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New Year's Greeting

2014, a year for a new giant step forward! An eventful year has passed and the hopeful New Year 2014 has dawned.

This year, optimistic forecasts for global shipbuilding industry have been published both at home and abroad. Global order backlog stood at over 100 million CGT, showing signs of recovery. Also, optimistic outlook has been presented for the fields of offshore plant and LNG market in which domestic shipyards have shown strong performance.

Domestic shipyards have been hit hard by global economic downturn in the aftermath of the global financial crisis that began in 2008.

We hope that the New Year will heal all the pains, such as financial crisis, order drought, suffered by large and small companies in shipbuilding industry.

Monthly KORSHIP will strive to contribute to the advancement and growth of domestic shipbuilding industry also this year.

We hope that you would continue to show your attention and encouragement in 2014.

On the New Year's Morning All employees of the Monthly KORSHIP

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NEWS

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Memorandum of Understanding Signed for Mobile Powership

Polaris Shipping, Korea Midland Power, Hyundai Heavy Industries (HHI) and Siemens Energy Solutions signed a Memorandum of Understanding at COEX Intercontinental Hotel in Seoul on December 10, 2013 to develop Mobile Powership, an integration of shipbuilding and power generating technology in which a highly efficient power generating facility will be installed onto a FSRU for the very first time in the world.

It is expected that Mobile Powership will commence its operation in December 2017 with total investment of U\$ 940 Million. When compared to building a power plant on land, the model will substantially reduce civil complaints as it will not require a large scale land. In addition, due to systemized and skillful shipbuilding process, overall construction period will be shortened. In terms of power transmission, Mobile Powership will utilize existing cables so that sections subject to new installation will be minimized, which leads to significant cost saving. Once the business model is

현대중공업, 이동식발전선 개발 위한 MOU 체결

지난 12월 10일 코엑스 인터컨티넨탈 호텔에서 폴 라리스쉬핑, 한국중부발전, 현대중공업, 지멘스는 이동식발전선(Mobile Powership) 개발을 위한 합작 사업 양해각서를 체결했다.

이동식발전선 프로젝트는 국내 첨단 복합발전설비 건설과 운영 경험을 바탕으로 현대중공업의 세계 최초 부유식 액회천연가스 저장/재기화 설비(Foating Storage Regasification Unit) 건조기술과 세계 최고 효율의 발전설비 제작기술을 융합하는 신개념 선박 개발 프로젝트이다.

이 이동식발전선은 2017년 12월말 가동을 목표로

successfully launched in Korea, it is anticipated to move overseas to selectively target combined cycle power producing market where high yields can be generated. "This Powership integrates the LNG FSRU, the model first designed and built by Hyundai, with the top-of-the-line



4 concerned parties including Korea Midland Power will launch a Task Force Team after signing the Memorandum of Understanding to closely examine technical issues which will be reflected in the

총 9,886억원 투자비가 소요될 것으로 추정된다. 이 설비는 기존 육상발전소와 달리 부지확보가 필요 없어 지역민원을 줄이고, 조선소의 표준화된 공정관 리를 통해 공기가 단축되며, 기존 송배전망에 연계 하여 신규 송전선로를 최소화할 수 있어 건설비용 이 절감된다. 또한, 계약기간에 따라서 선택적으로 해외 고수익 발전사업지로 이동할 수 있는 큰 장점 이 있다.

현대중공업 관계자는 "이번 이동식발전선 프로젝트 는 세계 최초로 자체 개발 및 건조한 LNG FSRU 디자 인을 바탕으로 8800W급 최신 복합 화력 발전설비를 결합시킴으로써 조선과 플랜트 기술이 복합된 혁신



Computer generated image of the Mobile Powership

engineering of Powership. It is said that once performance of the Powership is ascertained through pilot project in Korea, then it will be exported to Philippines, Indonesia, Brazil, and other countries where power shortage has become a critical issue. In addition, it is anticipated that the project will firmly position itself as a business model well-suited for South Korean policies under the "Creative Economy" by generating approximately \$2 billion per project.

적인 선형개발의 선례가 될 수 있을 것이며, 이번 프 로젝트의 성공적인 수행을 통해 향후 해외로 발전선 신조 시장을 확대해 나갈 계획이라고 말했다. 한국중부발전 등 4개사는 이번 양해각서 체결 이후, 전문기들로 구성된 연구팀을 발족, 기술적 타당성을 사전에 면밀하게 검토하여 설계에 반영할 계획이다. 이번 이동식발전선 개발 프로젝트는 1단계로 국내 시범사업을 통한 성능을 확인한 이후, 전력가격이 국내보다 높은 필리핀, 인도네시아, 브라질 등 전력 부족 국기로 프로젝트당 약 20억 달러에 상당하는 민자발전 사업모델을 수출할 예정이다.

STX Heavy Industries launched full-scale management normalization process through restructuring

STX Heavy Industries embarked on fullfledged management normalization process on December 6 through large-scale restructuring and personnel reshuffle. STX Heavy Industries reorganized the business division into plant unit, energy & environment unit, and engine equipment unit in a bid to revamp the atmosphere of organization and strengthen responsibility management of business division, and furthermore, integrated the business management division, which had remained a dual structure in the wake of the merger between STX Metal and STX Heavy Industries, to strengthen risk management. Moreover, STX Heavy Industries became more simple and flexible organization through the expansion of large-team sys-

STX중공업, 조직개편으로 경영정상화 본격 시동

STX중공업은 지난 12월 6일 대대적인 조직개편 및 임원 인사를 단행하며 경영정상화에 본격적인 시동 을 걸었다.

STX중공업은 조직분위기를 쇄신하고 사업부문의 책임경영을 강화하기 위해 사업부문을 플랜트부문, 에너지환경부문, 엔진기자재부문으로 재편하는 한 tem. As a result, the company was reorganized into 4 sectors, 8 headquarters, 1 division, and 37 teams from previous structure comprising 2 sectors, 12 headquarters, 5 offices, and 50 teams.

Meanwhile, STX Heavy Industries applied for the voluntary agreement in May this year and entered into the voluntary agreement on September 12 through the procedures of due

편 STX메탈과 STX중공업의 합병으로 이원화되어 있던 경영관리부문을 통합해 리스크 관리 강화에 나섰다. 또한 대팀제 확대를 통해 단순하고 유연한 조직으로 변모시켰다. 이에 따라 기존 2부문, 12본 부, 5실, 50팀을 4부문, 8본부, 1실, 37팀으로 개편 했으며 임원의 33%를 줄였다.

한편 STX중공업은 지난 5월 자율협약을 신청해 채 권단의 실사, 동의 등의 절차를 거쳐 9월 12일 자율 diligence, consent, etc., of creditors. On November 12, STX Heavy Industries named Jeong Tae-hwa took as President to spur the management normalization of the company. An official from STX Heavy Industries said, "We started full-scale reorganization to bring business conditions back to normal and will emerge stronger from the restructuring process."

협약을 체결하였으며 11월 12일 정태화 STX중공업 대표이사 사장을 선임해 회사의 경영정상화에 박차 를 가하고 있다.

STX중공업 관계자는 "조직개편을 통해 경영정상화 를 위한 구체적인 노력이 시동을 걸었다"면서 "사업 구조 개편 등의 과정을 거쳐 새로운 면모로 거듭날 것"이라고 말했다.

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Kukdong Electric Wire won the 200 million Dollar Export Tower Prize on the International Trade Day

Kukdong Electric Wire, a leading manufacturer of marine wire, announced on December 5 that it was awarded the 200 million Dollar Export Tower Prize on the 50th International Trade Day. This prize came 7 years after the company received the 100 million Dollar Export Tower Prize in 2006, and it marks the third time that Kukdong Electric Wire won the prize after winning the 50 million Dollar Export Tower Prize in 1998. The International Trade Day, which marks the 50th anniversary this year, was launched on November 30, 1964 to celebrate exceeding USD 100 million in export, and was renamed in 1990 to promote the balanced growth of export and import.

극동전선, 무역의 날에 '2억불 수출의 탑 수상 선박용 전선의 선두업체인 극동전선은 제 50회 무 역의 날에 '2억불 수출의 탑을 수상했다고 지난 12 월 5일 밝혔다. 극동 전선은 1998년 '5천불 수출의 탑, 2006년에 '1억불 수출의 탑 수상에 이어 7년 만 에 또다시 '2억불 수출의 탑을 수상하는 쾌거를 이 루었다. Particularly, Kim Byeong-cheol, Chairman of Kukdong Electric Wire, was invited as a senior trader in recognition of his contribution to the development of the company which has seen a quadruple increase in export in 15 years. Kim Byeong-cheol, Chairman of Kukdong Electric Wire, was honored with the Gold Tower Order of Industrial Service Merit for his contribution to the achievement of USD 50 million in export in 1998. In relation to the 200 million Dollar Export Tower Prize, he conveyed a message of deep gratitude to the employees who shared the difficulties in boosting the export and turning the company to a prominent middle-standing one.

올해 50회를 맞는 무역의 날은 1964년 11월 30일 수출 1억 달러 돌파를 기념하기 위해 "수출의 날"로 제정되었고, 그 후 1990년에 수출과 수입의 균형적 인 발전을 위해 명칭이 "무역의 날"로 변경되었다. 특히 이번 무역의 날 행사에는 15년 만에 수출 규모 가 4배로 늘어난 극동전선의 성장 발전에 기여한 최병철 회장이 원로 무역인으로 초대되었다. 최병철



극동전선 회장은 1998년에 5,000만 달러 수출을 달성한 공로로 금탑 산업 훈장을 수상했었다. 이날 최 회장은 '2억불 수출의 탑' 수상에 대해 중소기업 에서 수출을 통해 견실한 중견기업으로 성장 발전 하는데 힘들고 어려운 시절을 함께 동고 동락한 임 직원들에게 깊은 감사의 말을 전했다.

NEWS

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DSME developed 3D ship design model system

Daewoo Shipbuilding & Marine Engineering (DSME) developed DaView, a threedimensional ship design model system, for the first time nationwide.

DaView, the acronym of DSME Advanced Viewer, means the program allowing the operator to view all aspects of ship and marine products. This system provides quicker and more efficient visual access to the three-dimensional design drawing created by the CAD, and therefore is specialized for the review of large-capacity ship and offshore design.

Particularly, DaView goes beyond simple visual aspect and performs various tasks, such as the design review, optimization of arrangement, prior verification of interference with blocks, etc., thus increasing the productivity. According to DSME, the

대우조선해양, 3차원 선박 설계모델 시스템 개발

대우조선해양이 국내 최초로 3차원 선박 설계모델 시스템인 다뷰(DaView)를 개발했다.

다뷰는 DSME Advanced Viewer의 약자로, 선박과 해양제품의 모든 것을 다 볼 수 있는 프로그램을 의 미한다. 이 시스템은 CAD로 만들어진 3차원 설계 도면을 보다 빠르고 효율적으로 보여줌으로써 대용 량의 선박 및 해양 설계 검토에 특화되어 있다. 특히 다뷰는 단순히 시각적인 측면을 넘어서 설계 adoption of DaView system as design standard viewer will help trim several billion Won (Korean currency) of the costs incurred from overseas license and product introduction.

DSME has pro-

ceeded with the research into 3D utilization technology converging with shipbuilding and IT(Information Technology) and is on track to unveil the advanced DaView system featuring the 8 major functions such as model movement/rotation animation effect, space inspection function using the avatar, etc., in the first half of next year.

검토 및 배치 최적화, 블록의 사전 간섭여부 검증 등 다양한 업무를 수행함으로써 생산 효율성을 향 상시킨다. 대우조선해양에 따르면, 다뷰 시스템을 설계 표준 뷰어로 활용해 수십억원 상당의 해외 라 이센스 및 제품 도입 비용을 절감할 수 있다. 그 동안 조선과 IT 기술을 접목한 3D 활용 기술 연 구를 지속해 온 대우조선해양은 내년 상반기까지 모델 이동/회전 애니메이션 효과, 아비터를 활용한 공간검사 기능 등 총 8가지 주요 기능을 보완한 진



In relation to that, an official from DSME said, "I expect that greater importance will be given to the tasks related to large vessels and marine products amid the increase in ultra large-scale offshore projects. We plan to push forward various researches aiming to increase the efficiency of design and production site."

보된 다뷰 시스템을 선보인다는 계획이다.

이와 관련해 대우조선해양 관계자는 "초대형 해양프 로젝트 수주가 늘어나는 만큼 앞으로 대형 선박 해 양제품의 설계 관련 업무 중요성은 더욱 커질 것으 로 예상된다"며 "앞으로 설계와 생산 현장의 효율성 을 높이기 위한 다양한 연구를 진행할 계획"이라고 밝혔다.

Jung Sung-Leep was named as the joint chief executive

Jung Sung-Leep took office as joint chief executive of STX Offshore & Shipbuilding (STXOS) on December 16.

Jung Sung-Leep, CEO of STXOS, said in his inaugural address, "I will turn STXOS into an independent company with the world's strongest competitive edge." Particularly, he made it clear that he would stand at the fore front of effort with the help of creditors in restoring the business conditions back to normal by leveraging the experience that he gained from the management normalization procedure at Daewoo Shipbuilding & Marine Engineering (DSME). He stressed, "It is the time that we should bring the changes and innovation with strong determination to help



STXOS emerge stronger, rather than being self-complacent.

Jung Sung-Leep, CEO of STXOS, put forth the goals mapped out for each period. Specifically, he made it clear that over the short-term bad projects with low profitability would be eliminated, and that the flow of production would be stabilized by wining new contracts based on in-depth review of profitability. In addition, he indicated that

정성립 STX조선해양 신임 대표이사가 지난 12월 16

정성립 대표는 취임사를 통해 "앞으로 STX조선해양

을 세계 제일의 강한 경쟁력을 갖춘 독립회사로 재

탄생시키겠다"고 각오를 밝혔다. 특히 대우조선해양

에서 비슷한 과정을 겪으면서 경영정상화를 위해

힘썼던 경험을 토대로 채권단의 도움 이래 앞장서

겠다는 것이다. 덧붙여 그는 "과거 모습에 도취되어

관행에 머물지 말고 STX조선해양을 다시 일으켜 세

정성립 대표이사, 총괄사장 취임

일 총괄사장으로 공식 취임했다.

over the mid and long-term he would focus on human resource development, enhancement of productivity, and corporate culture rooted in collaboration in order to turn the company into a shipyard with unmatched competitiveness and technology in the global market.

Jung Sung-Leep, CEO of STXOS, stressed, "We have to accept this change positively by forming a united front to cope with many

우겠다고 굳은 결의를 가지고 변화와 혁신의 바람 을 일으켜야 할 때"라고 강조했다.

정성립 대표는 이와 함께 시기별로 회사가 나가가 야 할 목표를 제시했다. 단기적으로는 수익성이 떨 어지는 악성 프로젝트를 정리하고, 면밀한 수익성 검토를 거친 신규수주를 통해 생산 흐름을 안정화 시키겠다고 밝혔다.

또한 중장기적으로는 세계 1위의 기술력과 경쟁력 을 갖춘 강한 조선소가 되기 위해 인재 양성, 생산 성 향상, 협력의 기업문화 확립에 주력하겠다고 덧 changes ahead. Also, we should take initiative to help spur development of company, the foundation of life for families."

Jung Sung-Leep was named as new CEO of STXOS by the resolution of the Board of Directors on December 16 after being appointed as the registered director at the extraordinary meeting of shareholders which was held on the same day.

붙였다.

정성립 대표는 "우리 앞길에 많은 변화가 예상되지 만 우리 모두 하나가 되어 이 변화들을 긍정적으로 수용해야 한다. 나와 우리 가족의 삶의 터전인 회사 발전을 위해 내가 먼저 앞장서야 한다"고 강조했다. 대우조선해양 사장을 역임한 정성립 STX조선해양 신임 대표이사는 16일 열린 임시주주총회에서 등기 이사로 선임된 뒤 같은 날 열린 이사회에서 신임 대 표이사로 선임되었다.

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Siemens to Acquire TESIS PLMware, Further Enhancing Its Industry Software Portfolio

Siemens has entered into an agreement to acquire TESIS PLMware, a recognized leader in the integration of product lifecycle management (PLM) software with other enterprise applications. The acquisition will further enhance Siemens' industry software portfolio.

TESIS PLMware helps customers improve IT costs and efficiency by providing a proven solution for the integration of Siemens' Teamcenter[®] software with the world's leading ERP systems and other enterprise applications such as MES, CRM and SCM. TESIS PLMware will, after closing, be assigned to Siemens PLM Software, a business unit of the Siemens Industry Automation Division.

With the acquisition of TESIS PLMware, an important partner of Siemens PLM Software since 1992, Siemens is helping ensure that its customers will continue to

seamlessly assimilate the Teamcenter PLM portfolio into their global product development and manufacturing environments.

"Siemens is committed to delivering best in class solutions that help our customers, and the next generation of manufacturers, efficiently bring innovative products to market," said Chuck Grindstaff, president and CEO, Siemens PLM Software. "With the acquisition of TESIS PLMware, Siemens is further expanding its portfolio of industry software. With stable and proven interfaces to the world's leading ERP systems, our PLM solutions are completely integrated into the enterprise software architecture of our customers. This makes them faster, more efficient, more flexible and more cost effective. Today's announcement is another important execution step in our strategy of focused



acquisitions in the area of industry software."

TESIS PLMware, a member of the TESIS group, was founded in 1988 as a consultancy and software company that helps medium and large manufacturing companies worldwide create integrated PLM landscapes and highly efficient product development processes.

NEWS

지멘스 PLM 소프트웨어, TESIS PLMware 인수 통해 인더스트리 소프트웨어 포트폴 리오 강화

세계 선도적인 PLM 소프트웨어 및 서비스 공급기 업인 지멘스 PLM 소프트웨어가 PLM 솔루션과 엔 터프라이즈 애플리케이션 간의 통합에 있어 선도기 업인 TESS PLMware를 인수한다고 발표했다. 지멘 스는 이번 인수를 통해 자사의 인더스트리 소프트 웨어 포트폴리오를 한층 강화할 수 있게 됐다. TESIS PLMware는 지멘스의 Teamcenter® 소프트웨 어와 업계 최고의 ERP 시스템, 그리고 MES, CPM 및 SCM과 같은 엔터프라이즈 애플리케이션들의 통 합을 위한 검증된 솔루션을 제공함으로써, 고객들이 TI 비용을 절감하는 동시에 효율성을 향상시킬 수 있도록 한다. 이번 인수가 완료되면 TESS PLMware 는 지멘스 산업 자동화 사업 본부인 지멘스 PLM 소 프트웨어에 통합될 예정이다.

지멘스는 1992년부터 지멘스 PLM 소프트웨어의 중요 파트너였던 TESS PLMware를 인수함으로써, 고객들이 Teamcenter PLM 포트폴리오를 그들의 글 로벌 제품 개발 및 제조 환경에 보다 유연하게 적용 시킬 수 있도록 돕는다는 방침이다.

지멘스 PLM 소프트웨어의 척 그라인드스태프 (Chuck Grindstaff) 회장 겸 CEO는 "지멘스는 최고의 솔루션을 제공해 고객 및 제조 기업들이 혁신적인 제품을 효율적으로 시장에 내놓을 수 있도록 돕는 데 주력하고 있다. TESS PLMware의 인수를 통해 지멘스 인더스트리 소프트웨어 포트폴리오를 한층 확장할 수 있게 됐다."면서 "업계 최고의 ERP 시스템 을 위한 안정적이면서도 검증된 인터페이스를 통해 우리의 PLM 솔루션이 고객들의 엔터프라이즈 소프 트웨어 아키텍처에 완벽하게 통합될 수 있게 되었 다. 이는 고객들로 하여금 보다 향상된 속도, 효율 성, 유연성 및 비용 효율성을 실현하도록 한다. 이번 합병은 인더스트리 소프트웨어 분야에 초점을 두고 있는 우리의 인수전략에 있어 또 하나의 중요한 단 계를 실행한 것"이라고 설명했다.

TESIS 그룹의 계열사로 1988년 설립된 TESIS PLMware는 컨설팅 및 소프트웨어 기업으로 중견 제 조 기업들이 통합 PLM 환경을 구축하고 효율적인 제품 개발 프로세스를 갖출 수 있도록 돕고 있다.

HMD's asphalt carrier selected as world-class product

The asphalt carrier built by Hyundai Mipo Dockyard(HMD) was selected as worldclass product in 2013 World-class Product Company Certification Award held by the Ministry of Trade, Industry and Energy on December 19. HMD has churned out some world-class products, including its medium-sized product carrier in 2003, medium-sized containership in 2005, container/ro-ro carrier in 2012.

Asphalt carrier can transport various cargos, such as asphalt, coal tar, coal tar pitch, fuel oil, diesel oil, etc., in 2 standalone cargo tanks, and is fitted with heat medium, boiler, rock wool heat insulating material necessary for maintaining high temperature at 230°C to prevent the hardening of cargo.

the U.K-based shipbuilding and shipping magazine, selected HMD' 6,000-ton asphalt carrier IVER BALANCE (delivered to VROON of the Netherlands) and 19,000-ton asphalt carrier BLUEBIRD ARROW (which was delivered to GEARBULK of U.K. in January this year) as

In 2011. Naval Architect.



6,000-ton asphalt carrier built by HMD

the 'Ship of the Year' in recognition of their excellence in technology, design, and performance.

Meanwhile, the asphalt carrier market is a niche market where about 200 vessels are

현대미포조선, 아스팔트운반선 '세계일류상 품' 선정

지난 12월 19일 산업통상자원부가 주최한 2013년 세계일류상품기업 인증서 수여식에서 현대미포조 선이 건조한 아스팔트운반선(Asphalt Carrier)이 세계 일류상품으로 선정되었다. 이에 앞서 현대미포조선 은 지난 2003년 중형 석유화학제품운반선, 2005년 중형 컨테이너운반선, 2012년 컨테이너/로로선 등 이 세계일류상품으로 선정된바 있다. 아스팔트운반선은 2기의 독립된 카고탱크에 아스 팔트를 포함해 콜타르, 콜타르피치, 중유, 디젤유 등 의 다양한 화물을 운송할 수 있으며, 화물의 굳음 방지를 위해 230°C의 고온이 유지될 수 있도록 열 매체 보일러 및 암면보온재를 장착한 특수선이다. 현대미포조선은 지난 2011년 네덜란드 브룬(/ROON) 시에 인도한 6,000 톤급 아스팔트운반선인 아이버 밸 런스(MER BALANCE)호와 올해 1월 영국 기어벌크 (ⓒEARBULK)시에 인도한 19,000 톤급 아스팔트운반 operating worldwide. HMD became the first domestic company to make entry into this market in 2010, and has won orders for 10 vessels from world's leading shipping companies thus far.

선인 블루버드 애로우(BLUEBRO ARROW)호가 영국 의 조선해운 전문지인 '네이벌 아키텍트(Naval Archied)로부터 최우수 선박으로 선정되어 기술, 디자 인 성능을 이미 국제적으로 공인받은 바 있다. 한편 아스팔트운반선 시장은 전 세계적으로 200여 척이 운항되고 있는 틈새시장으로 국내 조선업체 중에는 현대미포조선이 유일하게 지난 2010년 진 출, 세계 유수의 선사로부터 지금까지 모두 10척의 선박을 수주했다.

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Wilhelmsen Technical Solutions maintains strong position in China

On 5 Dec 2013, Wilhelmsen Technical Solutions (WTS) has maintained a strong position as a preferred supplier to China's shipbuilding and asset operating community with a strong focus on innovation and total solutions delivery.

China continues to be a territory of strategic importance for WTS and the company has been active during the last five years to bolster its product portfolio, adding several new products to its established range of safety, environmental, HVAC, electrical and insulation solutions.

Yilie Shen, China Area Director, Safety and Environment, notes an improvement in trading conditions in China which supports the shift towards higher quality, high value products. He said, "A key trend we observe is the movement of Chinese shipyards away from low cost commodity shipbuilding and into higher value ship and offshore projects. That makes WTS natural partner when they are seeking to broaden their understanding of the solutions which are required in these sectors."

Recent acquisitions by WTS include Novenco Fire-Fighting A/S which brings specialised knowledge in water mist fire suppression technology. Also added to the portfolio is Maritime Protection, which is specialised in provision of diesel and dual fuel inert gas generators.

Maritime Protection IG generators are designed for installation on LNG and LPG carriers, with a smaller footprint than conventional IG systems, taking into account the premium for space in machinery areas on next generation LNG vessels.

For marine and offshore fire fighting applications and particularly where certain owners are looking to move away from CO_2 systems, WTS provides the Unitor XFlow Water Mist system. Using patented 'XFlow' nozzle technology, this low pressure system can provide protection area up to 5,000 sq m – an area which traditionally has required a high pressure system.

Employing this technology means that shipyards can specify a standard level of piping and control systems to keep installation, maintenance and water consumption low, while still relying on a highly effective solution.

For owners placing newbuilding orders with an eye to energy saving onboard ship with a fast ROI, WTS provides the Engine



Room – Energy Management Technology (ER-EMT) solution.

ER-EMT uses the True Demand[™] concept that automatically responds to the varying conditions of the engine room. The system alters the ventilation and combustion air supply to meet the demand of fresh air to the engine room and varies the sea water pumps to the actual cooling demand of the diesel engine at any given time.

EMS-CHEMIE moves to AVEVA Everything3D mid-project

AVEVA announced that EMS-CHEMIE has moved to the new AVEVA Everything3D (AVEVA E3D) software for the design of its chemical facilities. The EMS-SERVICES business unit of EMS-CHEMIE has successfully used AVEVA PDMS since 2004. Now it will benefit from the advanced functionality and improved design efficiency provided by AVEVA E3D; for example, the integrated drawing production that is exceptionally easy to use and produces deliverables much more quickly. This was just one of the drivers behind EMS-CHEMIE's decision to move to the nextgeneration AVEVA design software.

"We switched over right in the middle of an ongoing project," said Marco Derungs, AVEVA E3D Administrator, EMS-SERVICES. "Thanks to its intuitive functionality, AVEVA E3D can be mastered quickly and the migration to productive operation took place rapidly. This smooth transition was due to the fact that AVEVA E3D and AVEVA PDMS are fully compati* ***************



AVEVA Everything3D integrates as-built laser scan with new design in the 3D design environment



ble and can be used simultaneously across the same project."

"The ability to automatically generate design drawings directly from the 3D model is a critical deliverable for EMS-SERVICES," explained Helmut Schuller, Executive Vice President EMEA, AVEVA. "For other customers it may be the direct integration of as-built information in the form of 3D laser scans. We are seeing a wide variety of reasons why both EPCs and Owner Operators are deciding in favour of AVEVA E3D for their design departments. We have been very pleased by the number of customers in EMEA who have already made the decision to adopt or move to AVEVA E3D. It is very clear proof of the value that the new AVEVA E3D technology is bringing to their businesses."

Schneider Electric Korea obtained ISO 50001 certification

Schneider Electric Korea announced on December 5 that it obtained ISO 50001 (International Standard Energy Management System) from Bureau Veritas, the France-based global certification body, for its head office in Seoul, Iksan manufacturing plant, and Paju logistics center.

Schneider Electric has obtained ISO 50001 for 54 workplaces in many countries worldwide, including Korea, since it acquired the world's first certification for its head office in France. This certification for Schneider Electric Korea attests to the company's endeavor for efficient energy management. Having received this certification, Schneider Electric Korea plans to move ahead with energy management activities that suit its status as global expert in energy management.

ISO 50001 is the certification of international standard energy management published by the International Organization for Standardization in 2011, and is the energy management standard that allows all members of the organization, including the Chief Executive Officer (CEO), to be involved in the activities aiming to improve energy efficiency constantly. As the energy shortage has aggravated worldwide, ISO 50001 certification has received a lot of attention from the

companies striving to make continued investment in energy management.

Bureau Veritas, the certifier of ISO 50001 this time, has been recognized as a global leader in test, inspection and certification since its establishment in 1828.

Kim Geong-rok, President of Schneider Electric Korea, said, "I am delighted that we became the first foreign-owned company



in Korea to receive ISO 50001 certification from Bureau Veritas, one of the world's leading certification organizations. We will continue to fulfill our social responsibility for sustainable management as a leader in energy management sector and make utmost effort to maximize energy management capabilities of customers."

슈나이더 일렉트릭 코리아, ISO 50001 인증 취득

슈나이더 일렉트릭 코리아가 세계적 인증 기관인 프 랑스 뷰로베리타스(Bureau Verias)로부터 서울 본사, 익산공장과 파주 물류센터에 대해 ISO 50001(국제 표준 에너지경영 시스템) 인증을 받았다고 지난 12월 5일 밝혔다.

슈나이더 일렉트릭은 프랑스 본사의 전세계 최초 인증을 시작으로, 이번 한국까지 전세계 총 54개의 사업장이 ISO 50001을 취득했으며, 슈나이더 일렉 트릭 코리아는 이번 인증으로 효율적인 에너지 경 영 노력을 인정받게 됐다. 앞으로도 글로벌 에너지 관리 전문가의 위상에 걸맞은 에너지 경영 활동을 전개해 나갈 계획이다.

ISO 5000101란 국제 표준화기구 ISO가 2011년 공 표한 국제 표준 에너지경영시스템 인증으로, 최고경 영자부터 모든 조직 구성원이 참여해 에너지 효율 향상 활동을 지속적으로 추진할 수 있는 에너지 관 리 표준이다. 전세계적으로 에너지난이 심화되는 가 운데 에너지 경영에 지속적인 투자와 노력을 하는 기업으로부터 많은 관심을 받고 있다.

이번 ISO 50001을 인증한 기관인 뷰로베리타스는

1828년 설립 이래 테스트와 검사 및 인증 분야에서 글로벌 리더로 인정받고 있다.

슈나이더 일렉트릭 코리아 김경록 대표는 "전세계 유수 인증 기관 중 하나인 뷰로베리타스로부터 국 내 외국계기업 중 최초로 ISO 50001인증을 받게 되 어 기쁘다. 앞으로도 에너지 관리 분야 업계 리더로 서 지속가능 경영에 대한 사회적 책임을 다하고 고 객들의 에너지 관리 역량을 극대화하는데 최선을 다하겠다"고 말했다.

• • • • • E.ON Netz uses aluminium underground cables from Nexans

E.ON Netz is using an aluminium underground cable from Nexans in the expansion of its grid infrastructure for wind energy. In the administrative district of Dithmarschen, Nexans has installed a double circuit 110 kV underground cable system for E.ON - the first of its kind for a German customer - with a total length of around 5.5 km and an order volume of \in 4 million.

The section that has now been connected up is part of the concept of the federal state government of Schleswig-Holstein to transport

넥상스, E.ON Netz의 알루미늄 지중선 설치 EON Netz는 자사의 풍력 에너지용 그리드 인프라 확장 프로젝트에 넥상스의 알루미늄 지중선을 사용 했다. 넥상스는 E.ON Netz의 슐레스비히홀슈타인 주 디트마르센의 프로젝트에서 총 길이 5.5km의 4 백만 유로 상당에 해당하는 더블서킷 110kV 지중 선 시스템을 설치한 것이다.

현재까지 연결 된 것은 지중선으로 20km 넓이의

wind power electricity inland along the coast in a 20 km wide corridor via underground cables. As part of the energy turnaround, E. ON Netz has embarked upon an infrastructure project that will enable a future feed-in of 9000 MW of electricity from offshore wind farms into the 380 kV transmission grid along the west coast of Schleswig-Holstein.

The underground cable that has now been taken into operation has a cross-section of 2500 mm², and it is the first time that

회랑지대 해안선을 따라 풍력 전기를 내륙에 공급 하려는 슐레스비히홀슈타인 연방 주정부 계획의 일부이다. 에너지 정책 전환의 일환으로 E.ON Netz는 해상풍력단지로부터 생성된 9000MW의 전력을 슐레스비히홀슈타인 주 서쪽 해안을 따라 380kV 송전 그리드에 보낼 기간 산업 프로젝트를 시작했다.

현재 운영되고 있는 지중선은 단면적이 2500mm²

Nexans has installed a cable of its type in Germany. The underground aluminium cable installed at a depth of around 1.75 m in PE tubes between Dieksanderkoog and Marne has a slightly larger circumference than a comparable copper cable, but it makes up for this by being lighter and more economic overall. The transmission capacity of the cable system is 360 MW – enough power to supply the three cities of Flensburg, Kiel and Lübeck with electricity.

이며, 넥상스가 독일에 이와 같은 타입의 전선을 설 치한 것은 이번이 처음이다. 디에크산데르쿠그와 마 른 사이의 약 1.75m 깊이의 PE관에 설치된 지중 알 루미늄 케이블은 동 케이블과 비교하여 둘레가 약 간 더 크지만 전반적으로 더 가볍고, 경제적이다. 케 이블 시스템의 송전량은 360MW로, 플랜스부르크 (Flensboug), 키엘(Kie), 뤼벡(Lübeck) 등 세 도시에 전력을 충분히 공급할 수 있다.

Land Based Test Site (LBTS) will be built in Changwon, which is furnished with test and research facilities for submarine, electricitypowered destroyer, etc. This is the nation's first LBTS for electricity-powered vessels such as submarine, and is the world's 3rd of its kind after the United States and U.K. The Korea Electrotechnology Research Institute (KERI) held the groundbreaking ceremony for this LBTS for electricity-powered vessels such as submarine, which was attended by about 200 officials including Hong Joon-pyo, governor of South Gyeongsang Province, Park Wan-soo, Mayor of Changwon, etc., on December 18. This LBTS will carry out the integrated tests on land for performance verification of the equipments for electricity-powered vessels such as submarine prior to the onboard installation.

KERI presented the proposal of the onshore business of electricity-powered vessel to Daewoo Shipbuilding & Marine Engineering (DSME) in April last year. In June, DSME selected KERI as preferential negotiator. South Gyeongsang

Provincial Government and KERI anticipate that the establishment of this LBTS would generate KRW 1 trillion 484 billion for market creation and create 3,968 jobs.

KERI's research team will establish the land-based laboratory for submarine/electricity-powered vessels, along with the research laboratory building dedicated to the research into electricity-powered ves-



sel, in September and carry out the onshore integrated test of submarine propulsion system through test equipment installation and buildup for submarine propulsion system. In addition, KERI plans to develop core technologies for electric ship propulsion system and high value-added electricity-powered vessels, and provide technical support to related companies.



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Global shipbuilding market on an upturn in 2014

-Shift of focus in resource development from onshore to offshore

The recovery in the shipbuilding market, which started from the second half of 2013, is expected to continue into 2014. This momentum of growth comes from the expectation for the increase in new orders for facilities used in offshore development projects, as well as the recovery in the market for commercial vessels such as containership, tanker, bulk carrier, etc. Therefore, a surge in new orders for gas carriers, particularly LNG carriers, is expected in vessel sector, while the F-LNG(Floating LNG) is likely to dominate the market for the offshore plant facilities. Moreover, the market is expected to see a recovery in the newbuilding prices, driven by the upturn in the demand among the global shipping companies for eco-ship fitted with dual fuel engine and very large containership to save fuel costs.

As the strain of the European financial crisis is being reduced, large-scale projects underway in many parts of the world are expected to gather momentum after they were stymied. In case that these projects are in full swing, new orders for LNG carriers and F-LNG are expected to skyrocket.

The market for commercial vessels has seen a robust growth in new orders for high efficiency eco-ship and ultra-large vessels amid rigorous enforcement of environmental regulations and emphasis on fuel-savings. Besides, the deep-sea development, shale gas, etc., are expected to have a positive impact on the market. Therefore, the global shipbuilding market is likely to show slow signs of recovery this year. The shipbuilding industry is expected to be put back on track to full-scale recovery. The shipbuilding market recovery will be led by offshore plant and eco-ship in 2014.





The offshore plant sector has witnessed unprecedented level of offshore (deep-sea) drilling activities worldwide over the last 2 years. Global oil & gas companies have expanded to the offshore (floating) from onshore area, considering the advancement of drilling technology and productivity. However, the Eurozone crisis put strain on the energy development projects that were carried out worldwide. According to Clarkson, then number of newbuild vessels stood at 243 units in the offshore plant sector, which represents only 50% of the level registered in 2012, and particularly, drillship, FPSO, and platform supply vessel showed the sharpest decline in new orders.

This year, large projects that have been stagnant are expected to gather momentum amid global economic recovery and resultant mitigation of the strain of financial crisis in Europe and the United States. New orders for LNG carriers and F-LNG are likely to increase if the projects, most of which are related to LNG development, make progress in full scale. Domestic shipyards, highly competitive in both areas, are expected to experience a sharp increase in new orders. In particular, new orders for LNG carriers have grown steadily over the past few years. This year, a noticeable increase is expected in the shale gas production led by the United States, and new orders for LNG carriers are likely to soar compared to the previous years. The commercial vessel market is expected to see an increase in new orders for high efficiency eco-ships and ultra large vessels due to the stringent enforcement of environmental regulations and emphasis on fuel-savings. Besides, many issues such as deep-sea development, shale gas, etc., are expected to have a positive effect on the market. Therefore, the global shipbuilding market is likely to show slow recovery this year.

According to Clarkson, the number of newbuild vessels stood at 121 million DWT(42.2 million CGT) with 1912 units



UIG EPSO

Bird's eye view of LNG FPSO by SHI

which represents a 158% increase year-on-year. The Clarkson newbuilding price index recorded 132.1 points due to the recovery in the prices of containership and bulk carrier.

Advent of LNG era

This year, the rising demand for LNG will result in the swollen orderbook for LNG carriers, F-LNG, FSRU, and FLSU (Floating Liquefaction Storage Unit) which serves the role of LNG export terminal.

The consumption of LNG has risen as low-carbon alternative energy source amid the enforcement of environmental regulations worldwide. Along with that, shale gas production which is expanding due to the profitability also has a major impact on the expansion of the LNG. New orders for LNG carriers are expected to exceed the level recorded in 2011, a year that saw rapid growth in new orders for LNG carriers in wake of nuclear meltdown in Fukushima, Japan.

The increase in new orders for LNG carriers this year will be driven by the surge in the demand for LNG carriers transporting the shale gas from the United States with the approval of U.S. DoE(Department of Energy) for the LNG export. The United States is expected to start exporting the shale gas in full scale from 2017.

Therefore, new orders will be placed from this year, considering that it takes 2 to 3 years to complete the construction of a LNG carrier. In addition, gas fields in Australia, Russia, etc., are scheduled to start production from 2017. The shipbuilding industry predicts that at least 70 LNG carriers will be ordered this year, which is an increase by more than 50% compared to the previous year.

F-LNG enables the development of small and medium-sized gas fields that have been delayed over the issue of profitability. New orders for offshore platforms, such as F-LNG, FPSO,

Gas field	Region	Operator	EPC	Progress
Tamar	Israel	Pangea LNG BV	DSME prospective	Expected FEED for 2014
Abadi FLNG	Indonesia	Inpex/Shell	Competition among consortiums, such as GC-MODEC-Technip-DSME, Saipem- Chiyoda-SBM, etc. HHI and SHI are expected to participate when the facility EPC contract is signed next year.	Expected FEED for 2014
Browse FLNG	Australia	Shell/Woodside	HHI, SHI, DSME are expected to compete.	Expected FEED for 2014
Cash Maple	Australia	PTTEP(Thailand NOC)	KBR-Hoegh LNG-DSME carries out the FEED project	DSME carries out the FEED project
PNG FLNG	Papua New Guinea	Petromin	DSME, Hoegh LNG (FEED, EPC)	Expected FEED for 2014
Rotan FLNG	Malaysia	Petronas	Competition between SHI consortium and MITC consortium	Expected FEED for 2014
Scarborugh FLNG	Australia	ExxonMobil/BHP Billiton	HHI, SHI, DSME are competing	Bid scheduled for the second half of 2013 (Pre-FEED currently in progress)
Bonaparte FLNG	Australia	GDF SUEZ Bonaparte	Chiyoda, McDermott, Saipem, Technip participate in the bid for FEED, EPC	Carrying out the FEED for 2013, expected to enter into the FID in 2014
Lavaca Bay LNG (FLSO)	United States	Excelerate Energy	SHI-Oil&Gas Solutions consortium carries out the FEED	SHI is expected to enter into the FID in mid part of 2014 (Pre- FEED completed)
ConocoPhillips LNG	Unknown	ConocoPhillips	SHI, DSME are competing	Slated for 2014 (Pre-Feed completed)
Santos Basin Petrobras PJ	Brazil	Petrobras	SHI, Technip participation	1Q FID was signed in 2012 Main contract is expected to be awarded in 2014, FEED currently in progress
Gulf LNG Project	Papua New Guinea	Interoil	Exploration stage - Korea Gas Corporation, Japan Petroleum Exploration, Mitsui consortium	Project approved in November, 2012

Table 1. Current F-LNGs in major gas fields worldwide

FSO, are expected to be placed in full-scale, given that it takes approximately 3-5 years until actual placement of new order.

According to the shipbuilding industry, an average of 4 to 5 ultra large LNG-FPSOs are expected to be ordered for the next years. Moreover, the market is expected to expand by more than USD 15 billion each year.

Meanwhile, Australia's Woodside recently announced its plan to put 3 additional FLNG into operation at the Browse

offshore gas field of the country. Woodside has confirmed its plan to make investment in LNG until 2015, and cancelled its investment plan for onshore LNG facility worth USD 45 billion. Instead, Woodside decided to expand investment in F-LNG. Such decision reflects the significantly lower cost of FLNG compared to the onshore LNG. According to the shipbuilding industry, F-LNG can reduce the costs by more than 20% compared to the onshore LNG.

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Feature 2. Trends in the volume of LNG carriers (Source: Clarkson, Daewoo Securities Research Center)

Evolution of eco-ship

The challenge of fuel reduction heralds a sea change of global shipping industry. Although the shipping industry is reeling from recession worldwide, a handful of large shipping companies continue to make surplus based on the differentiated strategies. These large shipping companies have achieved the cost-cutting management that reduces fuel costs by making intensive investment in high efficiency eco-friendly vessels. Maersk drastically reduced fuel costs by making intensive investment in high efficiency eco-friendly vessels over the last decade, despite the downturn of the market. According to the industry. Maersk has reduced the fuel costs equal to USD 310 million in the first guarter alone. Moreover, Scorpio Tankers, which suffered deficit from 2010 to 2012 ordered 65 units of eco-designed tankers from a few years ago and successfully made a turnaround with surplus in 2013. As a result, the aged vessels of the previous shipping fleets will be dismantled earlier than scheduled, which in turn will sharply increase new orders for high-efficiency eco-ships this year.

Furthermore, new orders for eco-ship, which began with MR tanker, also cover large vessels. Last year, Daewoo Shipbuilding & Marine Engineering (DSME) successfully delivered the Suezmax VLCC to ALMI TANKER, the Greecebased shipping company. This vessel is the world's first VLCC fitted with the eco-friendly marine engine of G-Type developed by MAN Diesel & Turbo (MDT).

According to the shipbuilding industry, VLCC less than 5 years old consumes about 100 tons on average per year. If the VLCC built at Chinese shipyard consumes an average of 100 tons per year, the eco-designed VLCC built at Korean



VLCC built by DSME

shipyard consumers less than 100 tons yearly. The market for large eco-ships is expected to move even faster. Scorpio tankers has already begun to secure VLCC dock slot at Korean shipyards and recently awarded a contract to DSME for 5 units of 300,000-ton eco-designed VLCCs.





Fuel efficiency competition in shipping market

This year, full-fledged competition over freight rates is likely to start among global shipping companies. In this case, new orders for ultra large containerships are expected to increase, motivated by the desire to reduce costs(fuel consumption). Loading many cargoes in bulk at a time can lead to the lower freight rates and less fuel consumption, and global shipping companies have already been involved in competition to acquire ultra large containerships.

Global shipping companies are expected to place additional orders to benefit from lower freight rates and higher fuel efficiency, considering that ultra large containership with a capacity of over 18,000TEU can reduce fuel consumption by more than 30% compared to the existing 13,100TEU vessel. According to the Korea Maritime Institute (KMI), the balance of supply and demand will improve slightly this year in containership market in 2014, compared to the previous year. Last year, the global containership market conditions were not favorable very much. The China Containerized Freight Index (CCFI) recorded 1,092p on average from January, 2013 to October 25 of the same year, which is lower than the previous year's average of 1,171p. The freight rates are not expected to recover significantly as witnessed in the second half of 2013. Therefore, the freight rates will remain at a lower level compared to the previous year. Although the demand for containership per slot was 11 to 13TEU before 2008, it has fallen to 9TEU since 2009 with persistent instability of demand and supply. In other words, there are more vessels than the cargoes that have to be carried.

KMI predicts an improvement in the market conditions in 2014 with the growth rate of demand surpassing that of supply for the first time after the financial crisis worldwide. The cargo traffic volume of 2014 is expected to stand at 170 million TEU, an increase by 6.1% compared to the previous year.

According to the IMF, the world economic growth rate for 2014 will rebound from 2.9% this year 3.6% in 2014, led by the developed countries. However, the growth is expected to slow down or remain flat in emerging economies such as China, contributing to the instability. The capacity is expected to reach 18.35 million TEU in 2014, which represents a 5.6% increase compared to the same period of previous year. The ship dismantling volume stood at 430,000TEU, which may be the record high since 2009, and therefore, the capacity increase is likely to slow down slightly in 2014.



Figure 4. Trends in the volume of Container Ship`s new order (Source: Clarkson)



Figure 5. 8,0000 TEU over Container Ship`s new order (Source: Clarkson)

More rigorous regulation on NOx and SOx

Environmental regulations are expected to have a tremendous impact on the shipbuilding industry also this year. The NOx generated from the combustion process of marine fuel will attract much attention in 2014. The regulation on nitrogen oxides (Tier I), which IMO is currently applying, targets the diesel engine with an output exceeding 130Kw which is installed in vessels which were built after 2000 or underwent major modification. IMO enacted the new regulation (Tier II) in October 2008 which reduces the emissions of nitrogen oxides by 20% compared to the previous level. As a result, all vessels built after January 1, 2011 are mandatorily equipped with the engine that satisfy the new standards. However, this regulation will come into full force in 2016. The Tier III slated to take effect in 2016 requires the reduction of nitrogen oxides by 80% compared to current level. Furthermore, SOx is also covered by the regulation, and as a result, the sulfur content in marine oil is required to be reduced to 0.1%. The fuel used in on-board power generator or boiler would be the main targets. The provisions that limit sulfur content in marine oil have already taken effect, depending on the regions. The international standard applicable to the harbors of each country is 4.5% or less. However, the target value of IMO is 0.1 %. It was decided to lower the maximum sulfur content limit from current 1.5% to 0.1% by 2015. The EU already decided to lower the limit to 0.1% in the area within 24 miles from the territory, starting from 2012. To lower the sulfur content, more expensive and higher quality MGO needs to be used. In other words, it is

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necessary to use the oil, much more expensive than the fuel oil whose price has soared. Therefore, researches have been conducted vigorously with respect to the usability of LNG, instead of marine oil, in order to cope with the environmental regulations on SOx and NOx.

Engine makers, such as MDT and Wärtsilä, already unveiled the 2-stroke low-speed propulsion DF engines. ME-GI engine of MDT will be fitted to the vessels ordered by Teekay and Stream LNG. Wärtsilä recently presented the technology for 'Wärtsilä RTflex50DF' applying the new 2-stroke dual fuel engine technology which is slated for commercialization from this year.



Figure 6. New order treand of Tankers & Bulkers (Source: Clarkson)

Advent of dual fuel engine

The propulsion engine installed in existing merchant vessel was the low speed engine operating on the bunker-C as main fuel, while the auxiliary engine was the medium speed engine that runs on diesel as main fuel. DFDE (Dual-Fuel Diesel Electric) operating on LNG, cheaper than bunker-C oil, has been developed since several years before, and domestic shipyards, including Samsung Heavy Industries (SHI), won new orders for LNG carriers adopting the medium speed DF. However, DFDE engine, which had weak power, could not be applied to ordinary commercial vessels, and was applicable only to LNG carriers below 150,000CBM.

ME-GI, which was recently unveiled by engine makers, is the low-speed 2-stroke propulsion engine that complemented the shortcomings of existing DFDE engine. ME-GI engine, operating on LNG as main fuel, has the advantage of lower fuel cost compared to bunker-C oil and provides strong power unique to low speed engine, making it applicable to large LNG carriers, as well as small and medium-sized LNG carriers. Furthermore, ME-GI engine can be commercialized for ordinary commercial vessels.

Meanwhile, MDT signed a contract with Knutsen OAS Shipping, a Norway-based shipping company, to supply the ME-GE engines. This engine is expected to be installed in 176,300CBM LNG carriers. So far, only Hyundai Heavy Industries (HHI) and Japan's Mitsui Shipbuilding have


obtained the license for ME-GE engine of MDT. Hyundai Heavy Industries (HHI) was registered as the first licensee in 2012, while Japan's Mitsui Shipbuilding entered into the license agreement in April last year. ME-GE engine consumes less than 50% of fuel per day, compared to diesel engine, and furthermore has 46% efficiency which is higher compared to the DF engine with 40% efficiency. Particularly, ME-GE engine can significantly reduce the emission of environmental pollutants regulated by IMO, and is likely to come under limelight in the newbuild market this year.

Expansion of subsea facility investment

As the demand for energy increases, the global offshore plant market will be worth USD 503.9 billion, growing at an annual average rate of 6.7% from USD 145.2 billion in 2010. With the 5 global oil giants increasing the investment by 2 to 3% each year, the offshore plant is expected to continue high growth, spurred by the development of deep-sea oil fields which gathered momentum from the growing demand for energy.

In the offshore plant sector, new orders for drillship are expected to diminish this year. Drillships were ordered in large quantities in the period between 2011 and 2012, but their supply has been maintained at a stable level with the delivery starting in full-scale from 2014. Another factor hindering additional orders is the fact that domestic shipbuilding heavyweight have the order backlog of more than 20 drillships.

Meanwhile, there has been heightened interest in the subsea sector over the years. Topographic maps of energy development indicate a clear pattern of the shift in focus from the coastal waters to the deep-sea floor. According to the industry, the offshore plant market will be worth USD 73 billion by 2015, growing at an annual average rate of 15.5%, and among them, the market for subsystems will be worth USD 33 billion by 2015, growing rapidly at an annual average rate of 16.4%.

Particularly, order volume for subsea facility works reached a record high level until last year, increasing by about 50% after 2011, and is expected to grow steeply over the next 5 years. The harbinger of rapid growth of subsea sector is the Libra mining lot known to have large-scale oil and natural gas reserves among the deep-sea oil fields. This Libra mining lot is considered the largest oil field in regions other than the Organization of the Petroleum Exporting Countries (OPEC). Libra mining lot is estimated to have 8 billion to 15



LNG-RV of DSME

billion barrels of oil and natural gas reserves.

Meanwhile, deep-sea oil fields were discovered in a row in the Atlantic coast of Brazil since 2007. The deep-sea oil fields are located at a water depth of 5,000 to 8,000m and estimated to have up to 100 billion barrels of oil and natural gas reserves based on the prospecting effort thus far.

3 domestic shipbuilding heavyweights raise annual new order target by 12%

This year, the 3 domestic shipbuilding heavyweights, which have exceeded their annual new order targets this year, are expected to raise the targets for 2014 by about 12%. That is based on the prediction of surge in new orders for ordinary commercial vessels, such as LNG carrier, eco-ship, ultra large containership, etc. Hyundai Heavy Industries (HHI) is expected to increase its annual new order target for 2014 by 11.3% compared to the previous year. Samsung Heavy Industries (SHI) and Daewoo Shipbuilding & Marine Engineering (DSME) are expected to raise their annual new order target for 2014 by 10.3% and 13.3%, respectively, compared to the previous year. This outlook is based on the increase in new orders from the commercial vessel sector, driven mainly by the growth in orders for LNG carriers. The annual new order target for the offshore sector will be maintained at a level similar to this year's. As a result, the 3 domestic shipbuilding heavyweights are expected to set a combined annual new order target of USD 45 billion, an increase from USD 40 billion of previous year. 🚸

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The world's first FLNG was launched successfully

The world's first FLNG (Floating LNG) was set afloat on the seawater off the coast of Geoje by Samsung Heavy Industries (SHI). SHI plans to shorten the construction time with a new engineering method called 'half ship combination'.

SHI successfully completed the launch of 'Prelude FLNG', the world's first FLNG production facility awarded by Royal Dutch Shell.

Issue

FLNG is offshore plant equipment that can store, refine the natural gas extracted from the seabed, liquefy it into LNG which is then loaded and unloaded. Previously, natural gas from subsea gas field was transported via pipelines to onshore location, and then was liquefied and stored until being transported onboard the LNG carrier. The FLNG is a complex facility capable of performing this whole processes. Billions of dollars can be saved from the costs incurred in the construction of onshore liquefaction/ storage facilities when the subsea gas field is developed with the FLNG, and furthermore, the subsea ecosystem can be protected because the FLNG makes it unnecessary to lay the submarine pipes. For such advantages of FLNG, major oil & gas companies, including the Royal Dutch Shell, have been scrambling to develop the gas fields using the FLNG in Australia, East Africa, Southeast Asia, etc., and currently, there are about 20 projects that involve the use of FLNG. Particularly, the FLNG market is expected to expand further, considering that there are about 350 small and mediumsized gas fields worldwide with the



reserves below 100 million tons that can be extracted at a profit by using the medium-sized FLNG. In that regard, SHI is expected to be better positioned to win new orders for FLNG as it has successfully launched the world's first FLNG on schedule.

Meanwhile, SHI set a record of launching the world's largest offshore facility at the same time. The Prelude FLNG, which was launched this time, is the world's largest, measuring 488m in length, 74m in width, and 110m in height. The weight of the Prelude FLNG reached roughly 200,000 tons at the time of its launch. It is a facility larger and heavier than any vessel and offshore facility that have been built at shipyards around the globe. The largest aircraft carrier in the world weighs only 100,000 tons.

SHI made thorough preparation for the launch, like simulating the expected depth at which this facility would be immersed in water, the height of the sea surface on the day of launch, etc. After

the mooring of the Prelude FLNG to the quay, SHI plans to proceed with a series of tasks, such as the production of LNG storage tank inside the hull, installation of upper plant parts, outfitting works on internal and external sides, etc., for about 2 years from now. In particular, the key process of this project is to install the 80,000-ton plant facility on the top side of hull. For that, SHI plans to separately make 14 modules with a weight of 6000 tons each and mount them sequentially by using the 8,000-ton marine crane. Park Dae-young, President of SHI, said, "We made another milestone in the course of the production of the world's first and largest FLNG. We will finalize this project successfully based on close cooperation with Royal Dutch Shell, perfect quality and safety, and thorough management of process. 🖑





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Growth target of 15% for 2014 with a vision to dominate oil & gas market

Rockwell Automation Korea is expected to focus on oil & gas fields and offshore sector such as drillship this year. In a press conference on December 10, Rockwell put forth its vision for the Connected Enterprise, Energy Intelligence, industrial security solutions which the company is focusing on.

Choi Seon-name, President of Rockwell Automation Korea, said, "We have achieved rapid growth of about 20% over the last few years and have constantly treaded the growth path, despite the unfavorable market conditions at home and abroad. We have shown a robust performance throughout this year. Particularly, we have accomplished a 27% growth in our system business, winning large-scale offshore projects related to drillship in the offshore segment of EPC market. Moreover, we have seen a 15% growth in service sector such as the asset management and consulting."

Rockwell Automation has fully demonstrated its capabilities covering the whole oil & gas sector, ranging from the upstream, through the onshore and mid-stream, to downstream. In addition to the integrated control solutions for marine automation and offshore plant facilities, Rockwell Automation is providing a variety of products such as the power management, monitoring, and security/safety, etc. Recently, Rockwell Automation has further sharpened its competitiveness in oil & gas sector through the acquisition of vMonitor, a provider of wireless solutions connecting the digital oil-fields.

Rockwell Automation Korea has set a target of 15% growth year-on-year for



Figure 1. Rockwell Automation Supports the Entire Oil & Gas Supply Chain

2014. Having won a large-scale project in early December, Rockwell Automation Korea plans to put primary focus on oil & gas market this year and aggressively target the motor control market while strengthening its position in the midrange PLC and OEM market.



Figure 2. Acquisitions Expanding Oil & Gas Domain Expertise

Connected Enterprise

The key to the Connected Enterprise is to improve customers' productivity, reduce costs, and help ensure safer operation of plant. For 2014, Rockwell envisions perfect 'Connected Enterprise' rooted in the connection of the manufacturing industry and IT (Information Technology) based on its integration architecture in the fields of shipbuilding/ offshore and oil & gas.

The technologies that can turn the Rockwell's Connected Enterprise into reality can be classified into 4 types. First, it is the cloud technology. This technology is the Ethernet-based automated solution based on the changes in the manufacturing environment, and Rockwell expects that 52% of manufacturers will make migration to hybrid cloud within the next 2 years. The com-

pany explains that it has rolled out new products that can be integrated through the MS-based infrastructure to keep pace with the changes in the manufacturing environment. Second, it is the mobility technology enabling the remote control for the automation of existing plants, including the plant facilities such as oil & gas, etc. Third, it is the big data analysis, allowing the big data to be converted to information through the Connected Enterprise, thereby contributing to the improvement of productivity. Such data can be put together by respective equipments (devices), such as controller, etc., and then analyzed. Fourth, it is the implementation of the

Connected Enterprise which can be achieved on the basis of control and integration. Rockwell has developed the products that can apply those technologies. For example, the Connected Enterprise can be built efficiently through Stratix 5900 router, Stratix 5100 wireless access point, PowerFlex520 inverter, FactoryTalk, etc.

Smart Manufacturing

Rockwell pursues Smart Manufacturing, the future manufacturing environment. The Smart Manufacturing can bring continuous improvement in the areas of safety, environment, and energy in tandem with the optimization of overall manufacturing environment through the best automation solutions which Rockwell is proud of. The Connected Enterprise lays the cornerstone for that. According to Rockwell, the Smart Manufacturing is underpinned by the 3 elements, such as optimization of manufacturing environment, optimal equipment, and sustainability. Furthermore, Smart Manufacturing requires the

Rockwell Automation held the RSTechED Korea



Rockwell Automation Korea held the 'RSTechED Korea', a global training event that provides technical training on automation technology, market trend, etc., at Hotel Intercity in Daejeon from December 11 to 13. RSTech ED consisted of practical learning and

presentation for each session, offering various technical contents to participants. Particularly, RSTechED provided the sessions tailored for the solutions and customers from each industry, as well as the introduction of major new products and solutions unveiled in 2013. The sessions

were designed to allow the participants to acquire information about the automation solution capable of resolving the problems while presenting various potential challenges that could be encountered at the site. equipment that can optimize overall manufacturing process and enable the best results at lower costs, as well as the solutions that take the safety, environment, and energy into consideration. To create such smart manufacturing solution, the Connected Enterprise is the prerequisite.

Particularly, the Connected Enterprise is the underlying foundation on which to collect the data necessary for the energy management that has recently come into limelight, to convert such data into information, and to make decisions conducive to the optimized operations. Additionally, Rockwell has a wide-ranging product lineup encompassing the power monitoring, motor and power controller, information management, service, etc., based on efficient energy management solutions, which is intended for the implementation of smart grid.

Meanwhile, Rockwell explained that we would see greater security threats resulting from shift of operating system, data communication, and closed-type architectures towards the open type amid the expansion of Ethernet and network. Rockwell has constantly proceeded with the research into such aspects and has formed strategic partnership with the leading companies in the concerned fields as part of effort to safeguard the security of industrial facilities under the Ethernet-based network environment.

In that way, Rockwell is at the forefront of the evolution of the manufacturing industry through the Connected Enterprise, such as SW package for the completion of integrated architecture and operation of plants, convergence (integration) of plant and IT, open network, security, etc.

KorShip 41

Lloyd's Register, Refreshed brand identity unveiled

On 8 December 2013, Lloyd's Register unveiled a refreshed brand identity, with the introduction of a new logo that celebrates the culture of innovation built over the company's 253-year history.

LR has undergone significant change and growth over recent years, having grown to a £1 billion-turnover service provider with over 9,000 employees worldwide and undertaken the acquisitions of ODS, Human Engineering, ModuSpec, Scandpower and West Engineering. The group has also restructured to create the Llovd's Register Foundation as the organisation's parent entity, invested in technology leadership through its global technology centres, diversified its services further into energy and rail, and expanded its management systems business, LRQA. In September 2013, it announced a significant investment in Senergy, an integrated energy services company.

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Richard Sadler, LR Group CEO laid out the reasons for the change "We wanted to refresh our brand identity to reflect these changes to the market, our clients and all our stakeholders with a logo that works in the digital age."

He added "We took inspiration for our new logo from the LR stamp - the true 'brand' that our surveyors have stamped into steel as proof of approval since 1884. But this is not a name change – we will continue to be called Lloyd's Register, recognising the value that the Lloyd's name has around the world as a mark of quality."

"Our new identity reflects our heritage and our continued commitment to independence, technical

excellence and public benefit. And the new logo is a device that links together all the members in our group, including LRQA, making our broad service portfolio easier to navigate."

Mark Stokes, Group Communications Director, said "In line with our ethos of sustainability, to minimise the environmental impact we are introducing our new logo on digital items first. You will still see our old logo in use for a while on printed material and on our employee's safety equipment which will be replaced gradually through wear and tear."

Independence

LR's reputation as an independent body – with safety, integrity and high standards as guiding principles – has been built up over 250 years. The Lloyd's Register Foundation, a UK registered charity, is the parent entity in the organisation. The operating company, Lloyd's Register Group Ltd (Lloyd's Register) and its subsidiaries,



Lloyd's Register Marine

is a professional services organisation that generates profits that fund the public benefit activities of the Foundation.

Technical excellence

LR has confirmed a commitment to innovation through the investment of around £100 million in two global technology centres, in Southampton, UK and Singapore. LR is developing and supporting the innovations that will play a vital role in the immediate and long-term future of shipping and energy.

Public benefit

The Lloyd's Register organisation is a global body with a mission to protect life and property and advance transportation and engineering education and research. The parent entity in the organisation, Lloyd's Register Foundation, is a charity, with a mission to fund science, engineering and technology research for public benefit worldwide.

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The government invests KRW 900 billion into offshore plant sector

The government mapped out the plan to foster the offshore plant sector that serves as future growth engine, creating high quality jobs.

The government will inject KRW 900 billion funds for 5 years until 2017 into offshore plant sector which serves as key driver of growth in the period ahead. As a result, Deepsea Offshore Engineering Basin will be built to help expand the engineering capability, along with the expansion of universities specializing in offshore plants to secure professional workforce. The Ministry of Trade. Industry and Energy held the offshore plant policy meeting on December 18 and announced the measures to spur development of offshore plant industry. According to the Douglas Westwood, the global market for offshore plant is expected to increase from USD 145.2 billion in 2010 to USD 503.9 billion in

Issue

2030, growing at an annual average rate of 6.4%. Meanwhile, Korea took 39.5% of new orders for offshore plants in the period between January and August this year.

The Ministry of Trade, Industry and Energy will push forward the customer-linked localization strategy based on cooperation with marine equipment manufacturers, shifting away from current technology-oriented offshore plant equipment localization. Major shipyards, such as shipyard Daewoo Shipbuilding & Marine Engineering (DSME), Samsung Heavy Industries (SHI), STX Offshore & Shipbuilding (STXOS), will build the theme cluster in collaboration with subcontractors with

(Lipit: LICD 100 million)

Year		2010	2015	2020	2030	Compound annual growth rate (CAGR)	
Offshore plant	Total	1,452	2,303	3,275	5,039	6.4	
	Offshore platform	372	547	749	1,056	5.4	
	Deep-sea storage facility	450	793	1,165	1,898	7.5	
	Others(URL, etc)	630	963	1,361	2,085	6.2	

Table 1. Outlook of global offshore plant market (Source : Douglas Westwood)

(Un						
Year	2008	2009	2010	2011	2012	2013(Jan.~Aug.)
Korea	28.7	29.3	23.3	36.3	30.5	39.5
China	20.3	26.5	21.8	18.9	18.3	30.8
Singapore	23.7	8.7	12.6	16.8	7.0	11.3
Brazil	1.6	9.7	10.2	9.1	25.4	1.5
EU	8.3	8.7	12.6	9.3	12.0	10.8

* Based on the hull type offshore plant

Table 2. Shares of new orders for offshore plants by country (Source: Clarksons)

an aim to promote localization of core marine equipments. In addition, these domestic major shipyards plan to set up the localization council to promote the production of offshore plant equipment and move ahead with various expansion measures such as the attraction of investment, joint venture, localization, etc., and at the same time, will increase the development capabilities based on the valves, joints, flanges, bolts, nuts and the like.

Moreover, the government will fit the indigenously developed marine equipment to the LNG carriers – which are expected to be ordered by the Korea Gas Corporation from the next year – as part effort to help small and medium-sized companies build up the track record. Meanwhile, the government will expand the vendor registration support programs, such as the technical writing, lectures by the invited domestic/ foreign experts, etc., to help small and medium-sized equipment manufacturers registered as suppliers for overseas clients such as oil majors.

The Ministry of Trade, Industry and Energy plans to inject KRW 58 billion jointly from the private and public sectors, starting from this month, to build the Deepsea Offshore Engineering Basin in Saenggok district, Busan. This Deepsea Offshore Engineering Basin is considered essential for

Country	Organization	Year of Construction	Length×width ×depth(m)	Pit
Netherlands	MARIN	1998	45×36×10.3	20
Norway	MARINTEK	1981	80×50×10	-
Brazil	LabOceano	2003	40×30×15	10
China	Shanghai Jiao Tong University	2008	50×40×10	30
Korea	Korea Institute of Ocean Science & Technology	2016(scheduled)	100×50×15	35

Table 3. Deepsea offshore engineering basins in major countries

increasing the engineering capability to cope with the surge in the deep-sea resource exploitation.

Cultivation of offshore plant service industry

The Ministry of Trade, Industry and Energy has proceeded with a project to build the test bed for sea trial of drillship drilling system at a water depth of 150-200m since October. Additionally, the government, shipyards, and shipping companies are on track to advance into the offshore plant service sector from 2014.

The offshore plant service industry has large market size and great potential for job creation due to the transportation, installation, commissioning, maintenance, demolition, or remodeling, etc. However, this sector in Korea still remains weak in terms of global competiveness and has shortage of professional manpower, and therefore has yet to be fully opened up. Based on the industrial foundation of offshore plant production and construction, the government will embark upon full-fledged effort to nurture the service industry and help build up overall capabilities of offshore plants. Moreover, the government will move ahead with the development of the next-generation remodeling engineering technology to fit the ballast water treatment system to the existing vessels as the ballast water management system becomes mandatory from 2020.

To implement such plans, the government will invest KRW 900 billion jointly from the private and public sectors, starting from this year, until 2017. As a result, Korea is expected to see an increase in its offshore plant order book from USD 28 billion this year to USD 80 billion in 2020 with the creation of more than 10,000 jobs.

Wärtsilä AQUARIUS®EC BWMS granted Type Approval



Wärtsilä has announced that its Wärtsilä AQUARIUS®EC (Electro-Chlorination) Ballast Water Management System (BWMS) has been granted Interna -tional Maritime Organization (IMO) Type Approval. This is in accordance with the requirements of the 2004 IMO Convention for the control and management of ships' ballast water and sedi-

ments and is an essential certification pre-requisite for the system to be used onboard ships.

The Type Approval was attained in co-operation with the Flag Administration of the Netherlands, independent testing facilities, and the Lloyds Register classification society. Testing and optimization of the system were carried out during both land-based and shipboard trials conducted in accordance with IMO requirements. Additional testing is planned to ensure full United States Coast Guard (USCG) Type Approval for the Wärtsilä AQUARIUS®EC BWMS.

This is the second Wärtsilä BWMS to have been fully endorsed and type approved by the Flag Administration of the Netherlands, and represents the culmination of Wärtsilä's dedicated development programme that was initiated in 2010. The Wärtsilä AQUARIUS®UV BWMS was granted IMO Type Approval in 2012 and USCG Alternate Management System (AMS) acceptance in October 2013. The time required to complete Type Approval for an electro chlorination (EC) system is longer, as the EC treatment process makes use of an active substance that requires both intermediate Basic and Final approval from IMO GESAMP as pre-requisites to a Type Approval application. Compliance with the IMO Ballast Water Convention helps protect local eco-systems from the spread of harmful invasive species, while easing operational concerns for ship owners and operators.





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DNV GL launches new global brand

The new logo refers to DNV GL's heritage through the word mark 'DNV GL' and the blue and green colours, while pointing clearly to the future.

"In defining our new identity as DNV GL, our company's vision of making a 'global impact for a safe and sustainable future' has never been more relevant than it is today," said Henrik O. Madsen, President & CEO, DNV GL Group. "The new brand that we launch today reflects our broader service offering aimed at enabling our customers to make the world safer, smarter and greener."

The merger of DNV and GL in September this year, led to the creation of DNV GL, a world leading ship and offshore classification society, a leading independent service provider in the oil and gas sector, a powerhouse in energy and renewables, and one of the world's top three certification bodies.

"Businesses are facing increasing technological, regulatory, social and operational challenges, in a world that is becoming ever more complex. While at the same time, stakeholders are demanding greater accountability and transparency. To be confident they are making the right choices, both businesses and governments need an independent partner they can trust to empower their decisions," said Henrik O. Madsen CEO.

A broader view

As a foundation for this, DNV GL is making a significant and continuous investment in strategic research and development. Innovative projects are



Henrik O. Madsen, President & CEO, DNV GL Group

taking technology and standards to new, advanced levels in collaboration with our customers.

"It was from this broader view that our new brand strategy of our expansive, expert services and customer enablement was created. The new visual identity with the three extended lines was created to symbolize our working context of sea, land and sky," explained Stefan Nerpin, Group Chief Communications Officer of DNV GL.

Created from two highly respected companies whose parallel histories span almost 150 years, Nerpin is confident that the new DNV GL will "offer the businesses we serve much-needed benefits in terms of technical insight, risk management and knowledge transfer," he said, adding, "With our combined capabilities, more than 16.000 professionals are bridging technological and operational expertise to the greater goal of creating a safer and more sustainable society. DNV GL is able to offer this broader view across more than 100 countries, sharing our expertise and bringing best practices to our customers around the world."

A merger for growth

The post-merger integration is progressing well and Group CEO Henrik O. Madsen said the new global entity is in "a good position to take on the first full year of operations as one company with a new brand; DNV GL. We want to build upon the knowledge and expertise throughout the group by creating new networks and learning from each other. Our goal is to make sure that we are always finding innovative solutions that create value and growth for our customers, ensuring that the world we leave behind is a better one that the one we find today," he concludes.

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Technology

Ter Militan

Helping harness the power of the wind

Rolls-Royce has been involved from the beginning with propulsion systems for offshore wind turbine installation vessels.

Rolls-Royce

One of the latest vessels to join the Vroon MPI Offshore fleet, MPI Discovery, installing wind turbines at the London Array off the UK's east coast



The first major contract was to supply systems and products for the pioneering installation jackup vessel originally named Mayflower Resolution, now MPI Resolution operated by MPI Offshore, which is part of the Vroon Group. MPI Resolution was the first purpose-built wind turbine installation vessel (WTIV), designed to install foundations, towers and nacelles. It has been very successful, having been involved in the building of several offshore wind farms.

Rolls-Royce provided complete integrated systems for MPI Resolution, combining its own products and third party equipment to provide the owner with a single-source supply. Included were the propulsion and manoeuvring thrusters



- four 1.5MW US 205 azimuth thrusters at the stern and three 700kW CP tunnel thrusters at the bow, and the integrated control system.

MPI is now putting into service two new WTIVs for which Rolls-Royce has provided both diesel electric power and propulsion systems. These vessels incorporate the knowledge gained from operating MPI Resolution under a variety of conditions.

MPI Adventure, the first to be delivered, made the voyage from the build yard in China to Europe in 2011 and went straight to work. Operating out of Harwich, on the east coast of England where it is on its first contract, the MPI Adventure is in charge of installing foundations and wind turbines on the London Array offshore wind farm. The wind farm, the world's largest, is located around 15km from the Kent and Essex coasts in the outer Thames estuary. Up to 341 turbines will be installed in an area of around 245km². When complete, it will provide sufficient electricity for 750,000 homes.

Sister ship, MPI Discovery, was delivered at the end of December 2011 and is now operating on the same project.

MPI Adventure is a large self-propelled jack-up vessel, 138m long with a 40.8m beam, but drawing only 3.5m light. Six legs allow the vessel to operate in waters of up to 40m deep, with an ability to jack with 6,000t of cargo on board. The exact depth depends on the amount of sinkage of legs into the seabed and clearance needed between the sea surface and the underside of the jacked-up hull to avoid wave impact. Dynamic positioning to DP2 standard enables the vessel to be accurately located at the spot where a turbine is to be installed. The main crane is rated for 1,000t at 25m radius, with a hook height of 104m. The vessels also have accommodation for 112 people.

Six Rolls-Royce Bergen C25:33L-8 diesel generator sets provide electrical power for all purposes. Three Rolls-Royce US 355 fixed pitch azimuth thrusters propel MPI Adventure, giving a transit speed of 12.5 knots, and are complemented by three TT 2200 DP tunnel bow thrusters. These new MPI-operated vessels are designed to transport, lift and install turbines and foundations efficiently, based on a good transit speed. They have the ability to move quickly from one installation location to the next, position accurately, jack up rapidly and begin installation work with minimum delay. The WTIVs can also remain on station, jacked-up, in severe weather conditions.





Power and speed for effective wind farm support

Small craft known as wind farm support vessels are playing a vital role in building offshore wind farms and their subsequent maintenance. Rolls-Royce waterjets are proving the ideal means of providing the speed, economy and the power to safely ferry personnel, as well as transporting heavy equipment.

With a growing number wind farms under construction and entering service, the development of the wind farm support vessel or WFSV is rapidly expanding. Boat builders and operators worldwide are competing to develop the best technology and techniques.

Typically, the boats run at high speed to and from the wind farm, but when at a wind turbine they must push hard against fender posts to hold themselves in position against wind, waves and currents while people transfer to the tower, or equipment is offloaded. Good manoeuvrability is vital in all circumstances, along with the highest efficiency and safety levels.

"Waterjets have proved to be a winning solution and operators are finding that Rolls-Royce waterjets offer an excellent combination of speed, static thrust and manoeuvrability," says Andy Brett, UK Sales Manager. "Operator feedback from vessels in service is good, and many vessels now on order will be equipped with these units. Deliveries include both the smaller FF-series waterjets and the new Kamewa A3-series for the highest possible efficiency and durability."

In the case of Kamewa A3 series waterjets, the pump unit (impeller, impeller housing, stator and steering nozzle) are all made of stainless steel and are extremely durable in demanding applications. The pump performance has been improved in both the FF- and Kamewa A3-series, resulting in very high static thrust, exceptional cavitation margins and excellent performance over the whole speed range. All new models feature factory-mounted hydraulic valves and piping to reduce installation time and costs for the yard. The new compact control system makes operations easier and safer and is pre-calibrated, making the startup procedure extremely easy and quick. Engine RPM and clutch controls are integrated to the control system with several safety interlocks to avoid potentially hazardous situations. Inlet ducts are made of marine grade aluminium plate, allowing modular installation while custom tailoring for individual design needs can be provided, which further improves efficiency and optimizes boat design and performance.

Powering the latest designs

Following experience with a 10m long boat, CTruk introduced the 15m catamaran Advance, propelled by two FF41 waterjets with Vector Stick control. The company's latest design, the CTruk 20T MPC, is the largest to date and for the first example, CWind Asherah, Rolls-Royce propulsion has again been selected. Two FF41 waterjets, each powered by a 447kW diesel, gives the 17m by 7m catamaran a speed of 30 knots. The Vector Stick system means that control is intuitive, allowing the coxswain to focus on the safe transfer of people and materials. Waterjet propulsion allows operation in shallower waters than other solutions. CWind Asherah has the CTruk flexible pod system, which allows the operator to change the vessel's layout to suit the requirement within a few hours. By moving the wheelhouse fore or aft, operators can optimise the vessel for different tasks, such as ferrying personnel or carrying service generators, cranes or survey gear. The vessel is currently operating for Dong Energy on the Walney array wind farm in the Irish sea.

Alicat Workboats, based in Gt Yarmouth, builds alu-



Figure 1. CWind Asherah transferring maintenance crew to a wind turbine. (Source: Cwind)



Figure 2. The intuitive waterjet control system makes life easier for the skipper. (Source: Cwind)



Figure 3. The Austal 21m catamarans being built for Turbine Transfers are powered by a pair of MTU diesels driving Kamewa 45A3 waterjets. (Source: Austal)



Figure 4. The 15m catamaran ECC Topaz can carry three tonnes of cargo and is propelled by two FF41 waterjets, for a top speed of 30 Knots. (Source: East Coast Charters Ltd.)

minium catamarans for wind farm support using designs from Global Marine Design, Western Australia. They are currently building their third 20m WFSV. Rolls-Royce FF41 waterjets give a top speed of over 30 knots with Vector Stick controls for safe operation.

East Coast Charters in the UK has built up a range of workboat services. Wind farm support is a growing part of the business and to consolidate its position in the field, two new vessels are being added to its fleet. ECC Topaz is a 15m work catamaran specifically designed to transfer stores and personnel to wind turbines in shallow waters, but it can also undertake other tasks such as crew transfer for larger vessels.

Blyth Workcats is the builder and this WFSV has two 410kW diesels driving Rolls-Royce FF41 waterjets with Vector Stick controls, giving a 25 knot service speed, with a maximum of 30 knots. ECC Topaz can carry up to three tonnes of cargo on deck and is certified for three crew and 12 passengers up to 60 miles from a safe haven. Its first contract is to support the wind farm off Barrow in Furness in northwest England.

Austal in Western Australia is well-known for large aluminium passenger/ vehicle catamaran ferries and specialist vessels, many with Rolls-Royce waterjet propulsion. Recently launched for this market sector are the Austal Wind Express series of catamarans and three are being built for Turbine Transfers in the UK. The 21m vessels are powered by twin MTU 10V2000 M72 diesels each driving a Kamewa 45A3 waterjet with the new compact control system. They will have a #ne entry chine hullform and a large tunnel height for operation at up to 30 knots and targeted sea keeping ability in up to 2m significant wave height.

The new compact control system makes operations easier and safer and is pre-calibrated, making the startup procedure extremely easy and quick.

In February 2012, Austal confirmed a contract for a fourth vessel for Turbine Transfers. It is the first of a new design based on the benefits of Austal's trimaran hull configuration to deliver low vessel motions in transit and when alongside wind turbines. The 27.4m vessel is powered by two 900kW MTU 10V2000M72 diesels coupled to Kamewa 50A3 waterjets to provide a service speed of 23 knots. Operated by a crew of three, it has an operating range of up to 75 nautical miles offshore and will be able to transfer 12 wind farm technicians and over 4t of deck cargo.

The new compact control system is part of the package, and Rolls-Royce will also integrate the bow thruster. The 50A3 waterjets will be mounted on a common plate and include part of the bulkhead and ship struture to ease installation at the shipyard. An adaptor plate for the Humphree interceptors will ensure correct installation.

For South Boats, one of the UK's largest builders of WFSVs, Rolls-Royce will supply Kamewa 56A3 waterjets, complete with the new compact control system for three newly designed 24m long catamarans. Powered by two MTU diesels, each rated at 1,081kW, the vessels will have a top speed in excess of 28 knots. Rolls-Royce has also received an additional order from South Boats for twin FF500 waterjets to propel a 17m WFSV.



Figure 5. Austal have designed a trimaran for wind farm support, it has twin MTU diesels driving Kamewa 50A3 waterjets. (Source: Austal)

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구리 48mm	47	110
구리38mm	38	110
구리 45mm	28.3	90
구리 47mm	47	80
연선 구리 35mm	47	140
경선 구리 21mm	151	270
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배터리



















ELINA CELINA CELINA CELINA CELINA CELINA



- ABB's motion-monitoring, response-prediction and heavy-weather decisionsupport system

Today, industries such as offshore oil and gas are deploying larger and heavier floating production units to their fields, requiring heavy lifting capacity. Consequently, oversized cargo weighing thousands of tons is often transported via heavy-lift vessels over vast distances, demanding stateof-the-art motion monitoring, response prediction, heavy-weather decision support and weather window evaluation systems to protect their valuable cargo. ABB's monitoring and forecasting system, OCTOPUS-Onboard, has been installed on the largest and most advanced heavy-lift vessel built to date - the Dockwise Vanguard.

ABB

Leon Adegeest - Amarcon, a member of the ABB Group, Dalfsen, Netherlands

With a carrying capacity of 117,000 metric tons, a length of 275 m and a beam of 70 m, the Dockwise Vanguard's ability to safely deliver outsize, very heavy cargo such as drilling

rigs or offshore platforms, is unique in the specialized field of heavy marine transport. Vessels such as this one enable transport of complete, assembled structures, reducing

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commissioning time, and also provide dry-dock capability for other large vessels such as drillships at sea. The modular OCTOPUS-Onboard system developed by Amarcon, a member of the ABB Group, provides motion monitoring, response prediction and heavy-weather decision support aboard the Dockwise Vanguard.

OCTOPUS systems improve the safety and efficiency of ships, significantly reducing costs for customers.

ABB's three-sensor motion measurement system has also been installed, so critical areas like cargo can be displayed on and monitored from the bridge of the vessel. OCTOPUS systems improve the safety and efficiency of ships, significantly reducing costs for customers. They are part of ABB's Vessel Information and Control (VICO) systems suite, which provides a full range of automation and advisory solutions specifically for marine applications, based on ABB's field-

The modular OCTOPUS-Onboard system provides motion monitoring, response prediction and heavy-weather decision support.

proven process automation technologies.

Installed on about 200 vessels, OCTOPUS systems deliver practical information for making decisions at sea by continually monitoring, measuring and providing recommendations about a vessel's motion, status and location, fuel use and performance, ship hydrodynamics and positioning. The system makes use of crucial weather information and forecasts, maximizing efficient ship operations and helping the ship's crew make the best possible decisions as they deliver and deploy their cargo. OCTOPUS is part of ABB's Smart Marine initiative, which provides a range of solutions for the industry based on its expertise in marine propulsion and electrical, automation and advisory systems.



Figure 1. The Dockwise Vanguard has the ability to deliver outsize cargo such as drilling rigs or offsize platforms.

Meeting demand for sulphur emissions control technology

Demand for sulphur emissions control technology is steadily increasing and, in all likelihood, will accelerate as the 2015 deadline for meeting low sulphur regulatory requirements approaches. There are three main solutions for exhaust emissions compliance: the use of low sulphur fuel, the use of heavy fuel oil (HFO) with exhaust gas cleaning systems, or the use of liquefied natural gas (LNG). Each solution comes with pros and cons that require careful consideration. However, one thing is clear: Ship owners with the highest level of preparedness stand to gain from advance planning by limiting disruption to business.

Alfa Laval

Retrofitting vessels with new technologies to meet regulations, such as the International Maritime Organization (IMO) Annex VI - Prevention of Air Pollution from Ships, is one of the greatest challenge facing ship owners today. Ship owners will not only be required to make hard and fast decisions about the best and most cost-effective technology to suit their requirements, but to identify trustworthy partners with the expertise and capabilities to execute these retrofit projects and sometimes do so within a relatively short timeframe. But perhaps there is an even more important question: Once the tough technology decisions have been made, will ship owners be able to find suppliers and shipyards with proven track records to meet the burgeoning demand?

Making the right sulphur emissions control choice

There has been much discussion about the best way forward. On the one hand, while the use of low-sulphur fuel (MGO) offer ready relief, the higher fuel prices may turn out to a be costly solution in the long run. On the other hand, while industry studies point to the use of LNG as a sound long-term solution, the infrastructure is still in the early stages of development; in addition, LNG fuel prices are uncertain and the potential loss of cargo space when retrofitting is undesirable.

That leaves exhaust gas cleaning as an alternative that offers ship owners with trade routes in emission control



Petunia and Magnolia Seaways being retrofitted at Remontowa shipyard in Gdansk, Poland

areas (ECAs) a commercially viable option to meet the upcoming 0.1% sulphur emissions regulations in 2015. It is also a sound option for all ship owners looking to retrofit vessels to comply with the global 0.5% sulphur emissions limit in 2020.

Among the early adopters of exhaust gas cleaning technology is DFDS Seaways. It was important for DFDS to assess the costs and benefits of sulphur emissions control technology due to the company's operational profile and trade routes on the North Sea, English Channel and Baltic Sea. The shipping company first began testing the Alfa Laval PureSOx exhaust gas cleaning system onboard its Ro-Ro

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vessel, MV Ficaria Seaways, in 2009. As with any early test release, there were initial hiccups but these were later overcome. Today, DFDS' plan for sulphur emissions control is weighted heavily in favour of exhaust gas cleaning systems.

Facts about Alfa Laval PureSOx

PureSOx is a highly effective sulphur-removal system, and the first installed and operated as a main engine (21 MW) exhaust gas scrubber. The ability to switch between an open loop with seawater or a closed loop with fresh water gives PureSOx unique operational flexibility. PureSOx is the first scrubber system with multiple inlets, and its modular construction ensures a compact and energy-efficient installation.

- Sulphur removal in accordance with IMO MARPOL Annex VI Regulation 14
- Sulphur removal rate greater than 98% (exceeds IMO requirements)
- Particulate matter (PM) trapping up to 80%
- Ability to operate in low-alkalinity waters
- Multiple-inlet options to reduce the number of scrubbers on board
- Upgradeable design for compliance with future legislation
- Short payback time (1-2 years) thanks to fuel cost savings
- Operating power consumption: approximately 1.5% of engine power
- Includes the PureSOx H₂O water cleaning system

Capabilities that breed confidence

As one of the largest shipyards in Europe in terms of capacity and service range, Remontowa Shipyard was selected by DFDS for the retrofit projects. Remontowa specializes in ship conversions and repairs, newbuilding design and construction, steel structures including ship hulls and ship sections, as well as a wide range of offshore projects. Retrofitting the three DFDS ships with Alfa Laval PureSOx exhaust gas cleaning systems were among the 200 projects that the shipyard routinely handles each year. In July and August of this year, Remontowa completed the retrofit of the three DFDS vessels with four Alfa Laval PureSOx systems according to schedule. A single-inlet PureSOx system was installed on the MV Petunia Seaways and another single-inlet system on the M/V Magnolia Seaways. Both are sister ships to the MV Ficaria Seaways, and each is powered by a MAN 9L60MC-C main engine, providing an output of 21 MW. Two single-inlet systems clean the exhaust gas from two GMT Sulzer 9ZA 50S engines, which provide a combined output of 21.6 MW, on the MV Selandia Seaways. The systems enable the vessels to continue to use heavy fuel oil with high sulphur content, yet comply with current and future sulphur oxides (SOx) emissions limits.



PureSOx single inlet by Alfa Laval

"With the DFDS retrofitting project, we gained invaluable experience and stand fully prepared to help ship owners retrofit their vessels with sulphur abatement technologies such as exhaust gas cleaning systems," said Marcin Madrala, Remontowa's Commercial Manager.

As with most retrofit projects, refitting the DFDS vessels with Alfa Laval PureSOx presented challenges. Remontowa's design engineers and contractors, in cooperation with DFDS and Alfa Laval, were able to achieve minimal changes to the existing ship arrangements and operation while ensuring cost-effective installation.



According to Madrala, Remontowa has some 3,500 employees and dedicated contractors who provide engineering services and support throughout all phases of retrofit. Of these are more than 100 engineers who staff the shipyard's design office. The depth and breadth of in-house expertise lends itself to the innovative problem solving required within the short timeframe allotted for retrofits.

"Proper preparation and good supervision are givens," Madrala explained. "But critical thinking and the ability to adapt are also essentials. Often conditions onboard prove to be structurally different than the ship blueprints. So despite good planning, it can be difficult - if not impossible - to anticipate issues that can arise. That is why thinking on your feet, close collaboration with ship owner and supplier and open communications are key elements for retrofit success."



PureSOx Process

Proven, reliable and flexible system

The Alfa Laval PureSOx system offers key advantages for shipyards and ship owners alike. Among them are a proven track record, high reliability, great installation and operational flexibility, and global service and support. This unique, highly effective hybrid system removes sulphur from ship engine exhaust gas onboard all vessel types.

On the MV Ficaria, for instance, the system effectively removes sulphur from the exhaust gas of engines using heavy fuel oil, bringing sulphur emissions to a level below 0.1%. The PureSOx system has been in operation for more than 11,500 hours, cleaning up to 200,000 kilograms of

exhaust gas per hour.

With its relatively compact footprint, PureSOx makes installation feasible. Installation flexibility is most evident, however, in the multiple-inlet system that facilitates connection of the PureSOx system to both main and auxiliary engines. This provides significant equipment and installation savings, thereby reducing overall investment costs. The multiple-inlet system also makes the best use of available space where single-inlet systems simply will not fit and, due to its reduced weight, prevents potential stability issues.

Such a multiple-inlet system was installed on the Plyca, a Spliethoff Group Con-Ro vessel. PureSOx has proven itself through more than 6,000 hours of fully IMO-compliant operation onboard, and it continues to deliver space, ener-

Vessel	Year built	Year rebuilt	Class	Main engines	Output power	Deadweight tonnage	Length	Average speed
MV Petunia Seaways	2004	2013	LR+100 A1 RoRo	MAN 9L60MC-C	21 MW	10,407 tonnes	30 m	17.6 knots
MV Primula Seaways	2004	2013	LR+100 A1 RoRo	MAN 9L60MC-C	21 MW	10,407 tonnes	27 m	18.5 knots
MV Selandia Seaways	1998	2013	DNV 1 A1	2 x Wärtsilä New Sulzer Diesel 9ZA 50 S, 10.800 kW each	21.6 MW	11,089 tonnes	26 m	17.5 knots

Table. DFDS exhaust gas cleaning retrofit projects completed by Remontowa Shipyard

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gy and maintenance savings.

Beyond maritime equipment expertise

Cost savings such as these help boost the bottom line of ship owners around the world. That is why meeting energy efficiency and environmental regulatory demands are critical to the success of the maritime industry. The company has spent decades of work on incorporating innovative heat transfer, separation and fluid handling technologies for critical onboard operations. Alfa Laval technologies, such as PureSOx help create cost-effective solutions that benefit both the environment and ship owner profitability.



PureSOx System

"Alfa Laval expertise, however, extends beyond the provision of proven marine equipment," said Peter Leifland, President, Alfa Laval Marine & Diesel Division. "Working with shipyards, ship owners and ship operators for as long as Alfa Laval have has provided us with deep insights into the challenges the industry is facing."

Leifland goes on to say that no matter the challenge, Alfa Laval works tirelessly not only to innovate solutions that address these challenges but also help maritime stakeholders assess their options and determine the best way forward.

"Our job is to make sure that Alfa Laval solutions fit on board

yet deliver long-term economy, reliability, simple installation, great operating flexibility and infrequent maintenance," Leifland noted. "But when all is said and done, we also make sure that we continue to optimize the performance of our equipment through global service and support."

Moving forward to 2015

As the 2015 deadline for compliance with the 0.1% sulphur emission limit in certain ECAs draws near, ship owners and operators must identify reliable partners who can ensure that ship operation meets strict regulations. With its vast expertise and solid experience from the recent DFDS retrofits, Remontowa and Alfa Laval are well positioned to assist other ship owners with the supply and installation of exhaust gas cleaning systems.

Remontowa's Madrala shares following lessons learned from retrofitting the DFDS vessels:

- Prepare well in advance using the highest possible standards and procedures
- Establish good communications with all parties involved
- Be clear about expectations and goals
- Communicate openly at every phase in order to ensure unexpected issues can be resolved in a timely manner

"We worked closely with Alfa Laval and received solid support for these retrofit projects," said Remontowa's Madrala. "This worked to our client's advantage because both Remontowa and Alfa Laval share a common aim: to deliver the best and most cost-effective services that will ensure client satisfaction."

For those ship owners and operators, especially those with main trade routes in emission control areas, these words demonstrate the strong commitment by Remontowa and Alfa Laval toward ship owner success. Should the combination of Remontowa's high level of preparedness and Alfa Laval's proven exhaust gas cleaning system prove to be the right choice for one or several of your vessels, you stand to limit disruption to your business while making big gains from advance planning.

In the near future, demand for retrofitting vessels with exhaust gas cleaning systems will be great, but the supply of reliable shipyards and reliable equipment from a reliable supplier may not be. Act now to ensure compliance.

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The Athabasca Oil Sands region in Canada is home to billions of barrels of recoverable bitumen resources.

Oil and gas industry OEM provides single-source HVAC and building-management control system for oil sands project to improve maintenance, streamline the supply chain and keep production running.

Rockwell Automation Korea

Oil production from bitumen - the heavy, tar-like substance found in regions around the world - is a booming industry. Technological advancements combined with the ever-increasing global demand for petroleum resources have made this previously cost-prohibitive method of oil production a viable addition to the world's oil and gas resources. Canada is the largest known region of natural bitumen deposits, also known as "unconventional oil."

To respond to this growing demand, each company serving the oil sands industry is seeking to quickly and safely establish facilities to

begin production - and revenue generation - as soon as possible.

One such company, a multinational oil firm, began work on a major project in the Athabasca Oil Sands region in Canada and required a single provider for the project's HVAC and building management system to streamline maintenance and spare parts inventory and keep the critical HVAC system run-

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Figure 1. In the race to build and commission production facilities, many oil and gas producers overlook the critical role a heating, ventilating and air conditioning (HVAC) system plays.

ning. The project provided a 50% cost savings compared to its existing HVAC control system, streamlined its supply chain and improved troubleshooting and maintenance.

Essential HVAC Uptime

The Athabasca Oil Sands region is home to billions of barrels of recoverable bitumen resources. When the multinational oil company began work on a major project in the region, it was critical that all systems function as planned. Any delay in the building or startup of a project of this magnitude could result in a loss of as much as several million dollars per day.

The user understands that a healthy HVAC system is critical to managing oil extraction process uptime.

In the race to build and commission production facilities, many oil and gas producers overlook the critical role a heating, ventilating and air conditioning (HVAC) system plays in a quick and efficient start-up. Industrial HVAC systems used in the open-pit mines built for bitumen extraction are essential components of the overall process, responsible for cooling the cokers, mixers, turbines, chemical heat exchangers and control rooms that drive the entire process. In many cases, if the HVAC system is down for any reason, production downtime will follow.

The company executing the project understood this risk and in 2009 tasked its engineering, procurement and construction (EPC) company with identifying a single provider for the project's HVAC and building management system (BMS) solution.

"The oil and gas end user insisted on having a single vendor for the HVAC and BMS controls," explained Rick Melia, general manager of

Scott Springfield Manufacturing (SSM), an OEM Partner in the Rockwell Automation PartnerNetwork™.

"For them, it was about streamlining maintenance and spare parts. They wanted a single supplier for simplified maintenance and a smaller spare part inventory. We understood how critical the HVAC control system was for simplifying and speeding troubleshooting to preserve production uptime, and made sure it was a high priority in the early project stages," Melia said.

A Single Supplier

The EPC on the project ultimately selected SSM to provide the HVAC and BMS, based on the company's HVAC experience. "The first phase of the project called for 183 airhandling units and 43 BMS systems," explained Melia. "We needed a partner that could provide controls for both systems, as well as supply the knowledge and experience that we lacked in designing and installing BMS systems."

The SSM team reviewed proposals from multiple controls vendors, but ultimately selected Rockwell Automation to provide control hardware for the HVAC solution, as well as BMS system design, engineering and commissioning services from the Rockwell Automation Global Solutions team.



Figure 2. Allen-Bradley PowerFlex 40 variablefrequency drives control fan speed, allowing operators to select and automate their preferred speed.

SSM implemented an HVAC control system based on the Allen-Bradley[®] MicroLogix[™] 1400 controller (www.rockwellautomation.com/ go/prmicro) to accommodate the robust communication and troubleshooting requirements the user required for its system. Allen-Bradley PowerFlex[®] 40 variable-frequency drives (www.rockwellautomation. com/go/tjpf40) allow operators to control, select and automate their preferred fan speed.

To complete the system, the SSM team used Allen-Bradley IEC contactors and overloads, push buttons, terminal blocks, power supplies, safety and control relays, power distribution blocks and high-density I/O cards from PartnerNetwork Encompass[™] Referenced Product Partner Spectrum Controls.

In addition, the control system bill of materials - including Encompass Partner products - is available from SSM's local Authorized Allen-Bradley Distributor Westburne Electric as a single purchase order, which helped simplify SSM's procurement process, as long as the EPC maintains a consistent engineering specification.

"Forty percent of the HVAC units we delivered for phase one of the project are located in hazardous locations," Melia said. "Because the MicroLogix controller is Class I, Division II rated, we were able to avoid purchasing expensive air-purge panels or NEMA 7/9 enclosures, which meant cost savings for us and a simplified, easier-to-maintain solution for the end user."

The system communicates data from the HVAC system directly to the facility-wide process control system via an EtherNet/IP network for improved system reliability.

Integrated Architecture

For the BMS, the Rockwell Automation Global Solutions team designed, programmed, installed and commissioned a control system based on the company's Integrated Architecture[™] system. A SIL-2 certified, Allen-Bradley ControlLogix[®] programmable automation controller (www.rockwellautomation.com/go/tjcontrollogix) provides the HVAC system intelligence for the SSM-designed air handler and the peripheral unit heaters, exhaust fans and dampers.

The system communicates data from the HVAC system directly to the facility-wide process control system via an EtherNet/IP[™] network for improved system reliability. So that the HVAC, process control, and fire and gas systems could maintain robust communications connections, the Rockwell Automation team installed Allen-Bradley Stratix 8000[™] managed Ethernet switches (www.rockwellautomation.com/go/stratix).



Figure 3. SSM implemented an HVAC control system based on the Allen-Bradley MicroLogix 1400 controller to accommodate the robust communication and troubleshooting capabilities the end user required for its system.

Allen-Bradley PanelView[™] Plus humanmachine interfaces (http://ab.rockwellautomation.com/Graphic-Terminals) offer operators intuitive, easy-to-navigate access to system health and operation data.

"The user understands that a healthy HVAC system is critical to managing oil extraction process uptime," said Melia.

"The BMS provides the company with real-time operational data on everything from air flow and temperature, to steam temperature and electrical amp draws, to the central control system. That means control room operators get actionable data immediately, and if something is wrong, they can easily troubleshoot the issue and get the system up and running quickly," he added.

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국내외 조선 & 해양 기업들의 정보를 수록한 "Offshore & Shipbuilding Guide 총람"이 발간되었습니다.

본 총람은 조선소 및 조선 & 해양 기자재 업체 등을 비롯한 관련 업체들의 주요 제품, 소재지, 연락처 등 각종 정보가 담겨 있습니다. 특히 국내외 조선해양 기업들의 정보를 한눈에 파악할 수 있도록 (조선, 해양) 분야 및 (조선소, 기자재, 해운/항만 등) 영역별로 구성되어 있으며, 가나다 순서로 일목요연하게 정리되어 있습니다.

총람 발행기념 할인행사

권당 정가 80,000원, 30% D.C / 할인가 56,000원 (VAT 별도) 총람 구매에 관한 자세한 내용은 홈페이지(www.korship.co.kr)를 참조바랍니다.



DSME secured an order from Zodiac for 6 large containerships

Daewoo Shipbuilding & Marine Engineering (DSME) announced on December 17 that it won an order from Zodiac for 6 units of 10,000 TEU containerships. This contract is valued at approximately, USD 540 million. All these vessels will be built at Okpo shipyard in Geoje and are scheduled for delivery by mid 2016. After delivery, these vessels will be chartered to Hyundai Merchant Marine on a long-term basis. In addition, this contract includes an option for 4 additional vessels, besides the 6 vessels. These vessels are the Post-Panamax containerships designed to fit through the expanded Panama Canal. Moreover, these vessels feature the optimized ship model with maximum fuel efficiency.

This contract brings the total number of vessels ordered at DSME to 55 units, including the vessels and offshore plants, worth USD 13 billion which accounts for 100% of its annual new order target set at the beginning of 2013. Particularly, DSME has registered more than SD 10 billion in new orders for 4 consecutive years since 2010.

An official from DSME said, "The key driver for DSME's new order growth is the well-balanced competitiveness in various ship types such as commercial vessels, offshore plants, warships, etc. We will continue to exceed our annual new order target also for the next year based on customer management tailored to their needs and active sales activities."

대우조선해양, 조디악(Zodiac)사로부터 대형 컨테이너선 6척 수주

대우조선해양은 조디악(Zodiac)사로부터 1만 TEU급 컨테이너 운반선 6척을 수주했 다고 지난 12월 17일 밝혔다. 수주액은 약 5억 4,000만 달러로 모두 거제 옥포조선 소에서 건조되어 2016년 중순까지 인도될 예정이다. 이들 선박은 인도 후 모두 현 대상선에 장기 용선되어 운영된다. 또한 양사는 6척 이외에 별도로 4척의 추가 건 조 옵션에도 합의했다.

이번에 수주한 선박들은 확장된 파나마 운하에서 운항이 가능한 포스트 파나막스



Lee Nam-yong(left), Managing Director of Hyundai Merchant Marine, Eyal Ofer(middle), Chairman of Zodiac, and Jang Yoon-geun(right), Senior Managing Director of DSME, are posing for photo after signing the shipbuilding contract.

(Post-Panamax)급 컨테이너선이다. 또한 최적화된 선형을 바탕으로 최고의 연료 효율 성능을 낼 수 있는 고효율 선박 으로 평가 받고 있다.

한편 이번 계약으로 대우조선해양은 현재까지 총 55척/기, 130억 달러 상당의 선박과 해양플랜트를 수주하며 올해 수 주목표 100% 달성에 성공했다. 특히 지난 2010년 이후 4년 연속 연간 100억 달러 이상을 수주하는 기록을 달성했다. 대우조선해양 관계자는 "상선과 해양플랜트, 군함까지 다양 한 선종에서 골고루 경쟁력을 갖춘 균형 잡힌 영업력이 대 우조선해양의 수주 원동력"이라고 설명하며 "내년에도 맞춤 식 고객관리와 적극적인 영업활동을 통해 수주목표 초과 달 성을 이뤄낼 것"이라고 밝혔다.

Samsung Heavy Industries received orders for LNG-FSRU and PC, etc., worth USD 300 million

Samsung Heavy Industries (SHI) announced on December 13 that it clinched orders worth approximately USD 300 million for 1 LNG-FSRU and 2 product carriers, etc.

Recently, SHI won an order from BW, a global shipping company, for 1 LNG-FSRU, and had secured an order from the same company for 1 LNG-FSRU in January, 2013.

LNG-FSRU, which is called the floating liquefied natural gas storage and regasification facility, is the vessel that can regasify LNG into natural gas at sea which is then directly supplied to the onshore locations. These vessels are scheduled for delivery by 2016.

So far, SHI has won orders for 2 LNG-FSRUs and

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12 LNG carriers worth approximately USD 3 billion in LNG market alone last year. In 2013, SHI clinched more than 30% of 36 LNG carriers which were placed worldwide.

Meanwhile, SHI signed a contract with a European shipping company to build 2 product carriers on December 10.

The latest contract brings the total value of orders placed at SHI to USD 12.6 billion which accounts for 97% of its annual new order target of USD 13 billion.

삼성중공업, LNG-FSRU 및 PC선 등 3억 달러 수주

삼성중공업은 LNG-FSRU 1척과 PC(Product Carrier)선 2척 등 선박 3척을 약 3억 달러에 수주했다고 지난 12월 13일 밝혔다.

삼성중공업은 최근 글로벌 해운그룹인 BW사로부터 LNG-FSRU 1척을 수주했으

며, 지난 해 1월에도 이 회사로부터 LNG-FSRU 1척을 수주 한 바 있다. 부유식 액화천연가스 저장 및 재기화 설비로 불 리는 LNG-FSRU는 해상에서 LNG를 천연가스로 재기화해 육상의 수요처에 직접 공급할 수 있는 선박이다. 이번에 수 주한 선박은 2016년 인도 예정이다.

이로써 삼성중공업은 2013년에 LNG-FSRU 2척, LNG선 12 척 등을 수주하며 LNG선 시장에서만 약 30억 달러의 수주 실적을 거뒀다. 지난해 전 세계적으로 발주된 LNG선은 총 36척, 그 중 30% 이상을 삼성중공업이 수주한 것이다. 한편 삼성중공업은 지난 10일 유럽 선사와 PC선 2척에 대한 건조 계약도 체결했다. 이번 계약을 포함해 삼성중공업은 현재까지 126 억 달러를 수주, 연간 수주목표 130억 달러의 97%를 달성했다.

STXOS secured orders for 5 coastal patrol boats from the Ministry of Defense of Peru

STX Offshore & Shipbuilding announced on December 12 that it signed a contract with the Ministry of Defense of Peru to build 5 units of 500-ton coastal patrol boats(including the optional vessels).

The signing ceremony was attended by Yoo Jeong-hyeng, President of STXOS, Carlos Tejada, Navy Chief of Staff of Peru, Vice-Admiral Reynaldo Pizarro, Chairman of SIMA state-run shipyard of Peru, Vice-Admiral Victor Pomar, President of SIMA shipyard, etc.

These 5 coastal patrol boats are worth approximately KRW 75 billion. The equipment and materials will be supplied from Jinhae shipyard in the CKD (completely knocked down) form, and the vessels will be built in Peru with technical support from STX. These vessels are scheduled for delivery by late 2015. These coastal patrol boats will measure 54.5m in length, 8.5m in width

with a speed of 22 knots, and be armed with 30mm guns, carrying out the coastal guard and defense duties.

Last month, Pedro Cateriano, Minister of Defense of Peru, expressed intention to introduce 10 coastal guard boats from Korea in a defense ministerial talk between Korea and Peru on November 27, raising the expectation of new order for additional 5 vessels. Last year, Peru selected STXOS as preferential negotiator for the coastal guard boat project.

STX조선해양, 페루 국방부로터 연안경비정 5척 수주

STX조선해양은 페루 국방부로부터 만재배수량 500톤급 연안경비정 5척(옵션 포 함)에 대한 건조계약을 체결했다고 지난 12월 10일 밝혔다. 이날 계약식에는 유정 형 STX조선해양 대표이사, 카를로스 떼아다(Carlos Tejada) 페루 해군참모총장, 페 루 SIMA 국영조선소 이사회 의장 레이날도 피사로(Reynaldo Pizarro) 해군 중장 및



SIMA조선소 대표이사 빅터 포마(Victor Pomar) 해군 중장 등 이 참석해 자리를 빛냈다.

STX조선해양이 수주한 연안경비정 5척의 건조금액은 한화 로 약 750억원으로 진해조선소에서 CKD(현지조립생산) 형 식으로 자재 및 기자재가 공급되고 STX의 기술 지원을 받아 페루 현지에서 건조되어 2015년 말에 인도될 예정이다.

연안경비정은 길이 54.5m, 너비 8.5m의 크기로서 22노트의 속도로 운항할 수 있으며, 30mm 함포가 탑재돼 페루 해안 경비임무를 수행하게 된다.

한편 지난달 27일 한국—페루 국방장관 회담에서 카테리이노 페루 국방장관이 한국으로부터 10대의 연안경비정 기술을 도입해 생산하겠다고 밝힌 만큼, 앞으로 추가로 5척을 더 수 주할 것으로 기대되고 있다. 페루는 지난해 연안 경비정 도입 사업의 우선협상대상자로 STX조선해양을 선정한 바 있다.

Emerson to automate new offshore UKCS production platform

Premier Oil has awarded Emerson Process Management a \$17-million contract to automate a new offshore production platform on the UKCS. The Solan oil field platform will be 160 km (100 mi) west of Scotland and will be designed for unmanned operations.

Emerson will provide project services including project management, detailed design, configuration, acceptance testing, commissioning, and start-up support.

The integrated solution will use Emerson's PlantWeb digital plant architecture, including its DeltaV digital automation system, DeltaV SIS process safety system, CSI 6500 Machinery Health Monitor, and AMS Suite predictive maintenance software. Other elements will include Emerson's Rosemount pressure, temperature, radar level, and vortex flow transmitters; Micro Motion Coriolis flowmeters; and Roxar sand monitors and multiphase flowmeters.

Emerson will also provide electrical switchgear, uninterruptible power supplies, and satellite telecommunication equipment, as well as an operator training solution that simulates real-world.

Solan field is expected to reach a production rate of 24,000 b/d of oil by the end of 2014, out of 40 MMbbl of producible reserves. Premier Oil is the operator and holds 60% interest in Solan.

에머슨, UKCS 해상 생산 플랫폼에 대한 자동화 프로젝트 계약 체결

Premier OI사가 UKCS(영국 대륙붕)에 소재한 신규 해상 생산 플랫폼의 자동화 업 체로 에머슨 프로세스 매니지먼트를 선정하고, 1,700만 달러의 계약을 체결했다. 이로써 에머슨은 프로젝트 관리, 상세 설계, 구성 설정, 인수 시험, 시운전, 기동 시 작 지원을 포함한 프로젝트 서비스 전반을 제공하게 된다. Solan 유전 플랫폼은 스



코틀랜드 서쪽 160km에 위치하며, 무인 작업을 목적으로 설계될 예정이다.

이번 프로젝트에 적용될 에머슨의 통합 솔루션은 Delta / 디 지털 자동화 시스템, Delta / SIS 공정 안전 시스템, CSI 6500 기기 상태 모니터(Machinery Health Monitor), AMS Suite 소프 트웨어를 포함하며, 특히 PantWeb 디지털 플랜트 아키텍처 가 사용된다. 또한 에머슨의 Rosemount 압력, 온도, 레이더 레벨, Vortex 유량 트랜스미터, Micro Motion Coriolis 유량계, Roxar 모니터링 장치, 유량계 등이 적용될 예정이다. 이울러 에머슨은 전기 개폐기, 무정전 전원 공급 장치(UPS), 위성 통신 장비를 비롯해 효율적인 운영 및 관리를 위해 실제 상황을 가상화 하는 시뮬레이션 솔루션까지 제공할 예정이다. 한편 Premier 이시는, Solan 유전에 대해 60%의 지분을 보유 하고 있으며, 이 유전의 생산 가능 매장량은 4,000만 배럴에 달한다. 2014년 연말까지 하루에 24,000 배럴의 속도로 석유 를 생산할 것으로 예상되고 있다.

Daehan Shipbuilding won an order for 4 bulk carriers

Daehan Shipbuilding announced on December 12 that it signed a contract with Korea Lines to build 1 unit of 180,000 DWT bulk carrier and 3 units of 207,000 DWT bulk carriers.

These vessels are eco-friendly vessels fitted with the latest engines that provide high fuel efficiency and emit less harmful gases, and will be delivered from the second half of 2015 to the second half of 2016 on a staggered basis. Meanwhile, Korea Lines announced on December 10that it made a large-scale investment worth KRW 242 billion to place an order for the 4 bulk carriers although the ship price

remains undisclosed.

Last month, Daehan Shipbuilding received orders for 14 bulk carriers, including the optional vessels last month. The latest order brings the total order book of Daehan Shipbuilding to 18 units, including 8 product carriers and 18 bulk carriers which are equivalent to almost 3-year works until the second half of 2016.

An official from Daehan Shipbuilding said, "We will

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make our utmost effort to build high-quality eco-friendly vessels by fully leveraging our experience with the construction of 12 Cape-size bulk carriers and 2 Newcastle-max bulk carriers. Daehan Shipbuilding, the best shipyard that specializes in Cape-size bulk carriers, has secured competitive advantage in this market based on relentless improvement of quality and customer-oriented services."

대한조선, 벌크선 4척 수주

대한조선은 지난 12월 10일 대한해운과 180,000 DWT급 벌크선 1척, 207,000 DWT 급 벌크선 3척 등 총 4척의 벌크선에 대한 건조계약을 체결했다고 밝혔다. 이번에 수주한 선박들은 연비효율이 높고 유해가스 배출은 적은 최신형 엔진이 탑 재되는 친환경선박으로 오는 2015년 하반기부터 2016년 하반기까지 순차적으로 인 도될 예정이다. 한편 선가는 공개되지 않았으나 대한해운은 지난 10일 공시를 통해 벌크선 4척 발주를 위해 총 2,420억원 규모의 금액을 투자했다고 밝힌바 있다. 지난달에도 옵션 포함 총 14척의 벌크선을 수주한 대한조선은 이번 수주를 포함해 석유제품선 8척, 벌크선 18척의 수주잔량을 보유하며 오는 2016년 하반기까지의 일감을 확보하게 됐다.



대한조선 관계자는 "2척의 케이프사이즈 벌크선과 2척의 뉴캐 슬막스 벌크선을 건조한 경험을 바탕으로 고품질 친환경 선박 건조에 최선을 다하겠다"며 "케이프사이즈급 벌크선 전문 조선 소인 대한조선은 끊임없는 품질향상과 고객지향 서비스를 앞 세워 이 분야 시장에서 경쟁우위를 확보하고 있다"고 밝혔다.

DSME won orders for 5 ultra- large crude carriers

Daewoo Shipbuilding & Marine Engineering (DSME) clinched an order from the U.S.-based Scorpio Tankers for 5 units of 300,000-ton ultralarge crude carriers(VLCCs). This contract is worth approximately USD 500 million. All these vessels will be built at Okpo shipyard in Geoje and are scheduled for delivery by the first half of 2016.

These vessels will measure 336m in length and 60m in width with a carrying capacity of about 300,000 tons of crude oil. Moreover, these vessels are environment-friendly eco-ships incorporating various fuel-saving technologies and fitted with high-efficiency engines.

Significantly, this is the first VLCC order placed by Scorpio Tankers which have focused on the small and medium-sized crude carriers, product carrier, and gas carriers thus far. In addition, Scorpio Tankers has maintained close cooperative relationship with DSME, placing orders with it for 4 product carriers and 3 very large gas carriers (VLGC) this year even amid the sluggishness in the market. DSME has focused on developing the eco-friendly high-efficiency vessels, keeping pace with the market trends, even in the midst of market downturn caused by the falling oil prices and overcapacity, and is ready to win new orders for ultra large-scale crude carriers.

An official from DSME said, "An upswing in the demand for crude carriers is anticipated amid the easing of economic sanction against Iran and oil-producing countries' announcement to increase crude oil pro-



duction. I expect that Korean shipyards equipped with various eco-friendly high-efficiency ship technologies will be better positioned to win new orders in the period ahead."

The latest orders brings the total orders placed at DSME to 49 vessels and offshore plants worth USD 12.5 billion, achieving about 96% of its annual new order target of USD 13 billion.



대우조선해양, 초대형 원유운반선 5척 수주

대우조선해양은 미국 스콜피오 탱커(Scorpio Tankers)사로부터 30만톤급 초대형 원유운반선(VLCC) 5척을 수주했다. 총 수주액은 약 5억 달러로 모두 거제 옥포조 선소에서 건조되어 2016년 상반기까지 인도될 예정이다. 이번에 수주한 선박들은 길이 336m, 폭 60m에 약 30만톤의 원유를 수송할 수 있으며, 고효율 엔진과 각종 연료절감 기술들이 탑재된 친환경 고효율 에코십이다.

그 동안 중소형 원유운반선과 정유운반선, 가스운반선에 주력했던 스콜피오 탱커가 최초로 발주한 초대형 원유운반선이라는 점에서 그 의의가 크다. 또한 스콜피오 탱 커는 시장 불황 속에서도 올해 중순 대우조선해양에 4척의 정유운반선과 3척의 초 대형 가스운반선(MGC)을 발주하는 등 상호 긴밀한 협력관계를 유지하고 있다.

그 동안 유가 하락과 선복량 과잉으로 침체됐던 시황 속에서도 대우조선해양은 시

장 트렌드에 맞춰 지속적으로 친환경 고효율 선박 기술을 개발해왔고, 그 결과 다수의 초대형 원유운반선을 수주할 수 있었다.

대우조선해양 관계자는 "최근 이란 경제제재 완화 조치와 각 국의 원유수입량 증가 계획 발표 등으로 원유운반선의 수요 가 높아질 전망"이라며 "다양한 친환경 고효율 선박기술을 확보한 한국 조선업체들이 향후 수주 경쟁에서 유리할 것으 로 본다"고 밝혔다.

한편 현재까지 대우조선해양은 총 49척, 약 125억 달러 상당 의 선박과 해양플랜트를 수주하며 수주목표 130억 달러의 약 96%를 달성하고 있다.

ABB wins \$180 million in orders from cruise ship builders in 2013

ABB won orders worth \$180 million in 2013 to deliver complete electrical power plants and propulsion systems for six new cruise liners that include its latest-generation Azipod XO units. The orders make 2013 the best-ever year for ABB in cruise liners with the Azipod system.

The six ships include two for Norwegian Cruise Line (NCL), two for Royal Caribbean International and one each for Holland America Line and Carnival Cruise Lines, all leading brands in the cruise market. The orders were booked over the course of the year, with about \$30 million in the first quarter, about \$90 million in the second, about \$30 million in the third, and the remaining \$30 million in the fourth.

Azipod is an electric propulsion unit, which is housed in a submerged pod outside the ship hull. The pod contains a variable-speed electric motor which drives a fixed-pitch propeller, and can be rotated around its vertical axis to provide propulsion thrust freely in any direction. The Azipod propulsion system eliminates the need for rudders, stern transversal thrusters or long shaft lines inside the ship's hull. Since its introduction 20 years ago, the Azipod system has found favor among builders of cruise liners and ice-going ships.

"This is a remarkable run of orders for our cruise-ship power and propulsion systems, confirming ABB's leading position in this high-end market," said Veli-Matti Reinikkala, head of ABB's Process Automation division. "Since the launch of the Azipod XO, nearly all of the ships ordered will be equipped with this new generation unit."

The two ships for NCL are Breakaway Plus class vessels and include complete electrical systems, each with two Azipod XO propulsion units and three bow thrusters. Each has163,000 gross tonnage (gt)



with capacity for 4,200 passengers and are due for delivery from German shipyard Meyer Werft GmbH in October 2015 and spring 2017 respectively. ABB will supply Azipod XO units with combined propulsion power of almost 40 MW, plus generators, transformers, frequency converters and related power system equipment. The installation includes ABB's new "Intelligent Maneuvering Interface" (IMI), which is equipped with the 'red dot' design awardwinning ABB Azimuth lever and the Azipod Dynamic Optimizing system which can enable fuel savings of up to two percent.

The ships for the Holland America Line and Carnival Cruise Lines are under construction at

72 KorShiP

Fincantieri yards in Italy. For the former, ABB will supply the complete electrical power plant and propulsion system, with 28 MW of power, for a 99,500 gt, 2,660-passenger capacity liner, due for delivery at the start of 2016. The latter liner, 133,500 gt, 4,000-passenger capacity, named Carnival Vista, will feature ABB power plant and propulsion systems, augmented by generators, main switchboards, a remote control system and distribution transformers.

One of the liners for Royal Caribbean International is the Oasis 3, due for delivery from STX France in the second quarter of 2016, equipped with

three 20 MW Azipod XO units from ABB. The 225,282 gt, 5,400 passenger-capacity ship will also be equipped with ABB propulsion transformers, propulsion drives and remote control systems. The other, being built by Meyer Werft GmbH, will feature two 20,5 MW Azipod XO propulsion systems as well as generators, main switchboard, a remote control system, bow thruster motors and set of transformers. The ship will be delivered in April 2016.

HMD clinched an order for the world's first methanolpowered PC

Hyundai Mipo Dockyard (HMD) recently announced that it won an order for 6 units of 50,000-ton eco-friendly PCs (including the optional vessels) from Norway-based Westfal-Larsen, Sweden-based MARINVES, and Bermuda-based SKAGERACK INVEST.

These eco-friendly PCs will measure 186.0m in length, 32.2m in width, and 19.1m in height, and are scheduled for delivery on a staggered basis from June 2016. Particularly, these vessels will be fitted with the dual fuel engine for the first time worldwide which can run on both bunker C oil and methanol.

Methanol is an environment-friendly fuel that emits no sulfur oxides (SOx) in the atmosphere from combustion. Therefore, vessels powered by these fuels do not have to be subject to specific regulations when operating at the SOx Emission Control Area (SECA) such as the North Sea and Baltic Sea.

HMD has dominated the global market for medium-sized tankers since last year through the construction of eco-friendly PCs, and is stepping up effort to win new orders for the high value-added special purpose vessels such as platform supply vessel, combo vessel, juice carrier, refrigerated container, etc.

In 2013, this order brings the total orders placed at HMD to 146 units, including about 110 medium-sized PCs, etc., worth USD 4.96 billion which accounts for approximately 155% of its annual new order target of USD 3.2 billion.

현대미포, 세계 최초 메탄올 연료 PC선 수주

현대미포조선은 최근 노르웨이 웨스트팔-라센(Westa-Larsen)사와 스웨덴 마린베 스트(MARINVEST)사, 버뮤다 스카게락 인베스트(SKAGERACK INVEST)사로부터 50,000톤급 친환경 PC선 6척(옵션 포함)을 수주했다고 밝혔다.

이번에 현대미포조선이 수주한 PC선들은 길이 186.0m, 너비 32.2m, 높이 19.1m의



친환경 선박으로 2016년 6월부터 순차적으로 인도될 예정이 다. 특히 이들 선박은 세계 최초로 벙커C유와 메탄올(Melhanol) 을 모두 사용할 수 있는 '이중 연료 엔진(Dual Fuel Engine)'이 탑재된다.

메탄올은 연소시 대기 중으로 황산화물(SOX)을 전혀 배출하지 않는 친환경 연료다. 따라서 이를 연료로 사용하는 선박은 발 트해와 북해 등 황산화물 배출 규제해역(SECA, SOX Emission Control Area) 운항시 별다른 규제를 받지 않아도 된다. 한편, 지난해부터 친환경 PC선 건조를 통해 세계 중형 탱커 시장을 주도하고 있는 현대미포조선은 해양작업지원선 (Platform Supply Vessel), 광석,황산 겸용선(Combo Vessel), 주 스 운반선(Juice Carrier), 냉동컨테이너선 등 고부가 특수선 시장 선점을 통한 수주경쟁력 강화에 박차를 가하고 있다. 이로써 현대미포조선은 2013년 들어 중형 PC선 110척 등 모 두 146척의 선박을 49억 6,000만달러에 수주함으로써 올해 목표(32억 달러)대비 약 155%를 초과 달성했다.
고객이 선택한 이유!

◈최고의 성능
◈사용자 위주의 편리성
◈지속적인 레이저 교육실시
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Global newbuilding orders increased more than 70% year-on-year to approximately 35 million CGT as of October this year. According to Clarkson, new orders placed in October alone stood at 3.16 million CGT, and among them, Chinese shipyards secured 1.8 million CGT, overwhelmingly outperforming the Korean shipyards which won 550,000 CGT. This year, China and Korea registered the order intake of 14.5 million CGT and 11.75 million CGT, respectively.

The newbuilding market has witnessed sharp increase in new orders for ordinary commercial vessels with the Chinese shipyards showing strong performance. Based on the ship type, new orders for bulk carriers (BC) and containerships soared compared to the previous year's level, and new orders for product carriers (PC) have been steadily placed.



Domestic shipbuilding industry has seen the growth in new order intake driven by high value-added vessels such as LNG carrier, eco-ship, product carrier, drillship, etc. Particularly, the 3 domestic shipbuilding giants have already met their annual new order target.

Here, we take a close look at the performance of major domestic 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: SPP Shipbuilding Co., Ltd.

Offshore plant orders awarded to domestic shipyards in 2011-2013

ľ		+				: (
	Jata	lype	Number of vessel	Amount	Ship owner	Delivery	Shipyard
		Uriliship	1 vessel		Diamond Offshore Uniling Limited, U.S.A	Mia 2013	Hyundal Heavy Industries
	uel .	Offshore Plant		USD 900 million	RasGas, Qatar	Late 2013	Hyundai Heavy Industries
	- 001	Drillship	2 vessels	KRW 1 trillion	Noble Drilling, U.S.A	On a staggered basis until Sep 2013	Hyundai Heavy Industries
		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
	Feb	Platform Supply Vessel	1 vessel	,	1	2012	STX OSV
		Fisheries Research Vessel	1 vessel	EUR 35 million	Ministry of Fisheries and Marine Resources, Republic of Namibia	Early 2012	STX Finland
		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
	Mar	Deepwater drillship	2 vessels	KRW 1.2 trillion	Aker Drilling, Norway	Second half of 2013	Daewoo Shipbuilding & Marine Engineering
	7	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		- 1	2012	STX OSV
		Drillship	1 vessel	•	Fred Olsen Energy, Norway	August 2013	Hyundai Heavy Industries
	,	Drillship	2 vessels	USD 1.12 billion	Maersk, Denmark		Samsung Heavy Industries
	Apr	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
		Deepwater drillship	1 vessel	•	Vantage Drilling, U.S.A	Late May, 2013	Daewoo Shipbuilding & Marine Engineering
2011		Offshore Platform (Top side)		USD 414 million	Statoil, Norway		Samsung Heavy Industries
	May	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
		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
	<u>_</u>	LNG-FSRU	2 units	USD 500 million	Höegh LNG, Norway	Second half of 2013, first half of 2014	Hyundai Heavy Industries
	100	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
	lul	Drillship	2 vessels	USD 1.1225 billion	Maersk, Denmark	July 2014	Samsung Heavy Industries
	Aug	LNG-FSRU	1 vessel	USD 280 million	Excelerate Energy, U.S.A	First quarter of 2014	Daewoo Shipbuilding & Marine Engineering
		Semi-submersible Rig	2 units	USD 1.1 billion	Songa Offshore, Norway	Second hallf of 2014	Daewoo Shipbuilding & Marine Engineering
	Sep	Well Intervention Vessel	2 vessels	USD 420 million	Eide Marine Services AS, Norway	2013	STX Finland
		Drillship	1 vessel	KRW 600 billion	Noble Drilling, U.S.A	Second half of 2014	Hyundai Heavy Industries
		Fixed Offshore Platform		USD 1.4 billion	Chevron, U.S.A	Second half of 2014	Daewoo Shipbuilding & Marine Engineering
		Drillship	1 unit	USD 550 million	Offshore drilling company, Americas	T	Daewoo Shipbuilding & Marine Engineering
	Oct	Platform Supply Vessel	1 unit		Troms Offshore Supply AS, Norway	First half of 2013	STX OSV
		Offshore Plant Module	2 units	,	I	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
	Nov	Pipe Laying Support Vessel	2 units	USD 500 million	Odebrecht, Brazil	August of 2014	Daewoo Shipbuilding & Marine Engineering
	Dec	Offshore facilities (Gas platform and various facilities)	·	USD 900 million	Major multinational oil companies	2nd half of 2014	Hyundai Heavy Industries
	2	CPF (Central Processing Facility)		KRW 2.6 trillion	INPEX, Australia	4th quarter of 2015	Samsung Heavy Industries
	- 3 0	Semi-submersible rig	1 unit	USD 620 million	Odfjell, Norway	by mid 2014	Daewoo Shipbuilding & Marine Engineering

Offshore Plant Orders

F	Feb	LNG-FSRU	,	,	Hoegh, Norway	,	Hyundai Heavy Industries
	Mor	Offshore Platform	1 unit	USD 560 million	DONG E&P A/S, Danish	April 2015	Daewoo Shipbuilding & Marine Engineering
	INIAI	FPSO	1 unit	USD 2.0 billion	INPEX, Australia	April 2016	Daewoo Shipbuilding & Marine Engineering
L	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
	<u>:</u>	Semi-submersible drilling rig	1 unit	USD 700 million	Fred Olsen Energy, Norway	March 2015	Hyundai Heavy Industries
	unn	LNG-FPSO	1 unit	•	Petroliam Nasional Berhad, Malaysia	June 2015	Daewoo Shipbuilding & Marine Engineering
2012	14	Drillship	1 vessel	USD 645 million	Ensco plc	1	Samsung Heavy Industries
	Inc	Gas Compression Platform	1 unit	USD 420 million	(Letter of Award)	Second half of 2015	Hyundai Heavy Industries
L	Aug	LNG-FSRU	8 vessels	•	Excelerate, U.S.A	Between early 2015~2017	Daewoo Shipbuilding & Marine Engineering
I	i c	Drillship	1 vessel	USD 620 million	Rowan, U.S.A	First half of 2015	Hyundai Heavy Industries
	oeb	Drillship	1 vessel	USD 623 million	1		Samsung Heavy Industries
I		Drillship	4 vessels	USD 2.06 billion	Transocean, U.S.A	One-by-one from mid 2015	Daewoo Shipbuilding & Marine Engineering
	Oct	Drillship	1 vessel	USD 560 million	Atwood Oceanics, U.S.A	1	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
	<u>c</u>	Gas Production Platform (topside)	1 unit	USD 1.1 billion	Statoil, Norway	Mar 2016	Hyundai Heavy Industries
		LNG-FSRU	1 vessel	,	BW Maritime, Singapore	2015	Samsung Heavy Industries
	NACK	Floating Production Unit (FPU)	1 unit	USD 1.3 billion	Total, France	First half of 2016	Hyundai Heavy Industries
	Mai	Tension Leg Platform (TLP)	1 unit	USD 700 million	Total, France	First half of 2015	Hyundai Heavy Industries
	Apr	FPSO	1 unit	USD 1.9 billion	Chevron, U.S.A	-	Hyundai Heavy Industries
	May	Semi-Submersible Drilling Rig	1 unit	USD 750 million	Diamond Offshore, U.S.A	Nov of 2015	Hyundai Heavy Industries
		Ultra-deepwater Drillship	1 unit	USD 515 million	Ensco, United Kingdom	Third quarter of 2015	Samsung Heavy Industries
	Jun	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	1	Samsung Heavy Industries
2013		Ultra-deepwater Drillship	2 units	USD 600 million	Seadrill, Norway	Second half of 2015	Samsung Heavy Industries
	Jul	Semi-Submersible Rig	1 vessel	USD 718 million	Stena, Sweden	First half of 2016	Samsung Heavy Industries
		Ultra-deepwater Drillship	1 unit	USD 570 million	Atwood Oceanics, U.S.A	The end of 2015	Daewoo Shipbuilding & Marine Engineering
		Drillship	1 unit	USD 550 million	I	Dec of 2015	Samsung Heavy Industries
	Sep	Ultra-deepwater Drillship	1 unit	USD 600 million	Ocean Rig, Greece	Dec of 2015	Samsung Heavy Industries
		Jack-up Rig	1 unit	USD 530 million	Maersk Drilling, Denmark	The middle of 2016	Daewoo Shipbuilding & Marine Engineering
		Drillship	2 vessels	USD 1.24 billion	1	Second half of 2015	Daewoo Shipbuilding & Marine Engineering
	Oct	Drillship	1 vessel	USD 520 million	Transocean, U.S.A	The middle of 2016	Daewoo Shipbuilding & Marine Engineering
		LNG-FSRU	1 unit	,	Gas Sayago (Joint venture)	Sep of 2016	Daewoo Shipbuilding & Marine Engineering
	Dec	LNG-FSRU	1 unit		BW Maritime, Singapore	Early 2016	Samsung Heavy Industries
Noto .	Raced on	the press release and multiplic appro-	nincements of as	internal internal	estimation of Monthly KOBSHID (estimat	tion until Dec 15, 2013)	





This year, many exhibitions & conferences will be held around the world. In the first place, Posidonia, one of the world's top 3 shipbuilding and marine engineering exhibitions, will be held in Greece in June, and SMM will take place in Germany in September. These exhibitions will bring together the world-renowned oil & gas developers, shipyards, marine equipment makers, etc., under one roof, providing abundant spectacles. Particularly, the exhibitions related to the offshore and plants have become large events, reflecting the vigorous offshore oil & gas development activities. Multifarious shipbuilding and marine engineering events will be held in various parts of the world, including Europe, Malaysia, Singapore, and China.

Seatec 2014

5~7 Feb 2014 http://www.sea-tec.it

At the 12th edition, Seatec is the International Exhibition of Technology, Subcontracting and Design for boats, megayachts and ships.



AOG exhibition 2014

19~21 Feb 2014 http://www.aogexpo.com

The Australasian Oil and Gas Exhibition and Conference, known as AOG, will be held on the 19-21 February, 2014. In the past few years it has broken records and become Australia's largest oil and gas exhibition, with over 500 exhibitors from 20 countries.





19~21 Mar 2014 http://www.apmaritime.com

Asia Pacific Maritime (APM) is the one-stop market for the region's maritime community, showcasing the latest in marine engineering and port technology.

Gastech 2014

24~27 Mar 2014 http://www.gastechkorea.com

Gastech 2014, the World's Premier Natural Gas Conference & Exhibition Reaches South Korea. Gastech is the world's favourite meeting place for energy professionals working in the natural gas and liquefied natural gas (LNG) industries.





KorShip 79



CIMPS-Europort 2014

9~11 Apr 2014. http://www.china-ship.com

China International Marine, Port & Shipbuilding Fair 2014 (CIMPS-Europort 2014), focusing on advanced technology & special purpose vessels, is to be held at Nanjing International Exhibition Center (NJIEC) from April 9 to 11, 2014.







Tube 2014

7~11 Apr 2014 http://www.tube-tradefair.com

Tube 2014, the world leading trade fair for the tube industry, is a must, all the experts agree: No less than the future of the tube industry awaits over 34,500 international trade visitors. On a growing area with increasingly attractive trade fair stands, decision makers gather information on future-oriented trends concerning machinery and plant for the manufacturing and processing of tubes, forming and bending technology, tube trade and accessories as well as profile technology.



9~11 Apr 2014 http://www.seajapan.ne.jp

SEA JAPAN 2014, the 11th edition of the exhibition, will focus visitor attention on environmental protection, ocean development and maritime security.





Offshore Technology Conference 2014

5~8 May 2014 http://www.otcnet.org

Founded in 1969, the Offshore Technology Conference (OTC) is the world's foremost event for the development of offshore resources in the fields of drilling, exploration, production, and environmental protection. OTC is held annually at Reliant Park in Houston.







INAMARINE 2014

13~15 May 2014

http://www.inamarine-exhibition.net

INAMARINE 2014 will continue to be the Indonesia's largest marketplace for maritime industry. To bring together with the qualified exhibitors and prospective visitors from local and international to create the more opportunities business.

Posidonia 2014

2~6 Jun 2014 http://www.posidonia-events.com

'Posidonia 2014', which marks 24th anniversary this year, is the largest exhibition in Greece, which brings together the world-famous shipyards, major ship paint, navigation system, marine engine, marine equipment manufacturers. Last year's event attracted about 1800 exhibitors from 87 countries.











Offshore wind china 2014

4~6 Jun 2014 http://www.offshorewindchina.com

Offshore Wind China 2014 is Asia's largest offshore wind event featuring on offshore wind power. Launched in 2009, it offers an ideal platform where the decision-makers, farm developers, technology and service suppliers gather together to present the advanced technology and innnovation, and learn about the latest market intelligence, policy and projects in China and the world.



SMM 2014

9~12 Sep 2014 http://smm-hamburg.com

SMM, one of the world's top 3 shipbuilding & marine engineering exhibitions, marks its 26th anniversary this year. Held in Messe, Hamburg, this show attracts a large number of marine equipment manufacturers mainly from Europe.





VDMA



Rio Oil&Gas 2014

15~18 Sep 2014 http://www.riooilgas.com.br

A leading oil and gas industry event in Latin America, Rio Oil & Gas Expo and Conference, have contributed to build up Rio de Janeiro's reputation of being the "Brazilian oil capital". In fact, Rio de Janeiro State concentrates 80% of the oil produced in the country, along with 50% of the total gas production.







Offshore Korea 2014

12~14 Nov 2014 http://www.okkorea.org

The 2nd Offshore Korea will be held in Busan, the offshore and shipbuilding city in Korea, from 12 to 14 Nov for 3days under the specially sponsored by 4 largest shipbuilding companies in Korea who are proud of their second-to-none offshore building technologies in the world leading the world's offshore plant new building market.







OSEA 2014

2~5 Dec 2014 http://www.osea-asia.com

OSEA is the biennial tradeshow that has served the offshore Oil & Gas market and it's supporting industries since 1976. The Platinum Edition (20th) of OSEA will be held from 2~5 Dec 2014 at Marina Bay Sands, Singapore. Established as the region's most well-attended Oil & Gas event, it has continuously attracted a high quality attendance.

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High efficient, eco-friendly Fresh Water Generator

LHE Co., Ltd.

LHE launched a new concept fresh water generator 'Woorisoo'. This Fresh Water Generator does not require separate Demister because the evaporation/separation/condensation processes are integrated into a single heat transfer plate, and features a distiller to convert seawater into high-quality freshwater using evaporation & condensation process. Unlike the ordinary fresh water generator that requires the management of the 4 different types of heat plate, this product requires the management of only one type and is therefore convenient. Particularly, the LHE plate incorporates evaporation, separation and condensation processes into one single type of titanium plate.



Reduction of seawater pumping needs correspond

to lower consumption of electrical energy, giving less energy requirement. No outer shell and minimum maintenance area are required, LHE FWG has a minimal weight, and easy to install and maintain.

Features

- Material: Plate Titanium, Gasket NBR
- Water Quality: Sea water 20,000~35,000ppm, Fresh water generator 0.5~10ppm
- Capacity: 10~60ton/day
- Model: Woorisoo-65/80/100
- SIZE: 750mm~1,850mm (L), 850mm (W), 1,500mm (H)
- Weight: 950~1,240kg
- Patents on Fresh water generator and Heat transfer plate

-TEL: +82-55-340-0100 -http://www.lhe.co.kr

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The world's most powerful direct drive

Bosch Rexroth Korea Ltd.



The new Hägglunds CBM hydraulic motor from Bosch Rexroth creates powerful opportunities. Taking over from the tried-and-true Hägglunds Marathon motor, the Hägglunds CBM packs 50% more torque into a motor that is smaller and up to 50% lighter than its predecessor. That gives it the world's highest torque-to weight ratio.

For Bosch Rexroth customers, the new motor opens up new possibilities. The Hägglunds CBM not only handles heavier workloads, but also takes up less space and places less weight on the drive shaft. This means that customer machines, and in some cases the facilities that house them, can be smaller, lighter and simpler.

The motor's reduced installation requirements, combined with the higher productivity it allows, can mean lower overall investments and increased long-term revenue. Added to this are the unique operating advantages of a hydraulic direct drive: full torque from zero speed, protection from shock loads and four-quadrant operation.

Power for growing demands

The Hägglunds CBM motor was developed in direct response to customer requests. Greater power is increasing-

ly needed in many industries, and it is a prerequisite for a number of new applications, such as wind and tidal energy. The Hägglunds CBM provides power for these applications and many others.

Tested to meet high expectations

In replacing a successful and trusted motor like the Hägglunds Marathon, Bosch Rexroth has left nothing to chance. Many years of R&D have gone into the Hägglunds CBM, as well numerous hours of testing to verify performance and quality. In fact, the Hägglunds CBM has undergone more lab testing than any other Hägglunds motor.

A smooth transition to greater power

Those looking to upgrade from the Hägglunds Marathon will be pleased to know that direct retrofit kits are available. These make exchanging the motor both quick and simple in existing machines.

> -TEL: +82-31-270-4200 -http://www.boschrexroth.co.kr

IECEx certified 'AccuTrak 2800' linear position monitors

Westlock Controls

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Westlock Controls announced that AccuTrak[™] 2800 series units have achieved further independent certification. Following extensive testing, the AccuTrak[™] 2800 linear position monitors are IECEx certified, as well as meeting the latest ATEX and EN health and safety standards. Internationally recognised, the IECEx certification provides global assurance of the product's ability to check linear valves, using junction housing and position switches in explosive or flammable atmospheres.

The AccuTrak[™] 2800 series of linear position monitors now benefit from a wider certified temperature range, from -30°C to +60 or 85°C, depending on the unit, offering greater flexibility for use in a wide variety of hazardous applications. Factory pre-wired Magnum switches allow position sensing of smaller valves, while easy back wiring of 316 Silver Bullet sensors accommodate observation of larger ones, delivering a cost-effective method of monitoring linear valves in situ.

The aluminium enclosures, with an ultra low copper content, also ensure optimal performance even in corrosive environments. The innovative linear unit now comes with the option of a robust stainless steel enclosure, and the addition of a Falcon solenoid valve if required, thanks to conduit entries and a numbered terminal strip.

-TEL: +82-31-777-8200 -http://www.ytec.net

First Router with Dual VPN and Firewall Capabilities

Rockwell Automation Korea



The Allen-Bradley Stratix 5900 services router is the first in the Rockwell Automation network product portfolio to deliver virtual private network (VPN) and firewall capabilities simultaneously. These capabilities make the router well-suited for securing cell/area zones, as well as connecting to a cell/area zone from a remote location over an untrusted network.

The Stratix 5900 services router expands a portfolio of jointly developed industrial products from Rockwell Automation and Cisco that are helping manufacturers build a unified, secure environment from the enterprise to end devices in an industrial automation control system. With VPN and firewall capabilities, the router restricts and regulates communication to help ensure a security perimeter is maintained and information exchange crossing the security boundary is not tampered with or interrupted. VPNs can also create a secure tunnel for server-machine communications to help protect cell/area zones from other machines in the facility. Firewall capabilities can monitor and block an input or an output that does not meet the firewall's configured policy. When combined, VPN and firewalling create a more robust, more secure network.

The router also enables manufacturing locations to connect to and communicate with remote locations and substations. For example, a remote machine – whether 100 feet or 1,000 miles away – can connect to a plant-based machine using the services router. This is a common application for the oil and gas and water wastewater industries where equipment dispersed across vast distances needs to communicate with each other to operate a common process.

The ruggedized Stratix 5900 services router runs on Cisco IOS, and includes a wide area network (WAN) port and four Fast Ethernet-ports. The hardware includes embedded features such as: Network Address Translation (NAT), NBAR protocol filtering, Access Control Lists (ACL) and Quality of Service (QoS) for prioritization. It has extended shock and vibration capability, comes with a DIN rail mount, and operates in a temperature range of minus 25°C to 60°C making it suitable for industrial applications.

The Stratix 5900 services router is currently available and complements the full portfolio of Stratix switches and the Allen-Bradley ControlLogix EtherNet/IP secure communication module (1756-EN2TSC) from Rockwell Automation.

-TEL: +82-2-2188-4400 -http://www.rockwellautomation.co.kr

BMEA (Busan Marine Equipment Association) Member List

ANSWER CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.answerclear.com Main Products : CO2 Extinguishing Sys. External Fire Fighting Sys. TEL : +82-51-831-3691

BANDO MARINE.

Head Office : Gangseo-gu Busan Homepage Add. : www.bando.info Main Products : Life Boat TEL : +82-51-831-1950

BERM YOUNG VALVE.

Head Office : Gangseo-gu Busan Homepage Add. : www.byvalve.com Main Products : Quick Closing Valve, Ball Valve, Bellows, Beal Valve TFI : +82-51-311-2511

B-I INDUSTRIAL CO., LTD.

Head Office : Gangseo-gu, Busan Homepage Add : www.b-i.co.kr Main Products : Fire & gas detection system, smoke, heat & fiame detector. TEL : +82-51-441-5670

BMT CO., LTD.

Head Office : Yangsan Gyeongsangnam-do Homepage Add. : www.superlok.com/ Main Products : Fitting & Valve, Vacuum Clamp TEL : +82-55-783-1000

BO KYOUNG IND., CO.

Head Office : Gangseo-gu Busan Homepage Add. : Main Products : O-ring, Sealing, Gasket TEL : +82-51-831-4615

BOKYUNGTL CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : Main Products : Rudder Body, Winch, Crane TEL : +82-51-832-0801

BO MYUNG METAL CO., LTD.

Head Office : Saha-gu Busan Homepage Add. : Main Products : Copper Tube & Pipe, Cupro-Nikel Pipe, Copper Fitting TEL : +82-51-266-4101

BOYANG HARDWARE CO., LTD.

Head Office : Kimhae Gyeongsangnam-do Homepage Add. : www.byhd.co.kr Main Products : Stairway Body, Ladder, Hardware TEL : +82-55-345-1951

BUSAN INDUSTRY CO.

Head Office : Gangseo-gu Busan Homepage Add. : Main Products : Powder Coating TEL : +82-51-831-4810

BUSUNG PLANT CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : Main Products : Cargo Reducer Piece TEL : +82-51-831-1784

CEPHAS PIPELINES CO., LTD. Head Office : Gangseo-gu Busan Homepage Add. :

Main Products : Butterfly Valve TEL : +82-51-263-3661

CHK CO., LTD. Head Office : Gangseo-gu Busan Homepage Add. : www.chkj.co.kr Main Products : Telephone Booth, Work Shop, Cable Box, Spare Box TEL : +82-51-831-9500

CHWANG HYEOP INSTRUMENTS.

Head Office : Gangseo-gu Busan Homepage Add. : www.chkj.co.kr Main Products : Telephone Booth, Work Shop, Cable Box, Spare Box TEL : +82-51-831-3607

CHANG WON ENVIRONMENT IND CO., LTD.

Head Office : Kimhae Gyeongsangnam-do Homepage Add. : www.seaclean.kr Main Products : Sewage Tredtment Plant TEL : +82-55-342-5545

CMR KOREA CO., LTD.

Head Office : Kurnjung-gu Busan Homepage Add. : www.cmkkorea.com Main Products : Temperature & Press Sensor, Alarm Monitoring Sys. TEL : +82-51-521-2883

DAECHANG METAL CO., LTD. Head Office : Saha-gu Busan

Homepage Add. : Main Products : Main Bearing support, Chain Wheel, Gear Wheel TEL : +82-51-264-0831

DAE-DONG ENTEC CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.ddentec.com/ Main Products : Air Cooler, Oil Cooler, Oil Tank, Air Tank, Oil Heater TEL : +82-51-832-1123

DAE HAN HEAT ELECTRIC MACHINERY IND.,CO. Head Office : Kijang-kun Busan

Head Omce : Njang-kun Busan Homepage Add. : Main Products : CO2 Welder, DC Tig, Welder, AC ARC Welder TEL : +82-51-724-6777

DAEHEUNG IND. CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.daeheungind.kr/kr/ Main Products : Forged Flanges, Nozzel & Forged Neck, Forged Items for ship TEL : +82-51-831-6635

AQ TECK CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : Main Products : Flower Meter, Viscometer, Control Valve TEL : +82-51-831-3720

DAEHWA TECHNICAL CO., LTD.

Head Office : Kimhae Gyeongsangnam-do Homepage Add. : Main Products : Shot & Blast, Painting, Painting's Manufacture TEL : +82-55-329-5705

DAEJUNG SPECIAL STEEL CO., LTD. Head Office : Gangseo-gu Busan

Homepage Add. : Main Products : Winch, Shaft, Gear Cluch TEL : +82-51-831-1133

DAEKYUNG CO., LTD.

Head Office : Saha-gu Busan Homepage Add. : www.dkhoist.com Main Products : Chain Block, Lever Block Trelley TEL : +82-51-264-6611

DAERIM MACHINERY CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.dae-rim.kr Main Products : Head, Air Receiver Tank, Pressure Vessel, Reactor TEL : +82-51-831-1456

DAESAN ENGINEERING CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.daesan-eng.com Main Products : E/R Package unit, Pipe Group Unit TEL : +82-51-831-0090

DAE SEONG MARINE TEC CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.ds-frp.com/ Main Products : Pipe Insulation System, FRP Weather Door TEL : +82-51-832-2071

DAESUNG IND CO.

Head Office : Gangseo-gu Busan Homepage Add. : Main Products : VENT SYS, OIL TANK, Out Fitting TEL : +82-51-831-7427

DAE WON HEAVY INDUSTRIES CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.daewonindustry.co.kr/ Main Products : Deck Machinery, Deck Equipments, OffShore TEL : +82-51-831-5215

DAEWON METAL IND. CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.galvanizing.co.kr/ Main Products : Hot Dip Galvanizing, Pipe for Shipbuilding TEL : +82-51-831-2541

DAEYANG ELECTRIC CO., LTD.

Head Office : Saha-gu Busan Homepage Add. : www.daeyang.co.kr Main Products : Precision Instrument TEL : +82-51-200-5331

DAEYANG INSTRUMENT CO., LTD.

Head Office : Saha-gu Busan Homepage Add. : www.daeyang.co.kr Main Products : Precision Instrument TEL : +82-51-200-5331

DAEYANG SP CO., LTD.

Head Office : Yangsan Gyeongsangnam-do Homepage Add. : Main Products : Welding machine TEL : +82-55-388-3800

DA HEUNG ENG. CO., LTD.

Head Office : Sasang-gu Busan Homepage Add. : Main Products : Marine valves TEL : +82-51-311-1882

DAOM METAL.

Head Office : Sasang-gu Busan Homepage Add. : Main Products : Sus plate, Flange, Pipe sleeve TEL : +82-51-315-1347

DEAIL MACHINERY.

Head Office : Gangseo-gu Busan Homepage Add. : Main Products : Piston Rod, Cross headpin, Propeller Shaft TEL : +82-51-832-1119

DECKWIN CO., LTD.

Head Office : Youngdo-gu Busan Homepage Add. : www.deckwin.com Main Products : Winch TEL : +82-51-413-1193

DH-M CO., LTD.

Head Office : Seo-gu Incheon Homepage Add. : www.dhm.co.kr Main Products : High Pressure Blower, High Pressure Washer TEL : +82-32-527-5782

DHP ENGINEERING CO., LTD.

Head Office : Dongnae-gu Busan Homepage Add. : www.dhpeng.com Main Products : Plate Type heat Exchanger, Disk & Shell type heat Exchanger TEL: +82-51-556-4200

DINES CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : Main Products : Provision Crane, Tilting Radar Post TEL: +82-51-971-0972

DK INDUSTRIAL CO., LTD.

Head Office : Saha-gu Busan Homepage Add. : www.dk-ind.com/ Main Products : Silencer, Fire Damper, Lashing Bridge, Rudder TEL +82-51-832-1436

DK TECH CORPORATION CO., LTD.

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

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

DOLIM PRECISION.

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

DONG-A VALVE IND.

Head Office : Gangseo-gu Busan Homepage Add. : Main Products : Marine Offshore valve, Strainer TEL: +82-51-831-1500

DONGBANG SHIP MACHINERY CO., LTD.

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

DONGHAE INTEC CO., LTD.

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

DONG HUN ENTERPRISE CO.

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

DONGHWA ENTEC CO., LTD.

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

DONGHWA M&E CO., LTD.

Head Office : Gangseo-gu, Busan Homepage Add. : www.donghwame.com Main Products : Heat Exchanger TEL : +82-51-971-3455

DONGHWA PNEUTEC CO., LTD.

Head Office : Gangseo-gu Busan Homenage Add Main Products : Air Comfressor, Cylinder, Cylinder, Head, Piston TEL:+82-51-974-4800

DONGIL SHIPYARD CO., LTD. Head Office : Saha-gu Busan

Homepage Add. :www.dongilshipyard.co.kr

Main Products : Rescue Boat Davit & Winch, Assembly, Line Hauler TEL : +82-51-200-1211

DONGKYUNG INDUSTRY CO., LTD.

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

DONG NAM ENGINEERING CO., LTD.

Head Office : Saha-ou Busan Homepage Add. : www.dongnam-eng.com Main Products : Electric Control Panel TEL +82-51-204-3984

DONGNAM PRECISION IND. CO., LTD.

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

DONG SUNG HIGHTECH.

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

DONGYANG G.T.S.

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

DONGYANG HYDTEC CO., LTD.

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

DONGYANG METAL CO., LTD.

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

DONGYOUNG ELECTRIC CO., LTD.

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

DSB ENGINEERING CO., LTD.

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

DSE BEARING CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.dsebearing.com Main Products : Metal Bearing TEL: +82-51-831-2046

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

DUYOUNG INDUSTRIAL MACHINES CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add.

Main Products : Plate-Baffle TEL : +82-51-831-2477

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

FRIEND CO., LTD.

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

GEO MAEK SHOT&PAINT CO.,LTD.

Head Office : Saha-gu Busan Homepage Add. : Main Products : Deck Machinery Part, Hose Handling Crane TEL : +82-51-264-3315

GEORIM ENGINEERING CO., LTD.

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

GISUNG ENGINEERING CO., LTD.

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

G. M. TEC CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.igmtec.com Main Products : Duct Equip't Seat Support TEL: +82-51-831-5851

G.S HIGH-TECHER CO., LTD. Head Office : Gangseo-gu Busan

Homepage Add. : www.gshightecher.koreasme.com Main Products : Air Vent Head, Pipe Coupling TEL +82-51-832-0456

G&S PRECISION IND CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : Main Products : Cable Tray, Vent, Hull Outffittings TEL : +82-51-831-0849

HAE DONG METAL CO., LTD.

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

HAE DUK RUDDER & R.STOCK CO., LTD.

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

HAE SUNG INDUSTRIAL.

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

HAEWON INDUSTRIES CO.

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

HAEWON IND. CO., LTD.

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

HAEYANG FAMILY CO., LTD.

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

HAEYANG METAL CO., LTD.

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

HAEYANG PROPELLER CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : Main Products : Marine Propeller TEL : +82-51-831-4599

HANCHANG TRANS CO., LTD.

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

HANJULEVEL.

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

HANLA IMS CO., LTD.

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

HANLA IND CO., LTD.

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

HANMAUM KI-GONG CO., LTD.

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

HEARTMAN CO., LTD.

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

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

HOSEUNG ENTERPRISE CO., LTD.

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

HWAJIN ENTERPRISE CO., LTD.

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

HWAJIN PF CO., LTD.

Head Office : Saha-gu[®] Busan Homepage Add. : www.hwajinpf.com Main Products : Butt-Welding Pipe, Fittings Carbon Steel TEL : +82-51-204-3001

HWA SHIN PRECISION CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : Main Products : Life Boat Winch TEL : +82-51-831-9839

HYOSUNG STEEL TECHNOLOGIES CO., LTD.

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

HYUNDAI HYCRAULIC CO., LTD.

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

HYUNDAI ZINC METAL CO., LTD.

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

HYUNJIN MATERIALS CO., LTD.

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

ILDO MACHINE ELECT CO., LTD.

Head Office : Saha-gu Busan Homepage Add. : Main Products : Heavy Electric Parts TEL : +82-51-266-6066

IL - SUNG INDUSTRY CO.

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

IN SUNG INDUSTRY CO. Head Office : Saha-gu Busan

Homepage Add. : Main Products : Profile, Steel Coalming Insulation TEL : +82-51-293-7550

JAESEUNG ENGINEERING CO., LTD.

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

JEILSANKI CO.

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

JEONG-AM SAFETY GLASS CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.jeong-am.co.kr Main Products : Tempered Glass, Laminated Glass TEL : +82-51-831-6161

JEONG HWA ACCOMMODATION SYSTEM CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.jeonghwa21.com Main Products : Wooden Furniture TEL : +82-51-974-8000

JEONG WOO COUPLING CO., LTD.

Head Office : Kimhae Gyeongsangnam-do Homepage Add. : www.jwcjoint.co.kr Main Products : Pipe Coupling, Pipe Repair Clamp TEL : +82-5339-766

JIN GU ENGINEERING.

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

JIN IL BEND CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : Main Products : TEL : +82-51-832-1919

JINKWANG ELECTRIC CO., LTD.

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

JINYOUNG METAL CO., LTD.

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

JMC HYDRAULICS.

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

JNC HI-TECHNOLOGIES.

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

JOKWANG I.L.I CO., LTD. Head Office : Gangseo-gu Busan

Head Office : Gangseo-gu Bus Homepage Add. : Main Products : TEL : +82-51-602-0200

JONGHAP POLESTAR ENGINEERING CO., LTD.

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

JUNG GONG IND. CO., LTD. Head Office : Saha-gu Busan

Head Onlice: Sana-gu busan Homepage Add.: www.jung-gong.com Main Products: Ordinary Window Side, Scuttle, Heated Window TEL: +82-51-261-2911

JUNG - WOO MACHINERY CO., LTD.

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

KANG BACK INDUSTRY CO., LTD.

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

KANGIL CO., LTD. Head Office : Gangseo-gu Busan

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

KANGRIM HEAVY INDUSTRIES CO., LTD.

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

K.C. LTD.

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

KEO HUNG MACHINERY.

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

KEYSUNG METAL CO., LTD.

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

KOC ELECTRIC CO., LTD.

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

KOREA HYDRAULIC CO.

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

KOREA PHE CO., LTD.

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

KOREA STEEL SHAPES CO., LTD.

Head Office : Sasang-gu Busan Homenage Add www.ekosco.com Main Products : Flat Bars, Equal Angles, Unequal Angles TEL +82-51-323-2611

KOREA TRADING & INDUSTRIES CO., LTD.

Head Office : Saha-gu Busan Homepage Add. : www.kticopper.co.kr Main Products : Copper alloy coil, Plate TEL: +82-51-293-4423

KORINOX CO., LTD.

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

KORVAL CO., LTD.

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

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

KSV

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

KTE CO., LTD.

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

KUKDONG ELECOM CO., LTD.

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

KUKDONG INDUSTRIAL ENGINEERING.

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

KUKJE METAL CO., LTD.

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

KUM HAW PRECISION CO.

Head Office : Gangseo-gu Busan Homenage Add Main Products : Coupling Flange, Bellows Flange TEL: +82-51-831-5685

KUMKANG ENGINEERING.

Head Office : Gangseo-gu Busan Homepage Add. :

Main Products : Hand Rail, Storm Rail, Platform, Inc. Ladder TEL +82-51-831-0091

KUMKANG PRECISION.

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

KWANGIL CORP.

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

KWANG JIN E.N.G CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : Main Products : Pipe Piece, Pipe Spool TEL +82-51-831-1435

KWANG JIN IND. CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : Main Products : Part of Heat Exchanger TEL : +82-51-831-4131

KWANG JIN TECH.

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

KWANG LIM MARINE TECH. CO.,LTD.

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

KWANG SAN CO., LTD. Head Office : Gangseo-gu Busan

Homepage Add. : www.kwangsan.com Main Products : Heating Coil unit, Expansion joint TEL : +82-51-974-6301

KWANGWOON CO.,LTD.

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

KYEONG SIN FIBER CO., LTD.

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

KYOUNGWON BENDING CO.

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

KYUNGIL METAL CO., LTD.

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

KYUNGSUNG INDUSTRY CO., LTD.

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

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

MANZU INDUSTRY. CO., LTD. Head Office : Gangseo-gu Busan

Homepage Add. : Main Products : Phosphate Coat. Pipe & Structure Painting. Special Painting TEL: +82-51-832-0944

MARINE RADIO CO., LTD.

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

MARINE TECHNICAL ENGINEERING CO., LTD.

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

MARSEN CO., LTD.

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

MAX TECH

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

MCM CO., LTD.

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

MI JIN PRECISION.

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

MIJOO INDUSTRY CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : Main Products : TEL: +82-51-831-1588

MIRAE ENGINEERING CO., LTD.

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

MJ TSR CO., LTD.

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

MODERN INTECH CO., LTD.

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

MT.H CONTROL VALVES CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. Main Products TEL: 82-51-974-8831

MYTEC CO., LTD.

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

NAMSUNG SHIPBUILDING CO., LTD.

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

NAMYANG METAL

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

NARA CORPORATION CO., LTD.

Head Office : Saha-gu Busan Homepage Add. : Main Products : TEL : +82-51-790-7505

NAVUTEC.

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

NEW-OHSEUNG CO., LTD.

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

NK CO., LTD.

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

NOKSAN FLANGE CO., LTD. Head Office : Gangseo-gu Busan

Homepage Add. : Main Products : Flange for ship TEL : +82-51-831-7956

OBOK ELECTRIC CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : Main Products : Transformer TEL : +82-51-832-1751

OK KWANG ENG CO., LTD.

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

OK KWANG METAL CO., LTD.

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

ORIENTAL PRECISION & ENGINEERING CO., LTD.

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

ORIENTAL PRECISION MACHINERY CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.opco.co.kr Main Products : Crane Component TEL: +82-51-831-0202

O.S.C.G CO., LTD.

Head Office : Sasang-gu Busan Homepage Add. : www.oscg.net Main Products : Cable grand, Junction box TEL: +82-51-305-3910

PACO HITEC CO., LTD.

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

PAL MI METAL IND CO., LTD.

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

PANASIA CO., LTD.

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

PI PLUS CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.pharmaidsolutions.com Main Products : Rudder stock, Pintle, Intermediate Shaft TEL +82-51-831-9338

POONG JIN METAL CO., LTD.

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

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

SAEJIN INTECH CO., LTD.

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

SAMBOO METAL CO,, LTD.

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

SAMGONG CO., LTD.

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

SAMJOO ENG. CO., LTD.

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

SAMJUNG MACHINERY.

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

SAM KWANG HI-TEC CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : Main Products : Rectangle Windows TEL: +82-51-832-0177

SAMSUNG NONFERROUS METAL CO., LTD.

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

SAMYANG METAL IND. CO., LTD.

Head Office : Saha-gu Busan Homepage Add. : www.cuniship.com Main Products : W-NT 90/10 Flange, Elbow, Tee TEL : +82-51-266-6655

SAMYOUNG FITTING.

Head Office : Gangseo-gu Busan Homepage Add. : Main Products : Elbow, Tee, Coupling TEL: +82-51-832-0211

SDK CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. :

Main Products · Winch Hatch TEL: +82-51-832-1882

SEAPLUS CO., LTD. Head Office : Gangseo-gu Busan Homepage Add. : www.sea-plus.co.kr Main Products : Low Pressure CO2, Fire Extinguishing Sys TEL: +82-51-831-0119

SEBO METAL CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.sebometal.co.kr Main Products : Pump Tower for LNG, Vent Mast TEL: +82-51-970-0200

SEBO TECH CO., LTD.

Head Office : Gangseo-gu Busan Homenage Add Main Products : Windwall, Heat Shield, Manual Hatch TEL: +82-51-831-4171

SEIL SERES CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.seilseres.com Main Products : VRC system, ODME TEL : +82-51-831-1858

SEJIN BOLT CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. Main Products : Bolt. Nut & Be. Double Nut. Chard Nut. Hinge Bog TEL : +82-51-831-9832

SEUNG JIN E.N.G.

Head Office : Gangseo-gu Busan Homepage Add. Main Products : Pipe Spool (Steel) TEL: +82-51-831-9050

SEUN STEEL CO., LTD. Head Office : Jin-gu Busan

Homepage Add. : www.seunsteel.co.kr Main Products : CR, HGL, CGL, EGL TEL +82-51-639-3200

SEWOONG PRECISION MACHINERY CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : Main Products : TEL: +82-51-831-0595

SEYANG HIGH-TECH

Head Office : Gangseo-gu Busan Homepage Add. Main Products : Water & Oil Strainer, Condensate Chlorination Tank TEL : +82-51-831-9125

SHILLA E&T CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. Main Products : Spot Cooler, Heat Exchanger, Pressure Yeses TEL: +82-51-831-7705

SHINDONG DIGITECH CO., LTD.

Head Office : Dong-gu Busan Homepage Add. : www.shindong.com Main Products : Navigation Communication, Satellite Communication TEL: +82-51-461-5000

SHINHWA INTERIOR & TECHNOLOGY CO., LTD.

Head Office : Saha-gu Busan Homepage Add. : Main Products : Marine Furniture TEL: +82-51-441-1294

SHINKWANG ACE ELECTRIC CO., LTD. Head Office : Kimhae Gyeongsangnam-do

Homepage Add. : www.skace.com Main Products : Cable Tray, Accessories TEL: +82-55-332-3315

SHINMYUNG INDUSTRIAL CO., LTD. Head Office : Gangseo-gu Busan

Homepage Add. : Main Products : Cable Tray Joint, Hanger TEL +82-51-831-5061

SHIN SHIN HEAVY INDUSTRIES CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : Main Products : Deck Machinery, Hydraulic system, Serface Treatment TEL: +82-51-832-0734

SHIN SHIN MACHINERY CO., LTD.

Head Office : Kijang-kun Busan Homepage Add. : www.sspump.com Main Products : Centrifugal Pumps, Gear Pumps, Screw Pumps TEL:+82-51-727-5300

SHINWOO METAL CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.shinwoometal.net Main Products : Flange, Forging TEL: +82-51-831-2830

SHIN YOUNG AIR CLUTCH.

Head Office : Gangseo-gu Busan Homepage Add. : www.airclutch.co.kr Main Products : SY-CB Type, SY-VC Type, SY-E Type TEL: +82-51-831-7072

SILLA METAL CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.sillametal.com Main Products : PROPELLER(F.P.P), C.PPROPELLER Blade & Hub TEL:+82-51-831-5991

SIN HUENG FLANGE CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : Main Products : Flange for ship TEL : +82-51-831-6167

SINWEOL GRATING CO., LTD.

Head Office : Sasang-gu Busan Homepage Add. : www.steelgrating.net Main Products : Steel Grating for Ship TEL: +82-51-323-7000

SMS CO., LTD. head office : Saha Gu Busan homepage add : www.sms-marinesystem.com main products : hatch-pontoon type, folding type, side rolling type, etc. lashing equipment-2/3tier TEL: +82 51-290-1000

SM POWER TEC CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.smpt.co.kr Main Products : Vacuum Pump for Shipping Bldc, AC,DC Motor & Generator TEL: +82-51-973-0267

SNP CO., LTD. Head Office : Saha-gu Busan Homepage Add. : Main Products : Galley Equipment, Cold Chamber, Catering Furniture TEL: +82-51-261-7711

STACO CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.staco.co.kr Main Products : Wall Panel, Celing Panel, Unit Toilet, Marin Door TEL : +82-51-831-7000

STA-JH CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : Main Products : Welding Fittings (Butt Welding) TEL: +82-51-831-1274

STASB CO., LTD.

Head Office : Jinhae Gyeongsangnam-do Homepage Add. :

Main Products · Marine Furniture Door TEL : +82-55-544-8070

STAUFF KOREA LTD.

Head Office : Saha-gu Busan Homepage Add.: www.stauff.co.kr Main Products : Hyd' System & Engineering, Hyd' Clamp & Test TEL : +82-51-266-6666

STBEND CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.stbend.co.kr Main Products : SUS Pipe Fitting, SUS Bend TEL: +82-51-831-5131

STEEL KOREA CO., LTD.

Head Office : Jinhae Gyeongsangnam-do Homepage Add. Main Products : TEL : +82-55-541-2212

SUHHEUNG ENGINEERING CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.shge.co.kr Main Products : Steel Grating TEL : +82-51-831-1811

SUNBO IND CO., LTD.

Head Office : Saha-gu Busan Homepage Add. : www.sunboind.co.kr Main Products : Tank Top Unit, Engine Room unit, Sater Strainer Silenser TEL: +82-51-261-3454

SUNG CHANG CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. Main Products : Non-Asbestos Gasket, Spiral Wound Gasket, PTEE Gasket TEL: +82-51-316-6300

SEOUNG HYUP MACHINERY.

Head Office : Sasang-gu Busan Homepage Add. : Main Products : White Metal. Piston Lo TEL : +82-51-303-4112

SUNG IL CO., LTD.(SIM)

Head Office : Gangseo-gu Busan Homepage Add. : www.sungilsim.com Main Products : Pipe Spool Pre-Fabrication, Induction Pipe Bending TEL: 82-51-831-8800

SUNG KWANG M/C.

Head Office : Gangseo-gu Busan Homepage Add. Main Products : Oil Press, Pipe Vending, Pipe Fitting Unit TEL +82-51-831-0620

SUNGWON ELECTRIC CO.

Head Office : Gangseo-gu Busan Homepage Add. Main Products : Cable Tray, Starter, Panel, Cable Way TEL : +82-51-831-9230

SUNG WON ENTERPRISE. CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.sungwonent.co.kr Main Products : V-Flow Swing Check, Valves, Manifold Unit TEL: +82-51-831-2140

SUNIL INSTRUMENT CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.suniltech.co.kr Main Products : Tank Level System, Viscosity System TEL: +82-51-831-1994

SUN KWANG P.S.P INC. CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. Main Products : Cargo Line, Ballasst Line, Engine Room, I.G Line TEL : +82-51-831-3777

S&W CO., LTD.

Head Office : Saha-ou Busan Homepage Add. : www.snwcorp.com Main Products : Com Shaft, Valve, Seat, Piston Pin, Bolt, Nut TEL: +82-51-205-7411

TAE HWA INDUSTRY CO.,LTD (THI)

Head Office : Seocho-gu Seoul Homepage Add. : www.thi.co.kr Main Products : Reciprocating & Screw, Compressor Unit, Brine/ Water Chiller Unit TEL: +82-2-598-1126

TAEHWA KALPA SEAL

Head Office : Gangseo-gu Busan Homepage Add · www.taehwa1.com Main Products : TH3000, TH3000W TEL: +82-51-831-9944

TAE KWANG INDUSTRIES.

Head Office : Gangseo-gu Busan Homepage Add. : www.tkic.co.kr Main Products : Boiler, Oil Cooler / Heater, Shell & Tube Heat, Exchanger TEL: +82-51-831-1801

TAESHIN G & W CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.taeshin.co.kr Main Products : Co2 / Mag, Mig Arc Welding, Machine, Air Gouging TEL : +82-51-831-1100

TAESUNG MACHINERY CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.taesungmc.co.kr Main Products : Manufacture of Structures, for Shipbuilding(LNG,LPG) and plant TEL +82-51-971-4006

TAEWON CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.twubc.kr Main Products : Flange, Strainer, Pressure TEL +82-51-831-0310

TAEWOONG CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.taewoong.com Main Products : Piston Rod/ Crown/ Head, Cross Head Pin TEL : +82-51-329-5000

TAEWOONG TECH CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : Main Products : Main Shaft, Connecting Rod, Inter Shaft, Propeller Shaft TEL +82-51-831-6685

TANKTECH CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.tanktech.co.kr Main Products : High velocity valve TEL : +82-51-979-1600

TK CORPORATION CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.tkbend.co.kr Main Products : Fittings (Elbow, Tee, Reducer, Cap) TEL : +82-51-970-6600

TMC CO., LTD. Head Office : Kimhae Gyeongsangnam-do Homepage Add. : www.besttmc.com Main Products : Membrane Sheets, Heavy Steel Corner, Anchor Strip TEL: +82-55-340-3000

TYCO MARINE SERVICES KOREA CO., LTD.

Head Office : Sasang-gu Busan Homepage Add. : www.dbefire.com Main Products : Fire Fighting System & Equipment TEL: +82-51-633-9100

U-YOUNG PRECISION IND. CO., LTD.

Head Office : Kimhae Gveongsangnam-do Homepage Add. : u-nex.com/ Main Products : Elec/Hyd. Windless, Elec/Hyd, Winch, Steering TEL +82-55-326-9691

U-YOUNG & TECH.

Head Office : Kimhae Gyeongsangnam-do Homepage Add. : u-nex.com/ Main Products : Elec/Hyd. Windless, Elec/Hyd, Winch, Steering Gear TEL:+82-55-326-9691

WON KWANG VALVE CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.wonkwangvalve.com Main Products : Marine Globe Valve, Marine Angle Valve, Marine Gate Valve TEL: +82-51-831-9932

WOONG CHEON OUTFITTING CO., LTD.

Head Office : Jinhae Gyeongsangnam-do Homepage Add. Main Products : Ship Component Parts, Painting, Deck Machinery TEL:+82-55-545-2432

WOOSUNG FLOWTEC CO.

Head Office : Gangseo-gu Busan Homenage Add Main Products : Simplex Oil Strainer, Can Water Filter TEL: +82-51-831-1531

WOOYANG B&P IND CO., LTD.

Head Office : Gangseo-gu Busan Homepage Add. : www.wooyangshot.com Main Products : Deck Outside Monting Item, Engine Room Mounting Item TEL:+82-51-831-5000

Y.C.P CO., LTD. Head Office : Saha-gu Busan Homepage Add. Main Products : Carbon Steel Precision, Tybe for Hydraulic Line Service TEL: +82-51-264-9300

YESUNG IND. CO., LTD.

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