd's Register (LR) is focused on its continuing support of innovation in gas technology. Jose Navarro, Gas Technology Principal Specialist at Lloyd's Register, commented: "It is a great honour to have been chosen to class the lead ships in this project - a continuation of our strong relationship with Dynagas and a milestone for Hyundai Heavy Industries. We have worked closely with HHI in supporting and helping enable the technological development required in these ships."

The design complies with LR's Ice-Class and Winterisation Rules for operation under harsh Arctic conditions, and the ShipRight FDA plus notation for a 40-year North Atlantic fatigue assessment. The ships also have been constructed in accordance with ShipRight Construction Monitoring procedures, and built to LR's Environmental Protection 'ECO' notation demonstrating the operator's commitment to, and investment in, environmentally friendly ships while also featuring an Inventory of Hazardous Materials (IHM).

The new gas carriers also use the LR Trim Optimisation solution, pro-

viding simple and accurate information to ship's staff so that they can implement operational best practice and achieve fuel savings whilst also demonstrating Dynagas' commitment to environmentally sound operations.

The ships' bridge design complies with LR's NAV1 notation, which confirms the bridge layout and level of equipment are suitable for safe periodic operation under the supervision of a single bridge watchkeeper. They also have been designed to comply with integrated bridge system (IBS) requirements for centralised monitoring and control of the bridge's navigational functions, while engine room arrangements conform with LR's integrated computer control (ICC) notation for integrated and computer based control and supervision of ship operational functions.

Nexans wins power umbilical contract from OneSubsea

Nexans has been awarded a major contract by OneSubsea (a Cameron & Schlumberger company) to design, manufacture and supply an integrated power umbilical solution and associated termination hardware for Exxon Mobil Corporation's Julia oil field development in the deepwater Gulf of Mexico. A 23 km length of Nexans' innovative power umbilical, which combines power cables and umbilicals in a single cross-section, will be installed at water depths in excess of 2,000 meters to tieback the Julia field subsea systems to a semisubmersible production unit. The Julia field production start-up is scheduled for 2016.

Nexans has pioneered the development of power umbilicals that integrate the functions of power cables and umbilicals in a single cable, enabling a high-voltage (HV) supply to be provided for deepwater projects. The power umbilical includes a number of steel tubes as well as fiber optic elements and signal cables for control and monitoring purposes. For the Julia project, the power umbilical will operate subsea pumps supplied by OneSubsea. The power umbilical for the Julia field will be designed and manufactured at the specialised Nexans subsea cable manufacturing facilities in Halden, Norway.

"This important contract for OneSubsea continues Nexans' momentum for power umbilicals in the deepwater Gulf of Mexico" said Krister Granlie, Vice President Hybrid Underwater Cables, Nexans Norway. "It is clear that a growing number of operators are recognising that power umbilicals, while complex in design, offer a more elegant and cost-



effective approach than the transportation and installation of separate subsea power cables and umbilicals".

넥상스, 원서브씨와 엄빌리칼 공급 계약 체결

넥상스는 엑손모빌이 개발하는 멕시코만 줄리아 유전 프로젝트에 사용 될 전력 및 엄빌리칼 서비스가 가능한 혁신적인 솔루션의 설계, 생산, 공급 및 관련 터미네이션 하드웨어 공급 계약을 원서브씨와 체결했다. 총 길이 23km의 싱글 크로스 섹션에 전력 전선과 엄빌리칼 서비스가 가능한 넥상스 솔루션은 심해 2,000m 이상 되는 줄리아 유전을 세미서브머시블 (반잠수형 해양 굴착 장치) 생산 기지와 타이백하는데 설

치된다. 줄리아 유전의 생산은 2016년부터 시작될 예정이다.

넥상스는 심해 프로젝트에 고압 전력 공급이 가능하도록 싱글 크로스 섹션에 전력 전선과 엄빌리칼 서비스 기능이 가능한 솔루션 개발을 주도해왔다. 파워 엄빌리칼에는 여러 개의 스틸 튜브뿐 아니라 광통신, 제어와 모니터를 위한 시그널 케이블도 포함 되어 있다. 줄리아 프로젝트에서 파워 엄빌리칼은 원서브씨가 공급하는 해저 펌프를 작동하는데 사용될 예정이다. 한편 줄리아 프로젝트에 사용될 파워 엄빌리칼은 해저 케이블 특화 공장인 노르웨이 할덴에서 설계 및 생산된다.

넥상스 노르웨이 크리스터 그란리(Krister Granlie) 해저 하이브리드 전선 부사장은 "원서브씨와 체결한 이번 계약으로 심해 멕시코만에서의 넥상스의 파워 엄빌리칼의 위상은 계속 높아지고 있다."면서 "디자인은 복잡하지만, 전력선과 엄빌리칼이 각각 분리된 경우 운반과 설치에 더 많은 비용이 들기 때문에 비용 효율성에서도 장점이 있는 파워 엄빌리칼을 찾는 프로젝트 운영자들이 점점 늘고 있다"라고 말했다.

DSME clinched an order for 2 high efficiency eco-friendly LNG carriers

Daewoo Shipbuilding & Marine Engineering (DSME) announced that it signed a contract with a client from the Americas to build 2 units of 173,400m³ LNG carriers on July 26. The contract amount has not been disclosed. These vessels will be built at Okpo shipyard and delivered by 2016. Particularly, these vessels will be fitted with the eco-friendly engines (ME-GI engines) of MAN Diesel & Turbo, the world's largest marine engine maker, and the high-pressure natural gas fuel supply system developed independently by DSME.

Incorporating the latest technologies of both companies, these LNG carriers increased the fuel efficiency by more than 20% compared to existing LNG carriers equipped with DFDE (Dual-Fuel Diesel Electric) engine. Additionally, these vessels that use LNG as main fuel can reduce harmful emissions, such as carbon dioxide, nitrogen compounds (NOx), sulfur compounds (SOx), by over 30%, compared to existing diesel engines.

Thus, these vessels are considered innovative eco-friendly high efficiency vessels. DSME has dominated the market for LNG-powered vessels that have been thrust into limelight as the next-generation vessels, winning an order for 2 LNG carriers of similar type from Canada-based Teekay in December last year and making a clean sweep of the orders for 4 units of natural gas-powered LNG carriers which have been placed worldwide thus far, including the order awarded this time. An official from DSME said, "The use of LNG, the clean energy, will be even more widespread in the ship market if the related infrastructures and market conditions improve further. DSME has secured essential technology for LNG-powered vessels and even exported the related patented technology to the world's largest marine engine maker, thereby paving the way for leadership in the related market in the period ahead."

Meanwhile, this new addition brings the total number of vessels ordered to DSME so far this year to 25 units worth approximately 7.9 billion, including the ordinary commercial vessels, offshore products, special purpose vessels, etc.

대우조선해양, 고효율 친환경 LNG 운반선 2척 수주

대우조선해양은 지난 7월 26일 미주 지역 고객사와 총 2척의 173,400m³급 LNG 운반선 수주 계약을 체결했다고 밝혔다. 수주금액은 공개되지 않았으나, 모두 옥포조선소에서 건조되어 2016년에 인도될 예정이다.

특히 이 선박들에는 세계 최대 선박엔진 업체인 만디젤 & 터보(MAN Diesel & Turbo)의 친환경 천연가스 엔진(ME-GI engine)과 대우조선해양이 독자 개발한 고압 천연가스 연료 공급장치가 함께 장착된다.

양사의 최신 기술들이 접목되어 건조될 이들 LNG운반선은 이중연료 전기추진방식(DFDE: Dual-Fuel Diesel Electric) 엔진을 탑재한 기존 LNG선보다 연료 효율이 20% 이상 높다. 또한 LNG를 주연료로 사용하면서 기존 디젤 엔진 대비 이산화탄소, 질소화합물(NOx), 황화합물(SOx) 등 각종 오염물질 배출을 30% 이상 감소시킬 수 있다.

때문에 이들 선박은 획기적인 친환경 고효율 선박으로 평가 받고 있다. 이미 작년 12월 캐나다 티케이(Teekay)사로부터 이와 유사한 사양의 LNG운반선 2척을 수주했던 대우조선해양은 이번 계약까지 포함해 현재까지 전 세계에 발주된 천연가스 추진 LNG운반선 4척을 모두 수주하며 차세대 신개념 선박으로 각광받는 LNG 연료 선박 시장을 선점해 나가고 있다. 이와 관련해 대우조선해양 관계자는 "연관 인프라와 시장여건이 좀 더 갖춰진다면 앞으로 선박시장에서 청정에너지인 LNG를 주 연료로 사용하는 추세는 더욱 보편화될 것"이라고 전망하며 "세계 최대 선박엔진 회사에 관련 특허를 수출할 만큼 LNG 연료 선박의 핵심 기술을 확보하고 있는 대우조선해양이 향후 관련 시장을 선도해 나갈 것으로 기대된다"고 밝혔다.

한편 현재까지 대우조선해양은 총 25척/기, 약 79억 달러 상당의 일반상선과 해양제품, 특수선 등을 수주하고 있다.

SHI secured orders worth USD 400 million for 2 LNG carriers

Samsung Heavy Industries (SHI) announced on July 8 that it secured an order worth approximately USD 400 million from Monaco-based Gaslog for 2 LNG carriers. These vessels ordered this time are the LNG carriers, each with the capacity of 174,000m³, and are scheduled for delivery by the second half of 2016.

This order brings the total number of LNG carriers (including 1 LNG-FSRU) ordered to SHI so far this year to 11 units. It means that SHI won 42% of 26 LNG carrier orders placed worldwide this year. In addition, SHI clinched new orders for 110 LNG carriers out of 388 units that have been placed worldwide since 1996, capturing 28% share, the highest, in the global market.

SHI has won new orders worth USD 10.7 billion so far this year, meeting 82% of its annual new order target of USD 13 billion.

삼성중공업, LNG선 2척 4억 달러 수주

삼성중공업은 모나코 가스로그(Gaslog)로부터 LNG선 2척을 약 4억 달러에 수주했다고 지난 8월 20일 밝혔다. 이번에 수주한 선박은 17만4천m³의 LNG를 운송할 수 있는 크기이며, 납기는 2016년 하반기이다.

이번 수주를 포함해 삼성중공업은 올 들어 현재까지 11척의 LNG선박(LNG-FSRU 1



척 포함)을 수주하고 있다. 올해 전세계에서 발주된 LNG선은 모두 26척 중 42%에 해당하는 규모이다. 또한 삼성중공업은 1996년 이후 전세계에서 발주된 LNG선 388척 중 110척을 수주해 세계 시장 점유율 28%로 1위를 기록하고 있다. 한편, 삼성중공업은 올 들어 현재까지 107억 달러를 수주했다. 연간 수주목표 130억 달러의 82%에 해당하는 금액이다.

HSHI won orders for 9 vessels in July alone

Hyundai Samho Heavy Industries(HSHI) won orders worth USD 780 million for 9 vessels in July alone. The cumulative number of vessels ordered to HSHI until July this year is 36 units worth USD 2.7 billion which accounts for approximately 57% of its annual new order target.

In July, HSHI won an order for 6 units of 84,000 CBM LPG carriers from Monaco-based Scorpio, 2 units of 7,300 UNIT PCTC from Glovis, and 1 unit of 10,000-ton HLV from Hyundai Heavy Industries. The construction of these 6 LPG carriers will start from May, 2014, and the delivery will be made from April 2015 to November of the same year. The construction of the 2 PCTCs will commence from September this year and February 2014, and the delivery will be made in June and November, 2014. The construction of HLV will begin in October this year, and the delivery is scheduled for March, 2015.

HSHI, 올해 들어 7월에만 9척 수주

현대삼호중공업이 7월에만 9척 총 7억 8000만 달러를 수주했다. 올해 7월까지 누적 수주액은 36척 27억 달러로 연간 목표의 약 57%를 달성했다.

현대삼호중공업이 7월에 수주한 내용을 보면 모나코 스킴피오(Scorpio)에서



84,000 CBM LPG선 6척, 글로비스에서 7,300 UNIT PCTC 2척, 현대중공업에서 10,000톤 HLV 1척 등이다. LPG선 6척은 2014년 5월부터 차례대로 착공에 들어가 2015년 4월부터 11월까지 모두 인도될 예정이다. PCTC 2척은 올해 9월과 내년 2월 건조에 들어가 내년 6월과 11월에 인도될 예정이다. HLV는 올해 10월에 건조를 시작해 2015년 3월에 인도될 예정이다.

Dongkuk Steel Mill clinched orders for 60,000 tons of thick plates for offshore plants

Dongkuk Steel Mill won orders from Danish state-run oil company DONG Energy(Danish Oil & Natural Gas Energy), etc., for 60,000 tons of thick plates used in offshore plants deployed for 4 oil field development projects around the globe.

Until July this year, Dongkuk Steel Mill clinched orders for 60,000 tons of thick plates used in offshore plants for 4 projects, including the thick plates for the topside of Denmark-based DONG Energy's offshore platform in the North Sea, topside and hull of FLNG-FPSO of Malaysia's Petronas in Pacific, hull of the platform of Japan's INPEX and French Total's FPSO in the Northwest of Australia, hull of U.S.-based Chevron's platform in the Northwest of Australia.

Particularly, the thick plates(Norsok Y20, Y30 standard product) ordered from Denmark-based DONG Energy are used for the platform processing the crude oil in the harsh marine environment of the North Sea and can be supplied only by a handful of steel manufacturers worldwide.

These thick plates have the strength over 40% higher, compared to ordinary thick plates, and provide excellent weldability in compliance with the Norsok(Norway's standard for offshore structures) which is the most rigorous standard for the thick plates used in offshore plants, and furthermore, can withstand the extreme temperature of 50 degrees below zero in the North Sea.

Having won an order to supply the thick plates to DONG Energy, Dongkuk Steel Mill is poised to successfully enter the market for the thick plates used in the offshore platforms deployed for the exploration and production of oil in the North Sea, thus raising the expectation of an upturn in new orders for the thick plates used in offshore structures put into operation for offshore oil field development projects in the North Sea.

Meanwhile, Dongkuk Steel Mill has mapped out a strategy to actively target the global market for high quality thick plates by supplying the thick plates used in offshore plants, thereby widening the gap with the competitors trailing behind.

The market for thick plates used in offshore plants remains a tenth the size of the market for thick plates used in commercial vessels, but has recently expanded by more than 40%.

Particularly, the thick plates used in the offshore plants have become the yardstick for the global competitiveness of the thick plate manufacturers who are required to guarantee the high quality and technology and register themselves as the vendor of global energy companies.

동국제강, 해양플랜트용 후판 6만톤 수주

동국제강은 덴마크 국영 석유회사인 동에너지(DONG Energy)사 등이 발주한 4개



글로벌 유전개발 프로젝트 해양플랜트용 후판 총 6만톤을 수주했다.

동국제강은 올해 7월 현재까지 덴마크 동에너지(DONG Energy, Danish Oil & Natural Gas Energy)의 북해 플랫폼 상부구조물(Top sides)용 후판을 포함해 말레이시아 페트로나스(Petronas)의 태평양 FLNG-FPSO 상부구조물과 선체(Hull)용 후판, 일본 인펙스(INPEX), 프랑스 토탈(Total)의 호주 북서부 FPSO 선체용 후판, 미국 쉘브론(Chevron)의 호주 북서부 플랫폼 선체용 후판 등 4개 프로젝트에서 총 6만톤의 해양플랜트용 후판을 수주했다.

특히 덴마크 동에너지(DONG Energy)사에서 수주한 후판(Norsok Y20, Y30 규격 제품)은 혹독한 북해 해양 환경에서 원유 등을 처리하는 플랫폼에 사용되고, 세계적으로 극소수의 철강사만이 공급 가능하다. 해양플랜트용 후판 규격 중 가장 엄격한 Norsok(노르웨이 표준해양규정) 규격에 따라 일반 후판보다 강도가 40% 이상 강하면서도 탁월한 용접성을 보이고, 영하 50도 이하 극한의 북해에서도 견딜 수 있는 제품이다. 동국제강은 동에너지(DONG Energy)사 플랫폼용 후판 수주를 계기로 최고난도의 기술이 필요한 '북해' 유전개발 플랫폼용 후판 시장까지 성공적으로 진출하게 됐으며, 북해 유전개발 프로젝트에 투입될 해양구조물용 후판의 수주 확대를 기대하고 있다.

한편 동국제강은 해양플랜트용 후판을 통해 글로벌 고급 후판 시장을 적극 개척하고, 후발 주자와 차별화를 가속한다는 전략이다.

해양플랜트용 후판 시장 규모는 상선용 후판 시장의 10분의 1 수준이지만 최근 40%이상 성장하며 각광을 받고 있다. 특히 해양플랜트용 후판은 제품의 절대적인 품질과 기술력을 보증하면서도 이와는 별도로 글로벌 에너지 기업의 공급사(Vendor)로 각각 등록해야 하는 등 후판 제조사의 종합적인 글로벌 경쟁력을 가능하는 척도가 되고 있다.

SSME won orders for 4 bituminous coal carriers from subsidiaries of KEPCO

Sungdong Shipbuilding & Marine Engineering (SSME) announced on August 28 that it signed contracts with Hanjin Shipping and SK Shipping to build 4 units of 151,000-ton bituminous coal carriers (each 2 units) out of 9 units ordered by 5 power generation subsidiaries of Korea Electric Power Corporation (KEPCO).

These vessels measure 273m in length, 46m in width, 22.7m in depth and will be delivered to the ship owner on a staggered basis from the third quarter of 2015 to 2016. After the delivery, they will be put into service to transport the coals used for power generation from Australia, Canada, South Africa, etc. The contracts are worth in excess of KRW 200 billion.

The power generation subsidiaries (Korea South-Eastern Power, Korea Midland Power, Korea Western Power, Korea Southern Power, Korea East-West Power) of KEPCO opened the bidding for the long-term charter of the 9 units of bituminous coal carriers in the second half of 2012 as part of effort to promote co-growth of domestic shipping/shipbuilding industries and help build up nation's competitiveness. The total order is worth KRW 450 billion. In this project, SSME topped the list of shipyards involved in this project, winning the order for 4 vessels.

SSEM clinched the orders for the largest number of vessels in recognition of its extensive shipbuilding experience and leading technology. Specifically, SSME has shown strong performance in the field of capesize bulk carriers which are the medium and large-sized type. Furthermore, SSEM took the top spot in this field worldwide in 2009 and has delivered about 100 vessels so far.

To win the bid, SSME has put effort for more than one year into developing new technology and ship model optimized for the operations.

An official from SSME said, "We have made constant effort to develop technology and win new orders even as the industry grapples with downturn. This contract will pave the way for brining the business of company back to normal and playing a part in helping spur the nation's economic growth."

성동조선해양, 한진 발전사 유연탄 수송선 4척 수주

성동조선해양이 한국전력 발전 회사 5곳이 발주한 151,000톤급 유연탄 수송용 벌크선 9척 중 한진해운과 SK해운으로부터 각 2척씩, 총 4척의 선박에 대한 건



조 계약을 체결했다고 지난 8월 23일 밝혔다. 이들 선박은 길이 273m, 폭 46m, 깊이 22.7m로 2015년 3분기부터 2016년까지 차례로 인도되어 호주, 캐나다, 남아공 등지의 발전용 석탄을 운반하게 될 예정이며, 총 계약규모는 2000억원이 넘는다.

한국전력 발전 회사의 유연탄 수송용 벌크선 발주 프로젝트는 지난 2012년 하반기, 국내 해운·조선업계와의 상생을 도모하고 국가경쟁력 제고를 위하여 한국전력 산하의 발전5사(남동 중부 서부 남부 동서발전)가 유연탄 전용 선박 9척에 대한 장기용선 공개입찰을 실시한 것으로 발주 금액이 총 4,500억원에 달한다. 그 중 성동조선해양이 참여한 조선사들 중 가장 많은 4척의 선박을 수주하게 된 것이다.

이번에 계약된 케이프사이즈급 벌크선은 그동안 성동조선해양이 강세를 보여온 중대형 벌크선으로 지난 2009년 이 분야에서 세계 실적 1위를 차지한 이력과 100여 척에 이르는 인도실적으로 탄탄한 경험과 기술력으로 가장 많은 수량의 계약을 이끌어냈다는 것이 업계의 평이다. 더불어 성동조선해양은 이들 선박의 운항 목적에 최적화된 선형을 개발하고자 1년이 넘는 기간 동안 신 선형개발과 기술개발에 공을 들이며 입찰을 준비한 것으로 알려졌다.

성동조선해양 관계자는 "업황 침체 등의 어려움 속에서도 끊임없이 기술을 개발하고 지속적인 수주 노력을 펼쳐왔다"라며, "이번 수주는 회사 정상화에 한 걸음 더 다가서는 계기가 될 뿐만 아니라 국가 경제에도 이바지할 수 있다는 점에서 의미 있는 계약"이라고 말했다.




This year, new orders placed at domestic shipyards jumped over 60% year-on-year to 5.99 million CGT. The new order value stood at USD 18.5 billion, which represents a 22% increase compared to the same period of previous year. Domestic shipyards are tidying over difficulties arising from internal and external environments and showing stronger performance.

In the first half of this year, domestic shipyards showed strong performance in new order intake for tankers, large containerships, LNG carriers, offshore plants, etc. Domestic shipyards swept the orders for 85 tankers out of 140 units placed worldwide, 26 large containers out of 43 units placed around the globe, and 12 LNG carriers out of 21 units placed in the world.

The shipbuilding industry predicts an upturn in commercial vessel market amid an increase in new orders for containership.

Particularly, an average of 20 vessels has been ordered over the recent 4 months, an upswing similar to that witnessed in new orders for containership from July, 2010. Thus, the increase in new orders for containership is expected to continue into the second half of this year.

Here, we take a close look at the performance of South Korean major shipyards, the world's leading players with strong growth in new orders as shown currently in the Clarkson data, such as Hyundai Heavy Industries (HHI), Daewoo Shipbuilding & Marine Engineering (DSME), Samsung Heavy Industries (SHI), STX Offshore & Shipbuilding (STXOS), and others based on the order backlog data. 

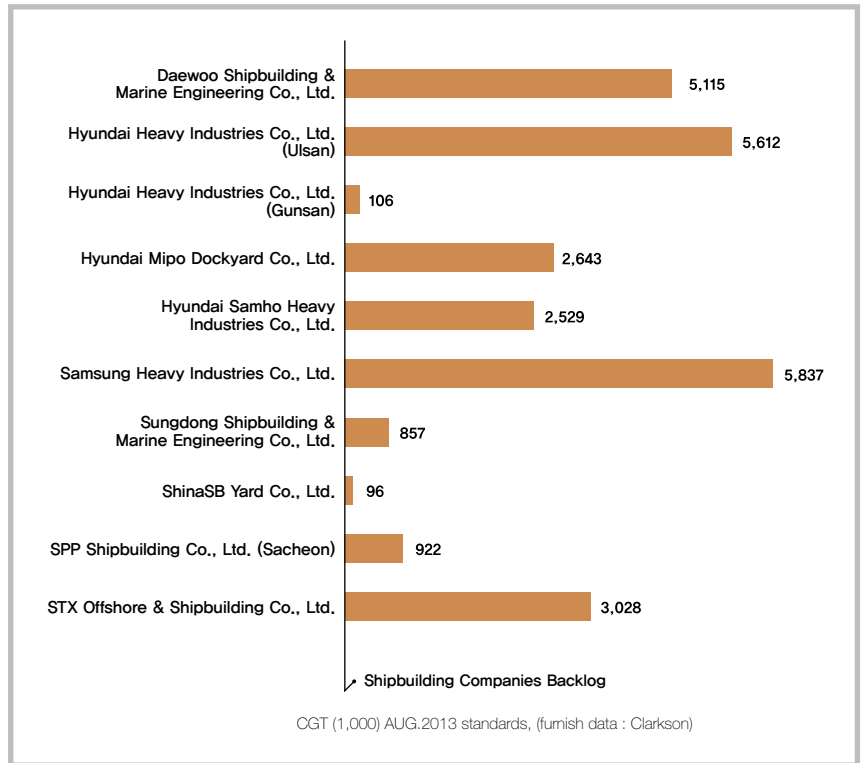


Photo: Sungdong Shipbuilding & Marine Engineering Co., Ltd.

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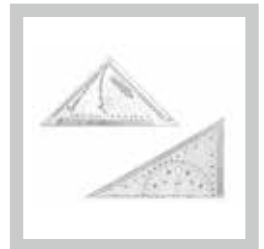
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Offshore Plant Orders

Offshore plant orders awarded to domestic shipyards in 2011-2013

Data	Type	Number of vessel	Amount	Ship owner	Delivery	Shipyard
Jan	Drillship	1 vessel	KRW 590 billion	Diamond Offshore Drilling Limited, U.S.A	Mid 2013	Hyundai Heavy Industries
	Offshore Plant	-	USD 900 million	RasGas, Qatar	Late 2013	Hyundai Heavy Industries
	Drillship	2 vessels	KRW 1 trillion	Noble Drilling, U.S.A	On a staggered basis until Sep 2013	Hyundai Heavy Industries
Feb	Deepwater drillship	1 vessel	-	Atwood Oceanics, U.S.A	Second half of 2013	Daewoo Shipbuilding & Marine Engineering
	Offshore facility carrier	1 vessel	KRW 265 billion	Dockwise, Netherlands	October 2012	Hyundai Heavy Industries
	FPSO for the North Sea	1 vessel	USD 1.2 billion	BP (British Petroleum), U.K	Early 2015	Hyundai Heavy Industries
	Platform Supply Vessel	1 vessel	-	-	2012	STX OSV
	Fisheries Research Vessel	1 vessel	EUR 35 million	Ministry of Fisheries and Marine Resources, Republic of Namibia	Early 2012	STX Finland
Mar	Offshore Platform (North Sea Drilling & Production platform, Quarters & Utilities platform)	1 unit each	USD 600 million	BP (British Petroleum), U.K	Late 2014	Hyundai Heavy Industries
	Deepwater drillship	2 vessels	KRW 1.2 trillion	Aker Drilling, Norway	Second half of 2013	Daewoo Shipbuilding & Marine Engineering
	Drillship	2 vessels	USD 1.1 billion	Ship owner, U.S.A	-	Samsung Heavy Industries
	Platform Supply Vessel	1 vessel	-	Norsea Group AS, Norway	June 2012	STX OSV
	Platform Supply Vessel	1 vessel	-	-	2012	STX OSV
Apr	Drillship	1 vessel	-	Fred Olsen Energy, Norway	August 2013	Hyundai Heavy Industries
	Drillship	2 vessels	USD 1.12 billion	Maersk, Denmark	-	Samsung Heavy Industries
	Drillship	1 vessel	USD 680 million	Ocean Rig, Greece	October 2013	Samsung Heavy Industries
	Shuttle Tanker	2 vessels	USD 200 million	European Navigation, Greece	2013	STX Offshore & Shipbuilding
	Drillship	2 vessels	USD 1.12 billion	Rowan, U.S.A	Second half of 2013	Hyundai Heavy Industries
May	Deepwater drillship	1 vessel	-	Vantage Drilling, U.S.A	Late May, 2013	Daewoo Shipbuilding & Marine Engineering
	Offshore Platform (Top side)	-	USD 414 million	Statoil, Norway	-	Samsung Heavy Industries
	FPSO	1 vessel	USD 636 million	Teekay Petrojarl, Norway	Mid 2013	Samsung Heavy Industries
	Platform Supply Vessel	2 vessels	KRW 120 billion	Farstad Shipping, Norway	First half of 2013	STX OSV
	FSO	1 unit	-	PTSC, Vietnam	Early 2013	Sungdong Shipbuilding & Marine Engineering
Jun	LNG-FPSO	1 unit	USD 3,026 billion	Royal Dutch Shell, U.S.A	2016	Samsung Heavy Industries
	Platform Supply Vessel	2 vessels	KRW 150 billion	Island Offshore, Norway	First quarter, third quarter of 2013	STX OSV
	LNG-FSRU	2 units	USD 500 million	Høegh LNG, Norway	Second half of 2013, first half of 2014	Hyundai Heavy Industries
	Multifunctional Deep Water Anchor Handling, Offshore Service Vessels	2 vessels	KRW 240 billion	Farstad Shipping, Norway	From the second quarter of 2013	STX OSV
	Drillship	1 vessel	USD 680 million	Ocean Rig, Greece	November 2013	Samsung Heavy Industries
Jul	Drillship	2 vessels	USD 1,125 billion	Maersk, Denmark	July 2014	Samsung Heavy Industries
	LNG-FSRU	1 vessel	USD 280 million	Excellerate Energy, U.S.A	First quarter of 2014	Daewoo Shipbuilding & Marine Engineering
Aug	Semi-submersible Rig	2 units	USD 1.1 billion	Songa Offshore, Norway	Second half of 2014	Daewoo Shipbuilding & Marine Engineering
	Well Intervention Vessel	2 vessels	USD 420 million	Eide Marine Services AS, Norway	2013	STX Finland
Sep	Drillship	1 vessel	KRW 600 billion	Noble Drilling, U.S.A	Second half of 2014	Hyundai Heavy Industries
	Fixed Offshore Platform	-	USD 1.4 billion	Chevron, U.S.A	Second half of 2014	Daewoo Shipbuilding & Marine Engineering
Oct	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
Nov	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
Dec	Pipe Laying Support Vessel	2 units	USD 500 million	Odebrecht, Brazil	August of 2011	Daewoo Shipbuilding & Marine Engineering
	Offshore facilities (Gas platform and various facilities)	-	USD 900 million	Major multinational oil companies	2nd half of 2014	Hyundai Heavy Industries
Jan	CPF (Central Processing Facility)	-	KRW 2.6 trillion	INPEX, Australia	4th quarter of 2015	Samsung Heavy Industries
	Semi-submersible rig	1 unit	USD 620 million	Odjeil, Norway	by mid 2014	Daewoo Shipbuilding & Marine Engineering

	Feb	LNG-FSRU	-	-	Hoegh, Norway	-	Hyundai Heavy Industries
	Mar	Offshore Platform	1 unit	USD 560 million	DONG E&P A/S, Danish	April 2015	Daewoo Shipbuilding & Marine Engineering
		FPSO	1 unit	USD 2.0 billion	INPEX, Australia	April 2016	Daewoo Shipbuilding & Marine Engineering
	Apr	Drillship	1 vessel	USD 645 million	Ensco 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-FPSO	1 unit	-	Petrolim Nasional Berhad, Malaysia	June 2015	Daewoo Shipbuilding & Marine Engineering
2012	Jul	Drillship	1 vessel	USD 645 million	Ensco 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
	Sep	Drillship	1 vessel	USD 620 million	Rowan, U.S.A	First half of 2015	Hyundai Heavy Industries
		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	Alwood 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
	Dec	offshore platform (Top side)	1 unit	USD 1.77 billion	Statoil, Norway	The end of 2016	Daewoo Shipbuilding & Marine Engineering
	Jan	Gas Production Platform (topside)	1 unit	USD 1.1 billion	Statoil, Norway	Mar 2016	Hyundai Heavy Industries
	Mar	LNG-FSRU	1 vessel	-	BW Maritime, Singapore	2015	Samsung Heavy Industries
		Floating Production Unit (FPU)	1 unit	USD 1.3 billion	Total, France	First half of 2016	Hyundai Heavy Industries
	Apr	Tension Leg Platform (TLP)	1 unit	USD 700 million	Total, France	First half of 2015	Hyundai Heavy Industries
		FPSO	1 unit	USD 1.9 billion	Chevron, U.S.A	-	Hyundai Heavy Industries
2013	May	Semi-Submersible Drilling Rig	1 unit	USD 750 million	Diamond Offshore, U.S.A	Nov. 2015	Hyundai Heavy Industries
	Jun	Ultra-deepwater Drillship	1 unit	USD 515 million	Ensco, United Kingdom	Third quarter of 2015	Samsung Heavy Industries
		FPSO	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
	Jul	Ultra-deepwater Drillship	2 units	USD 600 million	Seadrill, Norway	Second half of 2015	Samsung Heavy Industries
		Semi-Submersible Rig	1 vessel	USD 718 million	Stena, Sweden	First half of 2016	Samsung Heavy Industries

*Note : Based on the press release and public announcements of each shipyards, internal estimation of Monthly KORSHIP (estimation until July 15, 2013)



Deepwater jack-up rigs thrust into limelight

- Semi-submersible drilling rig gains popularity

Semi-submersible drilling rig and jack-up rig have more than 4 rigs that ensure stable drilling operation in rough waters. Recently, semi-submersible drilling rig capable of drilling in water depths of more than 3000m has attracted much attention from ship owners.

Particularly, Statoil, a global oil company, announced that it would use the floating storage facilities and offshore drilling facilities for the next 4 to 5 years for the Mariner project which is located in the UK Continental Shelf of the North Sea, and this creates business opportunities for major domestic

shipyards. Samsung Heavy Industries(SHI) recently won an order from Statoil for the construction of jack-up rig which is a large-scale semi-submersible drilling rig capable of drilling up to 10km in water depths of 150m.

Jack-up rigs currently operational around the globe are mostly small and medium-sized equipments that can operate in water depths of less than 100m. Keppel and Sembcorp Marine have captured 70% share in the global market for jack-up rigs. ⚓



The bird's eye view of the large-scale jack-up rig ordered to SHI







(Source: Maersk Drilling)



(Source: Total E&P)







(Source: Vantage Drilling)



(Source: Vantage Drilling)



(Source: Total E&P)





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New tightened sulphur emission

Auramarine Ltd.

The new tightened sulphur emission rules will become effective in the Baltic Sea, the North Sea, the English Channel and North America in 2015. The time for making the alterations required by the new regulations is running short. The easiest, fastest and the most cost-effective solution to meet the challenges of reducing sulphur emissions is to switch to MGO, which only contains 0.1% sulphur. The emission limits can be met easily by using fuel that contains less sulphur.

• Challenges posed by low-sulphur fuel

A switch to low-sulphur fuel requires special equipment and expertise. The availability of total solutions in which all the challenges posed by a switch from HFO to MGO have been taken into account is limited. In an optimal solution, a switch from HFO to MGO or vice versa takes place automatically and in such a manner that the lubrication of the ship's engines is ensured in every phase.

• **Auramarine's solution fits both newbuilds and retrofits:** Auramarine is able to offer a fast, reliable and affordable service when a switch to low-sulphur fuel is needed. Auramarine's equipment consists of three units: FO Supply unit, MGO Cooling System, and Auramarine Fuel Selector - an automatic system that controls the HFO/MGO change-over procedure.

• **Ensuring engine lubrication is the number one priority:** The cooling system reduces MGO's temperature and increases viscosity to a level that meets the requirements set by the engine manufacturer. The ability of ship engines to utilize MGO varies considerably and the MGO Cooling System enables practically all ships to switch to low-sulphur fuel.

• **Auramarine's solution helps achieve lower sulphur emissions:** Auramarine Fuel Selector makes it possible to program the change-over procedure from one fuel to



another to take place fully automatically. The system also ensures that the temperature change process is slow enough. The temperature of the fuel entering the engine must not change by more than about 2°C per minute. Auramarine Fuel Selector also allows data reporting. The system saves the data on the PLC Unit and converts it into a clear report for the use of the shipping company and relevant authorities.

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3D laser scanning - help shipyards survive the downturn

AVEVA

AVEVA announced its publication of a new business paper – ‘On the Beam: How 3D laser scanning technology brings new opportunities in ship refitting and conversion’. In this paper, AVEVA examines how rapid, accurate and non-intrusive 3D laser surveying can increase shipyard capabilities to meet the coming surge in demand for ship conversion and refit projects. It describes how AVEVA’s laser scanning software has the potential to help both the commercial and naval sectors to find new business opportunities in a difficult economic climate.

“In a depressed, buyers’ market, ship owners are driving hard bargains and shipyard profitability is being squeezed”, said Gary Farrow, VP, 3D Data Capture Business Management, AVEVA. “Traditional manual surveying is costly, time-consuming and of limited accuracy. Dramatic increases in efficiency have been enabled through greater automa-

tion, rapid visualisation and processing of laser data making the conversion of laser scans into 3D quicker and cheaper than ever before. Shipyards will see increasing opportunities in refit and conversion projects, but only if they can offer rapid turn-round, competitive prices and more added value. Using inexpensive 3D laser surveying, the ‘as-operating’ vessel can now be captured quickly and accurately directly into the 3D design environment. It shortens the time out of service and can also be used as part of a vessel lifecycle management strategy.”

Early availability of detailed and accurate 3D surveys from laser scan data enables shipyards to be ahead of the game, planning the project, designing the refit and procuring materials ready to begin work as soon as the vessel reaches the repair dock.



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- Products : 43,000DWT Stainless Steel Chemical Tanker, 44,000DWT Chemical Tanker, 45,000DWT Chemical Tanker, 51,000DWT Product/Chemical Tanker, 49,700DWT Product Tanker, 41,000DWT Product/Chemical Tanker, 40,000DWT Product/Chemical Tanker, 58,000DWT Supramax Bulk Carrier

DAESUN SHIPBUILDING & ENGINEERING CO., LTD.

- Address : 12, 4-ga, Bongrae-dong, Yeongdo-gu, Busan, Korea • Tel : +82-51-419-5090~1 • Fax : +82-51-416-7965 • <http://www.daesunship.co.kr>
- Products : Container Ships, Bulk Carriers, Tankers, MPC & General Cargo Ships, Gas Carriers, Ro/Ro ships, Tug Boats, Fishing Boats/Vessels, Special Purpose Vessels



KOMEA (Korea Marine Equipment Association)

Member List

AMS CO., LTD.

Head office : HAEUNDAE-GU, BUSAN
 Homepage add : www.albatros.co.kr
 Main products : Unit Toilet/Wall&Ceiling Panel, Heat Exchangers(Plate Shell&Tube) etc
 TEL : +82 51 293 1035

A-TECH

Head office : GANGSEO-GU, BUSAN
 Homepage add : www.atech2004.co.kr
 Main products : Small davit, Air motor, Air winch
 TEL : +82 51 832 0723

BC TAECHANG CO., LTD.

Head office : JUNG-GU, BUSAN
 Homepage add : www.bcinternational.co.kr
 Main products : Ultimate Solution for Onboard crew maintenance, Deck Scaling Machine
 TEL : +82 51 442 6191

Bethel Engineering CO., LTD.

Head office : NAMYANGJU-SI, GYEONGGI
 Homepage add : www.magicgrating.com
 Main products : Magic Grating(Steel Grating)
 TEL : +82 31 593 2712

BIP INDUSTRIES CO., LTD.

Head office : GEUNJEONG-GU, BUSAN
 Homepage add : www.bn-bip.com
 Main products : Wall panel, Ceiling panel, Bathroom unit, Cabin unit, Floating floor, TLQ, Marine furniture, Marine door etc
 TEL : +82 51 519 2000

Bumhan Industries CO., LTD.

Head office : CHANGWON, GYUNGNAM
 Homepage add : www.bumhan.com
 Main products : Air Compressor, N2 Generator, High Pressure Control Valve
 TEL : +82 55 251 6070

BY CONTROLS, INC.

Head office : GIMHAE-SI, GYUNGNAM
 Homepage add : www.bycontrols.com
 Main products : Watertight Door, Pilot Door, Hydraulic Hatch etc
 TEL : +82 55 345 6110

BYT CO., LTD.

Head office : JINRAE-MYUN, GIMHAE
 Homepage add : www.bytd.co.kr
 Main products : HARDWARE, OUTFITTING, MARINE OUTFITTING, NEW PRODUCTS
 TEL : +82 55 345 1951

CAPE INDUSTRIES LTD.

Head office : YANGSAN-SI, GYUNGNAM
 Homepage add : www.capeind.com
 Main products : Cylinder Liner
 TEL : +82 55 370 1234

CENTURY CORPORATION

Head office : YANGSAN-SI, GYUNGNAM
 Homepage add : www.capeind.com
 Main products : Cylinder Liner, Man b&w sulzer(wartsila)type
 TEL : +82 55 370 1234

CHK CO., LTD.

Head office : GANGSEO-GU, BUSAN
 Homepage add : www.chkj.co.kr
 Main products : Ref. Container Socket, Junction Box
 TEL : +82 51 831 9500

ChungSol Marine CO., LTD.

Head office : GANGSEO-GU, BUSAN
 Homepage add : www.chungsolmarine.co.kr
 Main products : Window Wiper, Straight Line Type, Clear View Screen, Window, Door, Hatch
 TEL : +82 51 832 2226

ChungSong Industry CO., LTD.

Head office : GIMHAE-SI, GYUNGNAM
 Homepage add : www.koweld.co.kr
 Main products : Welding Auto Carriage, LWS etc
 TEL : +82 55 329 9500

CMR KOREA CO., LTD.

Head office : KUMJUNG-GU, BUSAN
 Homepage add : www.cmrkorea.com
 Main products : Marine Telephone System, Public Address System, Communal Aerial System, Marine CCTV System, Marine Clock System, Anemometer System, Rudder Angle Indicator System, Temperature Sensor, Pressure Sensor
 TEL : +82 51 521 2883

Dae Chang Metal CO., LTD.

Head office : SAHA-GU, BUSAN
 Homepage add : www.dcm.co.kr
 Main products : Propeller boss, Chain Wheel cam, Dummy ring, Valve body etc
 TEL : +82 51 264 0831

Dae Heung Cooler CO., LTD.

Head office : POCHON-SI, GYEONGGI
 Homepage add : www.cooler.co.kr
 Main products : Heat Exchanger
 TEL : +82 31 532 9667

Daechun Industrial CO., LTD.

Head office : KIMHAE-SI, KYUNGNAM
 Homepage add : www.daechun.co.kr
 Main products : Multi Core Tube, Stainless Steel Tube
 TEL : +82 55 345 2288

DaeJin Dampha CO., LTD.

Head office : ULJU-GUN, ULSAN
 Homepage add : www.dampha.co.kr
 Main products : Ceiling Panel
 TEL : +82 52 225 2361

Daemmstoff Industrie Korea LTD.

Head office : SAHA-GU, BUSAN
 Homepage add : www.daemmstoff.com
 Main products : KVM SEALING COMPOUND, MANGANA TETAINING COMPOUND(PUTTY), FIRE STOP, PANDA-90 etc
 TEL : +82 51 261 7073

Daeyang Electric CO., LTD.

Head office : SAHA-GU, BUSAN
 Homepage add : www.daeyang.co.kr
 Main products : Lighting Fixtures, Instruments, SAUV, UUV
 TEL : +82 51 200 5221

DAEYANG INSTRUMENT. CO., LTD.

Head office : SAHA-GU, BUSAN
 Homepage add : http://dic.daeyang.co.kr/08_affiliate/affiliate_01.php
 Main products : precision instrument-anemometer rudder angle indicator etc
 TEL : +82 51 200 5212

DaiHan Anchor Chain MFG. CO., LTD.

Head office : NAM-GU, INCHEON
 Homepage add : www.dhac.co.kr
 Main products : Anchor Chain, Offshore Mooring Stud etc
 TEL : +82 32 862 0091

DHMC CO., LTD.

Head office : KIMHAE-SI, KYUNGNAM
 Homepage add : www.dhmc-rudder.com
 Main products : Rudder, Block etc
 TEL : +82 55 346 3663

DK Tech Corporation

Head office : GIMHAE-SI, GYUNGNAM
 Homepage add : www.dklok.com
 Main products : Instrumentation fitting&valve
 TEL : +82 55 338 0114

DMC CO., LTD.

Head office : GIMHAE-SI, GYUNGNAM
 Homepage add : www.dongnam-crane.co.kr
 Main products : Offshore Crane, Deck Cranes, Floating Cranes
 TEL : +82 55 720 3000

DNP CO., LTD.

Head office : GANGSEO-GU, BUSAN
 Homepage add : www.dnpco.kr
 Main products : Accommodation System
 TEL : +82 51 831 4551

Dong Hae Machinery Co.,Ltd

Head office : SEO-GU, INCHEON
 Homepage add : www.east-sea.co.kr
 Main products : Grab Bucket, Orange Grab, Motor Grab, Wood etc
 TEL : +82 32 583 8061

Dong Kang M-Tech CO., LTD.

Head office : GANGNAM-GU, SEOUL
 Homepage add : www.dkmtech.com
 Main products : Water Jet, Night Navigator
 TEL : +82 2 553 0181

Dong Woo Machinery&Engineering CO., LTD.

Head office : CHANGWON, GYUNGNAM
 Homepage add : www.dwmc.com
 Main products : Engine room over head crane, F.O hose handling Davit etc
 TEL : +82 55 295 3261

Dong-A Valve Ind. CO.

Head office : GANGSEO-GU, BUSAN
 Homepage add : www.donga-valve.com
 Main products : Manufactured low&high pressure valves, Flap Check(duo-check) valve etc
 TEL : +82 51 831 1500

Dongbang Marine CO., LTD.

Head office : GANGSEO-GU, BUSAN
 Homepage add : www.danmarine.co.kr
 Main products : MARINE FIRE DETECTION & ALARM SYSTEM, MARINE FIRE EXTINGUISHING SYSTEM
 TEL : +82 51 205 1585

DONGHWA ENTEC

Head office : GANGSEO-GU, BUSAN
 Homepage add : www.dh.co.kr
 Main products : Heat Exchanger, Plate Cooler etc
 TEL : +82 51 970 1000

DongHwa Pneutec CO., LTD.

Head office : GANGSEO-GU, BUSAN
 Homepage add : www.dhkomp.co.kr
 Main products : Air/Gas Compressor
 TEL : +82 51 974 4800

Dong-I Industrial CO., LTD.

Head office : JINJU-SI, GYEONGNAM
 Homepage add : www.dongico.co.kr
 Main products : Marine Transmission, Steering system, P.T.O
 TEL : +82 55 755 9928

DooSan Engine CO., LTD.

Head office : CHANGWON, GYUNGNAM
 Homepage add : www.doosanengine.com
 Main products : Marine Diesel Engine, Diesel Engines for Power Generation
 TEL : +82 55 260 6000

DRB Holding CO., LTD.

Head office : YEUNGDEUNGPO-GU, SEOUL
 Homepage add : www.drworld.com
 Main products : Marine rubber fender, Industrial rubber sealing & gasket, Industrial rubber track, Rubber damper
 TEL : +82 2 2168 9133

Emerson Process Management Korea LTD.

Head office : SEONGNAM-SI, GYEONGGI
 Homepage add : www.emersonprocess.co.kr
 Main products : Pressure, Temperature, Level, Analytical&Flow
 Measurment, Valves, Tank radar level guaging etc
 TEL : +82 2 3438 4600

ESAB SeAH Corp.

Head office : CHANGWON, GYUNGNAM
 Homepage add : www.esab.co.kr
 Main products : Flux Cored Wire
 TEL : +82 55 289 8111

Flutek, LTD.

Head office : SEONGSAN-GU, GYEONGNAM
 Homepage add : www.flutek.co.kr
 Main products : Axial Piston pumps, Axial piston
 motors&reduction gear, Electro-hydraulic steering gear, Deck
 machinery, Staffa motor, ECO servo
 TEL : +82 55 570 5800

FRIEND CO., LTD.

Head office : GANGSEO-GU, BUSAN
 Homepage add : www.thefriend.co.kr
 Main products : Engine Valve Spindle, Cable Tray
 TEL : +82 51 974 7911

G.S HIGH-TECHER CO., LTD.

Head office : GANGSEO-GU, BUSAN
 Homepage add : www.gshightecher.koreasme.com
 Main products : Air vent head, Convex coupling
 TEL : +82 51 832 4656

GENERAL MARINE BUSINESS INC.

Head office : NAM-GU, INCHEON
 Homepage add : www.gmbmarine.com
 Main products : Marine system(ship shore comm.system,
 emergency shut down system etc), Defense Eng.
 (Control&monitoring system integration etc), Manufacturing
 &services(new shipbuilding, module production)
 TEL : +82 52 270 3500

GS-Hydro Korea Ltd.

Head office : GANGSEO-GU, BUSAN
 Homepage add : www.gshydro.com
 Main products : Flare Flange system, Retain ring system
 TEL : +82 51 266 8221

H.K.E CO., LTD.

Head office : YOUNGDO-GU, BUSAN
 Homepage add : www.hk-eng.kr
 Main products : Expansion Joint, Fuel Injection Pipe, Air Filter,
 L.O Filter, F.O Filter
 TEL : +82 51 415 2494

Haean Machinery Ind. CO., LTD.

Head office : GIMHAE-SI, GYUNGNAM
 Homepage add : www.haeam21.com
 Main products : Marine Crane, Deck Machinery
 TEL : +82 55 345 2024

Haewon Ind. CO., LTD.

Head office : GANGSEO-GU, BUSAN
 Homepage add : www.haewon.net
 Main products : Water Seal, Inflatable/Mating Ring
 TEL : +82 51 831 4600

Hal La Industrial CO., LTD.

Head office : SAHA-GU, BUSAN
 Homepage add : www.hallaiq.co.kr
 Main products : Non Seal Canned Motor Pump, Gear Pump
 TEL : +82 51 264 2201

Han Jo CO., LTD.

Head office : YOUNGDO-GU, BUSAN
 Homepage add : www.hanjoms.co.kr
 Main products : Lubrication Oil Filter, Fuel Oil Filter, Filter
 Elements
 TEL : +82 51 414 7201

HanKuk Miboo CO., LTD.

Head office : SAHA-GU, BUSAN
 Homepage add : www.hankukmiboo.co.kr
 Main products : Spiral Duct, Cold Chamber, Deck Covering, Level
 TEL : +82 51 263 3621

HANLAIMS CO., LTD.

Head office : GANGSEO-GU, BUSAN
 Homepage add : www.hanlaims.com
 Main products : Instruments(Level gauge/Level Switch) Tank
 Remote Sounding System/Cargo monitoring system valve Re
 TEL : +82 51 601 7016

HANSHIN ELECTRONICS CO., LTD

Head office : YOUNGDO-GU, BUSAN
 Homepage add : www.ehanshin.com
 Main products : Public Address Sys., Telephone Sys.
 TEL : +82 51 412 5551

HEARTMAN CO.,LTD.

Head office : GANGSEO-GU, BUSAN
 Homepage add : www.heartman.co.kr
 Main products : The fuel injection nozzle for marine diesel
 engine, The fuel injection plunger ass'y for marine diesel engine
 TEL : +82 51 264 8826

HI AIR KOREA CO., LTD.

Head office : GIMHAE-SI, GYUNGNAM
 Homepage add : www.hiarkorea.co.kr
 Main products : Air Handling Unit, Spot Cooler, Refrigeration
 condensing unit, Fire damper, Provision refrigeration plant, MGO
 cooling system, Packaged air conditioner, Ventilation fan, Spiral duct
 TEL : +82 55 340 5000

Ho Seung Enterprise CO., LTD.

Head office : GANGSEO-GU, BUSAN
 Homepage add : www.hosent.co.kr
 Main products : Package Unit for Engine Room
 TEL : +82 51 831 2233

HODU INDUSTRIAL CO.

Head office : GANGSEO-GU, BUSAN
 Homepage add : www.hoducompany.com
 Main products : Catering Furniture, Galley Hood W/Fire
 Fighting, Galley E/Q(Deep Fat Fryer/Cooking Range etc.)
 TEL : +82 51 271 3342

HWASEUNG R&A

Head office : YANGSAN-SI, GYUNGNAM
 Homepage add : www.hwsma.com
 Main products : Stern Tube Seal, Hatch Cover Seal, GRE pipe,
 Cathodic Protection Equipment(L.C.C.P/M.G.P.S)
 TEL : +82 55 370 3331

Hy-Lok Corporation

Head office : GANGSEO-GU, BUSAN
 Homepage add : www.hy-lok.com
 Main products : Tube Fitting&Valve, Double lock&Bleed Valve,
 Crygenic valve
 TEL : +82 51 970 0800

HYUNDAI EHEAVY INDUSTRIES CO., LTD.

Head office : DONG-GU, ULSAN
 Homepage add : www.hhi.co.kr
 Main products : Marine Diesel Engine & Machinery
 TEL : +82 52 202 7291

Hyundai Elevator CO., LTD.

Head office : INCHEON-SI, GYEONGGI
 Homepage add : www.hyundaielevator.co.kr
 Main products : Elevators, Escalators & Moving Walks, Meterial
 Handling Systems, Parking Systems, SOC Infra Systems
 TEL : +82 31 644 5114

Hyundai Fitting CO., LTD.

Head office : GANGSEO-GU, BUSAN
 Homepage add : www.hdfco.co.kr
 Main products : Flange
 TEL : +82 51 831 0891

HYUNDAI LIFEBOATS CO., LTD.

Head office : ULJU-GUN, ULSAN
 Homepage add : www.hdboat.com
 Main products : Life Boat , GRP Rigid Type Rescue Boat
 TEL : +82 52 240 3500

Hyundai Marine Machinery CO., LTD.

Head office : INCHEON-SI, GYEONGGI
 Homepage add : www.hmmco.co.kr
 Main products : W.O. Incinerator, Aux/Blower, F.D FAN
 TEL : +82 32 583 0671

HYUNDAI WELDING CO., LTD.

Head office : GANGNAM-GU, SEOUL
 Homepage add : www.hyundaiwelding.com
 Main products : Covered electrode arc welding consumables,
 Sub-merged arc welding flux&wire, Solid wire arc welding
 consumables, Flux cored wire, MIG TIG arc welding
 consumables, Welding machines
 TEL : +82 2 6230 6883

I.M.E. CORPORATION

Head office : GIMHAE-SI, GYUNGNAM
 Homepage add : www.promarine21.com
 Main products : Engine Valve Spindle&Seat
 TEL : +82 55 346 1127

ILJIN AND CO., LTD.

Head office : GJANG-GUN, BUSAN
 Homepage add : www.iljinamst.co.kr
 Main products : Fire detection system, Gas detection
 system, emission monitoring system, Water spray&cargo
 spray system etc
 TEL : +82 51 755 6191

ILSHIN ENGINEERING CO., LTD.

Head office : SIHEONG-SI, DYEONGGI
 Homepage add : www.ilshineng.com
 Main products : Chemical Equipment, Storage Tank
 TEL : +82 31 499 4502

ILSUEUNG CO., LTD

Head office : GANGSEO-GU, BUSAN
 Homepage add : www.ilsueung.co.kr
 Main products : Sewage tTreatment Plant, Fresh Water
 Generator, Oil Purifier
 TEL : +82 51 831 4110

IL-SUNG IND. CO.

Head office : SASANG-GU, BUSAN
 Homepage add : www.ilsunghs.co.kr
 Main products : Hot Water Calorifier, Silencer (For M/E, G/E,
 Fan), Mist Eliminator, Washable Air Filter, Pneu. Fire Damper
 (For Funnel, Em'cy G/E Room)
 TEL : +82 51 312 4056

International Machine Tool CO.

Head office : SASANG-GU, BUSAN
 Homepage add : www.clampimt.com
 Main products : Vertical Clamp, Horizontal Clamp etc
 TEL : +82 51 314 2038

INTRA PRECISION MANUFACTURE CO., LTD

Head office : DONG-GU, BUSAN
 Homepage add : www.intrapare.co.kr
 Main products : PISTON CROWN, CYLINDER LINER,
 CYLINDER COVER, PISTON SKIRT, WATER JACKET
 TEL : +82 51 466 4635

JHK INC.

Head office : YANGSAN-SI, GYUNGNAM
 Homepage add : www.jonghap.biz
 Main products : Container Fittings, Lashing Fittings
 TEL : +82 55 370 2600

JINSEONG LINER&PISTON

Head office : DAEJEOK-GU, DAEJEON
 Homepage add : www.jinseong.com
 Main products : Sylinder liner, Piston
 TEL : +82 42 931 8558

JONGHAP MACHINERY CO., LTD

Head office : YANGSAN-SI, GYUNGNAM
 Homepage add : http://jonghap.biz
 Main products : Sewage Treatment Plant, T-bar auto welding
 machine
 TEL : +82 55 370 2600

JS CABLE CO., LTD.

Head office : CHEONAN-SI, SHUNGNAM
 Homepage add : www.jsable.co.kr
 Main products : Shipboard Cable
 TEL : +82 41 559 4800

JUNG GONG IND. CO., LTD.

Head office : SAHA-GU, BUSAN
 Homepage add : www.jung-gong.com

Main products : Marine window, Fire resistant window, Marine wiper, Clear view scree, Anti-glare sunscreen
TEL : +82 51 261 2911

JUNG-A MARINE

Head office : GANGSEO-GU, BUSAN
Homepage add : www.jung-a.co.kr
Main products : Accommodation Ladder, Pilot slant ladder, Wiper, CVS, Sunscreen davit, Cpastan, AI structure, Hatch, Helideck, Special product
TEL : +82 51 970 6420

JUNGSAN ENTERPRISE CO., LTD.

Head office : ULJU-GUN, ULSAN
Homepage add : www.jungsan.com
Main products : Marine Engine Part
TEL : +82 52 254 3290

K.C. LTD.

Head office : GANGSEO-GU, BUSAN
Homepage add : www.iccp-mgms.com
Main products : Impressed Current Cathodic Protection(I.C.C.P) system, Anti-fouling system(M.G.P.S), Shaft earthing device
TEL : +82 51 831 7720

Kangrim Heavy Industries CO., LTD.

Head office : CHANGWON, GYUNGNAM
Homepage add : www.kangrim.com
Main products : Marine Boiler, Plant, LTG Tank
TEL : +82 55 269 7700

Kangrim Insulation CO., LTD.

Head office : SAHA-GU, BUSAN
Homepage add : www.kangrim.com
Main products : Tank, Pipe Insulation, Cold Provision Store
TEL : +82 51 200 6000

Keonchang Industry CO., LTD.

Head office : SAHA-GU, BUSAN
Homepage add : www.keonchang.co.kr
Main products : TOP CHARGING EQUIPMENT, HOPPER&CONVEYER, SIDE GUIDE ASS'Y
TEL : +82 51 203 0161

Keum Yong Machinery CO., LTD.

Head office : BUK-GU, DAEGU
Homepage add : www.beumyong.com
Main products : Exh. Valve Complete with Spindle
TEL : +82 53 382 9044

Key Sung Metal CO., LTD.

Head office : GANGSEO-GU, BUSAN
Homepage add : www.deysungmetal.com
Main products : Marine Valve
TEL : +82 51 831 3391

Keystone Valve(Korea)

Head office : ANSEONG-SI, GYEONGGI
Homepage add : www.keystonekorea.com
Main products : All kind of valves apply to offshore and shipbuilding
TEL : +82 51 604 4000

KHAN CO., LTD.

Head office : GEOJE-SI, GYEONGNAM
Homepage add : www.khan-offshore.com
Main products : Engineering Service, Sea-trian&Commissioning service, Facility for Fabricator, Modification
TEL : +82 55 639 7600

Kion Printing&Packaging Inc.

Head office : GIMHAE-SI, GYUNGNAM
Homepage add : www.kiwon.com
Main products : Marine Equipment & Vacuum System
TEL : +82 55 313 9913

KOC ELECTRIC CO., LTD.

Head office : GANGSEO-GU, BUSAN
Homepage add : www.kocelec.com
Main products : H/V Transformer(ATEX, WATER COOLED TYPE), UPS(Uninterruptible Power Supply), Bus way/Bus duct
TEL : +82 51 970 6302

Kokako CO., LTD.

Head office : YEOUNGDO-GU, BUSAN

Homepage add :
Main products : Exhaust Valve Spindle&Bottom Piece Grinding Machine
TEL : +82 51 403 4114

Komeco CO., LTD.

Head office : GIJANG-GUN, BUSAN
Homepage add : www.komeco.net
Main products : Tacho Sys., Electronic Equip.
TEL : +82 51 724 5070

Kongsberg Maritime Korea Ltd.

Head office : GIJANG-GUN, BUSAN
Homepage add : www.km.kongsberg.com
Main products : Alarm monitoring system, Cargo monitoring system, Offshore technology
TEL : +82 51 749 8600

KOREA FILTER CO., LTD.

Head office : GIJANG-GUN, BUSAN
Homepage add : www.korea-filter.co.kr
Main products : STRAINER, OIL FILTER, AIR FILTER, AUTO STRAINER
TEL : +82 51 727 8360

Korea Flexble CO.

Head office : KUMJUNG-GU, BUSAN
Homepage add : www.hkflex.com
Main products : Metalic Flexible Hose, Metalic Expansion Joint, Manufacturing of Metalic Flexible hose Assemblies
TEL : +82 51 508 6291

KOTO Technical CO.

Head office : SAHA-GU, BUSAN
Homepage add :
Main products : Maintain&repair item(all hydraulic system, Adjust alignment(centering)
TEL : +82 51 417 8501

KSP CO., LTD.

Head office : GANGSEO-GU, BUSAN
Homepage add : www.kspvalve.com
Main products : Exhaust Valve Complete, Exhaust Valve Spindle
TEL : +82 51 831 6274

KSV(Korea Special Valve) CO., LTD.

Head office : YOUNGDO-GU, BUSAN
Homepage add : www.ksv-valve.co.kr
Main products : Valve spindle and Valve seat, for marine diesel engine
TEL : +82 51 415 4466

KTE CO., LTD.

Head office : GANGSEO-GU, BUSAN
Homepage add : www.kte.co.kr
Main products : High Voltage Swichboard, Side Thruster, Low voltage swichboard, Side thruster Control system, Group Starter Panel, Alarm Monitoring system, electric equipment etc
TEL : +82 51 265 0255

Kuk Dong Elecom CO., LTD.

Head office : SAHA-GU, BUSAN
Homepage add : www.kukdongelecom.com
Main products : Lighting Fixture
TEL : +82 51 266 0050

KUKDONG ELECTRIC WIRE CO., LTD.

Head office : JINCHEON-GUN, CHUNGBUK
Homepage add : www.nexans.co.kr
Main products : All kind of cable for Offshore and Shipbuilding including JIS, BS, IEC, DIN, IEEE etc
TEL : +82 2 2140 3064

Kum Kang Precision CO., LTD.

Head office : SAHA-GU, BUSAN
Homepage add : www.kkmarine.co.kr
Main products : marine valve, valve for engine, air reservoir tank
TEL : +82 51 262 4894

KUNSUL CHEMICAL IND. CO., LTD.

Head office : BUSANJIN-GU, BUSAN
Homepage add : <http://jebi.co.kr/>
Main products : Main products : Shop Primer, Anti-Corrosive Coatings, Anti-Fouling Coatings etc
TEL : +82 51 892 4221

KWANG SAN CO., LTD.

Head office : GANGSEO-GU, BUSAN
Homepage add : www.kwangsan.com
Main products : AIR VENT HEAD, EXP.JOINT, HEATING COIL, PIPE SPOOL etc
TEL : +82 51 974 6316

Kwang Seong CO., LTD.

Head office : GIMHAE-SI, GYUNGNAM
Homepage add : www.ikwangsung.com
Main products : PIPE CABLE HANGER, SPARE PART SEAT ETC
TEL : +82 55 338 2271

Kyung Eun ceramics CO., LTD.

Head office : GIMHAE-SI, GYUNGNAM
Homepage add : www.ke-ceramics.com
Main products : Ceramic Packing
TEL : +82 55 345 7761

Kyungsung Industry CO., LTD.

Head office : GANGSEO-GU, BUSAN
Homepage add : www.e-clamp.com
Main products : LNG carrier, sus corner & Anchor Strips&Pipe clamp etc
TEL : +82 51 831 4960

Leeyoung Industrial Machinery CO., LTD.

Head office : ULJU-GUN, ULSAN
Homepage add : www.leeyoung.co.kr
Main products : Lashing bridge, T-bulk head block, Covered-block, Engine casing&funnel, Upper deck&module unit etc
TEL : +82 52 231 5800

LHE CO., LTD.

Head office : GIMHAE-SI, GYUNGNAM
Homepage add : www.lhe.co.kr
Main products : Plate Heat Exchanger, Fresh Water Generator
TEL : +82 55 340 0625

LS Cable &System

Head office : ANYANG-SI, KYEONGGI
Homepage add : www.lscns.com
Main products : Power Cable, Marine&Offshore Cable, Telecom Cable, SUBMARINE CABLE, WINDSOL, SUPERCONDUCTIVITY
TEL : +82 51 310 6781

LUXCO CO., LTD

Head office : SAHA-GU, BUSAN
Homepage add : www.luxco.co.kr
Main products : Electrical Equipment for Internal Combustion Engines, Magnet Products etc
TEL : +82 51 260 1300

MIN SUNG CO., LTD.

Head office : GANGSEO-GU, BUSAN
Homepage add : www.minsung.co.kr
Main products : Steel Outfitting, Access Hatch, Swing away hatch, Cable tray, Electric cable box etc
TEL : +82 51 305 8862

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Head office : HAMAN-GUN, GYEONGNAM
Homepage add : www.miraeinch.com
Main products : Winch, Chain Stopper, Capstan
TEL : +82 55 587 8520

MODERN INTECH CO., LTD.

Head office : SASANG-GU, BUSAN
Homepage add : www.mo-dern.com
Main products : Fire retardant curtain, mattress, upholstery furniture, fire retardant fabric, carpet, rubber flooring
TEL : +82 51 325 0260

MRC(Marine radio CO., LTD.)

Head office : YOUNGDO-GU, BUSAN
Homepage add : www.mrckorea.com
Main products : Public Address System, Auto telephone sys
TEL : +82 51 414 7891

MSL Compressor CO., LTD.

Head office : POCHON-SI, GYEONGGI
Homepage add : www.mslcomp.com
Main products : Breathing Air Compressor
TEL : +82 31 541 7000

Mt.H Control Valves CO., LTD.

Head office : GANGSEO-GU, BUSAN
 Homepage add : www.mth.co.kr
 Main products : Main Starting Valve, Crank Case Relief Valve,
 Cyogenic Safety Valves&Control Valve
 TEL : +82 51 974 8800

NK CO., LTD.

Head office : SAHA-GU, BUSAN
 Homepage add : www.nkcf.com
 Main products : Ballast Water Treatment Sys., Co2 Sys.
 TEL : +82 51 200 0152

Oriental Precision&Engineering CO., LTD.

Head office : GANGSEO-GU, BUSAN
 Homepage add : www.opco.co.kr
 Main products : Deck House, Funnel & Engine Casing
 TEL : +82 51 202 0101

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Head office : SASANG-GU, BUSAN
 Homepage add : www.oscg.net
 Main products : Cable gland and accessories, GRP junction box
 TEL : +82 51 305 3910

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Head office : GANGSEO-GU, BUSAN
 Homepage add : www.worldpanasia.com
 Main products : Ballast water treatment system/level instrument,
 seawater coarse filtration/emission gas control system,
 engineering service
 TEL : +82 51 831 1010

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Head office : GANGSEO-GU, BUSAN
 Homepage add : www.piplus.co.kr
 Main products : Crank Shaft, Rudder Stock, Motor Shaft
 TEL : +82 51 831 9338

S&W CO., LTD.

Head office : SAHA-GU, BUSAN
 Homepage add : www.snwcorp.com
 Main products : Cam/Cam Shaft, Valve/Seat ring, Engine Bolts/
 Nuts, Bolts
 TEL : +82 51 205 7411

S. A. M-Tech

Head office : INCHEON-SI, GYEONGGI
 Homepage add : www.samartkr.com
 Main products : Engine control lever, Engine control cable,
 Hydraulic steering system, Stern drive, Helm pump, Cylinder etc
 TEL : +82 32 815 3614

SAE JIN INTECH CO., LTD.

Head office : GANGSEO-GU, BUSAN
 Homepage add : www.saejintech.com
 Main products : Emergency Towing System
 TEL : +82 51 971 9911

Sam Gong Industrial CO., LTD.

Head office : PYEONGTAEK-SI, GYEONGGI
 Homepage add : www.samgongkorea.co.kr
 Main products : Inflatable rubber products, Ship's ballast water
 treatment system, Life rafts, Speed boats, River boats, Fishing
 boats, Water tanks, High speed boats
 TEL : +82 31 651 3012

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Head office : GANGSEO-GU, BUSAN
 Homepage add : www.sam-gong.co.kr
 Main products : Oil Purifier, Ship's Window, Ship
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 type tower gangway, Ship ballast water treatment system, Quick
 Release mooring hook&road monitoring system
 TEL : +82 51 200 3040

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Head office : GIMHAE-SI, GYUNGNAM
 Homepage add : www.samkunok.com
 Main products : F.W.supply unit, BWTS, PE coating, Plant
 TEL : +82 70 4034 0226

Samyang Ind. CO., LTD.

Head office : SAHA-GU, BUSAN
 Homepage add :

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 TEL : +82 51 263 4460

Samyoung Machinery CO., LTD.

Head office : GONGJU-SI, CHUNGNAM
 Homepage add : www.sym.co.kr
 Main products : Cylinder Head, Cylinder Liner, Piston&Carrier etc
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Samyoung M-TEK CO., LTD.

Head office : HAMAN-GUN, GYEONGNAM
 Homepage add : www.symtek.co.kr
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Head office : YOUNGDO-GU, BUSAN
 Homepage add : www.samyungenc.com
 Main products : AIS/GMDSS Radio Equip etc
 TEL : +82 51 601 5555

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Head office : GANGNAM-GU, SEOUL
 Homepage add : www.saracom.net
 Main products : GMDSS Equipment
 TEL : +82 2 566 4248

Scana Korea Hydraulic LTD.

Head office : GIMHAE-SI, GYUNGNAM
 Homepage add : www.scana.co.kr
 Main products : Actuators, HPU and Local Control Panel,
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 Homepage add : www.sewon-ind.com
 Main products : High velocity P/V valve, Air Vent Head,
 Expansion Joint, Flame Arrester / Breather Valve
 TEL : +82 55 580 7200

Shin Han Machinery CO., LTD.

Head office : ULJU-GUN, ULSAN
 Homepage add : www.shinerpia.com
 Main products : Deck House, Rudder
 TEL : +82 52 240 5000

Shin Heung ENG. CO.

Head office : GANGSEO-GU, BUSAN
 Homepage add : www.shinheungeng.co.kr
 Main products : Curtain, Upholstery, Sofa&Chair, Mattress,
 Carpet, Roller Blind
 TEL : +82 51 817 6455

Shin Myung Tech CO., LTD.

Head office : YANGSAN-SI, GYUNGNAM
 Homepage add : www.smdavit.com
 Main products : Air motor, Winch, Davit, Crane, Reel, Capstan,
 Pump etc
 TEL : +82 55 363 7091

Shin Yeong CO., LTD.

Head office : GIMHAE-SI, GYUNGNAM
 Homepage add : www.sy-ind.com
 Main products : Man-hole, Access Hatch
 TEL : +82 55 346 0034

Shin-A CO., LTD.

Head office : SAHA-GU, BUSAN
 Homepage add : www.shina-ent.com
 Main products : Navigational/Communication Equip.
 TEL : +82 51 204 6221

Shin-A Metal Tech CO., LTD.

Head office : BUK-GU, ULSAN
 Homepage add : www.shinametal.com
 Main products : Engine Metal Bearing, Bearings for
 medium&small engines, Main Bearing Shells,
 Segment&Segment Holder, Guide Shoe, Top&Bottom end
 bearing, Mesta Bearing
 TEL : +82 52 298 2100

Shindong Digitech CO., LTD.

Head office : YEOUNGDO-GU, BUSAN
 Homepage add : www.shindong.com
 Main products : Navigation&communication, Internal
 communication equipment
 TEL : +82 51 461 5141

Shinshin Machinery CO., LTD.

Head office : GJANG-GUN, BUSAN
 Homepage add : www.sspump.com
 Main products : VID(Cooling F.W&S.W Pump), EHC(Volute
 Casting Centrifugal Pump), NLG(External Gear Pump)
 TEL : +82 51 713 0000

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 Main products : Fixed Pitch Propeller(FPP), Controllable Pitch
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Simulation Tech Inc.

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 Main products : Voyage Data Recorder
 TEL : +82 2 3281 0960

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 Homepage add : www.smecopiston.com
 Main products : Piston, Piston Liner
 TEL : +82 44 864 3030

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 Homepage add : www.sms-marinesystem.com
 Main products : Hatch Cover, Lashing Bridge, Ro Ro Equipment,
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 TEL : +82 51 290 1000

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 Homepage add : www.specs.co.kr
 Main products : Oil Mist Detector
 TEL : +82 31 706 5211

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 Homepage add : www.staco.co.kr
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 Main products : Marine diesel engine, Military diesel engine,
 power plant diesel engine, electronic communication equipment
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 Homepage add : www.stxhi.co.kr
 Main products : Turbocharger, Diesel engine parts, Industrial
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 TEL : +82 55 280 0700

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Homepage add : www.sunboind.co.kr
Main products : Package module unit, Tank top unit, E/R Block etc
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Sung Jin Geotec CO., LTD.

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Homepage add : www.sgtkor.com
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TEL : +82 52 228 5801

Sung Kwang Bend CO., LTD.

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Homepage add : www.skbend.com
Main products : Butt Welding Pipe Fittings
TEL : +82 51 330 0200

Sung Mi CO., LTD.

Head office : GIMHAE-SI, GYUNGNAM
Homepage add : www.sung-mi.co.kr
Main products : Door Frame, Wall Panel, Ceiling Panel, Door Hardware, Unit Toilet
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Homepage add : <http://sungsin.koreasme.com>
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TEL : +82 54 776 6441

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Main products : Pipe bending, Pipe spool, Marine Engine, Gas Turbine
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TEL : +82 51 415 0445

T.K. Corporation CO., LTD.

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Homepage add : www.tkbend.co.kr

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Homepage add : www.tanktech.co.kr
Main products : Water-mist fire fighting system for engine room and accommodation, LNG fuel tank system, Offshore steel structure
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Techcross Inc.

Head office : JUNG-GU, BUSAN
Homepage add : www.techcross.com
Main products : Ballast Water Management System
TEL : +82 51 603 3500

TechMarine S/W CO., LTD.

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Homepage add : www.techmarine.net
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TEL : +82 55 673 7315

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Homepage add : www.whayoung.co.kr
Main products : Fuel Pump Ass'y for Ship's Engine
TEL : +82 55 359 1100

WONIL CO., LTD.

Head office : MASAN-SI, GYEONGNAM
Homepage add : www.ms-wonil.com
Main products : Cylinder Cover, Common Rail Unit, Silencer, Spraying Plate, Rotor Shaft
TEL : +82 55 253 1500

Woo Chang Ind. CO., LTD.

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Homepage add :
Main products : Weather Tight Steel Door, Louver Vent, Steel Window Box, Morning fitting
TEL : +82 55 337 1651

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Homepage add : www.wjme.com
Main products : Exp.Junction box, Warning Alarm etc
TEL : +82 51 264 9130

Yoo Won Industry LTD.

Head office : SAHA-GU, BUSAN
Homepage add : www.yoowonind.com
Main products : Steering Gear, Filter, Deck M/C
TEL : +82 51 205 8541

You Jeon Industry CO., LTD.

Head office : CHANGWON, GYUNGNAM
Homepage add :
Main products : Marine engine parts, Engine bed
TEL : +82 55 297 2121

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