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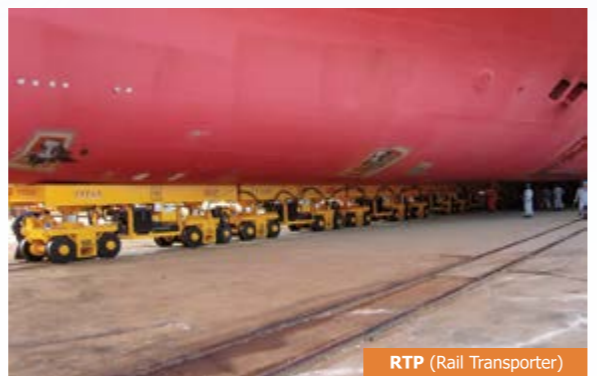
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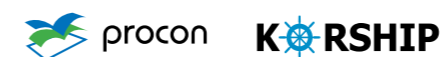
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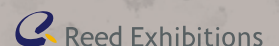
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KORMARINE 2013 will be open with great eclat at Busan Exhibition & Convention Center (BEXCO) , and Monthly KORSHIP will keep you updated with the latest news swiftly during the show as the official media of KORMARIE 2013 and we appreciate you cooperation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

KORMARINE 2013 will run from October 22 to October 25 Busan Exhibition Convention Center (BEXCO) .

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

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

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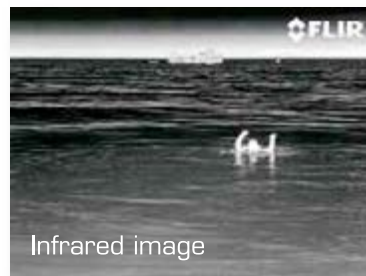


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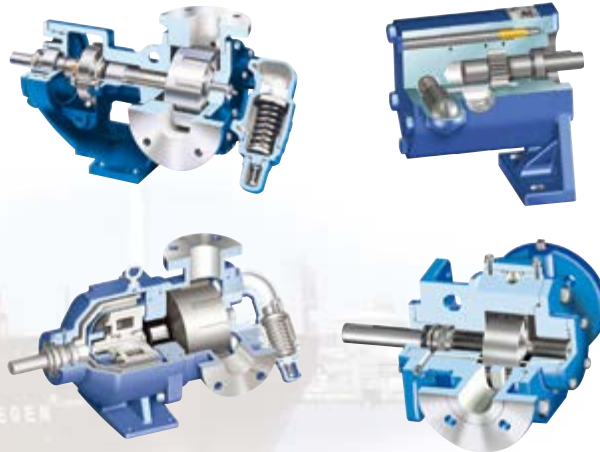
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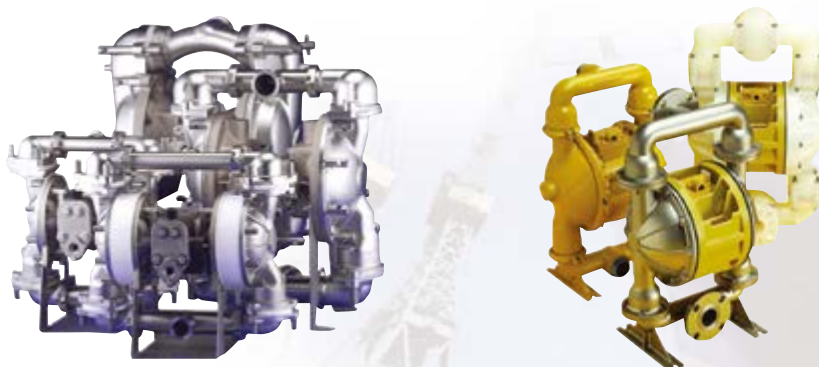
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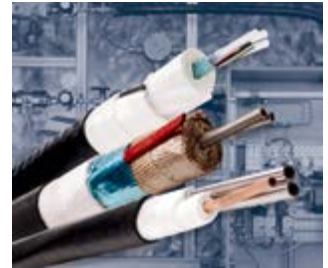
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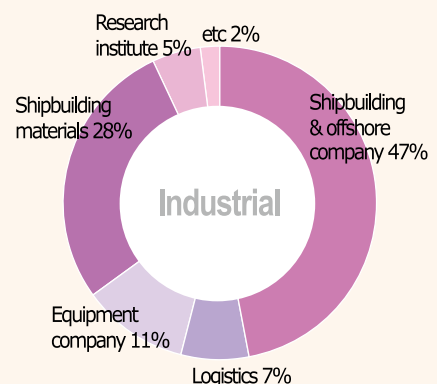
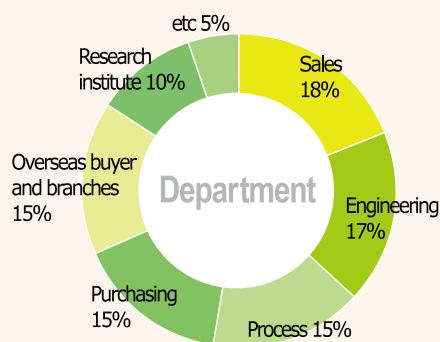
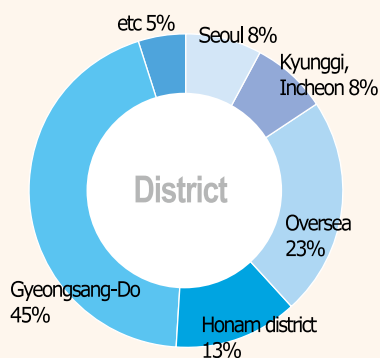
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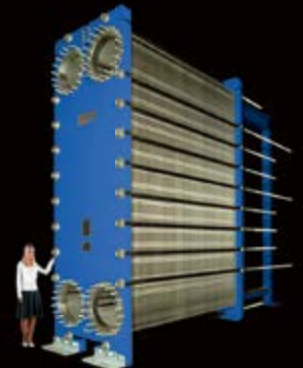
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HHI held a briefing session on its support for co-growth with subcontractors

Hyundai Heavy Industries(HHI) is taking the lead in promoting co-growth with subcontractors facing difficulties amid the sluggish shipbuilding market conditions.

The Co-growth Promotion Council of Hyundai Heavy Industries Group held a briefing session, titled 'the support for co-growth' at HHI's Ulsan headquarters on April 11 to announce its support for subcontractors, attended by the representatives from 71 primary subcontractors and 105 secondary subcontractors.

The Co-growth Promotion Council was created spontaneously in July last year by HHI's primary and secondary subcontractors under the supervision of the Integrated Council - which brings together Hyundai Heavy Industries Group's subcontractors - as part of effort to spread the co-growth culture to the secondary subcontractors and cash-strapped small and medium-sized companies.

This briefing session provided a unique platform to increase understanding of various supportive measures related to the finance, education, quality, etc., which HHI has been implementing since 2012 to spur

the co-growth with its secondary contractors, and ensure that more subcontractors could benefit from HHI's supportive measures.

During the briefing session, HHI provided detailed explanation on key aspects: the co-growth fund allowing the subcontractors to borrow money at low interest rates, the supply price information sharing system providing the information of supply price, payment conditions, etc., to secondary subcontractors, the free training system that provides the employees of subcontractors with the opportunity to improve their job performance.

An official from HHI said, "This briefing session was held to make sure that both primary and secondary subcontractors can benefit from HHI's wide-ranging supportive policies for co-growth. We will pay more attention and increase our support for secondary



HHI's briefing session on its support for co-growth

subcontractors in the period ahead." Hyundai Heavy Industries Group has focused on co-growth with subcontractors as part of its major policies and created the co-growth fund worth KRW 540 billion to ensure uninterrupted flow of funds to its subcontractors. Hyundai Heavy Industry Group has been at the forefront of efforts to spread the culture of co-growth. In March last year, Hyundai Heavy Industries Group announced three major strategies for co-existence and co-growth to lay the cornerstone for co-existence with small and medium-sized companies.

현대중공업, 협력회사 초청 '동반성장지원 설명회' 개최

현대중공업이 조선산업 침체로 어려운 상황에 처한 협력회사들을 위해 동반성장의 온기를 확산하는데 주력하고 있다.

현대중공업그룹 동반성장 확산 협의회는 지난 4월 11일 현대중공업 울산 본사에서 71개 1차 협력회사와 105개 2차 협력회사 대표들을 초청한 가운데, 협력회사에 대한 지원 정책을 알리는 동반성장 지원 설명회를 개최했다. 현대중공업그룹 동반성장 확산 협의회는 동반성장 문화를 2차 협력회사와 영세 중소기업들까지 확산하기 위해 지난해 7월 현대중공업그룹의 협력회사 모임

인 통합 협의회 주관으로 1·2차 협력회사들이 자율적으로 조직한 협의회다.

이번 설명회는 현대중공업이 지난 2012년부터 2차 협력회사로 동반성장 확산을 위해 시행하고 있는 금융, 교육, 품질 등의 각종 지원 제도를 자세히 알리고, 더 많은 업체에 실질적인 도움이 될 수 있도록 하기 위해 마련됐다. 현대중공업은 설명회를 통해 협력회사가 낮은 금리로 자금을 대출할 수 있는 동반성장 펀드, 납품단가와 대금지급 조건 등에 관한 정보를 2차 협력회사에 제공하는 납품단가 정보 공유 시스템, 협력회사 임직원의 직무 능력 향상을 위해 무료로 제공하고 있는 교육 지원 제도 등을 안내했다.

현대중공업 관계자는 "이 자리는 1차 협력회사뿐 아니라 2차 협력회사까지 폭넓게 동반성장 지원 정책의 혜택을 누릴 수 있도록 하기 위해 마련한 자리"라며, "앞으로 2차 협력회사에 대해 관심과 지원을 더욱 확대해 나갈 것"이라고 말했다.

한편, 현대중공업그룹은 협력회사와의 동반성장을 주요 경영 방침으로 정하고, 협력회사의 원활한 자금 운용을 위해 5,400억원 규모의 동반성장 펀드를 조성하였고, 지난해 3월 대·중·소 기업 간 상생의 생태계 조성을 위해 '공생발전 3대 추진 전략'을 선언하는 등 동반성장 문화를 조성하는데 앞장서고 있다.

Wärtsilä to supply inert gas systems for three new Oil & Gas sector vessels

On 16 April 2013, Wärtsilä is to supply inert gas systems for a Floating Storage Unit

(FSU) to be located on Norway's Heidrun offshore oil and gas field, and for two shuttle

tankers that will support the FSU. The FSU is owned by Statoil, the Norwegian state

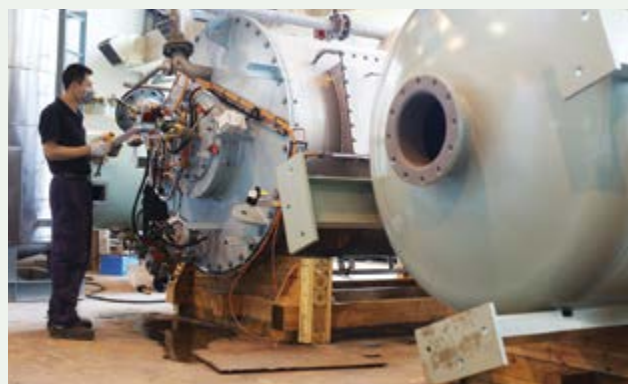
owned energy company, and the tankers by AET Tanker Holdings, the Singapore based petroleum transportation company. All three vessels are being built by Samsung Heavy Industries (SHI) in South Korea. The Wärtsilä contract with SHI was signed in February 2013. Delivery of the Wärtsilä equipment is scheduled for October, 2013.

The design and engineering of the systems is specifically intended for offshore applications with the nitrogen generators allowing for larger capacities. "Wärtsilä is the market leader in the supply of inert gas systems to the offshore industry, where the technical specifications are extremely high. Our comprehensive offering to this sector is based on years of experience and highly developed in-house know-how, and this order is further evidence of the company's strong reputation for providing technically advanced

and reliable solutions," said Juha Kytölä, Vice President, Environmental Solutions, Wärtsilä Ship Power.

Inert gas generator systems are used to prevent the gas mixture in cargo tanks or bunkers from reaching a range where explosions could occur. Inert gas maintains

the oxygen content of the tank atmosphere below 8 per cent, thus making the air and hydrocarbon gas mixture in the tank too lean to ignite. This is especially important during discharging when more hydrocarbon vapour is likely to be present in the atmosphere. This is also the case for the tankers during the ballast voyage. Inert gas



Moss inert gas generators by Wärtsilä

can also be used to purge the tank of volatile components in preparation for gas freeing, i.e. replacing the gas mixture with breathable air. Nitrogen generators are then used to supply dry air and oil-free inert gas for purging, pressurising, and blanketing functions.



Inha University, Seoul National University, and Korea Maritime University offer specialist courses on offshore plants

Three universities – Inha University, Seoul National University, and Korea Maritime University – opened the specialist courses on offshore plant. The Ministry of Trade, Industry and Energy announced that these universities were selected to offer specialist courses on offshore plants based on the results of evaluation as notified on February 8.

The Ministry of Trade, Industry and Energy has pushed forward the specialist courses aiming to foster professional manpower in offshore plant sector, covering the whole fields ranging from subsea oil/gas development to the design, construction, and maintenance of offshore plant in line with the offshore plant industry development plan

mapped out last year.

These three universities are recognized to have excellent infrastructure, such as the curriculum on offshore plants, faculty, etc., which are needed for creating synergic effects from the link between shipbuilding/offshore and resource engineering, among domestic four-year-course colleges that offer shipbuilding/offshore and resource engineering courses. Each university will receive the cash injection totaling KRW 500 million to 1.5 billion yearly over the next five years for curriculum development, faculty recruitment and retention, education environment creation, etc., reflecting the demand of offshore plant industry.

The industry expects that about 1,000 pro-

fessionals will be needed yearly amid the expansion of offshore plant and increasing order intake, and more than 10,000 professionals will be additionally required by 2020 for the offshore plant design, etc.

An official from the Ministry of Trade, Industry and Energy said, "The special courses on offshore plant, offered by these three universities, will help lay the cornerstone for systematic development of professional workforce specializing in offshore plant. We will ensure that the well-conceived training programs related to offshore plants are also offered to current employees, reflecting the demand of industry, as part of our effort to ensure sufficient supply of professional manpower."

인하대·서울대·해양대 특성화 대학교 선정
해양플랜트 특성화 대학으로 인하대, 서울대, 한국해

양대학교 등 3개 대학이 선정됐다. 산업통상자원부는
지난 2월 8일 공고된 해양플랜트 특성화 대학 선정 평

가 결과, 이 같이 결정됐다고 1일 밝혔다.
산업통상자원부는 지난 해 수립된 해양플랜트 산업 발

전방안에 따라, 해저석유 및 가스 자원 개발에서부터 해양플랜트 설계·건조·유지관리 분야를 통합하는 해양플랜트 전문인력 양성을 위한 해양플랜트 특성화 대학 개설을 추진했다.

선정된 3개 대학은 조선해양공학과 자원공학간연계를 통한 시너지 창출을 위해 조선해양공학 및 자원공학과를 보유한 국내 4년제 대학 중 해양플랜트 교과과

정과 교수진 개편 등 인프라 구축이 우수했다는 평가다. 이들 대학에는 향후 5년간 해양플랜트 산업계 수요를 반영한 교과과정 개발, 교수인력 확보, 교육환경 구축 등에 연간 대학당 5억원 내외 총 15억원이 지원될 예정이다.

해양플랜트 시장 확대 및 수주 증가로 인해 매년 1,000여 명의 신규 전문 기술인력 수요가 예상되고 있으며,

2020년까지 해양플랜트 설계 분야 등 신규 인력이 총 1만 명이 이상 필요할 것으로 관련 업계는 추정하고 있다. 산업통상자원부 관계자는 "해양플랜트 특성화 대학 개설로 해양플랜트 전문인력을 체계적으로 양성할 수 있는 기반을 조성하고, 산업계 수요를 반영한 재직자 대상 해양플랜트 전문 교육을 확대해 전문인력을 확충해 나갈 계획"이라고 말했다.



STX to aid its subcontractors in making entry into foreign markets and increasing the export

STX has become the first domestic company to share overseas after-sales network resources with its subcontractors in an attempt to help them make inroads into foreign markets. STX Offshore & Shipbuilding (STXOS) entered into an agreement with the subcontractors of STX Group (offshore & shipbuilding/marine service) in a signing ceremony on March 29, attended by Kim Tae-jeong, Vice-President of STXOS, Roh Gwang-gi, Managing Director of STX Marine Service, Jeong Yeong-tae, Secretary General of Co-Growth Committee, and representatives from 12 subcontractors.

Having signed this agreement, STXOS pledged that it would share its overseas after-sales network resources with its subcontractors to aid them in opening up foreign markets and increasing the export. In addition, STXOS will allow the subcontractors to use its logistics warehouse and office space of after-sales center in Singapore, Europe, and United States free of charge, thus relieving them of high warehouse fee

and rental burdens which have been the stumbling block to subcontractors in making headway into foreign markets, as well as use the overseas after-sales network comprising Singapore, Europe, and United States to help ensure swift response to the request for after-sales service.

Moreover, STXOS will produce and distribute the promotion brochures

jointly with its subcontractors to improve the brand image of subcontractors as part of joint sales and marketing drive targeting foreign buyers.

Meanwhile, STXOS has promoted co-growth with its subcontractors in various



Signing ceremony for the agreement between STXOS/STX Marine Service and subcontractors on joint entry into foreign markets. The photo shows Lee Soo-tae, President of Panasia, Kim Tae-jeong, Vice-President of STXOS, Jeong Yeong-tae, Secretary General of Co-Growth Committee, Nam Gi-sook, President of A-Rim Machinery & Engineering, and Roh Gwang-gi, Managing Director of STX Marine Service from the left.

fields, including the operation of co-growth fund, support for patent application and technology escrow, education to expand the capabilities of subcontractors through online education for employees (STX e-Academy).

STX, 협력기업 해외판로개척 및 수출활동 지원

STX가 국내 최초로 협력기업들과 해외 A/S 네트워크를 공유함으로써 협력사들의 해외 시장 진출을 지원하는데 앞장섰다. STX조선해양은 지난 3월 29일 김태정 STX조선해양 부사장, 노광기 STX마린서비스 전무, 정영태 동반성장위원회 사무총장 대행 및 12개 협력기업 대표들이 참석한 가운데 STX그룹(조선해양/마린서비스) 협력기업 해외 동반 진출 사업 협약식을 개최했다.

STX조선해양은 이번 협약식을 통해 STX가 보유한 해외 A/S 네트워크 자원 활용을 통한 협력기업의 해외 판로 개척 및 수출 활동에 대한 지원을 약속했다. 싱가포르, 유럽, 미국 법인에 구축되어 있는 해외 A/S 네트워크 제휴를 통해 협력기업의 A/S 대응력 향상은 물론, 협력기업이 해외 진출 시 고비용으로 걸림돌이었던 해외 사무공간 및 물류창고 임대료에 대하여 싱가포르, 유럽, 미국 A/S 센터의 사무공간과 물류창고를 무료로 제공함으로써 해외 진출 거점으로 활용하게 할 계획이다.

STX조선해양은 또한 해외 바이어 대상 공동 영업 및 공동 마케팅의 일환으로 협력기업과 공동 홍보 브셔를 제작·배포함으로써 협력기업의 브랜드 이미지 향상에 도움을 줄 방침이다. 한편 STX조선해양은 동반성장 펀드 운용, 특허 출원 및 기술 임치 지원, 임직원 온라인 교육(STXe-Academy)을 활용한 협력기업 역량 강화 교육 실시 등 다양한 분야에서 협력기업들과 동반 성장을 실천하고 있다.



Techcross and Keppel Shipyard Sign MOU on BWMS

Recently, Techcross and Keppel Shipyard Limited (Keppel Shipyard), a major ship repair, upgrading and conversion facility in Singapore, have signed a Memorandum of Understanding (MOU).

This MOU was executed in an attempt to meet many requirements of existing customers in the wake of the ratification of the Ballast Water Management Convention of IMO in 2004. As a result, Techcross and Keppel Shipyard are expected to cooperate closely

in providing the technology and services to ship owners in relation to BWMS. The new-building market has 2,500 to 3,000 vessels yearly, and the market for ships currently in operation is estimated to have approximately 50,000 to 70,000 vessels. Thus, the market for BWMS is expected to see exponential growth when the Ballast Water Management Convention of IMO comes into full force.

A major shipyard with more than a century of experience, Keppel Shipyard provides a

broad range of offshore and marine services to customers from around the world. The yard is well-placed to undertake retrofitting work such as the installation of BWMS in a cost-effective, prompt and safe manner.

Techcross has been preparing for the tremendous retrofitting market since the beginning of its business and is ready to expand its aggressive sales strategy with the signing of this MOU.

테크로스-Keppel 수리조선소와 BWMS 관련 MOU 체결

얼마전 테크로스는 싱가포르의 세계적인 수리 조선 업체인 케펠수리조선소(KeppelShipyardLtd)와 MOU를 체결했다. 이번 MOU 체결은 2004년에 IMO에서 제정된 선박평형수 관리 법안의 비준과 관련하여 그 전후에 발생할 수많은 기존선 고객들의 요구에 맞추기 위

한 것이다. 이에 테크로스 와 케펠수리조선소는 BWMS와 관련 해선주들에 계속된 기술과 서비스를 제공하는데 있어 긴밀한 협력 관계를 유지할 것으로 보인다. 신조선 시장은 연간 2,500~3,000척 규모이며, 현재 운항 중인 현조선 시장은 약 50,000~70,000척 정도로 예상되고 있다. 따라서 IMO가 추진하고 있는 선박평형수 관리 법안이 본격적으로 발효되면 BWMS 시장의

폭발적인 성장이 예상된다.

이에 100여년의 축적된 경험을 갖춘 케펠수리조선소는 그동안 경제적이고, 안전하면서도 즉각적으로 선박평형수처리 장치의 설치 가능하도록 준비해왔다. 테크로스는 향후 펼쳐질 현존선 BWMS 시장을 대비해 왔으며, 이번 MOU 체결을 시작으로 보다 체계화되고 공격적인 영업 전략을 펼칠 계획이다.



KOSHIPA renamed itself to Korea Offshore & Shipbuilding Association

The Korean Shipbuilders' Association (KOSHIPA) announced on April 5 that it renamed itself to 'Korea Offshore & Shipbuilding Association' on April 1. This renaming is aimed to bring fresh momentum to the diversification and specialization of its operations in an attempt to keep pace with recent expansion of global offshore plant market.

KOSHIPA will keep discussing with its member companies and proceed with reorganization to provide support for

Korean shipbuilding industry that dominates the global offshore plant market, although it has yet to map out specific plans related to offshore plants.

An official from KOSHIPA said, "Having renamed itself, KOSHIPA will do more to play a supporting role for its member companies and establish itself as a leading organization in shipbuilding and offshore plant sectors."

KOSHIPA was established in 1977 to strengthen the market information system,



promote mutual benefits and ship exports, etc., based on cooperation among companies, and is a corporate organization with member companies from shipbuilding industry.

한국조선협회, 한국조선해양플랜트협회로 협회명 변경

한국조선협회는 지난 4월 1일자로 협회명칭을 한국조선해양플랜트협회(Korea Offshore & Shipbuilding Association, KOSHIPA)로 변경했다고 지난 4월 5일 밝혔다. 이번 협회명 변경은 최근 세계 해양플랜트 시장 확대에 발맞춰 기존 협회 업무의 다양화·전문화를 추

구하기 위한 것으로 풀이된다.

한국조선해양플랜트협회는 아직까지 해양플랜트 관련 구체적으로 확정된 사업은 없으나 회원사들과 지속적으로 논의하고 조직을 정비함으로써 글로벌 해양플랜트 시장을 장악하고 있는 한국 조선업계를 지원한다는 방침이다.

한국조선해양플랜트협회 관계자는 협회명칭 변경을

통해 회원사들에게 효율적인 업무 지원을 해주고 조선 해양플랜트 대표 기관으로 자리매김할 것으로 기대한다고 말했다.

한국조선해양플랜트협회는 기업간 협동을 통해 시장 정보체제의 강화, 상호 이익 증진, 선박 수출 진흥 등 의 목적으로 1977년 설립됐으며 조선회사들을 회원사로 두고 있는 기업 단체이다.

HMM succeeded in remodeling the slow steaming eco-friendly vessel for the second time worldwide

Hyundai Merchant Marine(HMM) remodeled the front part of 'Hyundai Brave', a 8,600TEU containership for the first time nationwide and the second time worldwide. The remodeled part is the bulbous bow protruded like bulb at the lower front part of the vessel. This process turned the bulbous bow into a shape resembling a dolphin. In addition, the bulbous bow was lowered by about 1.5m from previous height and reduced both circumference and weight.

This operation aimed at the hull optimization for fuel efficiency to combat the rising fuel costs amid high oil prices. The bulbous bow, originally designed for high speed type(27 knots), was remodeled to enable slow steaming(18 knots) due to the recent shift to low speed operation.

Thus, 'Hyundai Brave' is expected to save energy by more than 3% equivalent to 1,040 tons of fuel(worth USD 600,000 yearly). This

remodeling was successfully performed for the first time nationwide and the second time worldwide following Maersk, and was carried out by DNV and DSEC through joint research. An official from HMM said, "We are building 3 additional containerships of same class(8,600TEU), besides Hyundai Brave. All works will be completed within the first half of this year to make sure that these vessels can be put into service at the soonest. We consider applying this remodeling process to other vessels, depending on the improvement of fuel efficiency."



'Hyundai Brave' which completed the remodeling

HMM is moving forward with the development of technologies and various methods to reduce greenhouse gas emissions and improve fuel efficiency, in addition to this project.

현대상선, 세계 두 번째로 저속형 에코 선박 개조

현대상선은 8,600TEU급 컨테이너선 '현대브레이브' 호의 앞부분을 개조하는 작업을 국내 최초로 이자세계에서 두 번째로 실시했다.

이번에 개조한 곳은 선박 앞부분 하단부에 둥근 공처럼 볼록 튀어나온 '구상선수(Bulbousbow)'라는 곳인데, 이곳 구상선수의 모양을 돌고래 형태와 비슷한 모양으로 성형한 것이다. 또한, 구상선수의 위치를 기존보다 약 1.5m 낮추고 둘레와 무게를 모두 줄였다.

이 작업의 목적은 고유가로 인한 연료비 상승에 따라 연료효율을 최적화할 수 있는 선형을 만들기 위함이다. 건조 당시 구상선수는 고속형(27노트)에 맞춰 설계됐으나, 최근 운항 패턴이 저속 운항으로 변화되면서 저속형(18노트)으로 구상선수를 고친 것이다. 이로써 '현대브레이브'호의 연료절감률은 약 3% 이상, 약 1,040톤(연간 60만 달러)의 연료를 절감할 것으로 기대하고 있다. 한편 국내 최초로 이자 머스크에 이어 세계 두 번째인 이번 개조 작업은 DNV와 DSEC의 공동 연구로 진행됐다.

현대상선 관계자는 "현대브레이브호 외에도 동급(8,600TEU급) 컨테이너선 3척을 추가로 개조하고 있다"며, "올해 상반기 안에 모두 작업 완료해 빠른 시일 내에 서비스 투입 예정이며, 연료효율화 개선 성과에 따라 다른 선박에도 적용을 고려하고 있다"고 밝혔다.

현대상선은 이번 프로젝트 외에도 선박의 온실가스 배출 절감과 연료 효율 개선을 위해 다양한 방법과 기술 개발을 추진하고 있다.

Haeyoung Maritime Services received international certification for its training courses on LNG carriers for the first time nationwide

Haeyoung Maritime Services(HMS)' training course on LNG carrier was certified by Lloyd's Register(LR) for the first time in Korea. HMS is the subsidiary of Hyundai Merchant Marine.

An official from HMS said, "Meaningfully, HMS' training program for LNGC received

the quality certification from globally-renowned certification organization for the first time nationwide. This certification is an important step forwards in developing highly skilled manpower in LNG carrier sector and strengthening the nation's competitive-

ness in global LNG sector."

HMS, the subsidiary of Hyundai Merchant Marine, received the international certification as it met SIGTTO Training Standards of SIGTTO (Society of International Gas Tanker and Terminal Operators) and requirements

of LR for marine technician training institutes. HMS' training program for LNG has already been well received in shipping industry. The training center of HMS is furnished with state-of-art simulator training equipment such as loading/unloading facility, steam turbine plant facility, etc, which are exact replicas of facilities in LNG carrier. In addition, HMS offers systematic training to transfer the technical know-how for operating LNG carriers, which Hyundai Merchant Marine has accumulated through many years of work including the operation of 'Hyundai Utopia', the nation's first LNG carrier, in 1994. To ensure the practicality, the training is provided by instructors with working experience on board LNG carrier. With excellent know-how in LNG carriers,

Hyundai Merchant Marine has been the only domestic company to manage LNG carriers of Greece-based Tsakos since 2007. HMS, the subsidiary of Hyundai Merchant Marine, was established in 2005 to provide the services such as the training for sailors, management of sailors, supervision of new-built vessels, etc.



Haeyoung Maritime Services, the subsidiary of Hyundai Merchant Marine, became the first domestic company to receive the certification of quality for its training courses on LNG carrier from U.K.-based Lloyd's Register(LR). (Lee Taek-gyu(left), Managing Director of Hyundai Merchant Marine, and Lee Soo-yeong(right), Korea Chief Representative, Lloyd Register Asia)

현대상선, 국내최초 LNG선교육과정국제인증

현대상선자회사인해영선박의LNG선교육과정이국내 최초로 영국의로이드선급협회(Lloyd's Register, LR)으로 부터 교육품질인증을 받았다. 현대상선 관계자는 "해영선박의 LNG 교육 프로그램이 세계적 인증 기관으로부터 국내 최초로 품질 인증을 받았는데 의의가 있다"며, "이번 인증은 고도로 숙련이 요구되는 LNG 선전문인력양성과 LNG 산업분야의 국제 경쟁력 제고에 기여할 것으로 전망된다"고 밝혔다.

현대상선의 자회사인 해영선박이 국제 인증을 받은 것은 국제 가스 탱커 및 터미널 운영자 협회(SIGTTO)의 SIGTTO Training Standards와 로이드 선급의 해기 전문 교육 기관 요구 조건을 충족했기 때문이다. 해영선박의 LNG 선 교육 프로그램의 우수성은 이미 해운 업계에서 인정받고 있는데, 해영선박이 운영하는 트레이닝 센터에는 실제 LNG 선박과 동일한 적/양하 설비 및 스팀 터빈 플랜트(Steam Turbine Plant) 설비 등 최첨단 시뮬레이션 훈련 장비가 구비되어 있어 교육의 질을 높이고 있다.

또한 1994년 국내 최초 LNG 선 현대유토피아호를 운항하는 등 그동안 축적된 현대상선만의 LNG 선 운영 노하우를 체계적으로 교육하고 있으며, LNG 선 승선 경력자를 전담 강사로 구성하여 실무 중심의 전문 교육을 수행하고 있다. 이러한 LNG 선에 대한 노하우를 인정받아 현대상선은 2007년부터 그리스 차코스(Tsakos)사의 LNG 선의 선박 관리 업무를 국내에서 유일하게 수행하고 있다. 한편 해영선박은 현대상선의 선원 교육, 선원 관리, 신조 감리 등의 서비스를 제공하는 자회사로 2005년에 설립됐다.

SSME named Kim Yeon-shin as new CEO & President

Sungdong Shipbuilding & Marine Engineering(SSME) named Kim Yeon-shin(aged 61), Vice-President in charge of Sales Division, as new CEO & President of SSME in a regular shareholders' meeting on March 29, who will succeed Ha seong-yong, the outgoing President whose terms expired. Kim Yeon-shin, new CEO & President of

SSME, obtained Bachelor's Degree in Law at Korea University and Master's degree in Business Administration at Boston University, United States, before he performed duties relating to the ship sales at Daewoo Shipbuilding Industry, the former name of Daewoo Shipbuilding & Marine Engineering(DSME). He was the first President inaugurated in Korean Ship

Finance and is known to be an expert in ship sale and finance.



Kim Yeon-shin, CEO & President of SSME

성동조선해양 김연신 대표이사 선임

성동조선해양은 3월 29일 열린 정기 주주총회에서 임기가 만료된 하성용 대표이사 사장의 후임으로 김연

신(61) 영업본부 부사장을 사장으로 승진 발령하면서 새로운 대표이사/총괄 사장으로 선임했다. 김연신 신임 사장은 고려대학교와 미국 보스턴대에서

경영학 석사 과정을 거쳐 대우조선해양의 전신인 대우조선공업에서 선박 영업을 담당했으며, 한국선박금융의 초대 대표이사를 역임하여 선박 영업과 재무 통으로 꼽힌다.

HSHI reached a milestone of 50 million DWT

Hyundai Samho Heavy Industries (HSHI) reached the milestone of 50 million DWT in 13 years and 5 months after its establishment. HSHI announced on April 1 that it achieved the milestone of 50 million DWT when it delivered the 263,000-ton very large ore carrier(VLOC) to the Singapore-based RGL, the ship owner.

DWT(deadweight tons) is a measure of total capacity of ship's cargo including the fuel, food, etc. In other words, 50 million DWT is the carrying capacity of 50 million vehicles, each weighing 1 ton.

HSHI has delivered 395 vessels since it was launched in October, 1999, which include the world's largest containership, very large crude carrier, pure car truck carrier, LNG carrier, LPG carrier, etc. It delivered 119 vessels to Greece, the global shipping powerhouse, 67

vessels to Germany, and 45 vessels to domestic ship owners. HSHI made steady strides since it achieved KRW 480 billion in sales from the construction of 8 vessels in 2000, and raked in KRW 4.2 trillion in sales from the construction of 42 vessels last year.

An official from HSHI said, "This milestone was achieved by the concerted efforts of all employees, steady technology development and productivity improvement. We will turn this crisis to new



The photo shows the 263,000-ton very large ore carrier(VLOC) which HSHI delivered to the Singapore-based RGL on April 1.

opportunity and evolve into a company adding vitality to the nation's and regional economy, although the shipbuilding market conditions currently remain sluggish."

현대삼호중공업,선박건조5000만DWT달성
현대삼호중공업이설립된이후13년5개월만에5000만DWT의선박건조기록을달성했다.현대삼호중공업은지난1일싱가포르알지엘(RGL)사가선주사인26만3000톤급초대형광물운반선(VLOC)을인도하면서5000만DWT의선박건조기록을달성했다고밝혔다. DWT(deadweighttons),즉재화중량톤수는선박에화물 및 연료, 식량 등을 실을 수 있는 무게를 의미하는 단위로 쉽게 말하면현대삼호중공업은창립 이래1톤무

게의승용차5,000만대를실어나를수있는선박건조실적을 달성했다는 의미다. 현대삼호중공업이1999년10월출범이후인도한선박은총395척으로, 이 중에는세계 최대규모의컨테이너운반선,초대형원유운반선,자동차운반선,LNG선,LPG선등이포함되어있다.국적별로는해운강국인그리스선박119척과독일선박67척을건조했으며,국내선박도45척을건조했다. 현대삼호중공업은2000년8척의선박을건조해4,800

억원의매출을기록한이후꾸준히성장해지난해에는42척,4조2,000억원의매출을달성했다. 현대삼호중공업관계자는"이같은건조기록은전임직원이헌연일체가돼꾸준한기술개발과생산성향상에매진해온결과"라며,"비록지금조선시황이어렵지만위기를기회로새로운기회를창출해국가와지역경제발전에기여하는선진기업으로발전해나갈것다"고밝혔다.

KDB arranged the bank financing worth USD 3.69 million for SK Shipping Consortium

Korea Development Bank(KDB) successfully arranged the bank financing worth USD 3.69 million with Japan's SMBC (Sumilomo Milsui Banking Corporation) and France's CIC(CREDIT INDUSTRIEL ET COMMERCIAL) for the construction of 2 LNG carriers on April 12. Following that, SK Shipping Consortium, formed between SK

Shipping and Japan's Marubeni Corporation, placed an order at Samsung Heavy Industries(SHI) for 2 LNG carriers. After delivery, these LNG carriers ordered by SK Shipping Consortium will be chartered to the U.K.-based subsidiary of France's Total, the global oil giant, for a long term and deployed for the transportation of

LNG which Korea Gas Corporation will import from Australia and United States. In 1996, KDB successfully arranged the bank financing for the construction of LNG carriers commissioned by Korea Gas Corporation, laying the cornerstone for domestic shipyards to start the construction of their first LNG carrier.

KDB산업은행, SK해운 컨소시엄에 3억 6,900만 달러 선박금융 주선

KDB산업은행, 12일 일본 SMBC(Sumilomo Milsui Banking Corporation) 은행, 프랑스 CIC(CREDIT

INDUSTRIELETCOMMERCIAL)은행과공동으로LNG선2척에대한3억6,900만달러규모의선박금융주선

에 성공했다. 이에 따라 SK해운과 일본 마루베니가 합작하여 설립한 SK해운 컨소시엄은 최근 삼성중공업에 LNG선 2척을 발주했다. SK해운 컨소시엄은 선박 건조 후 세계 유수 에너지기

업인 프랑스토탈(Total)사의 영국 자회사에 장비 용선할 예정으로, 제작된 선박은 한국 가스공사가 호주 및 미국으로부터 도입하는 LNG 수송에 투입될 예정이다. 한편 KDB산업은행은 1996년 한국 가스공사에 도입하

는 LNG선에 대한 금융 지원을 성공시켜 국내 조선소가 처음으로 LNG선을 건조할 수 있는 계기를 마련한 바 있다.

STX and Russia to cooperate for LNG project

Gang Deok-soo, Chairman of STX Group, had a video conference with Russian President Putin, Rosneft's Chairman Igor Sechin, Exxon Mobil Development's President Neil Duffin, etc., discussing the LNG project on April 11 during his visit to Russia.

STX Group Chairman Gang Deok-soo had an in-depth discussion via the video link on the cooperation for the offshore plant, LNG plant and overall infrastructure construction on Russian Pacific Coast, which is led by Russia's Rosneft in collaboration with Exxon Mobil.

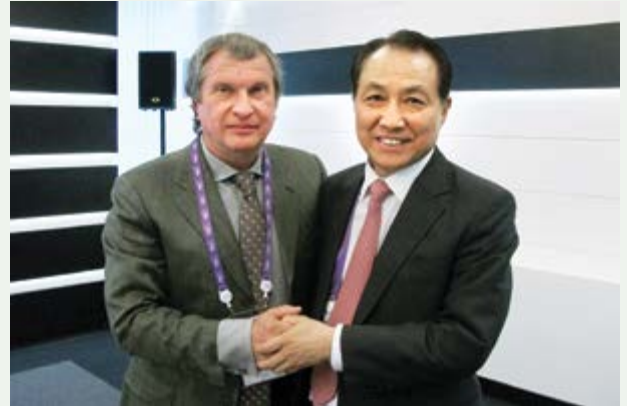
Rosneft, Russia's largest state-run oil company, unveiled the details of the LNG plant project worth USD 15 billion in Russia's Far East, undertaken jointly with Exxon Mobil. This project aims to build LNG plant liquefying the gas developed from Sakhalin region. The industry expects that full-fledge production of LNG will start from 2018.

Rosneft's Chairman Igor Sechin said, "This LNG plant will be built in Sakhalin or

Khabarovsk in Eastern Russia. We are discussing with STX on LNG plant project, offshore project and others.

STX Group Chairman Gang Deok-soo signed MOU (Memorandum of Understanding) with Mechel's Chairman Igor Zyuzin on strategic cooperation between STX and Mechel in September last year.

Also, he met with the chief executives of EN+, Russia's mineral resource development company, and Russia's state-run USC (United Shipbuilding Corporation) to discuss promotion of cooperation with respect to the ship order-taking, energy transportation, offshore plant, technical tie-up for the development in Arctic region, etc.



STX Group Chairman Gang Deok-soo met with Igor Sechin, Russia's former Vice-Prime Minister and Chairman of Rosneft, and discussed promotion of cooperation for offshore project and crude oil product trade in September last year.

An official from STX Group said, "STX has strengthened cooperation with prominent companies of resource-rich Russia. We will expand partnership with Russia in various fields such as natural gas, onshore/offshore plant, ship order-taking, marine transportation, etc., based on the world's best technology of STX for Arctic development."

STX, 러시아서 LNG 프로젝트 협력

러시아 방문 중인 강덕수 STX그룹 회장이 지난 4월 11일 푸틴 러시아 대통령, 이고르 세친(Igor Sechin) 로스네프트(Rosneft) 회장, 닐더핀(Neil Duffin) 엑손모빌 개발(Exxon Mobil Development Co.) 사장 등과 화상 회의를 통해 LNG 프로젝트에 대해 논의했다. 강덕수 회장은 이 자리에서 러시아 로스네프트가 엑손모빌과 함께 추진 중인 러시아 태평양 연안 LNG 플랜트 및 제반 인프라 건설, 해양 플랜트 건조 협력 등에 대해 심도 있는 논의를 나눈 것으로 전해졌다. 러시아 최대 국영 석유 회사인 로스네프트는 이날 엑손모빌과 함께 150억 달러 규모의 러시아 극동 지역

LNG 플랜트 프로젝트의 세부 사항을 밝혔다. 이 프로젝트는 사할린 지역에서 개발된 가스를 액화시키는 LNG 플랜트를 건설하는 사업으로, 업계에서는 2018년부터 LNG가 본격 생산될 것으로 전망하고 있다.

이고르 세친 로스네프트 회장은 "이번 LNG 플랜트는 사할린이나 러시아 동부 하바로프스크(Khabarovsk) 지역에 건설될 것"이라며 LNG 플랜트 프로젝트, 해양 프로젝트 등에 관해 STX와 논의 중"이라고 밝혔다. 한편 강덕수 회장은 지난해 9월 이고르 주진(Igor Zyuzin) 메첵(Mechel) 회장과 만나 STX-메첵 간 전략적 협력에 관한 양해각서(MOU)를 체결했으며 러시아 광물 자원 개발 기업인 이엔플러스(EN+), 러시아 국

영조선그룹 USC (United Shipbuilding Corporation)의 최고 경영진들과 선박 수주, 에너지 운송, 해양 플랜트, 극지(Arctic) 기술 협력 등에 대한 협력 관계 구축에 대해 논의했다.

STX 그룹 관계자는 "STX가 자원 강국 러시아를 대표하는 기업들과 잇따라 협력 관계를 강화하고 있다"면서 "앞으로 STX가 보유한 세계 최고급 극지 기술 기반을 바탕으로 러시아와 천연 가스를 비롯한 육상 및 해상 플랜트, 선박 수주, 해운 운송 등 다양한 분야에서 파트너십을 확대해 나갈 것"이라고 밝혔다.

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T&S was established on Sept 1st, 2001 based on the concept of providing sophisticated technology and services to customers. At this present, T&S are dealing with almost all of shipbuilding companies in Korea such as HHI, DSME, SHI, STX as a local agent of Greenlee Textron of American Textron Group, Klauke Textron(Germany), Hellermann Tyton(Multinational), FireSeal(Sweden), BIS Lambda(Norway), NEK Cable(Norway), etc.

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Indigenous offshore plant equipments developed domestically

- Survival of the fittest in the market

Domestic shipyards have unmatched track records in building offshore plants worldwide. By contrast, domestic offshore plant equipment industry which has close symbiotic relationship with shipyards still remains at the incipient stage. The localization rate of marine equipment exceeds 90%, whereas the localization rate of offshore equipment is 25% at best. Moreover, the concerted efforts of both Korean government and shipbuilding industry to stimulate offshore plant equipment industry have yet to come to fruition as the European or U.S. offshore equipment companies dominate this sector.

Fortunately, some small and medium-sized offshore plant equipment manufacturers, such as Donghwa Entec(www.dh.co.kr), Mirae industries(www.miraewinch.com), Cartec Sealing Technologies(www.cartecst.com), Hifly Valve (www.hiflyvalve.com), etc., embarked upon new product development with proven technologies and have shown tangible results, raising the expectation that more domestic offshore plant equipment manufacturers will make inroads into global market in the period ahead.





The shipbuilding and offshore industries have taken on added importance for their wide-ranging spillover effects on steel, mechanical and electronic industries. Particularly, offshore plant sector has emerged as new growth engine amidst increased development of offshore and deepwater oilfields, spurred by the surge in the demand for energy in the emerging economies after 2000.

The investment in offshore energy drilling facilities and production facilities has gathered momentum on the back of the improved cost-effectiveness in offshore resource development amid the sustained high oil prices and the shifting focus of resource development to the offshore in the wake of the depletion of onshore energy resources. As a result, the industry predicts an upswing in the demand for offshore plant.

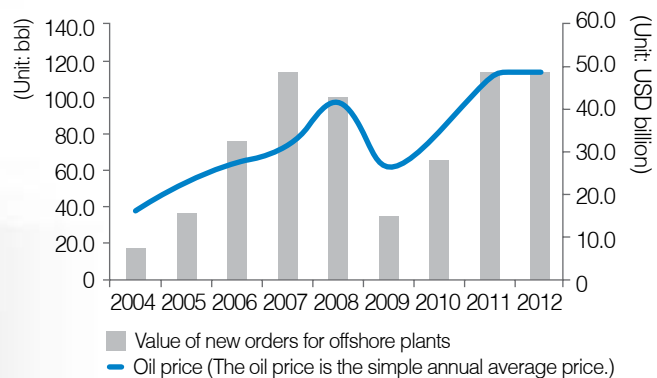
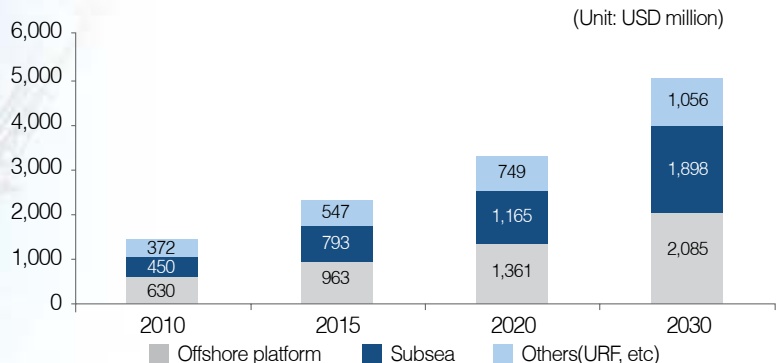


Figure 1. Trends in the value of new orders for offshore plants based on oil prices (Source: Bloomberg, Clarkson)

According to Douglas Westwood, the offshore plant market is expected to be worth USD 230.3 billion by 2015, growing at an annual average rate of over 10% from USD 142.5 billion in 2010, and worth USD 503.9 billion by 2030. The subsea equipment market is expected to see the most robust growth. The offshore platform market, which is dominated by domestic shipyards, is expected to be worth USD 75 billion by 2020, growing at an annual average rate of 5.6%, and worth USD 105 billion by 2030.



* URF(Umbilical Riser Flowline/Pipeline): Equipment for transporting the produced crude oil and gas from offshore platform

Figure 2. Size of offshore plant market(Source: Douglas Westwood)

Technology and market barriers

The greatest problem facing domestic offshore plant industry is that domestic shipyards' main role in offshore plant project is still confined to the construction of hull. Currently, domestic shipyards install and assemble the top sides, using the imported equipment, as they are not competitive enough to build top sides and do not have the qualified domestic equipment suppliers that can meet the standards of owner.

The FPSO, a sector where domestic shipyards have strength, costs approximately USD 1 to 2 billion for construction per unit. Here, the cost for hull account for about 30% of entire costs, whereas the construction of topside and subsea equipment comprises the remaining 70%. The inadequate localization level has been the biggest stumbling block that prevents domestic shipyards from undertaking the construction of top sides.

Offshore plant construction requires the equipment such as mechanical device, pipe materials, electric device, instrumentation, safety facilities, etc. The products are being supplied only by handful of domestic offshore plant equipment manufacturers registered as vendors of oil & gas majors' suppliers or registered as subcontractors of shipyards. The localization rate in this sector remains approximately 25%, which is considerably low compared to 90% of localization rate in marine equipment sector.

There are 3 major challenges hindering domestic offshore plant equipment industry. The first challenge is the technological challenge associated with the installation of structure at sea and very rigorous explosion-proof requirements for high stability of structure. The second challenge is ensuring the conformity to various requirements such as the requirements of classification societies in each region, international standards, etc., in addition to technical requirements for the specialized engineering. The final challenge facing the domestic offshore plant equipment manufacturers is that it is essential to place themselves on the vendor list of oil majors' suppliers.

Urgent need for developing the equipment industry

According to Korea Marine Equipment Association, the marine and offshore plant equipment industry has seen their sales plummeting for 3 consecutive years. The sales from hull construction fell to KRW 601.6 billion last year from KRW 642.4 billion in 2010, while the sales from the engine declined to KRW 6 trillion and 765.8 billion from KRW 8 trillion

and 125 billion. The sales from outfitting decreased to KRW 3 trillion and 35.6 billion from KRW 3 trillion and 561.1 billion. The marine equipment manufacturers in symbiotic relationship with shipyards find their survival at stake due to the serious slump in new orders.

The government and shipyards are actively supporting the development of offshore plant equipment industry which has emerged as new growth engine. The government has pushed forward the project to lay the foundation for offshore plant equipment R&D center in support for localization of parts. This project which aims to create the global R&D hub of offshore plant equipment focuses on developing core equipments requiring the localization, such as top sides and subsea facilities, and building the track records vital in opening up overseas markets.

Moreover, large companies have joined in the effort to speed up the development of middle-standing equipment manufacturers. Daewoo Shipbuilding & Marine Engineering, which won an order for the world's largest FPSO, is moving to localize the drilling system, the key part of offshore drilling facility, in collaboration with its subcontractors. Specifically, DSME has pushed ahead with the project to localize 33 offshore equipments and is on track to identify additional R&D targets this year. Korean Register of Shipping(KR) is developing the one-stop service system allowing domestic equipment manufacturers to submit online application for supplier registration. This one-stop service system will help domestic equipment manufacturers to overcome the hurdles in placing themselves on the list of oil majors' suppliers.

Meanwhile, the Ministry of Trade, Industry & Energy(MTIE) and Korea Plant Industries Association(KPIA) announced that new orders won by domestic plant builders for the construction of offshore plants abroad amounted to USD 11.8 billion in the first quarter of this year, a 0.7% increase compared to the same period of previous year. New orders from Europe increased noticeably. According to MTIE, new orders awarded by European clients totaled USD 3.779 billion in the first quarter of this year, which represents an increase by as much as 2678.7% compared to the corresponding period of previous year. Such sharp upswing in new orders is driven by the large-scale projects awarded to Daewoo Shipbuilding & Marine Engineering(DSME) and Hyundai Heavy Industries(HHI) which won an order worth USD 2.67 billion for a large offshore plant and an order worth USD 1.1 billion for a gas production platform, respectively.

Cartec Sealing Technologies Co.,Ltd

- Spearheading the localization of sealing products

Cartec Sealing Technologies("Cartec") has specialized in the manufacture of sealing products for about a decade since its establishment, and has unique technologies and know-how in many different sealing products.

So far, Cartec has accumulated extensive engineering experience with offshore plant equipment while supplying products to major domestic shipyards such as Hyundai Heavy Industries(HHI), Samsung Heavy Industries(SHI), Daewoo Shipbuilding & Marine Engineering(DSME), etc. Particularly, Cartec has partnered with GASKET, a multinational company, to speed up the localization of equipment.



Figure 3. Kwang Ho Kim, Engineering Sales deputy head of department, Cartec Sealing Technologies

Kwang Ho Kim, Engineering Sales deputy head of department, Cartec Sealing Technologies, said, "Cartec has been involved in the FLNG project of SHI and achieved localization of sealing products, thus drastically reducing the nation's

reliance on imported sealing products, and furthermore, has built successful track records through on-time delivery and competitive prices. We will move ahead with technology development and research to speed up development of indigenous offshore plant equipment."

Cartec is focusing on gasket used in pipes, such as metal, semi metal, non-metal gasket, etc. Particularly, Cartec is handling the products conforming to various industrial standards such as ASME, API, NORSOK standards, and has built extensive track records and experience in relation to Norway's NORSOK standard for offshore plants.

Safety and reliability

Cartec's mainstay products can be divided into 2 types in the offshore plant equipment market. The 'Spiral Wound Gasket' is the gasket with the helically wound metal hoop and nonmetallic filler, and provides excellent sealing performance. The hoop increased the elasticity of gasket, and the filler improved the heat resistance and cushion, which have wide-ranging applications in the devices operating at high temperature, high pressure, and extremely low temperature, such as RF Flange, Valve Bonnet, Manhole, etc. Particularly, the basic inner race/outer race were attached simultaneously, thus suitable for the applications requiring high reliability. In addition, the conformity to the gasket reinforcement and compression regulations is assured and there is no concern about possible deformation of inner diameter axis.

The Ring Type Joint Gasket is applicable to the pipes of processed line involving the use of high temperature/high pres



Figure 4. Spiral Wound Gasket product lines



Figure 5. Ring Type Joint Gasket product lines



Figure 6. Kammprofile product lines

Donghwa Entec. Co., Ltd.

- Expanding the reach into offshore plant sector

Donghwa Entec, established in 1980, specializes in the manufacture of marine and industrial heat exchangers and has relentlessly developed new products through its research arm Energy & Environment Technology Institute, along with the engineering technology, manufacturing facilities, production technology and quality system, thus sharpening its competitiveness in global energy and environment sectors. Donghwa Entec is the subcontractor supplying the products stably to major domestic shipyards, engine makers, shipping companies, etc.

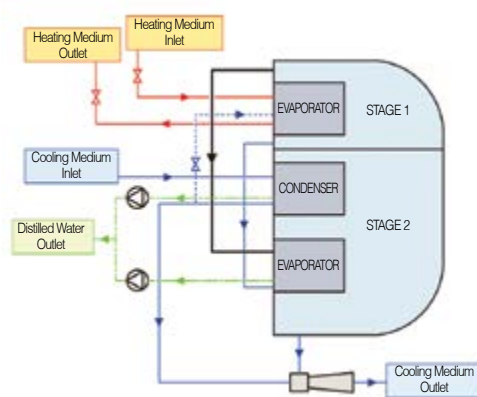


Figure 7. Double Effect Type Water Maker

Furthermore, Donghwa Entec is expanding its reach into the market with its special heat exchanger suitable for the offshore plant sector which is showing rapid growth. Additionally, Donghwa Entec plans to maintain the portfolio ratio of shipbuilding and plant at 50:50 to achieve KRW 300 billion in sales by 2015, although the company is currently focused on shipbuilding sector. Meanwhile, Donghwa Entec's plant factory is slated for completion within Hwajeon Industrial Complex(20,086m²) in August.

The offshore plant consists of top side and hull system. Korean shipyards have dependence on foreign engineering technology for the top side, the quintessence of offshore technology. Thus, Donghwa Entec is concentrating on the top side engineering, the high value-added area of offshore plant equipment sector. Among the flagship products of Donghwa Entec in the offshore plant market are included the Double Effect Type Water Maker and Plate-Fin Heat Exchanger(PFHE).

First, Double Effect Type Water Makers are the equipment that convert seawater or exhausted dirty water to pure water for drinking, boiler make-up, domestic use on ship and small power station. At that time, seawater is evaporated at about 70°C, 45°C respectively as the one passed the inside of heater under the high vacuum condition and the separated pure vapor is converted to freshwater on condenser. The other one is going to the heating medium of heater and then converted to freshwater.



Figure 8. Operation of Double Effect Type Water Maker



Figure 9. Plate-Fin Heat Exchanger

Second, PFHE consists of corrugated fins, separated parting sheets, nozzles and manifolds. Its principal use has been in oil & gas process, cryogenics and in aerospace where high performance with low mass and volume is

important. Plate-fin heat exchanger can treat multi-streams in only one unit. Donghwa Entec plans to focus on the field requiring the heat exchanger, such as the seawater desalination, condensation, evaporation, etc., by fully leveraging its know-how which it has accumulated by 3 decades of works. Donghwa Entec has built extensive track records in successfully supplying its products for many offshore plants built by domestic shipyards such as LNG FPSO, Drill ship, Jack up drilling rig, etc.

Hifly Valve Co., Ltd.

- Technology recognized in global market

Hifly Valve, established in 2006, specializes in the manufacture of knife gate valve and metal seat butterfly valve. Its patented multi-seat butterfly valve dramatically improved the seat leakage and durability of existing knife gate valves. The bio plant valve and the drilling mud line valve, which apply this patented technology, have been widely recognized for their excellent performance. Hifly Valve's Mud Line Knife(MLK) gate valve, used for the mud line of drillship and rig, is distributed nationwide and exported to overseas shipyards.

The metal seat butterfly valve is applicable to the special pipes for high steam, super heated steam, gas, etc. The products which can withstand up to 600°C have been put on the market. This metal seat butterfly valve does not use the existing elastic sheets as components, but uses the whole valve body and disc body as sheet to achieve the properties of high performance valve operable at high temperatures and high pressures. It can be used for various types of fluid and applied safely even in dangerous situation such as external fire. This The metal seat butterfly valve has gained favorable response from overseas markets, such as United States, Chile, Australia, Asia, etc., domestic shipyards, power plants, plant industry and others.

Mud Line Knife gate valve

Existing metal sheet valve has weak sealing performance

despite excellent durability. By contract, rubber sheet valve has excellent sealing performance, but has less durability.

The metal sheet provides the sealing performance that meets the standard as the fluid inside the pipe pushes the disc when the flow velocity is high. However, the fluid inside the pipe cannot push the disc when the flow velocity is low, causing excessive leakage through the gap between the metal sheet and disc. The rubber sheet valve has many problems with durability and often requires repair because it is susceptible to damage if the valve is opened and closed frequently. The expert intervention is needed if the sheet is damaged.

Hifly Valve's MLK is an innovative product that combines the strengths of metal sheet valve and rubber sheet valve. Its multi-sheet(Metal+Soft) enables perfect prevention of leakage and ensures high durability. Furthermore, the sheet can be replaced at site without the help of expert if damaged,



Figure 10. Mud Line Knife gate valve that has come under spotlight in drillship sector

thus providing excellent maintainability and reparability. An official from Hifly Valve said, “We will participate in exhibitions, such as OTC(Offshore Technology Conference), OGA(Oil and Gas Asia) and KORMARINE, this year as part

of our marketing drive. We aim to achieve more than two-fold growth in sales compared to the same period of previous year, and plan to focus on R&D related to special metal seat butterfly valve and knife gate valve used in offshore plants.”

Mirae industries Co., Ltd.

- Anchoring Winch system gaining ground worldwide

Mirae industries produces the marine and offshore equipments installed in high value-added drillship(deepwater drillship) and floating offshore structures. Its business portfolio is divided into 2 categories: marine/offshore business unit - such as the commercial vessels(Winch, Windlass), offshore floating crane, etc – and plant business unit encompassing the continuous casting unit, steel making unit, pressure vessel, offloading system, etc.

The anchoring winch system is most important in maintaining the offshore facility in a fixed position, although there are many different equipments for keeping the offshore facility locked in a fixed position at sea, such as dynamic positioning system(DPS), internal turret mooring system, etc.

Mirae industries became the first domestic marine equipment manufacturer to make inroads into global market when it supplied the Windlass and Anchor Handling Winch for the drillship and semi-submersible rig being built by Daewoo Shipbuilding & Marin Engineering(DSME) in 2010. These equipments are



Figure 11. Offshore Positioning Mooring System developed by Mirae industries



Figure 12. 'Offshore Anchoring winch' developed independently by Mirae industries.

used for mooring the offshore facilities such as drilling rig, drillship, FPSO, etc., and has the advantage that it is installable in narrow space and makes the mooring easy.

Jong Su kang, Chief Executive Officer, Mirae industries, said, “The offshore anchoring winch, developed with indigenous technology, is priced at a 70% of the major products made in Europe or United States which dominates the offshore plant equipment market. In addition to this price competitiveness, this offshore anchoring winch which incorporates the advanced technology has generated USD 50 million in export revenues in this market that has high barriers.”

Mirae industries plans to expand the capabilities of its R&D center as part of effort to be one jump ahead of others in offshore plant market dominated by overseas marine equipment manufacturers. The company is carrying on its business, standing firm in its belief that constant investment and efforts will always come to fruition.

Jong Su Kang, CEO of Mirae industries, said, “The entry into offshore plant equipment market requires much time and

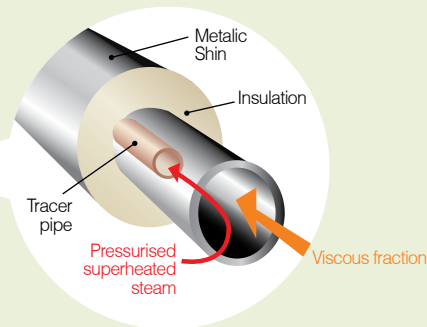
investment, although many domestic companies are proceeding with R&D to enter the market. So, the government support at policy level is desperately needed to ensure that

small and medium-sized companies can successfully demonstrate their capabilities.” 

TRIS Co., Ltd.

- Stainless seamless coil products

TRIS means three S's, as always providing smart Solutions to customers, achieving the Success, and pursuing the Sustainability. Specifically, TRIS has been the certified manufacturer and supplier of seamless tubes for the petrochemical industry since 2009, and has supplied its stainless seamless tube, a component of automotive engine injection system, to domestic automotive parts companies since 2010. TRIS has evolved into a global company in the field of precision seamless tube for semiconductor production facilities, automobiles, petrochemical facilities, boilers and medical equipments.



Tube for tracer. It can be applied to the pipe lines of various analytical devices and pressure transmitters, and used effectively for maintaining the low temperatures and high temperatures in related industries.

Stainless seamless coil

Seamless coil is the mainstay product of TRIS in marine equipment sector. TRIS developed the product with the weight of 100kg per coil for the first time in the world, exceeding the 90kg per coil which was the world's longest and heaviest previously.

This product is used most commonly for the Pre-Insulated Tube (PIT). The stainless seamless coil product of TRIS functions as the process tube in the middle of PIT product. The external surface is wrapped with non-hygroscopic fiber glass material and finished with aluminum foil and PVC. This product is used for the transport of steam and high or low temperature fluid, heat insulation/cold insulation of

gas, etc. It has wide-ranging applications in industries, commerce, instrumentation, transport of drinking water, and many more.

TRIS' world's largest coil brings about dramatic cost savings for auxiliary fitting products used in various pipe-laying works and facilities. Thus, TRIS is aggressively targeting the equipment manufacturers that make pre-insulation tube or fitting products.

The primary goal of TRIS is to actively provide support for the related domestic companies to shift to TRIS products, instead of imported products, or develop indigenous products. Moreover, TRIS aims to supply its coil, the world's largest, to more than 50% of related domestic companies based on price competitiveness and excellent quality.

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'Rockwell Automation on the Move 2013', a unique chance to see state-of-art automation solutions at a glance

Rockwell Automation with a legacy dating back 110 years, held an event to showcase its latest solutions and provide an insight into automation market trends in Seoul Renaissance Hotel on April 17.

Rockwell Automation on Tour (RA on Tour) is an event that provides unique insight into a broad range of Rockwell Automation's applications, its automation solutions and examples of recent application. Marking the 110th anniversary of Rockwell Automation, this year's event showcases the differentiated technologies and integrated solutions needed to achieve the 'Smart, Safe, Sustainable Manufacturing', the ultimate goal of end users and equipment manufacturers.

This RA on Tour was attended by domestic customers and partners of Rockwell Automation, along with about 400 people from automation industry.

Rockwell Automation featured 3 technical sessions linked to the customer value message, 'Plant-wide Optimization', 'Machine Builder Performance' and 'Sustainable Production'. Additionally, Rockwell Automation presented the products and solutions in such a way so as to offer customers hands-on experience with products, and the Rockwell Automation's domestic and overseas partners, such as PANDUIT, ProSoft, FLUKE, etc., were also present with their booths.

Choi Seon-name, President of Rockwell

Automation Korea, said, "The average lifespan of companies worldwide is said to be approximately 15 years. There are only a handful of domestic companies that have carried on business for several decades. Rockwell Automation marks 110th anniversary this year, and it is really amazing and meaningful very much that Rockwell Automation has made strides for more than a century." He added, "Rockwell Automation Korea will turn the integrated solution for end users and OEM into a growth engine, playing a key part in increasing the productivity of customers."

For end users and OEM

Rockwell Automation has focused on improving the efficiency of equipment manufacturers and optimizing the manufacturing environment and process. The integrated architecture, the key factor, has evolved constantly since 2000 and marked a watershed

in 2010. The architecture evolved into EOI, motion, I/O and small control in the period between 2000 and 2010. The integrated architecture has evolved further to create customer-oriented value such as process, information, safety, and OEM. Here, the 3 key factors are Plant-wide Optimization', 'Machine Builder Performance' and 'Sustainable Production' as presented by the 3 sessions in this RA on Tour.

Nam Soo-heyok, General Manager of Rockwell Automation Korea, said, "The evolution of integrated solution is driven by the need of customers for even more advanced integrated automation solutions. The convergence with IT(information technology) is



Choi Seon-name, President of Rockwell Automation Korea



Booths of Rockwell Automation's domestic and overseas partners

expected to bring about a sea change to automation market.”

Rockwell Automation presents 5 solutions to help customers achieve productivity improvement. Above all, Rockwell Automation provides the products and solutions for various automation applications (Multiple Disciplines). Specifically, Rockwell Automation presents the solutions suitable for variable scale (scalable dimensions), IT-friendly on-single network that can integrate corporate networks and automation applications, etc.

Nam Soo-heyok, General Manager of Rockwell Automation Korea, said, “We are building the solutions incorporating innovative technologies by systematically linking with IT companies as part of effort to meet the challenges of automation market.”

Focus on oil & gas, process markets

Rockwell Automation provides comprehensive solutions to ensure high availability of oil & gas industries and efficient operation of processes. The RA on Tour featured DCS solution for optimizing production processes, motor control solutions such as soft starters, high pressure/low pressure inverter, process safety solution, etc. Currently, Rockwell Automation Korea

is focusing on expanding its reach into oil & gas and process sectors as a total solution provider. Particularly, PlantPAx™, which is the process automation system, provides the integrated portfolio for process control, along with the specialized capabilities and standardized process library needed to shorten the development time, and is offered as single architecture for 2 areas, i.e., discrete automation and process.

Rockwell Automation Korea has proceeded with technological cooperation with many companies – such as OSIsoft, the partner for the joint development of Historian solution, Endress +Hauser, the strategic partner for process instrument – in an endeavor to provide the improved functions of PlantPAx™ to customers. Moreover, Rockwell Automation Korea has complemented the virtualization function and libraries for each industry, laying the cornerstone for achieving a robust growth in oil & gas and process markets. Yang Jong-tae, National

Sales Manager of Rockwell Automation Korea, said, “We have achieved a two-fold growth in sales in oil & gas sectors since 2009. With the process safety solution, which is our mainstay, we are targeting the markets for offshore plants such as drillship and FPSO.” 



View of 'RA on Tour 2013'



RA on Tour 2013 was attended by about 400 people from related industries.

DSME developed intelligent system to repel piracy attempt

Daewoo Shipbuilding & Marine Engineering(DSME) completed the DSME Anti-Piracy System (DAPS) after about 2 years of development and tests, which can be used to analyze the causes of marine accidents, identify pirates and thwart piracy attempt.

DSME unveiled DSME Anti-Piracy System(DAPS) which it developed independently and incorporates the state-of-art IT technology. This DAPS is a comprehensive ship security system to identify and thwart pirates at sea. DAPS analyzes the image data using the signals transmitted from on-board radar system. Based on the analyzed information, DAPS constantly monitors suspicious vessel at a distance in real time using the intelligent software and determines automatically whether or not the suspicious vessel is a pirate ship that can pose threat to the ship.

DAPS responses to the danger in two steps, and the extent of danger is determined based on radial distance. In the first step, the DAPS broadcasts warnings - using the high output directional loudspeaker - to the suspected pirates against coming close to the ship, and alerts the crews to be on guard against possible pirate infiltration and ready themselves to thwart the pirates' attempt to hijack the ship if the suspected pirate ship comes within the radius of approximately 2km.

If the suspected pirates ignore the warning and keep approaching, then DAPS practically cripples the ability of pirates to approach the ship by using


the countermeasures such as high output sound cannon, water cannon, and laser. Particularly, DAPS is automatically controlled and designed to enable the crew to monitor in safe place after evacuation and respond against the pirates who start attacking the ship. DSME expects that the DAPS will help prevent tremendous damage for humans and property which may be caused by pirates. In fact, DAPS will be installed in 5 crude carriers and product carriers which DSME is currently building for Kuwait's state-run KOTC(Kuwait Oil Tanker Company), the ship owner.

The DAPS was developed with purely indigenous technology through joint research with a small and medium-sized manufacturer of high output directional speaker. DSME is recognized to set an example of co-existence with small and medium-sized company through development of new technology.

Kim Won-seok, a technical expert at Design II Group of DSME, who led the



The sound cannon installed in the oil tanker currently being built.

development of DAPS, said, "DAPS is an effective solution to protect the crews, considering that the firearms and their use are prohibited at sea off the coast of countries during the navigation. DSME can be also used for analyzing the causes of many different marine accidents, as well as repelling the piracy attempt, if more capabilities are added, such as the function to provide image data via the satellite". 

LS Cable & System developed indigenous subsea umbilical cable

LS Cable & System developed subsea umbilical cable for the first time nationwide amid heightened interest in offshore and subsea development and plans to make inroads into global market by developing state-of-art products such as the cables for oilfield drilling.

LS Cable & System developed the umbilical cable used for subsea resource exploration and development. The umbilical cable is essential for subsea resource development as it supplies power to Remotely Operated Vehicle(ROV) and transmits the signals and communication data to operate robot arms, sensors, cameras, etc. The umbilical cable is the composite cable used for offshore engineering and has applications for geological exploration, oil drilling, and ROV. Mostly, umbilical cable is connected to subsea equipment to supply power or control the equipment and transmits signals from monitoring equipment.

The subsea cable, developed independently by LS Cable & System with its own technology, is the composite cable consisting of 4.5kV and 3.3kV power cable and 2 optical fiber cables, capable of withstanding unfavorable ocean conditions such as high pressure in water depth of 6,000m, irregular tidal current, etc.

Subsea cables were produced by only a handful of companies in Europe and Americas, and Korea had total reliance on imported subsea cables although it became the fourth country to develop Remotely Operated Vehicle operating in water depth of 6,000m to

explore deepwater mineral resources and research the polar regions, etc., in 2007 after United States, France, and Japan.

The focus of resource development has shifted from onshore to subsea. According to Korea Institute of Ocean Science & Technology, Korea has the right to explore 4 subsea mines totaling 112,000Km² which is larger than the area of south Korea(approximately 100,000Km²) amid fierce competition among countries to develop subsea resources, and plans to start mining the subsea mineral sources from next year.

According to Douglas Westwood, the volume of subsea mining equipment built yearly is expected to increase to approximately 1,000 units in 2015 from about 620 units in 2011, spurring the demand for umbilical cable and related systems.

Kim Dong-wook, the Executive Director (a research committee member of Product Technology Research Center) of LS Cable & System, said, "We have steadily expanded our capability to develop subsea cables since the establishment of Donghae manufac-



Subsea umbilical cable developed by LS Cable & System

turing plant in 2009, and have adequate production facilities." He stressed, "We will develop various products, such as the umbilical cable for deepwater oil drilling, to cope with various subsea operation environments and meet the requirements of customers. Furthermore, we will aggressively target the global market, including Europe and Americas, as well as domestic market." 

New A200-L a quantum leap in technology

ABB Turbocharging announced that its new 'A200-L' generation of single-stage turbochargers for low-speed two-stroke engines represents a quantum leap in the technological development of turbochargers.

ABB Turbocharging's 'A200-L' compressor stage has been optimized to enable significantly more additional volume flow. In comparison to previous models, the A200-L has up to 30% additional volume flow, which to date is fully the equivalent to one size smaller in a series of turbochargers. This increase represents a quantum leap never before seen in the turbocharging industry.

"Our latest technical findings from development are very promising," said David Ruch, who has been heading up the technological development of the A200-L, "This model represents a real departure from the past model because it's allowing us to ensure greater volume flow without making the concessions on efficiency that we used to have to make."

Michael Lok, General Manager Low Speed Segment, said "We are even looking at a model that potentially makes no compromises on the three key variables – that is, efficiency, pressure ratio, and volume flow – used to measure performance in a turbocharger. No one's ever been able to do that, at least as far as I know. That's a puzzle that engineers have had to wrestle with for as long as there have been turbochargers. If we're able to achieve that with the A200-L, we will have made a hugely important contribution to the turbocharging industry as a whole."

The benefits to the customer

The benefits of the A200-L's additional volume flow are manifold. First, the A200-L's compacter frame makes it possible to use a smaller turbocharger on a wide range of two-stroke engines. For customers that translate into lower weight and more space, which in turn have a positive impact on the bottom line in the form of lower service costs, a lower first cost and a lower total cost of ownership. And since less material is used to make the A200-L, the impact to the environment is also reduced.


"The savings in service costs alone amount to at least 25% in many models, and in some cases even more," said Arie Smits, Senior General Manager Global Turbocharging Projects.

ABB Turbocharging has already sold its first commissions and is currently in production. The first turbochargers will be tested on engines at the beginning of May, prospectively.

"This technology is going to change what it means to be, and stay, competitive in the turbocharging industry," said Axel Kettmann, Senior Vice President. "The A200-L series is much more efficient and



so much more cost-efficient than what we have seen before. Companies who choose not to develop their products in a similar direction will lose business, because in this market, customers are focusing on what will save money, particularly in the long-term."

ABB Turbocharging is at the helm of the global industry in the manufacture and maintenance of turbochargers for 500 kW to 80+ MW diesel and gas engines. Our leading-edge technology and innovation enables our customers to perform better and produce fewer emissions, even in the toughest terrains. Approximately 200,000 ABB turbochargers are in operation across the globe on ships, power stations, gen-sets, diesel locomotives and large, off-highway vehicles. 



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Shipbuilding industry still shows robust growth in the first quarter of this year

Domestic shipyards showed stronger-than-expected performance in the first quarter of this year despite the downturn in global shipbuilding market. According to the Ministry of Trade, Industry and Energy, domestic shipyards captured 39% of world new orders on the back of the rise in new orders for tankers and LNG carriers.

Domestic shipyards won new orders totaling 2.56 million CGT in the first quarter, capturing 39% of share in global market, despite the continued sluggishness in shipbuilding market. According to the industry sources, the increase in new orders for some ship types was driven by the growing demand for eco-friendly and high fuel efficiency vessels, low newbuilding prices, etc.

Domestic shipyards saw their combined new orders increasing by 22.5% year-on-year to 2.56 million CGT in the first quarter this year, spurred by the demand for medium-sized tankers weighing less than 50,000 tons. According to Korea off-shore & Shipbuilding Association, new orders placed at domestic shipyards stood at 1.03 million CGT in the first quarter, which accounts for 57% of all tankers (totaling 1.8 million CGT) ordered worldwide.

The volumes of vessels built worldwide stood at 9.57 million CGT in the first quarter, a 29.2% decrease compared to the same period of previous year (13.51 million CGT). The order backlog stood at 91.11 million CGT as of late March, 2013, a 24% decrease compared to the same

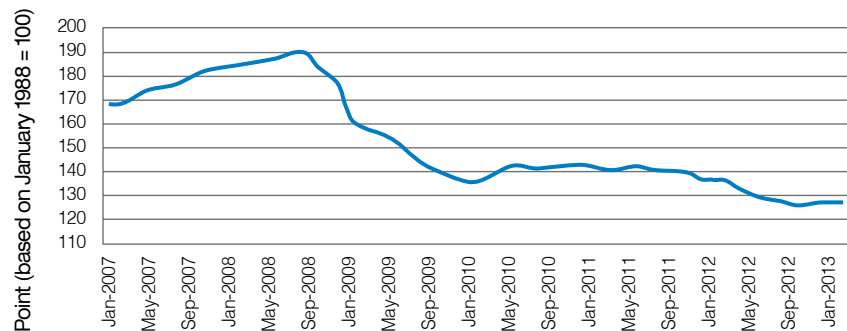


Figure 1. Trends of newbuilding price index (Source: Clarkson)

period of previous year (119.87 million CGT). Particularly, newbuilding price index has been maintained at 126 points since November last year, reversing the downward trends that began from late 2008 due to the glut of vessels in market and the decline in demand for new ship.

Domestic shipyards dominate eco-friendly and high value-added vessel sectors

Moreover, domestic shipyards swept new orders for 8 LNG carriers, 1 drillship, and 1 offshore plant which were placed in the world, thus solidifying the leadership in eco-friendly and high value-added vessel sectors. On the other hand, ship prices fell compared to the same period of previous year and domestic shipyards saw

the total value of their new order intake decrease by 31.8% to USD 5.68 billion amid the decline in global new orders for high value-added vessels such as LNG carrier and off-shore plants, the type of vessels that drove the upturn in new order intake in the first quarter.

Moreover, the vessel exports of domestic shipyards decreased by 26% year-on-year to USD 8.992 billion in the first quarter. Overall ship prices and volumes fell as the vessel ordered from the second half of 2008 and thereafter – the period when the shipbuilding was mired in doldrums – were delivered. In addition, the delivery of high value-added vessels, such as drillship, decreased compared to the previous year, leading to a slide in revenue from vessel

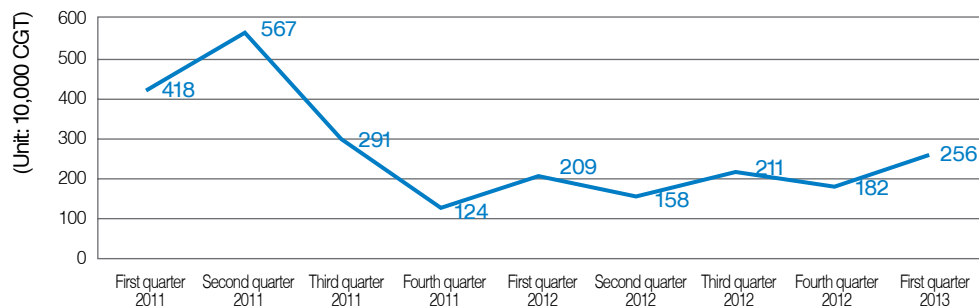



Figure 2. Trends in new orders at domestic shipyards by quarter (Source: Clarkson)

exports. Meanwhile, the global shipbuilding market has seen a reduction in ship finance due to the glut of vessels in market, Europe's financial crisis, etc. As the new order intake has dwindled since 2008, the volumes of vessels built worldwide decreased by 29.2% year-on-year to 9.57 million CGT in the first quarter of this year. As of late March this year, the order backlog stands at 91.11 million CGT, which represents a 24% decrease. Domestic shipyards made a clean sweep of new orders for 8 LNG carriers, 1 drillship and 1 offshore plant which were placed worldwide, domi-

inating the eco-friendly and high value-added vessel sectors. However, overall decline in new order amidst prolonged downturn in shipbuilding market took a toll. The volumes of vessels built at domestic shipyards stood at 3.49 million CGT (accounting for 36% of the entire volumes of vessels built worldwide) in the first quarter of 2013, a 24.7% decrease compared to the same period of previous year (4.63 million CGT). As of late March, the order backlog of domestic shipyards stood at 28.15 million CGT (accounting for 30.9% of global order backlog), a decrease by 21.5%

compared to the corresponding period of previous year (35.86 million CGT).

The shipbuilding industry predicts overall decrease in the export prices of vessels and volumes compared to the previous year as the vessels ordered in the second half of 2008 and thereafter are being delivered. Moreover, the industry sources predict a decrease in export amounts, considering the decline in the delivery of high value-added vessels, such as drillship, compared to the same period of previous year. 

Rolls-Royce to supply Promas propulsion system for two new Neptune lines cargo ships

Rolls-Royce has won a contract to supply its Promas propulsion system for two new car and truck carrying ships which are being built in Korea for Neptune Lines.

Promas is an integrated propeller and rudder system that increases efficiency and manoeuvrability. The vessels, to be built by Hyundai Mipo Dockyard (HMD), will also feature steering gear and deck machinery from Rolls-Royce.

The two ships were originally specified with a competing propulsion system from another supplier, but following additional model testing to demonstrate the possible efficiency gains, Neptune Lines selected the Rolls-Royce Promas system.

Neil Gilliver, Rolls-Royce, President - Merchant, said "Neptune Lines were determined to install an energy saving propulsion system on these ships, and I'm delighted that they have chosen Promas. The test results exceeded our expectations, showing significantly higher propulsion efficiency than our competitor. This contract not only recognises the quality and reliability of our system but also opens up future business opportunities with Neptune Lines."

HMD has also signed an agreement with Rolls-Royce for further model testing of Promas in order to evaluate its suitability for a number of other vessel designs.

Test certificate of superconductor cable system

In March, production started for the space-saving and energy-efficient HTS cable system that will replace a high-voltage cable in the city of Essen.

With the handover of the test certificate for a high-temperature superconductor (HTS) cable system, Nexans and RWE Deutschland AG will mark the completion of the 18-month development phase in the “AmpaCity” project on 11 March 2013. Following the successful test series of the prototype in the Nexans’ Hanover plant’s high-voltage laboratory, production of the 10 kV HTS system, which is 1 km in length, will now start. It is set to replace a 110 kV copper cable in the RWE-operated distribution network in the city of Essen at the end of the year, and transport the same power of up to 40 MW.

The three-phase, concentric 10 kV cable from the AmpaCity project will now be the longest installation of a superconductor cable in the world. The combination of a superconductor cable with a superconducting fault current limiter also constitutes a premiere. This device is produced at Nexans Superconductors GmbH in Hürth and protects the grid and the cable from overloading caused by short circuit currents, preventing them from spreading to other network parts. Meanwhile, its suitability was proven by the prototype of the HTS cable in a lightning impulse voltage test at roughly seven times the nominal voltage as well as during continuous loading at three

times the operating voltage.

“The superconductor cable being laid in Essen city centre runs between two transformer stations and is the first to have a length of one kilometre. It will facilitate a discernible increase in the power density and efficiency of the city centre power supply,” said Dr Andreas Breuer, Head of the New Technologies /Projects division at RWE Deutschland AG.


Technical superiority of ice-cold conductors

The technical superiority of the superconductor cable system can be attributed to the material properties of the conductor material. At temperatures of around -200°C , it is transformed into an almost perfect electrical conductor that can transport at least 100 times more electricity than copper. The required operating temperature can be created without considerable effort using liquid nitrogen, which is also used as a coolant for many other industrial purposes. Despite the essential heat insulation of the superconductor cable, it succeeds in transporting five times the electricity as a copper cable with the same outer



This prototype of a superconductive cable system for Essen city centre was put through its paces in the high-voltage laboratory in Nexans’ Hanover plant.

diameter – and with much fewer losses compared to copper.

High-temperature superconductors as used here in AmpaCity in the cable system and the fault current limiter have been ready for deployment in energy-related applications for some years now. Experts anticipate that these innovative cable systems will soon be in a position to compete with copper solutions in energy-intensive applications, from a cost-effective perspective as well. 

Structural Health Monitoring System

Monitoring the Health of the 2008 Olympic Venues in Beijing Using NI Products



NI Solutions for Structural Health Monitoring (SHM)

PXI

Industrial PCI/PCIe System

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Embedded, Real-Time System



Sound and Vibration Measurement Suite

Sound and Vibration Analysis Software

CompactDAQ/USB

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Co-growth among shipping, shipbuilding and steel industries

A seminar was held on April 16, organized by KSA, KOSHIPA, and KISA, to promote the exchange of information, co-existence and cooperation. The event drew approximately 200 people, including those from steel, shipbuilding and shipping industries.

A seminar revolving around the theme of co-growth among shipping, shipbuilding and steel industries was held at P&S Tower, Yeoksam-dong, on April 16, and ended in great success, which was co-organized by Korea Shipowners' Association(KSA), Korea Offshore & Shipbuilding Association(KOSHIPA), and Korea Iron & Steel Association(KISA).

Seo Yeong-joo, Vice-Chairman of KOSHIPA, said, "This seminar is meaningful very much in that it provided an opportunity for the 3 industries to share ideas related to the market conditions and trends and explore the ways for co-growth amid unfavorable market situation."

Oh Il-hwan, Vice-Chairman of KISA, commented, "The steel and shipbuilding industries are closely related. 23% of the steels produced yearly nationwide are supplied to the shipbuilding industry. The three industries need to work closely to stimulate growth and help build up nation's competitiveness."

Kim Yeong-moo, Managing Director of KSA, remarked, "The shipping, shipbuilding and steel industries are interconnected and need to make concerted efforts based on mutual trust to overcome current crisis. I hope that this seminar will serve as a platform to promote cooperation among the shipping, shipbuilding and steel industries and help add vitality to the nation's economy."

In the seminar, Park Moo-hyeon, a researcher of E-Trade Korea, made a presentation titled 'Fuel economy, the key to the future of shipbuilding and shipping industries', and Dr. Jang Won-ik of POSCO Research Institute(POSRI) made a presentation titled 'Outlook for steel and shipbuilding markets in 2013'. Meanwhile, Hwang Jin-hoe, Director of Shipping Market Analysis Center of Korea Maritime Institute(KMI), made a presentation titled 'Outlook of ship-



The photo shows Hwang Jin-hoe, Director of Shipping Market Analysis Center of KMI, Oh Il-hwan, Vice-Chairman of KISA, Seo Yeong-joo, Vice-Chairman of KOSHIPA, Kim Yeong-moo, Managing Director of KSA, and Park Moo-hyeon, a researcher of E-Trade Korea (from the left).



The seminar drew approximately 250 people, including those from shipping, shipbuilding, and steel industries and officials from related organizations.

ping market and inter-industrial cooperation strategy’.

Park Moo-hyeon, a researcher of E-Trade Korea, said in his presentation, “The realistic solution to cope with rigorous environmental regulations is building the eco-ship which can reduce CO₂ emissions by 30% and cut the fuel costs by USD 11.5 billion yearly. Eco-ship with excellent fuel economy will be vital for increasing the competitiveness of shipping industry as it was demonstrated by Maersk which has invested in eco-ship for about a decade.” He stressed, “The newbuilding market will see a transition to eco-ship within

a few years for fuel-savings and compliance with environment regulations.”

Dr. Jang Won-ik of POSRI said, “The economic downturn is expected to continue amid the slowdown of real economy in developed countries and emerging economies due to the prolonged Europe’s financial crisis and slow recovery of U.S. economy. The steel industry, caught in slowdown due to sluggish demand, is expected to experience a slump for the medium and long term as a result of flat demand for steel plate amid the downturn in shipbuilding industry, the largest consumer of steel, and the

aggravated glut in market.”

Hwang Jin-hoi, Director of Shipping Market Analysis Center of KMI, said, “The shipping market will see a turnaround in the demand and supply from 2014, although the oversupply and sharp rise in fuel price are aggravating the profitability of shipping companies. He stressed, “The shipping, shipbuilding and steel industries need to increase the value-added by promoting inter-industrial cooperation and map out strategies to cope with drastic changes in business cycle.” 

Hyundai Samho Heavy Industries upgrades from Tribon to AVEVA Marine

On 22 April 2013, AVEVA announced that Hyundai Samho Heavy Industries (HSHI), one of the world’s largest shipbuilders, has successfully completed its upgrade from ‘Tribon M3’ software to ‘AVEVA Marine’ for engineering, design and production. HSHI has used AVEVA’s legacy Tribon M3 design software very successfully for many years, but chose to upgrade to the very latest AVEVA Marine software portfolio after a thorough evaluation that identified major advantages in the new platform, including its powerful features such as customisation.

“One of the big benefits we found when upgrading to AVEVA Marine is its comprehensive and powerful capabilities for customisation,” said Ok Jae Huh, Senior Vice President, Hyundai Samho Heavy Industries. “AVEVA Marine is very user friendly. It will help keep us competitive as it includes efficient tools for the easy development of our own specialised scripts (macros) that can be adapted to the demands of our customers around the world.”

Ok Jae Huh, Senior Vice President continued, “The difficult economic conditions in the marine industry, combined with

new opportunities in the Offshore and Plant markets, have seen a diversification in the traditional shipbuilding industry. As the result of the merging of the AVEVA PDMS and the Tribon hull technologies, AVEVA Marine is responding to these market changes and is now one of the best names in the CAD industry for ships, offshore facilities and plants.”

“HSHI has been a long-standing AVEVA customer and we have worked very closely with its team to help develop its long-term strategic direction for shipbuilding”, added Eun Joo Park, Senior Vice President – Korea & Japan, AVEVA. “Organisations like HSHI who have migrated from Tribon M3 to AVEVA Marine have benefitted from cost savings across all disciplines as a result of our Integrated Engineering & Design approach. AVEVA Marine combines the world’s best hull design applications with the best outfitting capability using AVEVA’s powerful object-centric technology. It integrates completely into a much larger production environment, which is why customer are realising such significant project savings.”

Marine industry moves forward thanks to laser precision alignment



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(unmounted shaft)



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(mounted shaft)
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Hammelmann High pressure systems in the Marine, Oil & Gas industry

High pressure pumps – Cleaning systems - Process pumps

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Cleaning with high pressure pumps and applications systems up to 3500 bar

- Removal of marine growths from the hull, rudder and propellers
- Spot blasting
- Hull underside cleaning
- Surface preparation for re-coating the hull above and below the water line
- Rust removal and surface preparation in ballast tanks in dock or at sea
- Cleaning and surface preparation works on superstructure, deck machinery, winches, gangways and anchor chains
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- Washing primed new build sections
- Cold cutting
- General clean up operations on dock floors and walls
- Heat exchanger cleaning: rigid and flexible flushing lances, tube cleaning nozzles, internal and external heat exchanger cleaning systems
- Tank cleaning: tank cleaning heads, internal cleaning systems for autoclaves
- Pipe and sewer cleaning: standard and reversible sewer cleaning nozzles, powered hose reels



High pressure pumps

Hammelmann pumps produce maximum performance from a minimal footprint which is the result of combining a compact integral speed reduction gear end with the concept of a vertical configuration.

Power ratings up to 1100 kW
Flow rates up to 2987 l/min
Pressures up to 4000 bar



Process pumps

Hammelmann Triplex and Quintuplex pumps provide the highest standards of safety and reliability.

Power ratings up to 650 kW
Flow rates up to 2000 l/min
Pressures up to 3000 bar



Typical fluids

- Diesel oil
- Glycol
- LDHI
- Methanol
- Process water
- Salt water
- Scale Squeeze
- Inhibitors:
 - Asphaltene
 - Paraffin
 - Corrosion
 - Scale



Redefining leadership in ballast water treatment: inside PureBallast 3.0

April marks the official unveiling of the third generation of Alfa Laval's chemical-free system for ballast water treatment. Less of an update than a sweeping redefinition of the system, PureBallast 3.0 re-establishes Alfa Laval as a groundbreaker in ballast water treatment.

Alfa Laval

Space savings

50%



Energy savings up to

60%



Backing worldwide

100%



PureBallast, which was developed in cooperation with Wallenius Water, was originally launched in 2006 as the world's very first commercially available ballast water treatment system. Since then it has matured considerably, arriving in an updated PureBallast 2.0 version with EX options in 2010. Already then there were improvements to its energy efficiency and its basic construction, but nothing to compare with the advances in PureBallast 3.0.

PureBallast 3.0

- *New generation of leading technology*
- *Improvements based on real-world feedback*
- *Drastically reduced size and energy use*
- *Greater design flexibility*
- *Extensive experience and global support*

"This time we've completely rewritten the book when it comes to PureBallast," said Per Warg, the Alfa Laval Business Manager responsible for the system. "We've achieved space savings of 50%, energy savings of up to 60% and huge improvements in flexibility and flow capacity. But we've also learned a great deal that can be of impact for ballast water treatment in general."

Going back to the beginning

The development of PureBallast 3.0 began almost immediately after the release of its predecessor, with Alfa Laval returning to the drawing board in early 2011. Jonas Alván, Product Development Manager for PureBallast, points out that this was really a new start for the system. "The original construction had been streamlined as much as was possible, which meant we were forced to think in new ways to move forward," he said.

That original construction had been decided at a time when no supplier knew what would be needed to pass the IMO tests. Not being a company to take risks with compliance, Alfa Laval had thus created PureBallast with a good margin of error in terms of biological efficiency.

Now, drawing on real experience from around 100 PureBallast systems commissioned and hundreds more sold, it was possible to re-evaluate. So the development team set tough goals for the new system, especially when it came to energy efficiency.



Figure 1. PureBallast 3.0 - 300 system



Figure 2. PureBallast 3.0 - 1000 system

Identifying potential parameters

The key component in a UV-based system is its reactor, the chamber where UV treatment actually occurs. In standard UV treatment, organisms are eliminated directly or rendered unable to reproduce through damage to their DNA and biological structure. In PureBallast, the treatment process is enhanced by AOT (advanced oxidation technology), which creates free radicals that cause irreversible cell membrane damage. The AOT effect has a proven biological impact leading to better treatment performance and lower energy consumption.

In approaching a new PureBallast system, the development team asked itself one fundamental question: What factors determine the effectiveness of a UV-based reactor to be used with seawater at a high flow rate?

The latter part of that question was critical, according to Jonas Alván. "The UV treatment of seawater is a very different process from the UV treatment of drinking water on land," he said. "In drinking water applications, which many ballast water treatment systems are adapted from, the process is continuous and targets mainly bacteria in pre-cleaned and

well-regulated water. In ballast water treatment, the process is intermittent and involves a lot of standstill with saline water in the reactor. Plus the organisms targeted are harder and more varied.”

At sea, continuous treatment is not practically feasible. Neither is increasing residence time in the reactor, since ballasting and deballasting have to occur quickly. Adding stronger UV lamps or increasing the lamp number can increase biological efficiency, but only at the expense of energy efficiency. So the team was left with two main reactor parameters that could be adjusted: flow patterns and lamp placement.



Figure 3. PureBallast 3.0 - Reactor

Developing the new reactor

“One of the things we were looking for was greater mixing, which would both increase the effect of the AOT and help to compensate for low UV transmittance,” Alván said, referring to the distance UV light travels in water. “With more fluid mixing, the chance of an organism passing close to the UV lamps - and

thereby the biological efficiency - increases.”

Again, the difference between land-based and marine UV treatment was important. As Alván puts it, “Finding an acceptable balance of parameters is easier in a drinking water application, where clear and consistent water provides high UV transmittance. But the varying UV transmittance of ballast water, along with the need to minimize power consumption, makes it a more complex challenge to find an ideal reactor design.”

That design was finally found with the help of a unique CFD (computational fluid dynamics) model, which was developed around a well-established model for standard UV treatment. In the new model, light sources were introduced into the equation, making it possible to see the UV dose for each of 50,000 theoretical particles (organisms) passing through the reactor.

“In our visualizations, we assigned each particle a colour according to the UV dose incurred,” Alván explains. “By opti-

mizing the reactor design for a uniform colour among exiting paths, we could ensure the most even UV dose possible. And that gave us the reactor design with the least possible energy consumption. The end result is startling.”

Taking a hard look at CIP

Of course, the reactor was not the only focus of the PureBallast 3.0 development project. Another component re-evaluated was PureBallast’s CIP (Cleaning-In-Place) unit, which cleans the UV lamp sleeves between treatments by circulating a non-toxic, low-pH fluid. In this case, however, the unit was left unchanged.

“A lot of suppliers leave out CIP as a way to save space and cost,” says Alván. To evaluate the consequences of doing so, the team performed its own tests, allowing PureBallast to run for many cycles without performing CIP. “As it turns out, CIP was even more important than we expected,” Alván said.

The reason is the build-up of calcium chlorides and metal ions on the UV lamp sleeves, which occurs not only in PureBallast, but in all UV treatment involving seawater. This build-up degrades the sleeves’ UV transmittance, which greatly lowers the biological effect.

“We saw clear value in performing CIP to retain full equipment performance after ballasting or deballasting,” Alván says. “Mechanical wipers remove calcium chlorides but not metal ions, and both wipers and manual cleaning will eventually cause performance-reducing scratches on the quartz glass. CIP is the most gentle and effective means available to keep performance at type-approved levels.”



Figure 4. PureBallast 3.0 system onboard: The smaller number of units in most configurations of PureBallast 3.0 means that considerably less pipework is required.

The finished system - a small wonder

The completed PureBallast 3.0 system, while based on the same treatment technology as its predecessors, is a remarkable leap forward in terms of its compactness, energy efficiency and flexibility. Most striking at a first glance is its size. Where previous PureBallast reactors handled 250 m³/h each, individual PureBallast 3.0 reactors can handle either 300 m³/h or 1000 m³/h. Using the larger reactor, which is not much bigger than the original 250 m³/h version, the footprint of a 1000 m³/h system is literally cut in half. The bigger the system, the bigger the space savings.

“Needless to say, the new reactor capacities greatly reduce the footprint of larger systems,” said Per Warg. “With one reactor doing the same job that four did before, PureBallast 3.0 is competitive across the entire flow range up to 6000 m³/h.”

Energy savings of 30~60%

The size, however, is not the only thing that makes PureBallast 3.0 competitive. The new system is also as energy efficient as it is compact.

“The new 1000 m³/h reactors consume just 100 kW at full power, which is a minimum energy savings of 30% over previous versions,” Warg said. “And when full power isn’t needed, the energy savings can be as much as 60%.”

Warg is referring to the new dimming function in PureBallast 3.0, which lowers the system’s power consumption in clearer waters with good UV transmittance. In such conditions, less energy is needed to neutralize the organisms present. “PureBallast 3.0 has a dimming capacity of 50% and handles the dimming process automatically,” said Warg. “The system will operate with some level of dimming in the majority of circumstances, providing up to 60% energy savings over previous versions in fully dimmed mode.”

Installation flexibility and economy

For shipyards, the most appealing aspect of PureBallast 3.0 will not be its energy-efficient operation, but rather its high degree of flexibility and ease of installation - even when it comes to the highest flow rates. With the new reactor capacities, only one reactor will be needed per 1000 m³/h, which makes designing a system considerably simpler.

“When individual reactors can handle a greater amount of ballast water, there are fewer reactors and lamp drive cabinets to install,” said Warg. “That means not only less installation time, but also easier and more economical installation,




Figure 5. PureBallast 3.0 reactor onboard

since it does away with a considerable amount of pipework.” When it comes to the lamp drive cabinets, there is an additional bit of flexibility. Whereas reactors and cabinets were attached in previous versions of PureBallast, the cabinets can now be placed anywhere up to 150 m away. “The free placement of lamp drive cabinets within 150 metres simplifies the design of EX systems, since the power supply is easy to place outside the hazardous zone,” said Warg. “But it’s of benefit to everyone, since it can save space in the engine room where it’s needed most.”

Leadership redefined

Warg and Alván are visibly proud of the new PureBallast 3.0, and certainly not without reason. Its capabilities and features place the new system firmly at the cutting edge of ballast water treatment.

“Alfa Laval has always been at the forefront of ballast water treatment, but PureBallast 3.0 truly redefines that leadership,” said Warg. “We’re looking not just at a new generation of the system, but rather at a whole new standard that lives up to the tougher demands raised by today’s customers.” His colleague Alván agrees, concluding, “Where size, economy and energy efficiency are important, I’ve no doubt that customers will find what they’re looking for in PureBallast 3.0.” 

For further information

To learn more about PureBallast 3.0 and Alfa Laval’s approach to ballast water treatment, visit www.alfalaval.com/pureballast3

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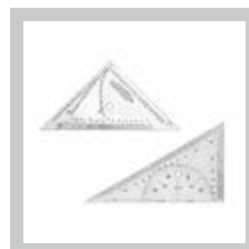
Sextants



Echo Sounders



Marine Binoculars



Navigation Triangles



Marine Quartz Chronometers



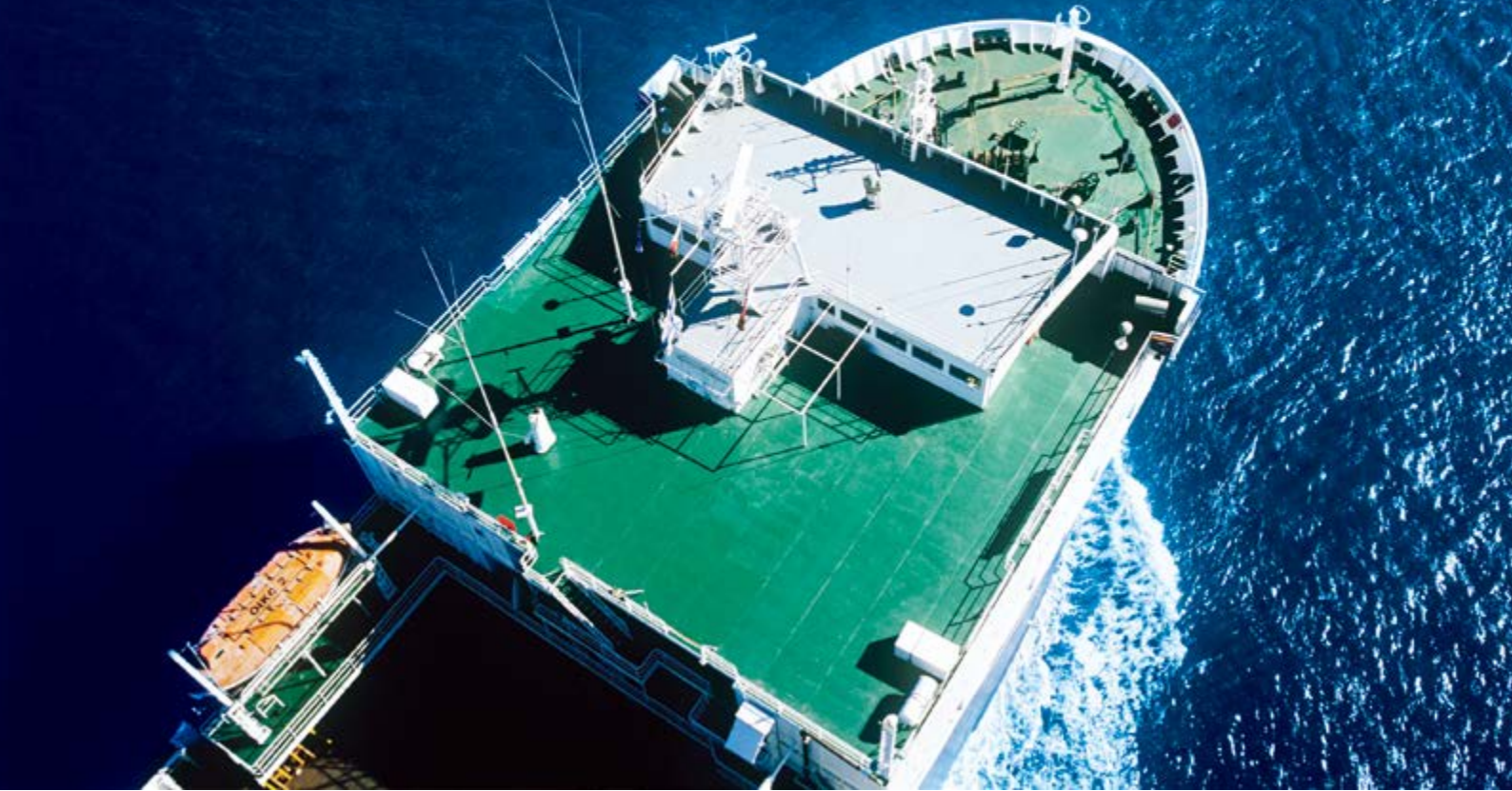
Wind Vane Anemometers



Area-Line Meters and
Planimeters



BON VOYAGE



Choosing the right instrument for an assigned task is very important. Because a good tool is an extension of one's skills intended to maximize efficiency and realize anticipated outcomes with least amount of time and effort, a reliable vendor with helpful information, knowledge and expert to recommend the appropriate equipments expands horizons of one's potential and possibility. With over 50 years in the business, JM Instruments Corp. has the expertise and know-hows to offer only the finest instruments which maximize the investment and experience of users with excellent performance-to-price ratio. Every product sold is backed by unsurpassed technical support from qualified staffs. At JM Instruments, we always strive to raise the bar and exceed expectation and satisfaction of our valued clients. For more information, look for us at JMIC.CO.KR.

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Surface Salinity Meters



Coating Thickness Gages





Seeking a solution for fuel cost reduction

Micro Motion® flowmeters help Rederi AB Transatlantic reduce costs, improve operations and increase profitability

Emerson Process Management Korea

Rederi AB Transatlantic operates in the Offshore/Icebreaking and Industrial Shipping business areas. The company has its Head Office in Skärhamn, Sweden and operates 38 vessels with approximately 1,100 employees. Net sales in 2009 were SEK 2,3 M.

Fuel efficiency control systems have been installed onboard the M/V Ortviken, and the M/V Transpaper. These systems collect information from various onboard systems including Micro Motion Coriolis flowmeters fitted between the Booster Module and engine. Coriolis mass measurement can be directly correlated to cost and energy content of fuel, and is unaffected by changes to the flow profile and variable fuel properties such as density or viscosity.

Results

- Fuel costs reduced by 2 per cent per vessel
- Improved engine efficiency and reduced emissions
- Payback time on investment of only two months
- Highly accurate, continuous, and reliable measurement of fuel quality

Shipping operators, including Rederi AB Transatlantic, are facing volatile fuel prices and challenging emission regulations. These issues are compounded by the need to control costs and improve operating efficiencies. Fuel represents a major cost in the operation of a large vessel, making fuel efficiency a real focus for the shipping and marine industry. With highly accurate, continuous, and reliable measurement of fuel quality, usage costs and waste can be managed.

Seeking a solution

Rederi AB Transatlantic, Transas AB, and Emerson Process Management embarked on a joint programme to develop an onboard solution for better control of marine fuel consumption.



“Fuel costs have been reduced by approximately 2 per cent a year for each vessel and these savings have provided a return on our total investment of just two months.”

*Leif Holmberg, Superintendent,
Rederi AB Transatlantic*

As a result of this programme, Rederi AB Transatlantic has installed Emerson’s Micro Motion Coriolis mass flowmeters on several ships in its fleet.

The standard solution uses a compact Micro Motion F100-Series Coriolis sensor with a Model 1700 transmitter to provide highly accurate, traceable and transparent mass-based measurement of fuel oil. Emerson also supplied its Mobrey MCU 901 Universal Transmitter Controllers and Indicators to show the actual flow for local reading in the engine room or control room. Using the MODBUS communications protocol, the Coriolis mass

flowmeter sends data to a fuel efficiency control system supplied by Transas AB in Sweden. This system, also called a Conning unit, collects information from the flowmeter and other onboard systems to help the crew optimise the operation of the ship. Tighter control and management of fuel burned improves engine efficiency, delivering fuel savings and reducing emissions. Micro Motion Coriolis meters are ideally suited to marine fuel measurement applications, providing extremely high accuracy

“Based on these successes, we will be investing in further installations onboard other ships in our fleet”

and wide rangeability. They are easy to install and because there are no moving parts, they also offer savings from reducing replacement or maintenance requirements when compared to volumetric flow measurement devices.

Emerson's unique MVD Direct Connect™ architecture further simplifies installation and reduces cost and complexity through



direct integration into a MODBUS host. Digital and analogue communications deliver the data directly to the control room or bridge, enabling close control. This complete solution also provides access to all Micro Motion instrument variables, including embedded diagnostics and full sensor configuration.

Micro Motion devices are suitable for a range of measurement installations on cruise and ferry ships, merchant ships (including container vessels and tankers), navy ships and special purpose vessels such as ice breakers. ⚓

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Low hanging fruit: optimising hull and propeller performance

Under constant pressure to improve fuel efficiency and reduce carbon emissions, owners of LNG carriers are confronted with a vast array of investment alternatives. Which are the most deserving, given scarce time and capital? Recent studies suggest that investments aimed at optimising hull and propeller performance are likely to be an important part of the answer.

Jotun

Geir Axel Oftedahl, Business Development Director, Jotun Hull Performance Solutions

Hull and propeller performance refers to the impact of changes to a vessel's hull and propeller surfaces on its energy efficiency in between two dry dockings. Hull and propeller performance determines the rate of speed loss, or alternatively how much more or less energy is required to move the vessel through water at a given speed over a given dry-docking interval.

From the moment a vessel enters service, the condition of its hull and propeller surfaces begins to deteriorate. Through a combination of mechanical damage and the

onset of biological fouling, these surfaces are constantly under attack. At each dry docking work is done to restore the hull and propeller surfaces to a good condition. However, with increased focus on lowering bunker costs and reducing emissions, owners are increasingly focused on what happens between dry dockings.

Last year, Jotun Marine conducted a comprehensive study based on actual vessel performance data collected from 32 vessels over 48 dry-docking intervals. The study concluded that average energy efficiency loss attributable to



hull and propeller performance for a typical vessel in a typical trade was between 11 and 18 per cent, depending on the length of its dry-docking interval (typically between 36 and 60 months). A typical vessel trading over a 60-month interval, for example, was found to use 36% more power at the end of the dry-docking interval, as compared to in the beginning, in order to maintain the desired speed. It should be noted that a number of the vessels included in the study had conducted regular or ad-hoc cleanings of hull and propeller. If such cleanings had not been done, the efficiency loss would have been even higher.

The findings in Jotun's study of hull and propeller performance correspond with the findings of other studies based on analysis of vessel performance data and the research into the effects of hull condition on frictional resistance. For example, a recent submission by the Clean Shipping Coalition to the MEPC63 (which cited several sources, including Jotun), estimates that the impact of a deterioration of hull and propeller performance is likely to result in a 15 to 20% loss in vessel energy efficiency on average over a docking interval.

Jotun's study also includes vessel performance data from 8 LNG vessels covering 12 dry-docking intervals. The energy efficiency loss attributable to hull and propeller performance for these 8 LNG vessels was found to be somewhat higher – 19% on average over a 60 month interval. While this sample is relatively limited, it is reasonable to assume that performance on LNG vessels is similar to that of the world fleet average.

The consequences of speed loss

There are three ways a vessel owner or charterer may respond to hull and propeller-related speed loss once a ship is in service: They can increase engine power (and thereby bunker consumption), accept a reduction in speed or find some combination of the two.

If the efficiency loss is compensated for by an increase in engine power, the resulting increase in bunker consumption and bunker cost will be equal to the relative efficiency loss. At current bunker prices, a large LNG vessel with an activity level of 75%, trading at 19 knots and consuming 145 tons of bunker per day would spend around \$143 million on bunker over a 60 month dry docking interval. For such a vessel the cost of compensating for an 18% loss in vessel energy efficiency by an increase in engine power and bunker consumption would be around \$ 26 million over the period or around \$ 5.2 million per year.

If the efficiency loss is accepted as a reduction in speed, bunker cost and consumption will remain unchanged. However, given a typical design, the vessel will have lost one third of the 18% efficiency loss in speed. Over a 60-month dry-docking interval at a 75% activity level, this results in a potential loss of around 82 trading days or around 38,000 sea miles. The economic cost associated with such a loss in transport capacity depends on the strength of the LNG freight market. In today's market, it may easily exceed the above estimate for the cost of compensating for the efficiency loss by an increase in engine power.

The impact of an energy efficiency loss on a vessel's GHG emissions also depends on how owners respond to speed loss. If speed loss is compensated for by an increase in engine power, the resulting increase in GHG emissions will be equal to the relative efficiency loss. For example, for the LNG carrier referred to above, would produce an increase in emissions of CO₂ of around 110,000 tons over a 60 month dry dock interval. If the speed loss is accepted, the GHG emissions increase would come from the additional capacity brought in to compensate for the lost transport capacity.

Calculating the value of improved hull and propeller performance

While the scale of the impact of speed loss on bunker consumption may have been underestimated, it is well known that hull and propeller performance affects the bunker consumption of a vessel. There are many products, services and solutions on offer from a broad range of paint manufacturers, as well as providers of complementary technologies, all claiming to deliver greater or more moderate improvements in hull and / or propeller performance.

In most cases, as long as even a fraction of the promised bunker cost saving is realized, the investment case would be attractive. For the LNG vessel used in the example above, an \$ 750 000 upgrade investment in the best available antifouling paint, for example, would be repaid in less than a year (one fifth of the lifetime of the paint) if the energy efficiency loss attributable to hull and propeller performance was reduced by as little as from 18 to 14%. The fuel cost saving over the remaining four years of the dry-docking interval would represent pure profit contribution.

When calculated over longer periods, the value of an



Jotun's Hull Performance Measurement Method

Early 2011, following several years of intensive research and investment, Jotun launched a method for measuring the actual impact of the hull and propeller performance on vessel energy efficiency under the name Jotun Hull Performance Measurement Method (JHPMM). The method is delivered in conjunction with Jotun's Hull Performance Solutions (HPS). HPS also includes a next

generation antifouling (SeaQuantum X200), upgraded technical service as well as a no-cure-no-pay high performance guarantee. Compared to a market average solution, Jotun's Hull Performance Solution is expected to deliver a 13.5% fuel cost saving over a 60 month dry-docking interval.

improvement in hull and propeller performance extends far beyond direct bunker costs savings, as even a moderate bunker cost saving has a substantial long-term impact on the overall cost of operating a vessel. For example, when markets decline, bunker costs become not just a cost issue, but a strategic issue. There are also clear indications that cargo owners are increasingly concerned with reducing the environmental footprint throughout their supply chains. Finally, regulatory schemes designed to incentivize more energy efficient designs and operations are currently coming into force or appearing on the horizon.

The challenge

The reason why the vessel energy efficiency loss attributable to hull and propeller performance remains so high, and why so much of the potential for improvement in hull and propeller performance remains unrealised has been a lack of reliable measurement and benchmarking capabilities. Indeed, calculating all the variables isolating the impact of hull and propeller performance on speed loss represents a complex, technical challenge. Until recently, little progress had been made on the issue, making it difficult for owners to calculate expected returns on investments. That is, if the return on an investment cannot be measured – the investment cannot be justified. Similarly, in the case of vessels operating under charter contracts, charterers have found it difficult to pay higher rates for vessels claiming to be more energy efficient as long as these efficiency claims cannot be documented.


The solution

The lack of reliable measurement and benchmarking capabilities can now finally be addressed. Over the last several

years, a number of systems for analyzing and optimizing vessel operations have become available on the market. These systems typically include a more complete range of sensors as well as system components for automatically capturing, storing and transferring the large amounts of data being generated by these sensors. Most modern LNG vessels today have had such systems installed on board during the new-building process or have added them as retrofits during dry dockings.

Based on the actual performance data available from most such systems, several methods have been developed for accurately isolating and quantify the impact of hull and propeller performance on overall vessel energy efficiency. One such method is Jotun's Hull Performance Measurement Method (JHPMM – see fact box) – the main principles of which are currently proposed as the basis for a global standard.

JHPMM, or one of the alternative methods, can be used to analyze historical data in order to establish a reliable hull and propeller performance benchmark for the vessel or fleet in question. Following investments aimed at improving performance, JHPMM can also be used to measure the extent to which a performance improvement is being delivered over a dry docking interval. Finally, JHPMM can be used to document delivered hull and propeller performance as a part of a performance based contract – by and between vessel owner and paint manufacturer and/or vessel owner and charterer.

Once reliable measurement and benchmarking capabilities have been established vessel owners can start addressing the improvement potential within hull and propeller performance based on sound investment decisions. 

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Clayton Exhaust Gas Boiler for Offshore

The Clayton Exhaust Gas Boiler operates on the same tried and tested principles and has been produced to satisfy a variety of industrial and marine applications to recover heat from waste gas.

Clayton Industries

Clayton Steam Systems is a world leader in the design and manufacture of compact, high efficiency, rapid start steam systems that are safe to use and are of advanced designs.

The Clayton Company was founded in 1930 and reorganized under the name of the Clayton Manufacturing Company in 1935 to investigate and develop new concepts in thermodynamic and mechanical products. The Clayton Steam Generator was the first such product and was conceived as a packaged, force circulation coil steam generator that could automatically produce steam in five minutes from a completely cold condition.



Clayton Manufacturing Company

The Clayton Steam Generator is of a unique design where high efficiency and rapid start-up are combined with high steam quality and fast response to changes in steam demand. In addition, the low blowdown requirement saves energy, water and treatment chemicals. The operating principle of the Clayton Steam Generator has eliminated the need to contain and heat large quantities of water. Consequently all generator models are small in size and weight and can be accommodated within a limited space.

One of the major safety advantages of the small water content is

that there is no possibility of a steam explosion from a Clayton Steam Generator.

The energy saving features of the Clayton Steam Generator was of considerable interest to William Clayton who was concerned with fuel conservation long before the modern day awareness and effects of energy use.

Offshore Steam Standard

Clayton Steam Systems has become the offshore standard for steam generating plant with a worldwide presence and well deserved reputation. The main advantages of the Clayton design are unparalleled in the offshore oil industry.

- Space Saving
- Safe
- Rapid Start-Up
- Rapid Response
- Modular Skid Design
- High Quality Steam
- Versatile
- Automatic Running
- Reliability
- Unmanned Operation



Certification can be supplied to comply with any marine certification and for any country such as:

Korean Register of Shipping (KR), American Bureau of Shipping (ABS), Lloyd's Register of Shipping (LR), Nippon Kaiji Kyokai (NK), Bureau Veritas (BV), Det Norske Veritas (DNV), Germanischer Lloyd (GL), China Classification Society (CCS), Registro Italland Navale (RINA), Russian Maritime Register of Shipping (RS)

The Offshore Oil and Gas Industry has ideal applications for Clayton Steam Generators and Exhaust Gas Boiler and they can withstand the most extreme conditions and roughest seas and are used extensively for all offshore and marine uses.

- Floating Production
- Harsh Environment
- Sub-Sea Operation Vessels
- Jack-Up Rigs
- Dynamically Positioned Rigs.
- Supply Vessels
- Semi-Submersible
- Deep Water Rigs
- Tankers
- FPSOs
- Offshore Steam Rental
- GEO Service Vessels



Benefits for Offshore Use

High Efficiency : Very high efficiency is the most obvious benefit that comes from small sizes because of the low heat losses. Heat flow is upwards – in the opposite direction to the water flow – and this optimizes heat transfer and results in low running costs.

Rapid Start : Start up from a completely cold condition is five minutes. Warm up fuel is minimized and the unit can be switched off when not required. The Clayton Steam Generator is therefore also ideal when used as an auxiliary or standby boiler.

High Quality Steam : Steam quality is the best available from any type of boiler and is at least 99.5% dry saturated at all

steam loads. This reduces the amount of water and impurities going into the steam line and ensures higher energy content of the process steam.

Low Blowdown : Blowdown which is necessary to prevent the build up of impurities in all types of boiler is extremely small with the Clayton design. This saves fuel, saves chemicals and saves water.

Unattended Operation : Because of the inherent safety and automatic systems all Clayton Steam Generators can be supplied to run without operator attendance for up to a period of one week if the unattended control option is included.

Small Size : The compact size means that minimal space is required for a complete boiler house. Building costs are reduced and a Clayton system can easily be fitted into the available area. The light weight even allows location on an upper floor level.

Safety : It is not possible to have a steam explosion. This is a danger associated with low water level in other types of boiler that store a large volume of hot water. The Clayton Steam Generator does not have a water level and does not store a large volume of water.

Rapid Response : Extremely rapid response to changes in the demand for steam is inherent in the forced circulation design. A Clayton Steam Generator will speedily ramp up or run at maximum steam output continuously without faltering.

Fully Automatic : The rapid start and rapid response can be controlled automatically. All Clayton systems can be started by a single switch locally or remotely just like any modern advanced machinery – if the automatic start option is included.

Low Maintenance : One of the practical benefits of the simple design concept is that maintenance requirements are minimal. The technology has been developed and improved over many years to make the Clayton Steam Generator the most reliable steam boiler available today.





Exhaust Gas Boilers

The Clayton Exhaust Gas Boiler was developed following the success of the Clayton Steam Generator and the design is based on the same tried and tested operating principle. This results in an Exhaust Gas Boiler of small size and weight that can produce steam of very high quality.

An added advantage of the Clayton Forced Circulation Monotube Coil Concept is that it is not necessary to rely on any type of fins on the tube surface to assist heat transfer and this reduces the possibility of clogging with exhaust gas deposits. The configuration of the Clayton plain coiled tube is designed to maximize performance and allow free flow of hot gas over the tube in the opposite direction to the water flow in a counterflow pattern for maximum efficiency.

Due to the small size and weight of the Clayton Exhaust Gas Boiler a number of installation options are possible and the boiler can be fitted into the exhaust gas ductwork to suit the client's requirements.

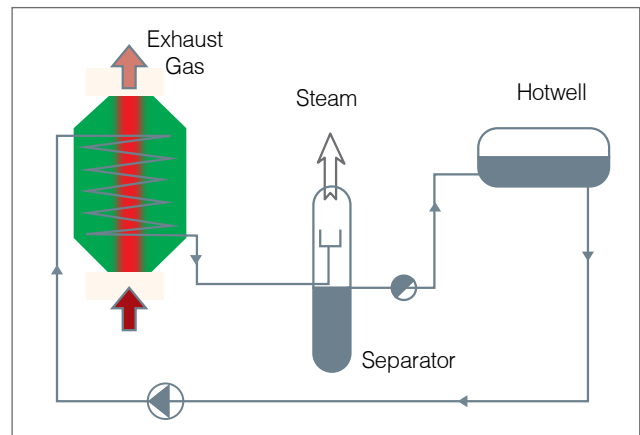


The Clayton Exhaust Gas Boiler can produce steam using the heat in the waste gases from diesel engines, small gas turbines, incinerators, glass furnaces, enamel ovens, stress relieving ovens and other suitable applications.

On marine installations the Clayton Exhaust Gas Boiler has been used extensively for over 40 years to recover heat from the exhaust of main propulsion and power generating diesel engines. On-board ships a separate oil-fired Clayton Steam Generator is often supplied in conjunction with the Clayton Exhaust Gas Boiler for use when the vessel is in port.

Diesel engines on electrical generators of sizes up to 15 MW of electrical power are ideal for heat recovery using the Clayton Exhaust Gas Boiler these include light and heavy oil fired engines, gas fired engines and dual fuel units of 4-stroke and 2-stroke design.

On other applications the Clayton Exhaust Gas Boiler is ideally suitable for gas flows up to 110,000 kg/h depending on application and temperature.



The Clayton E System

Construction of the Clayton Exhaust Gas Boiler is modular and a range of standard coil sections have been developed to suit a wide variety of process conditions. The sections are chosen for optimum performance by computer programme, based on the heat available, the steam output required and the allowable pressure drop.

Because of the modular construction of the Clayton Exhaust Gas Boiler the assembly is a straightforward matter since the standard coil sections are bolted together and coned transition pieces are then added onto each end for connecting to the exhaust ducting. The water connections between each section are made on the outside of the boiler shell and an effective soot blowing system is built into every Clayton Exhaust Gas Boiler.

Clayton Exhaust Gas Systems have been devised to suit numerous processes. On all designs the water is pumped through the steam generating coil and the steam/water mixture produced at the outlet of the boiler is directed to a vortex separator which can be housed in a separator or accumulator.

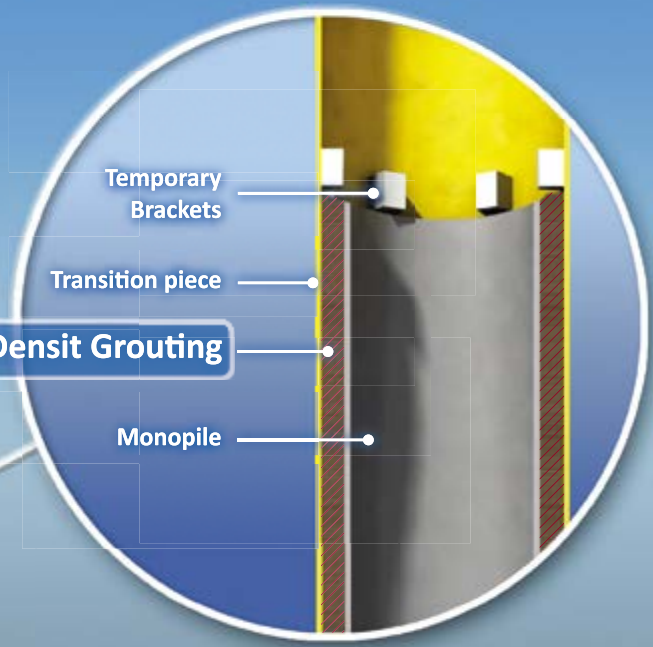
More than one Clayton Exhaust Gas Boiler can be connected to a single accumulator. A feature of every system is that means are provided to avoid dew point corrosion of the tubes to prolong the life of the boiler. ⚓

For further information

Kilwoo Corporation, www.kilwoo.com



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HHI won an order worth USD 2 billion for ultra large offshore facilities from Total

Domestic shipyards, plagued by the slump in new orders from offshore plant sector, won a large-scale order worth USD 2 billion for the construction of ultra large offshore facilities. Hyundai Heavy Industries(HHI) announced on March 26 that it entered into LOA(Letter of Award) with Total Congo, the West African subsidiary of French oil giant Total, to build 1 unit of FPU(Floating Production Unit) and 1 unit of TLP(Tension Leg Platform) in Congo, Africa.

This order won by HHI is the largest ever placed from global offshore plant sector this year with FPU worth USD 1.3 billion and TLP worth USD 700 million. HHI will undertake this project on EPSCC(Engineering, Procurement, Supply, Construction and Commissioning) basis for the entire processes ranging from the design, through the purchase, production, installation, to commissioning. Thus, HHI has already achieved more than half of its annual order target(USD 6 billion) in the offshore sector, including an order to build the gas production platform(worth USD 1.1 billion) in Norway last January.

These facilities to be built by HHI under this contract will be deployed in Moho Nord Field at sea located 80km southwestern off the coast of Congo, which is known to have the oil reserves of approximately 300 million barrels. FPU refines the oil and gas extracted and sent from TLP, and transports the processed oil and natural gas to onshore plants via subsea pipelines. This FPU is a gigantic offshore oil and gas production plant, measuring 250m in length, 44m in width, and 18m in height with a dead weight of about 62,000 tons and a production capacity of approximately 100,000 barrels of oil and 2.5 million m³ of natural gas per day.

TLP, buoyant semi-submersible structure, is tethered to the seabed with subsea structures and cables that have various tensions, ensuring stable operations without being affected very much by the sea surface conditions such as wind and waves. The TLP will be installed by the first half of 2015, while the FPU will be installed by the first half of 2016. HHI has successfully completed various projects awarded from Total, including the supply of FPU for Moho Bilondo in Congo in 2008 and the completion of 4 FPSOs(Floating Production, storage and Offloading) in African oil fields, thus gaining high recognition for its excellent technology and construction capability.

HHI set an annual order target of USD 6 billion in offshore sector this year. Including the USD 1.1 billion orders received in January for gas production platform, HHI have won orders worth USD 3.2 billion so far this year, achieving more than half of its annual order target for 2013.



Bird's-eye view of FPU(up) and TLP(down), the semi-submersible drilling platform, to be built by HHI

현대중공업, 토탈로부터 20억 달러 초대형 해양설비 수주

해양플랜트수주에목말랐던국내조선업계에20억달러규모의초대형해양설비소식이전해졌다.그주인공인현대중공업은프랑스정유사토탈의서아프리카자회사인토탈콩고(Total Congo)와아프리카공고에설치할FPU(FloatingProductionUnit)1기및TLP(TensionLegPlatform)1기에대한발주합의서(LOA, Letter of Award)를 체결했다고 지난 3월 26일 밝혔다. 이번 수주규모는FPU가13억달러, TLP가7억달러등총20억달러로올해발주된글로벌해양플랜트물량중최대규모이다. 현대중공업은 설계에서부터구매, 제작, 설치, 시운전까지전공정을일괄도급방식(EPSCC)으로수행하게된다.이로써현대중공업은지난1월노르웨이가스생산플랫폼(11억달러)수주를 포함, 해양사업부문에서벌써연간목표치(60억달러)의절반

이상을 달성하게 됐다.

현대중공업이 이번에 수주한 설비들은 약 3억 배럴의 원유매장량을 지닌 것으로 알려진 콩고 남서쪽 80km 해상 모호노르드 유전(Moho Nord Field)에 설치될 예정이다. TLP가 원유와 가스를 채굴해 FPU로 보내면, FPU는 이를 정제한 후 해저 파이프라인을 통해 육상플랜트로 보내게 된다.

이번에 수주한 FPU는 길이 250m, 폭 44m, 높이 18m 크기에 자체 중량만 해도 6만 2000여톤에 이르는 거대한 해상 원유 및 가스 생산공장으로, 하루 약 10만 배럴의 원유와 250만 m³의 천연가스를 정제할 수 있다.

TLP는 플랫폼을 해저면의 구조물과 장력파이프로 연결해 고정시키고 부력을 이용해 수면에 떠있는 반잠수식 형태의 설비로, 바람·파도 등 해수면의 상태에 큰 영향을 받지 않고 안정적으로 작업할 수 있는 것이 특징이다. TLP는 2015년 상반기,

FPU는 2016년 상반기까지 현지에서 각각 설치될 예정이다. 현대중공업은 지난 2008년 콩고에 모호 빌론도(Moho Bilondo) FPU를 공급하고, 아프리카 유전에 4기의 FPSO(부유식 원유생산·저장·하역설비)를 완공하는 등 토탈로부터 수주한다수의 프로젝트를 성공적으로 완수하며, 뛰어난 기술력과 공사수행 능력을 인정받은 것으로 알려졌다. 한편, 현대중공업은 올해 초 해양사업부문에서 60억 달러의 수주 목표를 세운 바 있다. 이로써 지난 1월 11억 달러 규모의 가스 생산 플랫폼 수주 등을 포함해 현재 수주 목표의 절반이 넘는 총 32억 달러 규모의 공사를 수주하게 됐다.

SHI secured an order worth USD 1.3 billion for 6 LNG carriers

Samsung Heavy Industries(SHI) won an order from Nigeria's BGT(Bonny Gas Transport) and SK Marubeni Joint Venture for 6 LNG carriers in April, adding momentum to its effort to boost new order intake.

On April 4, SHI clinched an order worth approximately USD 900 million from Nigeria's BGT(Bonny Gas Transport) for 4 units of 175,000m³ LNG carriers. These vessels will be delivered on a staggered basis from the second half of 2015.

BGT is the shipping subsidiary of NLNG(Nigeria LNG), the world's fifth largest LNG exporter which was established by Nigeria's state-run oil company NNPC(Nigerian National Petroleum Corporation). NLNG has proceeded with international tender bid process for LNG carriers since last year to replace its fleet of LNG vessels older than 35 years.

Meanwhile, SHI secured an order worth approximately USD 410 million from SK Marubeni Joint Venture, which was formed between SK Shipping and Japan's Marubeni Corporation, for 2 units of 180,000m³ LNG carriers on April 15.

These two LNG carriers will be delivered in the second half of 2016 and second half of 2017, respectively, and put into service to transport LNG of France's Total. One of these two LNG carriers will transport the LNG, produced from Australia's Ichthys project, to Korea. Last year, SHI won an order worth approximately USD 2.7 billion for CPF(Central Processing Facility), the ultra large offshore gas processing facility which would be deployed for Australia's Ichthys project.

Thus, SHI has won orders for 106 LNG carriers out of 371 units which have been placed worldwide since 1996, carving out 29% of share in global market, the highest rate. SHI expects that LNG carriers will comprise a considerable proportion of new orders for commercial vessels this year, and is making a full preparation to win new orders for LNG carriers.

An official from SHI said, "SHI won orders for 9 LNG carriers out of 12 units placed worldwide this year. We will keep focusing on winning new orders for LNG carriers and large vessels based on selective



Electricity-powered LNG carrier built by SHI

approach to secure stable order backlog in the market for commercial vessels."

삼성중공업, LNG선 6척 13억 달러 수주

삼성중공업이 4월 들어서면서 나이지리아 BGT(Bonny Gas Transport)와 SK마루베니조인트벤처(SK Marubeni Joint Venture)로부터 총 6척의 LNG선을 수주하며 본격적인 수주 물이 들어섰다. 먼저 지난 4월 4일 삼성중공업은 나이지리아 BGT(Bonny Gas Transport)사로부터 17만 5,000m³급 LNG선 4척을 약 9억 달러에 수주했다. 이들 LNG선은 2015년 하반기부터 순차적으로 인도될 예정이다.

BGT사는 나이지리아 국영 석유 회사인 NNPC(Nigerian National Petroleum Corporation)가 설립한 세계 5위 LNG 수출 기업인 NLNG(Nigeria LNG)사의 해운 부문 자회사이다. NLNG는 기존에 보유하고 있던 LNG선 가운데 선령 35년 이상의 노후 선박을 교체하기 위해 지난 해부터 LNG선에 대한 국제 입찰을 진행해왔다.

아울러 삼성중공업은 지난 4월 15일 SK해운과 일본 마루베

니상사의 컨소시엄 합작사인 'SK마루베니조인트벤처(SKMarubeni Joint Venture)'로부터 18만m³급 LNG선 2척을 약 4억1,000만 달러에 수주했다. 이 2척의 LNG선은 2016년 하반기와 2017년 하반기에 각각 인도돼, 프랑스 토탈(Total)의 LNG 운송에 투입될 예정이다. 또한 이 중 1척은 호주 이치스(Ichthys) 프로젝트에서 생산된 LNG를 한국으로 운송하게 된다. 삼성중공업은 지난해 이 프로젝트에 투입될 초대형 해상 가스 처리 설비인 CPF(Central Processing Facility)를 약 27억 달러에 수주한 바 있다. 이로써 삼성중공업은 1996년 이후 전세계에서 발주된 LNG선 371척 가운데 106척

을 수주함으로써, 시장 점유율 29%로 세계 1위를 기록하고 있다. 한편 삼성중공업은 올해 상선 발주량의 상당수가 LNG선으로 채워질 것으로 보고 LNG선 수주에 만전을 기하고 있다. 삼성중공업 관계자는 "올해 전 세계에서 발주된 LNG선 12척 중 9척을 삼성중공업이 수주했다"면서 "LNG선과 대형선 위주의 선별 수주를 통해 상선 시장에서도 안정적인 일감을 확보해 나갈 것"이라고 말했다.

Alfa Laval wins SEK 50 million environmental order to clean ballast water

Alfa Laval has won an order to supply Alfa Laval PureBallast systems to a leading shipyard in South Korea. The order, booked in the Marine & Diesel Equipment segment late March, has a value of approximately SEK 50 million. Delivery will start in 2013 and be finalized in 2014.

The Alfa Laval PureBallast systems will be installed onboard vessels where they will clean the ballast water down to a limit complying with the International Maritime Organization (IMO) convention and the United States Coast Guard (USCG) legislation, before it is discharged. "This order confirms the growing demand for our PureBallast system for new vessels", said Lars Renström, President and CEO of the Alfa Laval Group. "It is also encouraging to notice that during the last months there is an increasing interest among ship-owners for ballast water treatment for their existing fleet."

The IMO convention "International Convention for the Control and Management of Ships' Ballast Water & Sediments" will enter into force one year after ratification by 30 states, representing 35 percent of the world's tonnage. Today 36 states have ratified, representing 29 percent of the world fleet. Once the convention is ratified Alfa Laval estimates that 35,000 ships will be equipped with ballast water treatment systems during the following ten years – of which 15,000 are newly built vessels and 20,000 are existing vessels.

Alfa Laval's PureBallast is the world's first chemical-free solution for ballast water treatment that fully complies with IMO standards.

알파라발, 밸리스트 수 처리 관련 약 90억원 수주

알파라발은 한국의 한 대형 조선소로부터 PureBallast 시스템 공급 관련 약 90억원 규모의 주문을 수주했다고 밝혔다. 납품은 2013년에 시작되어 2014년에 완료될 예정이다. 알파라발의 PureBallast 시스템은 선박에 장착되어 선박 평형수에 포함된 미생물 수치를 IMO와 USCG의 규격에 부합하는 수준으로 낮추어 배출할 수 있도록 한다.



알파라발 그룹의 대표이자 CEO인 라스 렌스트롬(Lars Renstrom)은 "신규 및 기존 선박 선주들의 PureBallast 시스템에 대한 높은 관심과 수요를 다시 확인할 수 있는 계기가 되었다"고 전했다.

35개 국가가 참여하여 비준된 "International Convention for the Control and Management of Ships Ballast Water & Sediments" 협약은 전세계 선박량의 35% 이상과 30개 국가 이상의 비준 1년 후 효력을 발휘하게 된다. 현재 전세계 선단의 29%에 해당하는 36개 국가가 비준을 완료한 상태이다. 효력이 발생되면, 알파라발은 향후 10년간 약 35,000여척의 선박(신규 15,000/기존 20,000)이 밸리스트 수 처리 시스템을 장착할 것으로 예상하고 있다.

알파라발의 PureBallast는 IMO 규격에 부합한 세계 최초의 무화학(chemical-free solution) 밸리스트 처리 장치이다.

STXOS signed a contract to build 4 units of 113,000DWT Aframax tankers

STX Offshore & Shipbuilding(STXOS) announced on April 8 that it entered into a contract worth approximately KRW 200 billion to build 4 units of 113,000DWT Aframax tankers in Vancouver, Canada in a signing ceremony attended by Shin Sang-ho, President of STXOS, Peter Evensen, President of Teekay Corporation, Bruce Chan, President of Teekay Tankers, and other related officials.

These Aframax tankers will be built at Jinhae shipyard and delivered to the ship owner on a staggered basis from the second half of 2015. This contract includes an option for 12 tankers of same type, and is valued at approximately KRW 800 billion if the option is fully exercised.

These vessels conform to IMO requirement for Energy Efficiency Design Index(EEDI) and carbon emission regulations, and furthermore, are equipped with high efficiency G-type engines and new type propeller, meeting both high fuel efficiency and eco-friendly requirements of shipping companies. In addition, these vessels will feature the hull type which is the result of 2-year joint development by STXOS in collaboration with Teekay Tankers.

The Canada-based Teekay Tankers, the ship owner, is a large shipping company operating the fleet consisting of approximately 150 vessels, and is currently expanding its fleets in the field of vessels used for energy transportation such as LNG/LPG carriers, FSO/FPSO, etc. Particularly, Teekay Tankers has regained reputation as the world's leading shipping company in the field of Aframax and Suezmax tankers.

An official from STXOS said, "Shipbuilding market is showing signs of turnaround amid gradual recovery of ship prices and placement of large-scale orders for commercial vessels after prolonged sluggishness. We will take strategic approach in coping with market trends and keep proving our competitiveness to win new orders as the best partner who can meet various requirements of ship owners."

In late March, STXOS inked a contract worth KRW 140 billion with Denmark-based shipping company Norden to build 4 units of 50,000DWT tankers, which included an option for 4 vessels.

STX조선해양, 113,000DWT급 아프리카막스 탱커 4척 수주

STX조선해양은 캐나다 밴쿠버에서 신상호 STX조선해양 사장, 피터 에반슨(Peter Evensen)티케이코퍼레이션(Teekay Corporation)사장, 브루스첸(Bruce Chan)티케이 탱커스(Teekay Tankers)사장등관계자가참석한가운데113,000DWT급아프리카막스 탱커 4척을 약 2,000억원에 수주했다고 지난 4월 8일 밝혔다.

STX조선해양이건조하는아프리카막스탱커는진해조선소에서건조되어2015년하반기 부터 순차적으로 인도될 예정이다. 이번 계약에는 같은 선형의 탱커 12척에 대한 옵션 물량이 포함되어 있어 향후 모두 발주될 경우 약 8,000억원에 달하는 대규모 계약이다. 해당 선박은 IMO의 선박 연비 제 조지수 및 탄소배출 규제에 부합하는 것은 물론 연료 효율성이 입증된 G-타입 엔진과 신형 프로펠러가 탑재되어 최근 해운사의 가장 큰 관심 요소인 연료 효율성과 친환경 기능을 모두 만족하는 선박이다. 또한 STX조선해양과 티



A signing ceremony of STXOS and Teekay Tankers. The photo shows Bruce Chan(left), President of Teekay Tankers, and Shin Sang-ho(right), President of STXOS.



120,000DWT Aframax tanker built by STXOS

케이탱커스가약2년간공동협력하여개발한선형이적용된다. 발주처인 캐나다 선사티케이탱커스는 약150척의 선대를 운용하고 있는 대형 선사로서 LNG/LPG선 및 FSO/FPSO 등 에너지수송분야선대를 확장하고 있다. 특히아프리카막스, 수에즈막스 탱커 분야에서 세계 선두의 선사로 인정받고 있다. STX조선해양관계자는“선가의 점진적인 회복세와 대규모 상선 발주가 가시화되고 있는 등 최근 업황 추이를 종합해 보면 조선업중의 오랜 불황이 턴어라운드되는 모습을 보이고 있다”면서“시장트렌드에 전략적으로 대응하는 것은 물론 선주사의 다양한 요구를 만족시킬 수 있는 최고의 파트너로서 수주 경쟁력을 지속적으로 입증해 나갈 것”이라고 밝혔다. 한편, STX조선해양은 3월말에 덴마크 선사 노던(Norden)으로부터 50,000DWT급 탱커 4척에 대한 1,400억원 규모 건조 계약을 체결했으며, 이 계약 역시 옵션 4척이 포함되어 있다.

SHI received an order for 7 units of 9,300TEU containerships

Samsung Heavy Industries(SHI) announced on April 16 that it was awarded a contract worth KRW 642.9 billion from Chile-based CSAV, a shipping company, to build 7 units of 9,300TEU(1 TEU equals one 20 feet container) containerships. This contract includes options for several vessels, raising the expectation for additional orders in the period ahead. These containerships will be delivered on a staggered basis by the first half of 2015.

An official from SHI said, "Shipyards' priority is to maintain the order-book of commercial vessels at a proper level. SHI has focused on winning the orders for LNG carriers and large vessels based on selective approach to secure stable order backlog."

The Chile-based CSAV has a fleet consisting of about 50 vessels and is the largest shipping company in Latin America. Previously, CSAV placed orders at SHI for 7 units of 8,000TEU containerships.

삼성중공업, 9,300TEU급 컨테이너선 7척 수주

삼성중공업은 칠레 선사인 CSAV 사로부터 9,300TEU(1TEU는 20피트 컨테이너 1개)급 컨테이너선 7척을 6,429억 원에 수주했다고 지난 4월 16일 밝혔다. 특히 수척의 옵션도 포함돼 있어 향후 추가 수주가 기대된다. 이번에 수주한 컨테이너선들은 2015년 상반기까지 순차적으로 인도될 예정이다.

삼성중공업 관계자는 "조선소는 적정량의 상선 건조 물량을 유지하는 것이 중요하



The containership of same class, built by SHI

다"면서 "LNG선과 대형 선박 위주의 선별 수주를 통해 안정적인 일감 확보에 나서고 있다"고 말했다.

한편 칠레 CSAV사는 50여척의 선대를 보유한 남미 최대의 선사로 이전에도 삼성중공업에 8,000TEU급 컨테이너선 7척을 발주한 바 있다.

HHI received an order for an ultra large FPSO from Chevron

Hyundai Heavy Industries(HHI) clinched an order for an ultra large offshore facility, showing strong performance in offshore plant market. HHI announced on April 10 that it signed a contract worth USD 1.9 billion with the global oil giant Chevron to build a FPSO.

This floating facility will be deployed in Rosebank offshore oil field located 175km northwest of Shetland islands in North Sea, UK by 2017. HHI will carry out entire processes based on EPC(Engineering, Procurement and Construction), ranging from the design through purchase to production.

The Rosebank FPSO requires cutting-edge design and construction, strict process management to ensure that it can withstand rough marine environment, such as raging waves and freezing temperatures, etc., in the North Sea, and is designed to meet the rigorous requirements of UK Regulation and Norway's Offshore Industrial Standard Regulation(Norsok).



The containership of same class, built by SHI

This FPSO measures 292m in length, 57.4m in width, and 30m in height, weighing 99,750 tons. This facility has a production capacity of 100,000 barrels of crude oil and 190 million ft³ of natural gas

per day, and has a storage capacity of approximately 1.05 million barrels of crude oil. HHI is currently constructing many offshore plants to be deployed in the North Sea, including cylindrical FPSO, vessel type FPSO, platform production facilities, etc., and has gained reputation for its world's best technology in the field of offshore facilities for polar regions.

Particularly, Chevron placed this FPSO order at HHI based on private contract, not the competitive bidding, through negotiation in recognition of HHI's excellent technology and construction capability.

현대중공업, 세브론으로부터 대형 FPSO 1기 수주

현대중공업이 잇달아 초대형해양설비공사수주에 성공하며, 해양플랜트 시장에서 거침없는 수주 행진을 펼치고 있다. 현대중공업은 지난 4월 10일 세계적인 오일 메이저 업체인 세브론(Chevron)과 총 19억 달러 규모의 FPSO 계약을 체결했다고 밝혔다. 이부유식설비는 영국 북해 셰틀랜드(Shetland) 군도에서 북서쪽으로 175km 떨어진 수심 1.1km의 로즈뱅크(Rosebank) 해상유전에 2017년까지 설치될 예정이다. 현대중공업은 설계에서부터 구매, 제작까지 전공정을 일괄도급방식(EPC)으로 수행한다.

로즈뱅크 FPSO는 북해 특유의 강한 파도와 영하의 추위 등 거친 해상 환경에 견딜 수 있도록 최첨단 설계 및 시공, 엄격한 공정관리가 요구되며, 까다로운 영국 규정(UK Regulation)과 노르웨이 해양산업표준규정(Norsok)에 따라 제작된다.

이번에 수주한 FPSO의 규모는 길이 292m, 폭 57.4m, 높이 30m에 총 중량은 99,750톤에 달한다. 하루 10만 배럴의 원유와 1억 9000만 m³의 가스를 생산, 정제하고, 약 105만 배럴의 원유를 저장할 수 있다.

현대중공업은 현재 원통형 FPSO, 선박형 FPSO 및 플랫폼 생산설비 등 북해 지역에 투입될 다수 해양플랜트 공사를 수행 중이며, 극지용 해양설비 분야에서 세계 최고의 기술력을 인정받고 있다. 특히 이번 FPSO 공사는 세브론에서 현대중공업의 기술력과 공사 수행 능력을 높이 평가, 경쟁입찰이 아닌 수의계약 방식으로 현대중공업과 협상을 진행해 계약에 이르게 된 것으로 알려졌다.

Oil Company Nynas AB Signs Agreement with Intergraph® to Use SmartPlant® Enterprise Solutions

Sweden-based Nynas AB, a world-leading producer of specialty oil products, has signed a general agreement with Intergraph® for the use of the SmartPlant® Enterprise suite of solutions in all its plants and projects worldwide on 28 March 2013. Nynas, which is investing in an expansion of its Nynäshamn refinery to be ready by 2020 and plans to expand its assets in Germany, wants to ensure that the proven benefits in quality design, plant asset management and creation and review of engineering data, can be enjoyed in all its operations and projects.

In 2008, Nynas chose SmartPlant Enterprise for its expansion project since it offers a complete solution from start to finish. The company undertook a phased approach to software, starting with SmartPlant Foundation and SmartPlant P&ID and is now taking advantage of the assets created during engineering. In a structured manner, the company receives accurate and complete plant information in terms of data and documents from the suppliers. This is accomplished by means of an integrated information management system. In addition, the company is now using SmartPlant 3D to design the new facilities and assets.

"Intergraph solutions help us keep our plant information readily avail-

able and accessible for all personnel from a single source of truth," said Peter Eriksson, Nynas technical manager. "It enables us to improve our information management and handover as well as manage revisions more effectively. It is the tool of the future, ensuring a safer and more efficient way of working."

Over the years, Nynas has invested in advanced tools to handle checklists, certificates, documents and data, improving plant operations and maintenance. Now, Nynas expects to gain even higher performance levels and efficiency by deploying SmartPlant Foundation as its document and data platform.

Gerhard Sallinger, Intergraph Process, Power & Marine president, said, "Intergraph and Nynas have built a solid and profound relationship, and we are proud to be Nynas' partner in increasing safety, quality and productivity."



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This year has seen drastic changes in the rankings of shipyards based on order backlog. STX Offshore & Shipbuilding (STXOS) overtook Samsung Heavy Industries (SHI) to claim the second place 6 months after it overtook Daewoo Shipbuilding & Marine Engineering (DSME) to gain the third place in July last year.

According to the data published by Clarkson, Hyundai Heavy Industries (HHI) maintained top spot with 7,613 cgt in terms of new order intake as of February, followed by STX Offshore & Shipbuilding (STXOS) with 6,434 cgt, Samsung Heavy Industries (SHI) with 6,186 cgt, and Daewoo Shipbuilding & Marine Engineering (DSME) with 5,327 cgt. The combined order backlogs decreased as domestic major shipyards, which won large-scale

orders in a row at the end of last year, saw a decline in their new order intake in January.

By country, the order backlog of China stood at 183 million dwt(36%), surpassing Korea(67.2 million dwt) by wide margin. In terms of the amount, the order backlog of Korean shipyards stands at approximately USD 100 billion, outpacing China which has a combined USD 70 billion in order backlog.

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

data. 

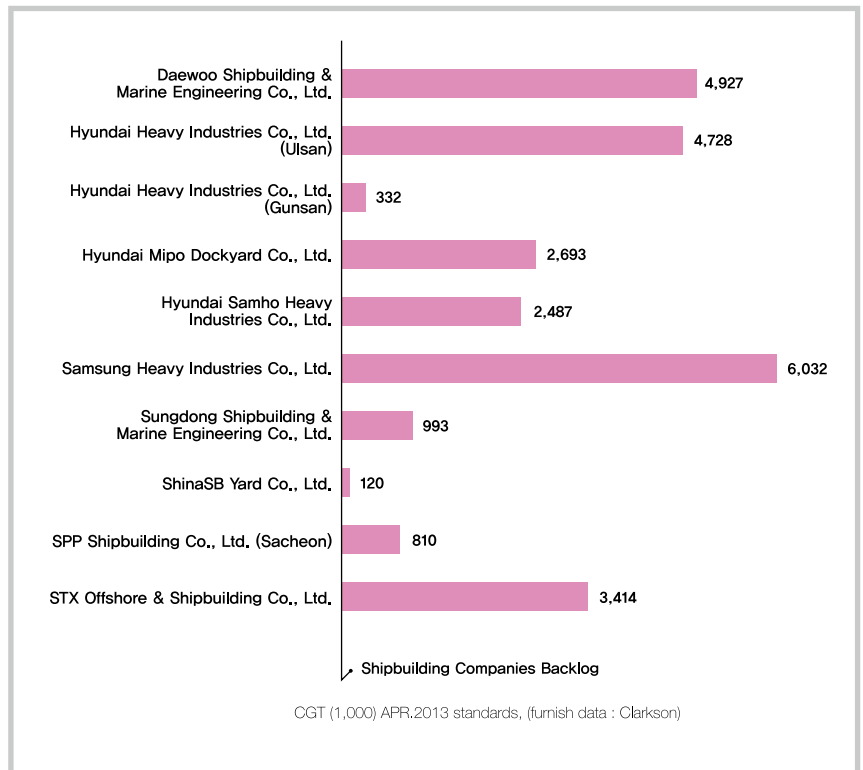


Photo: STX Offshore & Shipbuilding Co., Ltd.



Offshore plant orders awarded to domestic shipyards in 2011-2012

Date	Type	Number of vessel	Amount	Ship owner	Delivery	Shipyard
January	Drillship	1 vessel	KRW 590 billion	Diamond Offshore Drilling Limited, U.S.A	Mid 2013	Hyundai Heavy Industries
	Offshore Plant	-	USD 900 million	RasGas, Qatar	Late 2013	Hyundai Heavy Industries
	Drillship	2 vessels	KRW 1 trillion	Noble Drilling, U.S.A	On a staggered basis until Sep 2013	Hyundai Heavy Industries
February	Deepwater drillship	1 vessel	-	Atwood Oceanics, U.S.A	Second half of 2013	Daewoo Shipbuilding & Marine Engineering
	Offshore facility carrier	1 vessel	KRW 265 billion	Dockwise, Netherlands	October 2012	Hyundai Heavy Industries
	FPSO for the North Sea	1 vessel	USD 1.2 billion	BP (British Petroleum), U.K	Early 2015	Hyundai Heavy Industries
	Platform Supply Vessel	1 vessel	-	-	2012	STX OSV
March	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
	Deepwater drillship	2 vessels	KRW 1.2 trillion	Aker Drilling, Norway	Second half of 2013	Daewoo Shipbuilding & Marine Engineering
	Drillship	2 vessels	USD 1.1 billion	Ship owner, U.S.A	-	Samsung Heavy Industries
	Platform Supply Vessel	1 vessel	-	Norsea Group AS, Norway	June 2012	STX OSV
	Platform Supply Vessel	1 vessel	-	-	2012	STX OSV
	Drillship	1 vessel	-	Fried Olsen Energy, Norway	August 2013	Hyundai Heavy Industries
	Drillship	2 vessels	USD 1.12 billion	Maersk, Denmark	-	Samsung Heavy Industries
	Drillship	1 vessel	USD 680 million	Ocean Rig, Greece	October 2013	Samsung Heavy Industries
	Shuttle Tanker	2 vessels	USD 200 million	European Navigation, Greece	2013	STX Offshore & Shipbuilding
2011	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
	Offshore Platform (Top side)	-	USD 414 million	Statoil, Norway	-	Samsung Heavy Industries
	FPSO	1 vessel	USD 636 million	Teekay Petrojarl, Norway	Mid 2013	Samsung Heavy Industries
	Platform Supply Vessel	2 vessels	KRW 120 billion	Farstad Shipping, Norway	First half of 2013	STX OSV
	FSO	1 unit	-	PTSC, Vietnam	Early 2013	Sungbong 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
	LNG-FSRU	2 units	USD 500 million	Høegh LNG, Norway	Second half of 2013, first half of 2014	Hyundai Heavy Industries
	June	Multifunctional Deep Water Anchor Handling, Offshore Service Vessels	2 vessels	KRW 240 billion	Farstad Shipping, Norway	From the second quarter of 2013
Drillship		1 vessel	USD 680 million	Ocean Rig, Greece	November 2013	Samsung Heavy Industries
July	Drillship	2 vessels	USD 1.1225 billion	Maersk, Denmark	July 2014	Samsung Heavy Industries
	LNG-FSRU	1 vessel	USD 280 million	Excellerate Energy, U.S.A	First quarter of 2014	Daewoo Shipbuilding & Marine Engineering
August	Semi-submersible Rig	2 units	USD 1.1 billion	Songa Offshore, Norway	Second half of 2014	Daewoo Shipbuilding & Marine Engineering
	Well Intervention Vessel	2 vessels	USD 420 million	Eide Marine Services AS, Norway	2013	STX Finland
September	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
October	Drillship	1 unit	USD 550 million	Offshore drilling company, Americas	-	Daewoo Shipbuilding & Marine Engineering
	Platform Supply Vessel	1 unit	-	Troms Offshore Supply AS, Norway	First half of 2013	STX OSV
	Offshore Plant Module	2 units	-	-	First half of 2012	STX Finland
	Platform Supply Vessel	4 units	KRW 2 trillion	Island Offshore, Norway	Consecutively from the 3rd quarter of 2013 to the 1st quarter of 2014	of 2013 to the 1st quarter of 2014

November	Pipe Laying Support Vessel	2 units	USD 500 million	Odebrecht, Brazil	August of 2014	Daewoo Shipbuilding & Marine Engineering
December	Offshore facilities (Gas platform and various facilities)	-	USD 900 million	Major multinational oil companies	2nd half of 2014	Hyundai Heavy Industries
January	CPF (Central Processing Facility)	-	KRW 2.6 trillion	Australia / INPEX	4th quarter of 2015	Samsung Heavy Industries
February	Semi-submersible rig	1 unit	USD 620 million	Norway / Odifell	by mid 2014	Daewoo Shipbuilding & Marine Engineering
March	LNG-FSRU	-	-	Norway / Hoegh	-	Hyundai Heavy Industries
April	Offshore Platform	1 unit	USD 560 million	Danish / DONG E&P A/S	April 2015	Daewoo Shipbuilding & Marine Engineering
May	FPSO	1 unit	USD 2.0 billion	INPEX / Australia	April 2016	Daewoo Shipbuilding & Marine Engineering
June	Drillship	1 vessel	USD 645 million	Enso plc	Third quarter 2014	Samsung Heavy Industries
July	Semi-submersible Drilling Rig	2 units	USD 1.1 billion	Songa Offshore, Norway	Mid 2015	Daewoo Shipbuilding & Marine Engineering
August	Drillship	1 vessel	USD 600 million	Seadrill, Norway	Second half of 2014	Samsung Heavy Industries
September	Drillship	1 vessel	USD 655 million	Diamond Offshore Drilling Limited., U.S.A	4th quarter of 2014	Hyundai Heavy Industries
October	Semi-submersible drilling rig	1 unit	USD 700 million	Fred Olsen Energy, Norway	March 2015	Hyundai Heavy Industries
November	LNG-FPSO	1 unit	-	Petrolam Nasional Berhad, Malaysia	June 2015	Daewoo Shipbuilding & Marine Engineering
December	Drillship	1 vessel	USD 645 million	Enso plc	-	Samsung Heavy Industries
January	Gas Compression Platform	1 unit	USD 420 million	(Letter of Award)	Second half of 2015	Hyundai Heavy Industries
February	LNG-FSRU	8 vessels	-	Excellerate, U.S.A	Between early 2015~2017	Daewoo Shipbuilding & Marine Engineering
March	Drillship	1 vessel	USD 620 million	Rowan, U.S.A	First half of 2015	Hyundai Heavy Industries
April	Drillship	1 vessel	USD 623 million	-	-	Samsung Heavy Industries
May	Drillship	4 vessels	USD 2.06 billion	Transocean, U.S.A	One-by-one from mid 2015	Daewoo Shipbuilding & Marine Engineering
June	Drillship	1 vessel	USD 560 million	Atwood Oceanics, U.S.A	-	Daewoo Shipbuilding & Marine Engineering
July	LNG-FSRU	1 vessel	USD 270 million	Hoegh LNG, Norway	First half of 2015	Hyundai Heavy Industries
August	Drillship	1 vessel	USD 700 million	-	2nd half of 2015	STX Offshore & Shipbuilding
September	offshore platform (Top side)	1 unit	USD 1.77 billion	Statoil, Norway	The end of 2016	Daewoo Shipbuilding & Marine Engineering
October	Gas Production Platform (topside)	1 unit	USD 1.1 billion	Statoil, Norway	Mar 2016	Hyundai Heavy Industries
November	LNG-FSRU	1 vessel	-	BW Maritime, Singapore	2015	Samsung Heavy Industries
December	Floating Production Unit (FPU)	1 unit	USD 1.3 billion	Total, France	First half of 2016	Hyundai Heavy Industries
January	Tension Leg Platform (TLP)	1 unit	USD 700 million	Total, France	First half of 2015	Hyundai Heavy Industries
February	FPSO	1 unit	USD 1.9 billion	Chevron, U.S.A	-	Hyundai Heavy Industries

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




Navigation of very large vessels

- Low cost and high efficiency vessels in high demand



The demand for very large vessels may be spurred by the desire of ship owners to reduce the operation costs amidst high oil prices. The words, 'very large', 'ultra large', 'eco-friendly', and 'high efficiency', epitomize the character of newbuilding market.

'Alexander', a 175,343-ton vessel of France's shipping company CMA-CGM, which recently entered the Busan Port, is a very large vessel with a carrying capacity of

16,022 containers, each measuring about 6m. This vessel is said to load the largest number of containers among the vessels worldwide. The 14,000TEU containership ordered to HHI this year is also an ultra large vessel several times larger than a soccer field. The cargo capacity of vessel is measured by TEU (Twenty foot equivalent unit) and CBM(Cubic Meter). 1TEU is equal to a 20ft container, and 1 CBM is equal to $1m^3(1m[\text{Length}] \times 1m[\text{Width}] \times 1m[\text{Height}])$. 



13,000TEU ultra large containership built by STX



120,000 DWT
ultra large
tanker built by
STX



VLCC built by HHI





VLCC built by DSME



VLCC built by DSME



173,600CBM
ultra large LNG carrier built by STX

■ ■
Ultra large Suezmax
oil tanker
built by SHI



Ultra large oil tanker
built by SHI



■ ■ Ultra large container built by SHI



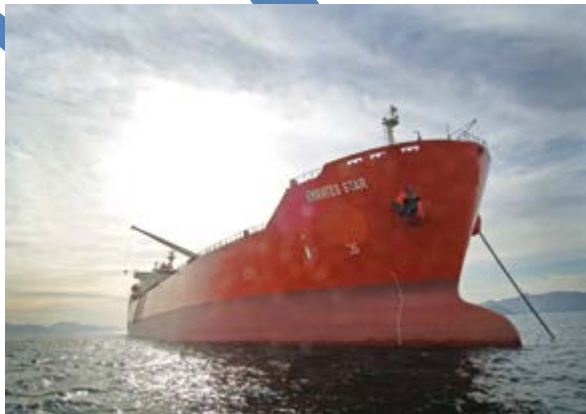
Ultra large Arctic oil tanker built by HHI



Eco-friendly
very large crude carrier
built by HHI



The world's largest membrane
LNG carrier built by HHI



Ultra large oil tanker
built by STX



263,000-ton VLOC by HSHI

Longest & Heaviest stainless seamless coil tubing

TRIS TUBE Co., Ltd

TRIS announced successful completion of production for seamless coil tubing, with 100% SEAMLESS & not orbital welded at all. The coil is produced from one mother tube through extrusion from POSCO Specialty Steel.

TRIS Seamless coil tubing is applied for the pre-insulated, steam & heat tracing and targeting for industry of Shipbuilding, Petrochemical, Energy, Oil & Gas and others. This will help for high efficiency and cost reduction by using less fittings which is being resulted with reducing the defects such as leaks and other failures.

TRIS has been very specialized for industry of semi-conductor, medical, automotive with seamless tubing since last 10 years, on high technology & well-organized man power. Longest and heaviest seamless coil tubing is good enough and innovative develop-



ment to be very proud for stainless steel tubing industry to TRIS and to all of other companies.

TRIS next challenge is to be the Umbilical, the highest level of technology ever, which is used to hydraulic and chemical injection piping for oil and gas industry.

-TEL: +82-31-866-4602
-http://www.tristube.com

Size Range with minimum length per SINGLE coil

Imperial Size				Metric Size			
O.D (in)	W.T (in)	L (ft)	Weight (lbs)	O.D (mm)	W.T (mm)	L (M <tr)< th=""> <th>Weight (kgs)</th> </tr)<>	Weight (kgs)
1/4	0.035	2,693	220	6.35	0.89	821	100
	0.049	2,065			1.24	630	
3/8	0.035	1,702		9.53	0.89	519	
	0.049	1,273			1.24	388	
1/2	0.035	1,245		12.70	0.89	379	
	0.049	921			1.24	281	
3/4	0.049	593		19.05	1.24	181	
	0.065	456			1.65	139	
1	0.049	437		25.40	1.24	133	
	0.065	334			1.65	102	

※ Other sizes can be offered on customer's request.

High quality thermal imaging cameras for maritime applications

FLIR Systems Korea

FLIR Systems 'MD-Series' are affordable, fixed-mount thermal night vision system. Once installed they always look in the same direction. MD-Series outputs standard analog video that can be easily displayed on any monitor at the helm or other monitors on the vessel. In addition, MD-Series are Ethernet-enabled for simple integration into your current electronics. The MD-Series can be mounted "ball up" or "ball down" according to user preference.

FLIR markets two different versions of the MD-Series. Both are equipped with a maintenance-free uncooled



Vanadium Oxide (VOx) detector. LIR MD-625 provides crisp thermal images of 640 x 480 pixels. It is equipped with a 25 mm lens that offers a 25° x 20° field of view. It is also equipped with a 4x e-zoom. It is able to detect a

small vessel at a distance of approx. 2,800 meter. Users that do not need this high image quality can choose for the FLIR MD-324 which provides thermal images of 320 x 240 pixels. It is equipped with a 13 mm lens that offers a 24° x 18° field of view. It is equipped with a 2x e-zoom. It is able to detect a small vessel at a distance of approx 1,340 meter. Both versions are come with the FLIR proprietary Digital Detail Enhancement (DDE) that provides a clear and sharp thermal image in all circumstances.

MD-Series provide crisp and clear thermal images in total darkness and in light fog and smoke. It features the same technology found in many of FLIR Systems' more sophisticated maritime systems but is packaged for those who wish to use the camera primarily as a navigation aid.

-TEL: +82-2-565-2714
-http://www.flir.com

35,300-horsepower high output small and medium-sized engine

Hyundai Heavy Industries



HHI's 35,300-horsepower HiMSEN Engine(model name: H46/60V), which received the type approval from 9 classification societies.

Hyundai Heavy Industry(HHI)'s 35,300 horsepower HiMSEN Engine passed the performance test of the world's 9 classification societies - such as U.S.-based ABS, Norway's DNV, etc - and received the type approval. HiMSEN Engine is the medium-sized diesel engine developed independently by HHI in 2000. This new 35,300 horsepower HiMSEN Engine has a power output more than twice larger than that of the previous 13,600 horsepower engine. HiMSEN Engine has applications as wide-ranging as marine propulsion, power generation, offshore facilities and onshore power generation. Approximately 7,200 HiMSEN Engines were exported to about 40 countries around the globe until April.

HHI developed the 'dual fuel engine package' last year, which runs on both diesel fuel and LNG and reduces the exhaust gas, to satisfy the rising demand for eco-friendly

engines and completed the construction of engine endurance test center as part of effort to improve the performance and quality of HiMSEN Engine.

Kim Jong-seok, Executive Director in charge of medium-sized engine design at HHI, said, "This 35,300-horsepower HiMSEN Engine will be vital in meeting the demand for high output engines in the market for marine engines and power generation engines. We will aggressively target the markets of Central, Latin America, Middle East, and Asia which have a growing demand for electricity."

HHI's HiMSEN Engine was placed on the lists of Korea's Top 10 New Technologies in 2002 and World-Class Products in 2004, and was recognized for excellent quality and design in the world's top 3 design awards.

-TEL: +82-52-202-2114
-http://www.hhi.co.kr

A large red ship is docked at a pier. The pier has yellow and blue markings. In the background, there are blue cranes and a clear sky. The ship is secured with white ropes and yellow fenders.

Monthly Korship, Korea's only Offshore & Shipbuilding monthly magazine in English

Monthly Korship keeps readers up to date with the latest news on Offshore & Shipbuilding industry and various companies swiftly. Korea, a small country on the planet, is leading the world's Offshore & Shipbuilding industry, powered by its economic growth.

This small but impactful Monthly Korship which is published in Korea, the world's largest Offshore & Shipbuilding country, will help keep your pulse on the Offshore & Shipbuilding industry around the globe.

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www.korship.co.kr

KOMEA (Korea Marine Equipment Association)

Member List

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 main products : universal machine
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 homepage add : www.bumhan.com
 main products : air compressor, high pressure air compressor,
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 main products : stairway body, ladder, handrail & stormrail, other
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head office : Gimhae Gyeongnam
 homepage add : www.bycontrols.com
 main products : control valves, hydraulic & pneumatic actuator,
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 TEL : +82 55-345-6110

BC TAECHANG IND. CORP.

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 homepage add : www.bcinternational.co.kr
 main products : water jet power pump, marine tape, petro tape,
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head office : Gangseo Busan
 homepage add : www.chk.co.kr
 main products : fire damper, junction box, steel furniture, pilot
 chair, cable box
 TEL : +82 51-831-9500

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

CAPE INDUSTRIES LTD.

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

Emerson Process Management Marine Solutions Korea Co., Ltd.

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

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 homepage add :

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

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

DONG-I INDUSTRIAL CO., LTD.

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

DONGHWA ENTEC

head office : Gangseo Busan
 homepage add : www.dh.co.kr
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DOOSAN ENGINE CO., LTD.

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 TEL : +82 55-260-6000

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 TEL +82 2-2185-7000

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 homepage add : www.gmbmarine.com
 main products : ship shore communication sys. emergency
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 TEL : +82 52-254-5215

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 main products : Air vent heads, Auto air vent heads, Pipe
 coupling, Expansion joint
 TEL : +82 51-832-0456

GS-HYDRO KOREA LTD.

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

HY-LOK CORPORATION

head office :
 homepage add : www.hy-lok.com
 main products : HY-Lok Tube Fittings, Bite Type (DIN 2353, JIS
 b2351) Fittings, 37°Flared Type(SAE J514) Fittings
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 homepage add : www.hankookmiboo.co.kr
 main products : Spiral Duct, Cold Chamber, Deck Covering
 TEL : +82 51-263-3621

HI AIR KOREA Co., Ltd.

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

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

HAN KOOK FLEXIBLE CO.

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

HANLA LEVEL CO., LTD.

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homepage add : www.hanlalevel.co.kr
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homepage add : www.hallaiq.co.kr
main products : Refrigeration Pumps (NH₃, R22, NHO₃, CO₂), Volute Pumps, Turbine Pumps
TEL : +82 51-264-2201/5

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

HAN JO CO., LTD.

head office : Yeongdo Busan
homepage add : www.hanjoms.co.kr
main products : expansion joint. Fuel Injection Pipe. Air Filter
TEL : +82 51-414-1201

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homepage add : www.haeon21.com
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TEL : +82 55-345-2024

HYUNDAI LIFEBOATS CO., LTD.

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

HYUNDAI MARINE MACHINERY CO., LTD.

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

HYUNDAI ELEVATOR CO., LTD.

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

HYUNDAI WELDING CO., LTD.

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

HYUN DAE FITTING CO., LTD.

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

HYUN JIN CO., LTD.

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

HYUNJIN MATERIALS CO., LTD.

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

HOSEUNG ENTERPRISE CO., LTD.

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

HOCHANG MACHINERY INDUSTRIES CO., LTD.

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

HAE WON INDUSTRY CO.

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

HODU INDUSTRIAL CO.

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

I.M.E. CORPORATION

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

IL SEUNG CO., LTD.

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

IL-SUNG IND. CO.

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

JUNG GONG IND. CO., LTD.

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

JUNG-A MARINE CO., LTD.

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

DONGHWA PNEUMATIC TECHNOLOGY CO., LTD.

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

JUNGSAN ENTERPRISE CO., LTD.

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

JHK INC.

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

JONGHAP MACHINERY CO., LTD.

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

JS CABLE LTD.

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

KANGRIM HEAVY INDUSTRIES CO., LTD.

head office : Changwon Gyeongnam
homepage add : www.kangrim.com
main products : boilers, marine & industrial, inert gas system(i.g.s.), i.g.g. & n₂generator
TEL : +82 55-269-7701

KANGRIM INSULATION CO., LTD.

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

KUNSUL CHEMICAL IND. CO., LTD.

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

KYUNG EUN CERAMICS CO., LTD.

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

KUKDONG ELECTRIC WIRE CO., LTD.

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

KUMKANG PRECISION CO., LTD.

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

KUMOH MACH. & ELEC. CO., LTD.

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

KEYSUNG METAL CO., LTD.

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

K. C. LTD.

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

KSP CO., LTD.

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

KTE CO., LTD.

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

KOKACO CO., LTD.

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

KONGSBERG MARITIME KOREA LTD.

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

KEYSTONE VALVE(KOREA) LTD.

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

KEON CHANG IND. CO., LTD.

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

KWANG SAN CO., LTD.

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

KEUMYONG MACHINERY CO., LTD.

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

KWANG SUNG CO., LTD.

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

KUK DONG ELECOM CO., LTD.

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

KYUNGSUNG INDUSTRY CO., LTD.

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

LS CABLE LTD.

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

LEE YOUNG INDUSTRIAL MACHINERY CO., LTD.

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

MIN SUNG CO., LTD.

head office : Sasang Busan

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

Mt.H CONTROL VALVES CO., LTD.

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

MSL COMPRESSOR CO., LTD.

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

MYCOM KOREA CO., LTD.

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

MYCOM KOREA CO., LTD.

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

Myung Sung Engineering Co., Ltd.

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

Marine Radio Co., Ltd.

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

NK CO., LTD.

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

ORIENTAL PRECISION & ENGINEERING CO., LTD.

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

OSCG CO., LTD.

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

PANASIA CO., LTD.

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

SARACOM CO., LTD.

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

SAMGONG Co., Ltd

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

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

SAMYOUNG MACHINERY CO., LTD.

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

SAMYUNG ENC CO., LTD.

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

SUH HAN INDUSTRY CO., LTD.

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

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

SUNBO INDUSTRIES CO., LTD.

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

SUNG KWANG BEND CO., LTD.

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

SUNG MI CO., LTD.

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

SUNGSIN INDUSTRIES CO., LTD.

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

SUNG IL CO., LTD. (SIM)

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

ESAB SeAH CORP

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

SEUN ELECTRIC CO., LTD.

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

SE-WON INDUSTRIES CO., LTD.

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

SAEJIN INTECH CO., LTD.

head office :

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

SE JIN IND. CO., LTD.

head office : 61-68 Ungnam-dong, Changwon-si,
Gyeongsangnam-do.
homepage add : www.sejin89.co.kr
main products : piping, h.f.o supply unit, purifier module each kind
TEL : +82 55-239-4700

SPECS CORPORATION

head office :
homepage add : www.specs.co.kr
main products : system division-oil mist detector, portable level
temp/oil
TEL : +82 31-706-5211

SHIN DONG DIGITECH CO., LTD.

head office :
homepage add : www.shindong.com
main products : satellite tv sets-satellite communication
equipments, draft buoy(1m, 1.6m, 2.4m discus buoy)-ocean
information technology division
TEL : +82 51-467-5001

SIL LA METAL CO., LTD.

head office :
homepage add :
main products : propeller(f.p.p.), c.p. propeller blade & hub,
propeller shaft, inter shaft
TEL : +82 51-831-5991/8

SHINMYUNG TECH CO., LTD.

head office :
homepage add :
main products : air & electric winch-0.2ton ~ 10ton, air motor-1p
~ 25p, davit (all)-0.2ton ~ 5ton
TEL : +82 55-363-7091

SHINSUNG DIESEL KIKI CO.

head office :
homepage add : nozzle.koreasme.org
main products : for marine engine-nozzle, plunger assy, delivery
valve assy
TEL : +82 51-264-8829, 262-8869

SHIN SHIN MACHINERY CO., LTD.

head office :
homepage add : www.sspump.com
main products : centrifugal pumps, gear pumps, screw pumps,
submersible pumps
TEL : +82 51-727-5300

SHINA METALTECH CO., LTD.

head office :
homepage add : www.shinametal.com
main products : white metal bearings-marine metal bearing,
automotive metals
TEL : +82 52-298-2100/4

SHIN YOUNG HEAVY INDUSTRIES CO.,LTD

head office :
homepage add : www.syhico.com
main products : oil & gas system, hydraulic system
TEL : +82 61-800-3700

S & W CORPORATION

head office :
homepage add :
main products : cam & camshaft, valve spindle & seat ring, piston
pin
TEL : +82 51-205-7411

S.A. MART CO., LTD.

head office :
homepage add : www.samartkr.com
main products : control lever, control cable, hydraulic steering
system, auto pilot system, stern drive system
TEL : +82 32-815-6314

STX ENGINE CO., LTD.

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

main products : marine diesel engine, military diesel engine, gas
engine, gas turbine
TEL : +82 55-280-0114

SIMULATION TECH INC.

head office : Geumcheon Seoul
homepage add : www.simulationtech.co.kr
main products : Emergency Shutdown System, Grease Extractor/
de-Oiler, Operator Training Simulator
TEL : +82 2-3281-0960

SHINHAN MACHINERY CO., LTD.

head office :
homepage add : www.shinerpia.com
main products : deck house, engine casing & funnel, fore/after-
end block & others
rudder, living quarters
TEL : +82 52-231-3525

SAMGONG INDUSTRIAL CO., LTD.

head office : Pyonghaek Gyeonggi
homepage add : www.samgong.com
main products : inflatable rubber products
TEL : +82 31-654-4805/6

SIN YOUNG ENTERPRISE CO., LTD.

head office : Gimhae Gyeongnam
homepage add : www.sy-ind.com
main products : main hole, access hatch, bollard
TEL : +82 55-346-0034

SUNG JIN GEOTEC CO., LTD.

head office : Namgu Ulsan
homepage add : sgtkor.co.kr
main products : bulbous bow, stern block, hull block, module, lng/
lpg tank
TEL : +82 52-228-5801

STACO CO., LTD.

head office : Gangseo Busan
homepage add : www.staco.co.kr
main products : Wall Panel, Ceiling Panel, Unit Toilet, Cabin Door,
Furniture,
TEL : +82 51-831-7000

STX ENPACO CO., LTD.

head office :
homepage add : www.stxenpaco.com
main products : turbocharger, diesel engine parts, marine equip.
TEL : +82 55-282-1131

SEOUL ELECTRIC CABLE CO., LTD.

head office : Eum-seong Chungbuk
homepage add : www.seoulcable.com
main products : offshore & shipboard cables, travelling cables,
high voltage power cables
TEL : +82 43-879-7200

SMECO

head office :
homepage add :
main products : piston, piston liner, piston skirt
TEL : +82 41-864-3030

SURO PROPELLER & MACHINERY CO

head office : Yeongdo Busan
homepage add : www.suropump.co.kr
main products : Propeller(d : 2500mm), Shaft (l : 6m), Pump
TEL : +82 51-415-0444

SHIN-A ENTERPRISE CO., LTD.

head office : Saha Busan
homepage add : www.shina-ent.com
main products : navigation equipment, communication
equipment, monitoring system equipment
TEL : +82 51-204-6221/5

TK CORPORATION

head office :
homepage add : www.tkbend.co.kr
main products : Elbow, Reducer, Tee, Cap
TEL : +82 51-831-6550

TAE YOUNG TRADING LTD.

head office : Junggu Seoul

homepage add : www.marine-material.com
main products : Receptacles & Wire Accessories, Floodlight,
Deck Light, Reflected Lamps
TEL : +82 2-2272-1960

TANKTECH Co., Ltd.

head office :
homepage add : www.tanktech.co.kr
main products : High Velocity P/V Valve, Local Fire Fighting Sys.
Tank Cleaning Machine
TEL : +82 51-979-1600

TECHMARINE SW CO., LTD.

head office :
homepage add : www.techmarine.net
main products : Loading Computer System
TEL : +82 51-467-7003

FRIEND CO., LTD.

head office : Gangseo Busan
homepage add : www.tsdream.co.kr
main products : cable tray, heating coil, strainer
TEL : +82 51-974-7900

TMC CO., LTD.

head office : Cheonan Chungnam
homepage add : www.tmc-cable.com
main products : marine cable, optical fiber cable
TEL : +82 2-771-3434

WARTSILA ACCOMMODATION SYSTEMS KOREA, INC.

head office : Goseong Gyeongnam
homepage add : www.waskorea.co.kr
main products : unit toilet, unit cabin, wall panel, ceiling panel,
door
TEL : +82 55-673-7315

WOCHANG IND. CO., LTD.

head office :
homepage add :
main products : steel door, ventilator, mooring fitting, h/c fitting,
hand rail
TEL : +82 55-331-1651

WHA YOUNG CO., LTD.

head office : Miryang Gyeongnam
homepage add : www.whayoung.co.kr
main products : Supply Unit Assy, Collector Block Assy, Fuel &
Exh. Movement, Fuel Pump Assy
TEL : +82 55-359-1100

WILSON WALTON CORRPRO KOREA

head office :
homepage add : www.wwckorea.com
main products : i.c.c.p system, m.g.p.s, s.g.d
TEL : +82 51-831-0131

YOUNG KWANG MACHINE CO., LTD.

head office :
homepage add : www.ykme.co.kr
main products : package unit, group unit, module unit for
industrial plant
TEL : +82 54-776-5456/9

YOOWON INDUSTRIES LTD.

head office :
homepage add : www.yoowonind.com
main products : steering gear, auto filter, deck machinery
TEL : +82 51-205-8541

YOUJEON STEEL CO., LTD.

head office : Changwon Gyeongnam
homepage add : www.youjeon steel.co.kr
main products : Marine Engine Parts-Engine Bed
TEL : +82 55-297-2121

HYUNDAI HEAVY INDUSTRIES CO., LTD. (HHI)

- Address : 1, Jeonha-dong, Dong-gu, Ulsan, Korea • Tel : +82-52-202-2114 • Fax : +82-52-202-3470 • <http://www.hhi.co.kr>
- Products : Bulk Carriers, Containerships, Tankers, VLCCs, Product Carriers, Multi-purpose Cargo Ships, OBO Carriers, Pure Car Carriers, LPG Carriers, Ro-Ro Ships, Chemical Tankers, Offshore Rigs/Barges, LNG Carriers, Passenger Ships, Drill Ships, Special & Naval Ships, FPSO, FSO, Semi-submersible Drilling Rig, Other Vessels

DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD. (DSME)

- Address : 85, Da-dong, Jung-gu, Seoul, Korea • Tel : +82-2-2129-0114 • Fax : +82-2-2129-0077~8 • <http://www.dsme.co.kr>
- Products : LNG Carriers, LNG-RVs, LNG-FPSOs/FSRUs, LPG Carriers, LPG-FPSOs, ULCCs, VLCCs, Suezmax/Aframax/Panamax Tankers, Shuttle/Chemical Tankers, Product Carriers, Containerships, Capesize/Kamsarmax/Supramax Bulk Carriers, Ore Carriers, VLOCs, Ro-Ro Ships, PCTCs, Passenger Car Ferries, FPSOs, FSOs, FPU, Drill Ships, Semi-Submersible Drilling Rigs, Fixed Platforms, Submarines, Submarine Rescue Vessels AUVs, Destroyers, Battle Ships

SAMSUNG HEAVY INDUSTRIES CO., LTD. (SHI)

- Address : 1321-15, Seocho-Dong, Seocho-Gu, Seoul, Korea • Tel : +82-2-3458-7312 • Fax : +82-2-3458-7319
- <http://www.shi.samsung.co.kr>
- Products : Arctic Shuttle Tankers, VCLLs, Crude Oil Tankers, Container Vessels, LNG/LPG Carriers, FPSO, FSO, Drillships, etc., LNG FPSO, Offshore Platforms, TLP, SEMI, Cruise Ships & Ferries, Steel Structures, Bridges & Building, Cargo & Material Handling Equipment

HYUNDAI SAMHO HEAVY INDUSTRIES CO., LTD. (HSHI)

- Address : 1700, Yongdong-ri, Samho-eup, Yeongam-gun, Jeollanam-do, Korea • Tel : +82-61-460-2114 • Fax : +82-61-460-3701
- <http://www.hshi.co.kr>
- Products : Tankers, VLCCs, Product Carriers, Chemical Tankers, Containerships, LNG Carriers, LPG Carriers, Pure Car Carriers, Bulk Carriers, Other Vessels

STX OFFSHORE & SHIPBUILDING CO., LTD.

- Address : 100 Wonpo-dong, Jinhae, Gyeongnam, Korea • Tel : +82-55-548-1122 • Fax : +82-55-546-7928 • <http://www.stxship.co.kr>
- Products : Crude Oil Tankers, Product Oil Tankers, Chemical Tankers, Bulk Carriers, Container Ships, LNG/LPG Carriers, Pure Car & Truck Carriers, Ferries & Passenger Ships, Naval Ships, Special Purpose Ships, Offshore and offshore support vessel, Etc

HYUNDAI MIPO DOCKYARD CO., LTD. (HMD)

- Address : 1381, Bangeo-dong, Dong-gu, Ulsan, 682-712 Korea • Tel : +82-52-250-3031~3040 • Fax : +82-52-250-3056 • <http://www.hmd.co.kr>
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