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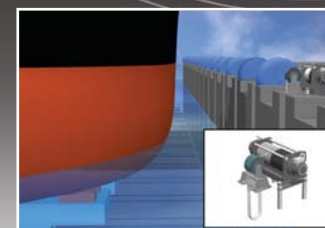
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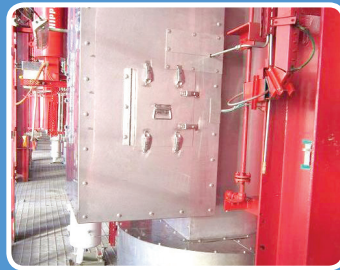
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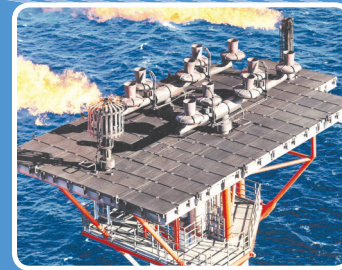




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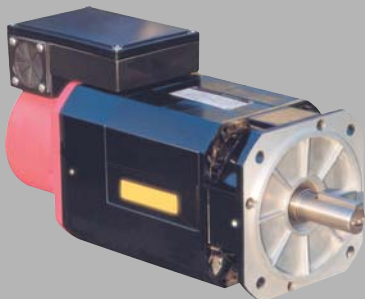
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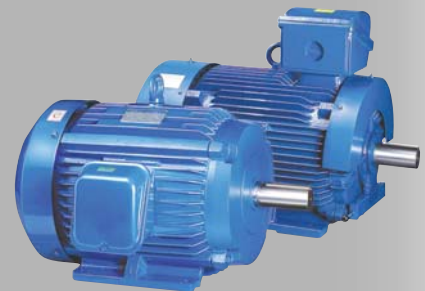
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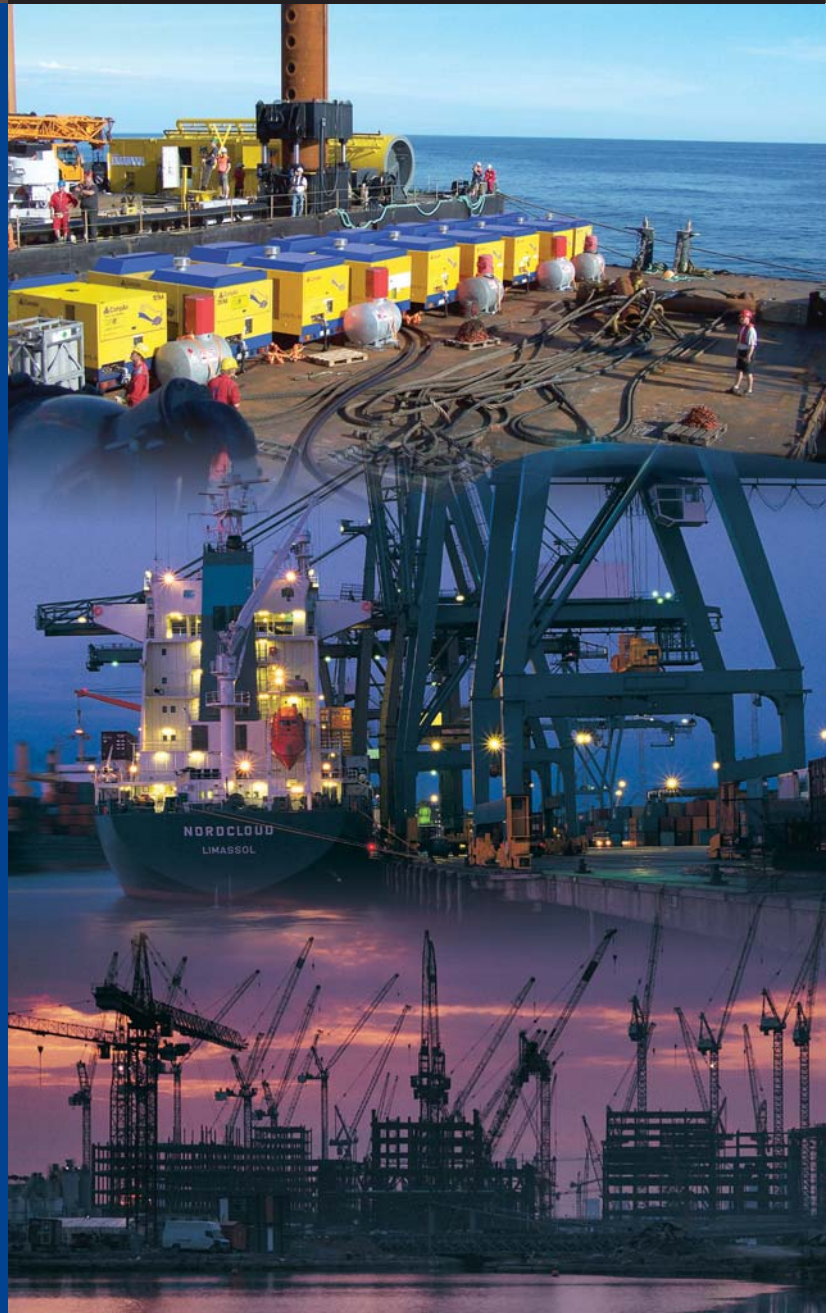
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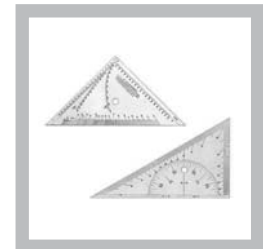
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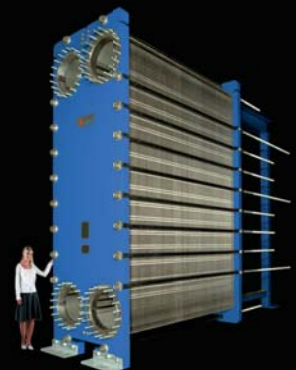
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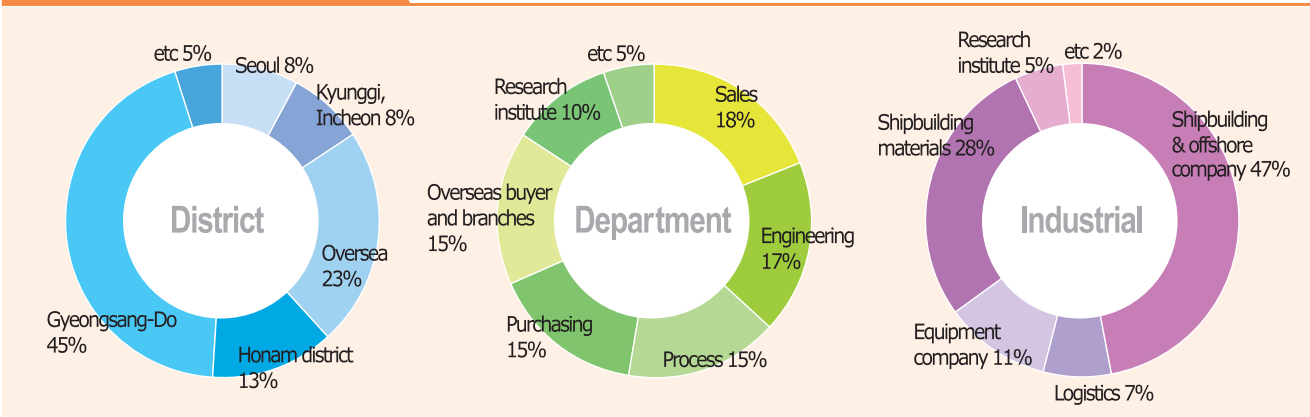
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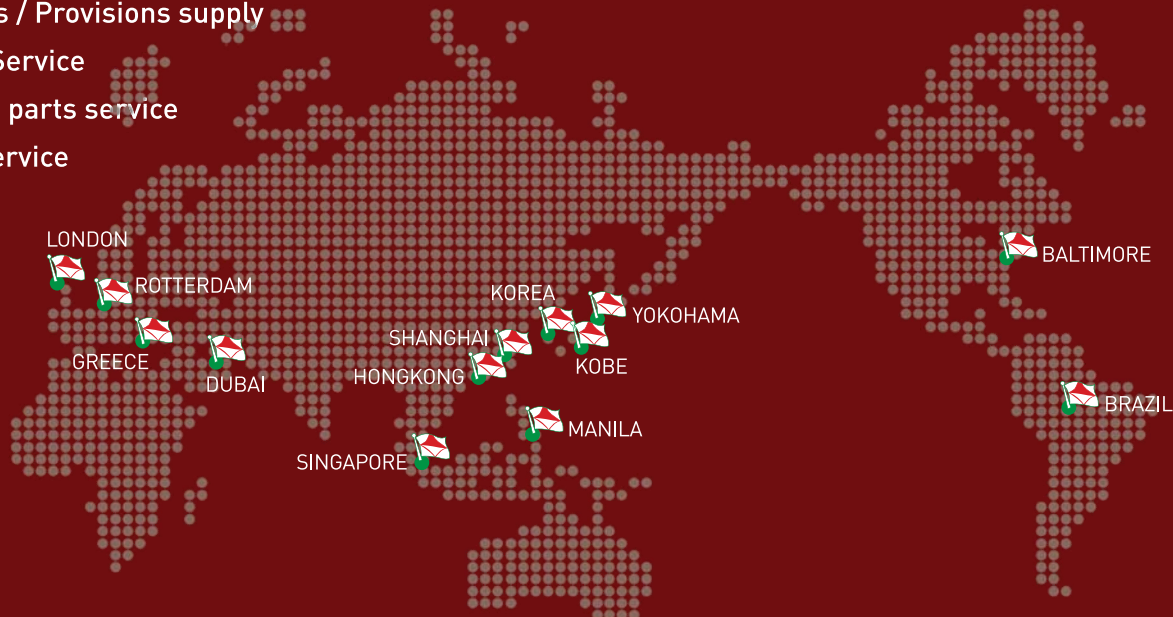
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ABB solves 100-year-old electrical puzzle - new technology to enable future DC grid

ABB announced a breakthrough in the ability to interrupt direct current, solving a 100-year-old electrical engineering puzzle and paving the way for a more efficient and reliable electricity supply system.

After years of research, ABB has developed the world's first circuit breaker for high voltage direct current (HVDC). It combines very fast mechanics with power electronics, and will be capable of 'interrupting' power flows equivalent to the output of a large power station within 5 milliseconds- that is thirty times faster than the blink of a human eye.

The breakthrough removes a 100-year-old barrier to the development of DC transmission grids, which will enable the efficient integration and exchange of renewable energy. DC grids will also improve grid reliability and enhance the capability of existing AC (alternating current) networks. ABB is in discussions with power utilities to identify pilot projects for the new development.

"ABB has written a new chapter in the history of electrical engineering," said Joe Hogan, CEO of ABB. "This historical breakthrough will make it possible to build the grid of the future. Overlay DC grids will be able to interconnect countries and continents, balance loads and reinforce the existing AC transmission net-

works."

The Hybrid HVDC breaker development has been a flagship research project for ABB, which invests over \$1 billion annually in R&D activities. The breadth of ABB's portfolio and unique combination of in-house manufacturing capability for power semiconductors, converters and high voltage cables (key components of HVDC systems) were distinct advantages in the new development.

HVDC technology is needed to facilitate the long distance transfer of power from hydropower plants, the integration of offshore wind power, the development of visionary solar projects, and the interconnection of different power networks. ABB pioneered HVDC nearly 60 years ago and continues to be a technology driver and market leader with many innovations and developments. With over 70 HVDC projects, ABB accounts for around half the global installed base, representing an installed capacity of more than



HVDC grid simulation center

60,000 megawatts (MW).

Deployment of HVDC has led to an increasing number of point-to-point connections in different parts of the world. The logical next step is to connect the lines and optimize the network. ABB is already working on the construction of multi-terminal systems and the latest DC breaker innovation is a major step in the evolution of HVDC grids. In parallel to the new hybrid breaker development, ABB has an established HVDC grid simulation center developing solutions for future DC overlay grid operations.

ABB, 고압송전을 위한 DC 차단기 개발

ABB는 보다 효율적이며 신뢰성 높은 전기공급을 가능하게 하는 DC(Direct current: 직류) 차단 기술에 관한 획기적인 성과를 지난 11월 7일 발표했다.

ABB는 다년간의 연구를 통하여 세계 최초로 HVDC 차단기를 개발했다. 이 차단기는 매우 빠른 메커니즘과 전력전자를 결합하여 1000분의 5 초안에 대규모 발전소의 전력 조류를 차단할 수 있는데, 이는 사람이 눈을 깜박이는 것보다 30배 빠른 속도이다.

이 획기적인 성과는 DC 송전망 개발의 100년 묵은 장벽을 허무는 것으로서 효율적인 통합과 함께 신재생 에너지로의 연계를 가능하게 한다. DC 그리드는 그리드 신뢰성 및 기존 교류 네트워크

의 용량 또한 향상시킨다. ABB는 이러한 새로운 기술을 확인할 시범 사업을 전력 회사들과 협의 중에 있다.

ABB 조 호건(Joe Hogan) CEO는 "ABB는 전기 엔지니어링 역사의 새로운 장을 열었다. 이 역사적인 진보를 통해 미래의 전력망 구축을 가능하게 하며, DC 중첩망은 나라와 대륙을 연계하고 전력 부하 균형을 조정함으로써 기존 AC 송전망을 보강할 것"이라고 말했다.

하이브리드 HVDC 차단기 개발은 연구개발비로 매년 10억 달러 이상을 투자한 ABB의 주력 연구 개발 프로젝트이다. ABB의 광범위한 제품군과 함께, 전력 반도체, 컨버터 및 고압케이블(HVDC 시스템의 핵심 요소)에 대한 자체 제조기술의 유일무이한 결합은 신개발의 탁월한 장점으로 작용

했다.

HVDC 기술은 수력발전소, 해상풍력의 연계, 태양광(열) 프로젝트의 발전 및 서로 다른 전력망의 상호연계 등으로부터 장거리 전력전송을 위해 필요한 기술이다. ABB는 약 60년 전 HVDC 기술을 개척했으며, 수많은 혁신과 개발을 통하여 시장을 선도해왔다. 70개 이상의 HVDC 프로젝트 수행을 통하여 전세계 설비의 절반 가량을 공급했으며 설비 용량은 60,000MW를 상회한다. 한편 ABB는 미래 DC 중첩망 운영 솔루션을 개발하기 위한 HVDC망 시뮬레이션 센터를 설립했다.



STX Metal embarked upon the LNG carrier insulation box business

STX Metal held a ceremony to mark the completion of LNG carrier insulation box factory on October 19. With the LNG carrier insulation box factory starting the operation, STX Metal made its first step into this new sector. The insulation box is the insulation material to be installed on the LNG cargo containment of LNG carrier. It fills the insulation materials in a wooden box to prevent evaporation of LNG which is vaporized into the air. The insulation box is one of the core facilities of LNG carrier.

More than 60,000 insulation boxes are installed on a single LNG carrier. STX Metal's insulation box factory has an annual production capacity of 240,000 insulation boxes. That is equal to the number of insulation boxes that can be installed on 4 units of 170K-class LNG carriers. STX Metal is expected to have many roles to play in relation to the construction of LNG carrier in the period ahead. Yu Cheon-il, President of STX Metal, said,

"The LNG carrier insulation box business lays a cornerstone for STX Metal to move beyond the existing marine engine parts sector and become a leading marine equipment maker. This new business will help build a way out of the recession in the shipbuilding and shipping markets, as well as help expand the LNG market which is expected to see a sustained upswing in demand and the marine equipment industry emerging as a new growth engine of STX Metal."

STX메탈, LNG선 단열박스 사업 본격 시동

지난 10월 19일 STX메탈은 LNG선 단열박스(LNG Carrier Insulation Box) 공장 준공식을 가졌다. STX메탈의 신규 사업인 LNG선 단열박스 사업이 공장가동을 시작하며 사업에 본격적인 첫 발을 내디뎠다. LNG선 단열박스 공장에서 생산될 단열박스는 LNG선 화물창(Cargo Containment)에 설치되는 단열 기자재로 나무 박스 내에 단열재를 메워 대

기에서 기화되는 LNG의 증발을 방지하는 역할을 담당한다. LNG선 한 척당 6만 개 이상의 단열박스가 들어가며, LNG 선박의 핵심설비 중 하나이다. STX메탈의 단열박스 공장은 연간 평균 24만 개의 박스를 생산할 수 있는 생산 인프라를 갖추었다. 이는 170K급 LNG선 4척에 공급할 수 있는 물량으로, 향후 LNG선 건조사업과 관련해 STX메탈이 많은 역할을 할 수 있을 것으로 기대된다. 유천일 대표이사는 "LNG선 단열박스 사업은

STX메탈이 기존의 선박엔진용 부품 소재 사업을 넘어 종합 조선기자재 생산 메이커로서 도약할 수 있는 발판을 마련하였다는 의미"라며 "앞으로 이 사업은 STX메탈의 신성장 동력으로 자리매김 할 조선기자재 사업과 지속적인 수요 확대가 예상되는 LNG 시장 확대와 함께 조선·해운업계의 불경기로 얼어붙은 시장에 대한 새로운 돌파구가 될 것으로 확신한다"고 말했다.



DSME developed the control room simulator for drillship, further ramping up its competitiveness in offshore plant sector

Daewoo Shipbuilding & Marine Engineering (DSME) developed a simulator for the drilling and oil field operation facilities that can reproduce the control room environment of drillship and semi-submersible drilling rigs, thus sharpening its competitiveness in the offshore sector. This simulator is equipped with the multi-vision connected to the control room and multiple monitors, oil field control system, etc., and recreates the real control room of drillship perfectly, providing a realistic experience of operating the drilling facilities. Particularly, this simulator, developed by DSME, will play a key part in preventing maritime accident such as oil spill during the drilling operation and represent a significant

forward in breaking the dominance of a handful of U.S. and European equipment manufacturers in the offshore plant-related equipment technology. DSME plans to incorporate the use of this equipment into its training programs to help increase the understanding of its employees with regard to the design, R&D, sales, etc., and expand the employees' capabilities.



Vice-President Jeong Bang-eon (supervising the technology) of DSME DSME is demonstrating its simulator, developed for the first time nationwide, for drilling facilities at the Central Research Center of DSME.

In addition, this simulator will be a part of the joint research projects driven forward with ship owners and external research institutes, and DSME will continue its independent R&D efforts related to drilling facilities.

This marks the first time that a domestic company independently developed and deployed the simulator of this kind, although some domestic companies had introduced foreign-

made simulators for training purposes.

This simulator, developed with indigenous technology, will help reduce the need for overseas training which arose from the lack of simulator nationwide and bring various tangible and intangible benefits such as the reduction of training costs.

In relation to that, an official from DSME said, "This simulator can be a substitute for over-

seas training, saving some billion won (Korean currency) each year. Furthermore, the simulator training program can be implemented in conjunction with external research institutes and universities, as well as DSME, to foster highly trained and specialized manpower."

대우조선해양, 시추선 조종실 시뮬레이터 개발로 해양플랜트 경쟁력 강화

대우조선해양이 드릴십·반잠수식 시추선의 조종실(Control room)을 재현한 시추 및 유전운영 장비 시뮬레이터를 개발함으로써 해양 분야의 경쟁력 강화에 나섰다.

이 장비는 조종석과 다수의 모니터를 연결한 멀티비전, 유정제어 시스템 등을 탑재하고 있으며, 실제 시추선 조종실을 완벽하게 재현함으로써 조종자가 마치 실제로 시추 장비를 운용하는 것처럼 실습·체험할 수 있다.

대우조선해양의 이번 시뮬레이터 개발은 실제 시추 작업시 원유 유출 등 발생 우려가 높은 해난사

고 방지와 미국·유럽 등 소수 장비업체들이 독점해온 해양플랜트 관련 장비 개발에도 단초를 마련한 것으로 평가된다.

앞으로 대우조선해양은 이 장비를 활용한 교육 프로그램을 통해 설계, R&D, 영업 등 관련 조직 직원들의 해양 분야에 대한 이해도도 높이고 업무 역량도 키워나간다는 계획이다. 또한 시뮬레이터를 이용해 선주, 외부 연구소들과 함께 공동연구 과제도 수행하는 동시에 자사의 독자적인 시추 장비 연구 개발에도 활용할 예정이다.

한편 외국 업체에서 제작한 시뮬레이터를 국내에 들여와 교육을 한 사례는 있었지만, 국내 업체가 이를 자체적으로 개발해 적용한 것은 이번이 최

초다. 지금까지 국내에서는 관련 장비가 부족해 외국에서 교육을 받아 왔으나 이를 대체할 수 있는 시뮬레이터를 자체적으로 개발함으로써 교육비 절감 등의 각종 유·무형 효과도 클 것으로 기대된다.

이와 관련해 대우조선해양 관계자는 "이번 시뮬레이터 개발로 연간 수십억원의 해외 교육 대체 효과가 기대된다"며 "향후 대우조선해양 뿐 아니라 외부 연구소와 대학교와도 연계해 시뮬레이터 교육 프로그램을 지원함으로써 우수 해양 전문 인력을 양성할 수 있을 것"이라고 밝혔다.



HHI launched a factory to manufacture the modules for offshore plants

Hyundai Heavy Industries (HHI) established a large-scale offshore plant factory in Ulsan to strengthen its competitiveness in the offshore plant sector.

HHI announced that it held a ceremony to mark the completion of the Onsan Offshore Plant Factory at Onsan National Industrial Complex in Ulsan on November 9 and started the full-fledged operation of the factory. This factory which covers a land area of approximately 202,000m² has the Office Section, Assembly Section, Painting Section, etc., including an outdoor workplace. It has an annual production capacity of over 50,000 tons of large modules used in offshore plants. HHI's Onsan factory is expected to generate in excess of KRW 1 trillion and create about 2,500 jobs yearly until next year, adding vitality to the local economy. Moreover, HHI's Onsan

factory plans to expand the quay wall facilities necessary for the outfitting works, depending on the market condition, in order to manufacture offshore plants such as FLNG, FPSO, etc.

An official from HHI said, "With the On-san factory starting the full-scale operation, we are in a better position to stay ahead of competition with our improved ability to manufacture offshore plants and meet the delivery time on order."

The launch of the Onsan factory is consistent with the HHI's effort to strengthen its competitiveness in the off-

shore plant market. In July, HHI set up an offshore engineering center and attracted excellent manpower for the design of offshore plants.



HHI held a ceremony to celebrate the completion of its Onsan Offshore Plant Factory in Onsan National Industrial Complex on November 9.

현대중공업, 해양플랜트용 모듈 제작 위한 설비공장 준공

현대중공업은 해양플랜트 경쟁력 강화를 위해 울산에 대규모 해양 설비공장을 신설했다. 현대중공업은 지난 11월 9일 울산시 온산 국가산업단지에서 '해양 온산 공장' 준공식을 갖고, 본격 가동에 들어갔다고 밝혔다. 약 20만2000㎡ 규모의 이 공장은 야외작업장을 비롯해 사무동,

조립동, 도장공장 등을 갖추고 있으며, 연간 5만톤 이상의 해양플랜트용 대형 모듈(module)을 생산하게 된다.

현대중공업 온산공장은 내년까지 연간 1조원 이상의 매출과 총 2500여명의 일자리를 창출해 지역 경제 발전에도 크게 기여할 것으로 예상된다. 또한 향후 시장상황에 따라 의장작업에 필요한 안벽 시설을 증축해 FLNG, FPSO 등 해양플랜트도

자체 제작할 계획이다.

현대중공업 관계자는, "이번 온산공장 준공으로 해양플랜트 제작능력 향상과 납기준수로 경쟁력을 더욱 높이게 되었다"고 밝혔다. 한편 현대중공업은 이번 해양공장 준공에 앞서 지난 7월 해양 엔지니어링 센터를 설립하고 해양플랜트 분야 우수설계 인력을 확보하는 등 해양플랜트 시장에서의 경쟁력 강화를 위해 집중하고 있다.



KR signed a MOU with SNU and XINNOS for the commercialization of SeaTrust-LineHeat

Korean Register of Shipping (KR) signed a three-party MOU (Memorandum of Understanding) with the Research Institute of Marine Systems Engineering of Seoul National University (SNU) and XINNOS, a PLM(Product Life-Cycle Management) Consulting Corporation, at its Busan Headquarters for the commercialization of SeaTrust-LineHeat.

This MOU will help create synergic effects from the combination of SNU's fundamental core technology, KR's technology in SeaTrust series and marketing capability supported by domestic and overseas network, and XINNOS' technology in shipbuilding software

development and web service, and paves the way for effective cooperation in technology development and commercialization.

An official from KR said, "This MOU will create the opportunity to prove the excellence of Korea's shipbuilding technology in the global market. Particularly, it will help advance the technology for the curvature processing which



is one of the most difficult processes in shipbuilding."

한국선급, 서울대-지노스와 SeaTrust-LineHeat 사업화를 위한 MOU 체결

한국선급(KR)은 부산 사옥에서 서울대학교 해양시스템공학연구소(Research Institute of Marine Systems Engineering), PLM(Product Life-Cycle Management) 컨설팅 전문기업인 (주)지노스(XINNOS)와 SeaTrust-LineHeat 사업화를

위한 삼자간 MOU를 체결했다.

이번 업무협약에 따라 서울대가 가지고 있는 원천기술, 한국선급이 가지고 있는 SeaTrust 시리즈 개발/상용화 및 국내외 네트워크를 활용한 마케팅 능력, (주)지노스의 조선 분야의 소프트웨어 개발 및 웹서비스 기술을 융합하여 시너지를 극대화하고 지속적인 기술 개발과 실용화 확대 등

서로 우호적인 협력체계를 구축할 계획이다.

한국선급 관계자는 "이번 MOU 체결을 통해 글로벌 시장에서 대한민국 조선기술의 우수함을 보여줄 수 있는 계기가 마련되었다"며 "특히 조선생산공정의 난제인 곡면가공에 있어 진일보한 기술을 선보일 수 있을 것으로 기대된다"고 말했다.



SSME successfully built the shuttle tanker on land for the first time worldwide

Sungdong Shipbuilding & Marine Engineering (SSME) succeeded in the load-out of the 157,000 DWT shuttle tanker of the Greece-based Tsakos, built on land for the first time worldwide, on November 4. In May 2006, SSME came into the spotlight in the industry when it set a world record in loading

out a ship, built on dry land for the first time, within the shortest time. SSME is at the forefront of the effort to bring the world's on-land building technology to the next advanced level. It has built approximately 160 vessels on land thus far, including the oil tankers, product carriers, containerships, offshore

facilities, purse seiners, etc.

Shuttle tanker is a new vessel type that has emerged amid the shift of focus in oil field exploitation and development from the land to the sea. It is a special purpose vessel that transports the crude oil from the offshore drillship or FPSO to the land-based facility.

Shuttle tanker is a high value-added vessel furnished with high-priced equipment and systems, such as DPS (Dynamic Positioning System) that uses the satellite technology to maintain the position of vessel during the loading operation at sea and BLS (Bow Loading System) for the offshore loading and discharge of crude oil.

An official from SSME said, "We will aggressively target the market by fully leveraging our on-land shipbuilding experience that we have

built up since our success in the on-land construction of FSO in July this year and tap into the niche market for vessels such as the purse seiner as part of effort to upgrade our business structure and expand our future growth engines"



성동조선해양, 세계 최초 셔틀탱커 육상 건조 성공

성동조선해양은 지난 11월 4일 세계 최초로 육상에서 건조한 그리스 차코스(Tsakos)사의 15만7천 DWT급 셔틀탱커(Shuttle Tanker)를 로드아웃(Load-Out) 하는데 성공했다.

성동조선해양은 2006년 5월 처음으로 육상 건조한 선박을 세계 최단 시간에 로드아웃하며 업계의 주목을 받았으며, 최근까지 원유 및 정유 운반선, 컨테이너선, 해양구조물, 참치선망선 등 160여

척의 선박을 육상에서 건조하면서 세계 육상건조 기술의 발전을 선도하고 있다.

셔틀탱커는 육상 위주였던 원유 개발이 해상으로 확대되면서 나타난 신선종으로 해상 시추선이나 FPSO와 연결된 상태에서 원유를 공급받아 선적해 육상의 석유기지로 운송하는 특수선이다.

셔틀탱커는 해상에서 원유를 선적하는 동안 일정한 위치를 유지해야 하므로 인공위성을 이용해 선박의 위치를 항상 일정하게 유지시키는 자동위치유지장치(DPS: Dynamic Positioning System)

와 원유를 받아들이고 내보내는 선적장치(BLS: Bow Loading System) 등 고가장비와 시스템이 사용되는 고부가가치 선박이다.

성동조선해양 관계자는 "최근 대형 해양플랜트 발주가 본격화 됨에 따라 지난 7월 세계 최초로 육상건조에 성공한 FSO와 이번 셔틀탱커의 건조 경험을 바탕으로 이 시장에 적극 진출하고 참치선망선 등 틈새시장의 진출로 사업구조 고도화와 미래 신 성장동력 확충을 위한 계기로 삼을 계획이다."라고 밝혔다.



Nexans wins major subsea cable contract for Terna's new HVDC power interconnection between Italy and Montenegro

Nexans has been awarded one of two lots of a contract for the supply and installation of a power cable for the high-voltage direct current (HVDC) link between Italy and Montenegro. It represents a value of approximately 300 Million Euros. The public tender was called by Terna Rete Italia S.p.A, a company fully owned by Terna S.p.A, the operator of Italy's electricity transmission system. Over the last twenty years, Nexans has supplied more than 3,000 km of HVDC submarine cables manufactured and installed.

The new link between Italy and Montenegro will connect the Italian peninsula with the Balkans and will contribute to improve the integration of the European Countries' electricity systems. The HVDC interconnection between Italy and Montenegro will be approximately 415 km in length, comprising 393 km of subsea

cable and 22 km of underground cable for the onshore connections. It will feature two 500 kV HVDC cables in a bipolar configuration (2 x 500 MW), with one cable supplied by Nexans.

"Nexans is proud to have been awarded by Terna this major contract for the link between Italy and Montenegro." said, Frédéric Michelland, Senior Corporate Executive Vice President of Nexans. "We believe that both parties are satisfied with the result of the negotiation and now our teams are eager to start working on the execution of the project. The successful delivery of high profile HVDC projects such as Skagerrak, NorNed, Cometa and Fenno-Skan II has played an important role in our ability of being selected for this challenging link."



넥상스, 이탈리아와 몬테네그로를 잇는 HVDC 링크에 포설되는 케이블 공급

넥상스는 이탈리아와 몬테네그로를 잇는 2회선의 대형 HVDC 링크 중 한곳에 설치 될 전력 전선의 공급 및 포설 계약을 체결했다. 계약 금액은 약 3억 유로이다. 이번 HVDC 링크 프로젝트는 이탈리아의 전력 송전 시스템 운영회사인 테르나 S.p.A(Terna S.p.A)가 100% 소유하고 있는 테르나 레테 이탈리아 S.p.A(Terna Rete Italia S.p.A)가 공개입찰을 진행했다. 최근 20년간 넥상스는

3,000km 이상의 HVDC 해저 케이블 생산 및 포설 공급 실적을 가지고 있다.

이탈리아와 몬테네그로를 잇는 새로운 링크는 이탈리아 반도와 발칸지역을 이어 주며 유럽 전력 시스템의 통합에 기여하게 된다. HVDC 링크의 길이는 약 415km이며, 393km의 해저 케이블과 해안지역 연결에 사용되는 22km의 지중선으로 구성되어 있다. 이 링크는 두 개 회선의 500kV HVDC(2 x 500MM) 양극 배치이며, 이중 한 회선을 넥상스가 공급하게 된다.

넥상스 프레데릭 미셀랑 부사장은 “넥상스가 이탈리아와 몬테네그로를 잇는 HVDC 링크 프로젝트를 계약하게 되어 매우 자랑스럽다. 양쪽 회사 모두가 협상 결과에 만족하며, 우리 팀은 프로젝트의 성공적인 진행을 위해 최선을 다하고 있다. 스카게락, 노르네드, 코메타와 펜노-스칸에 같은 첨단 기술을 요하는 HVDC 프로젝트를 넥상스가 성공적으로 수행했기에 이번 프로젝트를 수주하게 된 것”이라고 말했다.



Navarino telecom signs Inmarsat Global Xpress® value added reseller agreement

Inmarsat, the leading provider of global mobile satellite communications services announced that it has signed Piraeus-headquartered satellite communications organisation, Navarino as a Value Added Reseller (VAR) of Global Xpress® for the maritime market.

Navarino is one of the leading satellite communication providers in Europe and Asia, specializing in a number of innovative products and value added services for vessels that trade globally. The company has a client base of more than 500 shipping companies

throughout Europe and Asia, serviced by offices in Piraeus, Hamburg, Oslo, Cyprus, Hong Kong and Singapore.

Dimitris Tsikopoulos, CEO, Navarino said, “Global Xpress is the best response to the increasing need for data-driven and cost-effective communications at sea, offering the shipping industry unprecedented data speeds and global coverage. Greece has the largest single ownership of ocean-going vessels, with around 17% of the world’s ship owners based here. Our customers have the highest band-

width requirements and Global Xpress with its combination of a new super-fast Ka-band satellite network and the existing FleetBroadband service will deliver a quality, global service with the utmost reliability.”

Continues Tsikopoulos said, “The deployment of Global Xpress will herald a revolution in maritime communications and will have a significant impact on how the shipping industry can improve its profitability through achieving long term cost efficiencies.”



Golar LNG makes move for Floating Liquefied Natural Gas Production Vessel

Golar LNG Ltd announced that it has reached agreement for the development of first Floating Liquefied Natural Gas (FLNG) vessel. The agreement is with Keppel Shipyard Limited and is based on the conversion of existing Moss LNG carriers of which Golar owns three potential candidates. Golar has already successfully converted three other Moss carriers into Floating Storage and Regasification Units (FSRU) of which Keppel has converted two.

Use of Golar LNG’s existing Moss LNG vessels, proven topside liquefaction technology together with the appointment of Keppel to undertake the engineering and conversion

enables Golar LNG’s FLNG to facilitate the efficient development of gas monetization opportunities when it comes to cost and schedule.

The target gas supply for these units will be pipeline quality gas, lean associated reserves and, potentially, lean gas from otherwise stranded fields. The floating solution gives customers increased flexibility, quicker development times and the unique ability to develop reserves that are currently uneconomic. It further gives them an opportunity to capitalize on the large global gas spreads and the attractive economics associated with gas as an energy resource.

The first FLNG will have a capacity of up to 2

million tonnes per annum and will utilize the existing 125,000 cubic meters of LNG storage on board the carrier. Keppel will start the FEED study in November and detailed design and engineering is expected to be concluded around mid-2013 when vessel conversion is expected to start.

The first unit will be developed through several construction stages in order to accommodate customer requirements and is expected to be ready for production by Q1 2015. Golar LNG retains the option to convert two additional vessels with Keppel under the same agreement. The Company sees its partnership with an experienced shipyard and a production plant

provider with significant LNG experience as valuable for minimizing technical risk in the project. This project represents the next phase in Golar LNG's strategy of expanding its presence within the LNG industry. The Company aims

to offer its customers unique, flexible and highly economical solutions, thereby capturing a substantially greater share of the overall LNG commodity trade value. The Board anticipates that the first unit can be financed through a

combination of existing cash, future cash flow, further drop downs and new debt facilities and presently do not envisage any need for additional equity.



STX Metal received the international certification for its ballast water management system

STX Metal received the international certification for its ballast water management system (BWMS), an essential feature for the next-generation eco-friendly vessels. Winning this approval, STX Metal has put itself on a fast track to success in its business.

STX Metal announced on November 13 that its 'Smart Ballast (Smart Ballast)', a ballast water management system, received the final approval from International Maritime Organization (IMO) during the 64th session of Marine Environment Protection Committee (MEPC) of the IMO held in London, U.K. 'Smart Ballast' passed the performance standards set by IMO. Particularly, 'Smart Ballast' is

recognized to provide higher energy and space efficiency compared to existing products and comply with environmental standards.

STX Metal plans to win the type approval from the Ministry of Land, Transport and Maritime Affairs in the first half of 2013 through the on-board test and is on track to establish a mass production system.

The installation of on-board ballast water management system is expected to become mandatory from 2013 as per the IMO Ballast Water Management Convention. The ballast water management system will be phased in over the years for both new and existing vessels and become mandatory for all ocean-

going vessels by 2017.

For that, STX Metal plans to establish 'BWMS Business Department' to focus on developing the technology that sets itself apart from others and expanding its production capability in a bid to target customers more aggressively.

An official from STX Metal said, "Currently, the Smart Ballast technology is being applied to our new Smart UV(ultraviolet sterilization) suitable for small and medium-sized vessels. We will focus on developing the ballast water management system tailored to requirements of customers with an aim to carve out larger share of the market."

STX메탈, '선박 평형수 처리장치' 국제 인증 획득

STX메탈이 차세대 친환경 선박의 필수 요건으로 주 받고 있는 '선박 평형수 처리장치' (BWMS, Ballast Water Management System) 기술에 대한 국제 인증을 획득하며 본격적인 사업 진출에 박차를 가했다.

STX메탈은 국제해사기구(IMO)가 영국 런던에서 개최한 제64차 해양환경보호위원회 회의에서 자사가 개발한 선박 평형수 처리장치인 '스마트 발라스트(Smart Ballast)'에 대한 기술 인증을 최종 승인했다고 지난 11월 13일 밝혔다.

이번 최종 승인을 통해 '스마트 발라스트'는 IMO가 요구하는 장비 성능기준을 통과했다. 특히 기존 제품에 비해 에너지 및 설치 공간에서의 효율성과 친환경적인 성능을 인정받았다. STX메탈은 향후 선상시험을 통해 2013년 상반기 중 국토해양부 형식승인을 획득할 예정이며, 이에 맞춰 본격적인 양산체제를 갖출 계획이다.

선박 평형수 처리장치의 의무 설치는 IMO의 '선박 평형수 관리 협약'에 의해 2013년부터 발효될 전망이며, 신규 선박 및 기존 선박에 순차적으로 장착하기 시작해 2017년까지 모든 외항선에 의무적으로 설치해야 한다.

이를 위해 STX메탈은 차별화된 기술 개발과 생산 역량을 집중하기 위한 'BWMS 사업실'을 신설하고, 이를 발판으로 고객들 대상 적극적인 영업활동을 펼칠 계획이다.

STX메탈 관계자는 "스마트 발라스트 개발에서 축적한 기술력을 토대로 현재 중소형 선박에 적합한 'Smart UV(자외선 소독방식)' 개발도 진행 중"이라면서 "앞으로 고객들의 다양한 요구에 특화된 수처리 평형수 처리장치 개발에 집중해 시장경쟁력을 선점할 계획"이라고 밝혔다.



Intergraph® SmartMarine® 3D has been Selected by Keppel as the 3D Modeling Solution for its Next-generation Semisubmersible Drilling Rig

Intergraph® SmartMarine® 3D has been chosen by Keppel FELS Limited, the global leader in the design, construction and repair of mobile

offshore rigs, as its 3D modeling and production solution of choice for its new offshore projects, including its next-generation semisub-

mersible drilling rig for deployment in Brazil. Keppel FELS is a subsidiary of Keppel Offshore & Marine, and it sought to implement

a next-generation 3D modeling solution for its projects to support business growth and enhance its leadership position. The company selected SmartMarine 3D and began using Intergraph's solution for a pilot project in 2006. Keppel FELS was impressed with SmartMarine 3D's rule-based design and open architecture, and Intergraph's commitment and dedicated support to ensure the success of the SmartMarine 3D implementation. The company deployed SmartMarine 3D in a global work-share mode among Keppel FELS headquarters in Singapore and its engineering subsidiaries around the world. This allows users from different parts of the world to work and collaborate on the same projects in near real-time, enabling Keppel FELS to optimize its engineering

resources and promote concurrent engineering for enhanced safety, quality and productivity. SmartMarine 3D is the 3D modeling solution of choice for Keppel FELS and is used in the company's new offshore projects to deliver productivity gains. Keppel FELS implemented SmartMarine 3D for the design of a semisubmersible drilling rig for Sete Brasil, which is based on Keppel's proprietary DSS™ 38E design. This design won Keppel FELS the top honor of "Best of Show" in the 2011 Intergraph Golden Valve Awards. SmartMarine 3D played a significant role in the design enhancement of DSS™ 38E, recognized as one of the world's most advanced drilling semisubmersibles. This rig will support the exploration of Brazil's estimated 50 billion bar-

rels of deep-sea oil and gas reserves. SmartMarine 3D is the world's most advanced offshore and shipbuilding design solution, providing companies with the capabilities they need to gain and maintain an edge in a highly competitive industry. SmartMarine 3D is breakthrough engineering technology that is automated, knowledge- and rule-driven, streamlining marine asset design processes and improving delivery schedules, with increased detail and manufacturing design productivity of up to 30 percent. SmartMarine 3D is endorsed and used by leading offshore and marine companies globally, including the most productive shipyard, the top offshore owner operator, the top fabrication yard and the top classification society in the world.



National Instruments Korea held the NIDays 2012, a festival for engineers, in great success

National Instruments Korea held the NIDays 2012, a graphic-based design conference, at the Grand Ball Room of COEX on November 1, which attracted about 1,000 scientists, engineers, etc. Hwang Ji-ho, General Manager of Korea NI Marketing Headquarters, said in his keynote speech, "Redefining the instrumentation is vital for finding effective solutions to the complex challenges facing the test engineers today. That can be accomplished by leveraging the platform offered by the NI's graphic-based system design." Specifically, NI's demonstration of the VST (Vector Signal Transceiver) which was launched in August for the first time worldwide proved that the existing box type instruments

could be effectively substituted. The keynote speech was followed by the introduction of NI's RIO technology and new capabilities of LabVIEW 2012, the core product, along with the applications to various fields such as medical, automotive, military aircraft, etc. During the NIDays 2012, more than 35 presentations were given in 6 tracks with regard to the measurement, control, automation, software, data col-



Keynote speech by Hwang Ji-ho, General Manager of Korea NI Marketing Headquarters

lection, in addition to the special lecture on LabVIEW.

한국NI, 엔지니어의 축제 NIDays 2012 성황리 개최

한국내쇼날인스트루먼트(National Instruments Korea)는 지난 1일 코엑스 그랜드볼룸에서 1000여 명의 과학자와 엔지니어 등이 참석한 가운데 그래픽 기반 시스템 디자인 컨퍼런스 NIDays 2012을 성황리에 개최했다. 기조연설을 맡은 한국NI 마케팅 총괄본부 황지호

본부장은 "오늘날 테스트 엔지니어가 직면한 복잡한 과제를 효과적으로 해결하기 위해서는 '계측기 재정의'가 반드시 필요하다."면서 "NI의 그래픽 기반 시스템 디자인의 플랫폼을 통해 이를 실현할 수 있다."고 밝혔다. 특히 NI가 지난 8월 세계 최초로 출시한 VST(벡터 신호 트랜시버) 제품의 데모시연을 통해 기존 박스형 계측기를 효과적으로 대체할 수 있음을

보여주었다. 이어진 기조연설에는 NI의 RIO 기술과 코어 제품인 소프트웨어 LabVIEW 2012에 대한 신기능 소개와 더불어 의료, 자동차, 국방항공 등 다양한 산업 현장에 활용된 어플리케이션 사례를 선보였다. 이날 행사는 측정, 제어, LabVIEW 특강, 자동화, RF, 소프트웨어, 데이터 수집 6개의 트랙에서 35개 이상의 발표 세션이 진행되었다.

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Introducing Sensepoint XCD

XCD's unique tri-colour visual display allows the device's status to be seen at a glance - even from a distance! Using an instantly recognizable 'traffic light' system, the unit features three visual settings; steady green for normal operation, flashing yellow for a fault or warning and flashing red for an alarm.



Optimised for the detection of flammable, toxic and Oxygen hazards in potentially hazardous areas, XCD offers ease of operation and a low cost of ownership. Simple one man operation permits non intrusive configuration of the device, helping to reduce ongoing maintenance requirements.



Honeywell Analytics - Experts in Gas Detection

Made in Korea!



MED approval (MED-B-6360)

Fixed Gas Detection

Our fixed range of gas detection products is suited to all types of applications and industries; from high functionality devices to low-cost systems ideal for the compliance market.

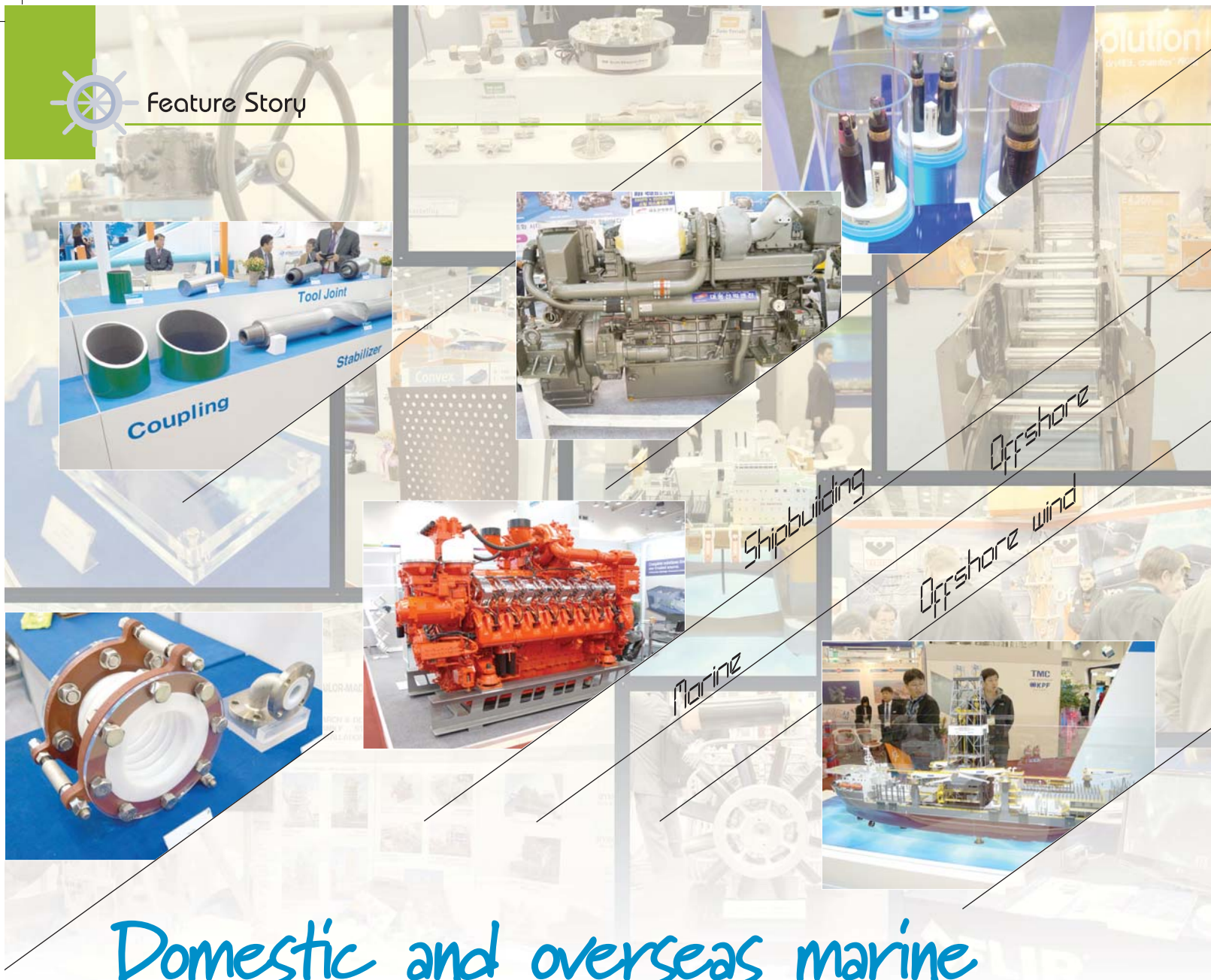
Toxic Gas Detection

Our toxic gas detection systems offer unrivalled sensitivity combined with flexible functionality to support a comprehensive array of gases including exotics.

Technical Services

From calibration work and maintenance to full end-to-end support, our technical services and additional support options provide expert assistance to ensure maximum up-time of your equipment.

Honeywell



Domestic and overseas marine equipments brought under one roof

- A glance at 'Marine Tech Korea 2012' and 'Offshore Korea 2012' in shipbuilding and offshore sectors

The enthusiasm heightened in the shipbuilding and offshore industries. Internationally renowned shipbuilding and offshore exhibitions were held at the same time in Changwon and Busan, South Gyeongsang Province in November. 'Marine Tech Korea 2012' and 'Offshore Korea 2012' attracted huge number of visitors from domestic and overseas shipbuilding and marine equipment industries and prominent domestic shipyards. Thousands of people visited the show site despite the cold weather. These exhibitions drew many companies from various sectors, such as shipyards, marine equipment manufacturers, ship owners, equipment and facility businesses, etc., providing an insight into the status and future of domestic shipbuilding industry.

CSP Co., Ltd.

- Glass-Fiber Reinforced Epoxy Pipe

CSP is a specialized company in the advanced composite material pipes & vessels. CSP satisfy customers with persistent R&D and lower costs in the field of pipe & high-pressure vessels made of high strength and light composite materials based on the plentiful experience and the technology in defense industrial field accumulating in Daewoo advanced Composite Material Center (DACC).

GRE pipe is made of Glass-Fiber Reinforced Epoxy developed through the filament winding method of high strength glass-fiber bound with epoxy resin.

Because of the excellent anti-corrosion property, high strength, lightweight, long durability and other merits, it is used as an Advanced Composite Material Pipe in various industrial fields of shipbuilding, offshore, marines, power plant, chemical and other plants.



GRE pipe of CSP, which was successfully localized

Especially GRE pipe is selected for the corrosive liquid system requiring excellent anti-corrosion and high strength. Also, an economic installation is possible without limitation in various environment conditions of underground laying, ground piping, underwater piping and others. (Marine & Offshore: Ballast, Seawater, Bilge, Cargo System etc.)

Daedong Marine Tech Inc.

- Diesel engine for small-to-medium sized ships

Daedong Marine Tech (DMT) supplies the diesel engine and power generator which were developed through technological collaboration with Hyundai Motor.

DMT's eco-friendly diesel engine, which is suited for targeting the low carbon emission green market, is considered an ideal diesel engine for small-to-medium sized ships in this era of high oil prices.

DMT showcased new products such as 'DD6CC 500PS/550PS 2000RPM' and 'DD4BB 80. 4000RPM' model which was launched as the engine for the Korea style V drive leisure boats, etc. Particularly, 'DD6CC 500PS/550PS 2000RPM' diesel engine is a marine engine developed by localizing the steel piston.

Currently, DMT has the excellent cooling technology, the core technology for marine engine, and the high speed engine technology which is an essential requirement for modern ships, and has expanded the export of its marine engines to about 20 countries worldwide.



Diesel engine for small-to-medium sized ships - DD6CC 500PS/550PS 2000RPM



IZUZU Marine Engine supplied by DMT to the domestic market



Daekyung Co., Ltd.

- Headroom Hoist/Electric Chain Hoist & Trolley

Daekyung specializes in manufacturing top quality hoists for various industries, especially marine & shipbuilding, in Korea. With its excellence in product quality and service, Daekyung has been supplying hoists to following top leading ship-builders since 1978.

Daekyung hoists are produced and marketed under the trademark name Black Bear Hoist in Korea. To further expand the sales market, DKI (formerly known as OTC) was established. DKI is in charge of all foreign operations and sales for Daekyung.

Daekyung exhibited various products such as Lever Hoist, Chain Block, Trolley, Low Headroom Hoist, Electric Chain Hoist, etc., in Marine Tech Korea 2012. Particularly, the Low Headroom Hoist of Black Bear Hoist combined the chain block and trolley and was designed to be suitable for the space with low ceiling height.

This hoist can lift the load to the maximum height by attaching the additional chain sheave to the chain block. It is suitable for the environment where the transport of loads is difficult due to the low height between the floor and beam. In addition, it can endure the load up to 30 tons and applies the hook rotating 360°, thus suitable for the environment on board the ship when the precise transport is required.

Moreover, the up-to-date Electric Chain Hoist was designed to have a closed structure to perfectly protect major components, such as gear and electric parts, from dust and mois-



Low Headroom Hoist of Black Bear Hoist



Chain hoists of various forms, displayed in the booth.

ture. The trolley, which is fitted with the inverter controller and electronic overload-prevention sensor, enables precise movement and speed adjustment.

FLIR Systems, Inc.

- Thermal imaging camera

FLIR Systems has over a half century history and experience in the thermal imaging camera technology and currently specializes in thermal imaging systems. It has established a leading position in terms of design, manufacturing, and sales of various thermal imaging and measurement solutions in the global market. In the Offshore Korea 2012, FLIR Systems showcased the recently launched PT-602CZ which attracted the attention of visitors.



Thermal imaging camera - PT-602CZ

The PT-602CZ multi-sensor is equipped with a highly reliable, mid-wave, cooled detector which offers mid- to long range detection in all weather conditions. The thermal imaging camera offers a continuous optical and electronic zoom. This offers excellent situational awareness while also giving the possibility to zoom in at suspect activities, and have a closer look, once they are detected.

The PT-602CZ precision pan/tilt mechanism gives operators accurate pointing control while providing fully programmable

scan patterns, radar slew-to-cue, and slew-to-alarm functionality. The multi-sensor configurations also includes a day/night 36x zoom color CCD camera on the same pan/tilt package. The PT-602CZ can be integrated into existing networks or used as a stand alone unit.

Higen Motor Co., Ltd.

- Explosion-proof & Deep sea water pump motor

Higen Motor, a leader in the fields of servo motor and controller capturing 25% share in the domestic market for industrial motors, showcased the state-of-art products which were developed through the localization of servo motor and servo drive. Higen Motor's effort to target the shipbuilding and offshore sectors culminated with its launch of 'Explosion-proof motor' and 'Deep sea water pump motor'.

The motor shall be built in an explosion-proof structure to withstand the explosion pressure and to prevent the flame to spread out to flammable gas outside the frame when any abnormal internal explosion incurred by any explosive gas permeated inside the frame.

- Should withstand any pressure developed by internal explosion.

*- Explosion flames should not spread outside of the frame.
- The surface temperature of motor should be lower to prevent any ignition of the ambient flammable gas.*

The deep sea water pump motor with the power output of 1250 kw was designed to have a vertical structure that directly connects the pump and the upper side, and is made of special stainless steel (super duplex) that provides perfect protection against corrosion. Particularly, it is distinguished for oil circulation structure inside the frame, interception of water pressure exerted from outside, and prevention of moisture caused by the difference in temperature between the inside and outside of the motor.



Explosion-proof motor



Deep sea water pump motor



Jeonghwa Accommodation system Co., Ltd.

- Marine furniture

Jeonghwa, which has a history dating back 3 decades, specializes in ship's wooden furniture. Jeonghwa is making its great endeavor to meet customer's needs with the best quality and design in continuously growing wooden furniture market for ship. According to order-based production, Jeonghwa carries out its R&D process to provide standardized furniture and to meet all customer's need with open mind. Based on deep understanding on normal furniture and color as well as R&D process, it carries out research on new design and materials. Also, Jeonghwa is recently heading to high-class furniture and interior area aiming cruise market.

Wooden furniture for ship is manufactured by order-based with many item types and to be solid and strong against weather changes which are different from mass produced normal furniture. Therefore Jeonghwa uses the strictly selected quality materials and manufactures wooden furniture and various inventories installed in cabins.

The cabin is to be place where crews can live comfortably and conveniently. Based on accommodation interior work



Wooden furniture by Jeonghwa

experiences for 200 ships, it carries out various processes such as joiner working, paneling, furniture installation, final, etc by skilled human resource to create customer satisfaction.

JFS Industries Co.,

- 2 Component spray coating system

JFS Industries showcased the paints and anti-rust paints for ships. Both MixCoat™ Flex and MixCoat™ Spray system incorporate the mixing technology of Sulzer Mixpac and are the cost-effective solutions that enhanced productivity and reduced labor costs. Particularly, MixCoat™ 2-K (2 liquid type) Coating System resolved the problems involved in manual works - such as the waste of paint, low productivity, limited working space - when the current 2-K anti-rust paint is used, thus assuring the safety of overall processes and paint quality, and is suitable for the coating works for ships, pipelines, steel structures, trains, aircrafts, etc.

The portable MixCoat™ Spray system is ideal for small to medium sized, 2-component maintenance or repair jobs.



Demonstration of MixCoat™ Spray system

This self-contained system requires only a pressurized air connection. The integrated air flow and dual stage trigger makes the system unique and user friendly. The dual stage trigger allows atomizing air to flow first to the nozzle and then to initiate material flow from the cartridge.

JM Instruments Corp.

- Sextant, Binocular, Salinity/Combustible meter

JM Instruments specializes in the supply of measuring instrument, test equipment, surveying instrument, etc., which are used in all industrial fields. In Marine Tech Korea 2012, JM Instruments showcased a variety of portable measuring instruments.

SSM-21P, manufactured by the Japan-based TOA-DKK, is a portable salinity meter for conveniently measuring the concentrations of 3 types, such as salt concentration, sodium chloride concentration and electric conductivity on the external surface of ships and offshore facilities. Particularly, it is a highly user-friendly product for inspecting the resistance to corrosion caused by seawater and is the only portable product conforming to the international standards.

Additionally, MS-833/733 is an economy type but full size sextant. It has many of the advanced features of more expensive sextants. Built to rigid specifications and engineered for quality, the MS-833 professional marine sextant is the most popular sextant TAMAYA offers. Particularly, MS-733,



Portable salinity meter 'SSM-21P'



MS-733 Sextant

designed as an optical system, is the sextant providing the best quality recognized by the experts in the offshore sector.

KROSYS Inc.

- Fresh Water Generator

Ever since its establishment in 1984, KROSYS which specializes in membrane-based separation technologies, has become the industry front-runner that sets the standards for membrane applications including seawater desalination, drinking water production, wastewater treatment and other highly sophisticated fields of separation and purification technology.

This model of Fresh Water Generator (FWG) is specially designed and tailored to the pride and conveniences for the offshore. No details will be overlooked on this system that comes with features, for example easy master control, duplex, 316L stainless steel piping connections, use of reliable components including high pressure pump and membranes from renowned manufacturers.

Basic FWG has the following production capacity. For bigger capacity, KROSYS engineers can work with users to meet



Fresh Water Generator

any special requirements. Major offshore references:

- Ah-Yang accommodation barge constructed by Daewoo Shipbuilding & Marine Engineering
- Gulmar Da Vinci (DSV, Diver supply vessel) constructed by Hanjin Heavy Industries & Construction
- Doo-Sung Semi-submersible drilling rig constructed by Daewoo Shipbuilding & Marine Engineering



Mesco Ltd.

- Satellite communication equipment

Mesco supplies the communication and navigation equipment through the technology exchange with the world's leading manufacturers of equipment related to ships and the service companies. In Marine Tech Korea 2012, Mesco showcased the SAILOR® 500 Fleet Broad Band, the satellite communication equipment for ships, manufactured by the Denmark-based Thrane&Thrane.

SAILOR® Fleet Broad Band is the new benchmark for broadband internet at sea and standard IP applications. With the launch of SAILOR® Fleet Broad Band reliable high-speed IP communication now becomes available to all vessels, providing broadband data and voice simultaneously on the latest generation of Inmarsat satellites.

- Background IP connection for e-mail and internet/intranet access including secure VPN capabilities
- Streaming IP (Quality of Service for data sessions or applications requiring a dedicated bandwidth of 8, 16, 32, 64, 128 or 256 kbps)
- ISDN 64 kbps
- Telephony and data simultaneously
- Remote Access to the terminal and on board systems from shore
- Local Exchange - up to 16 IP Handsets manageable directly by user terminal, each with its own extension number

Mesco showcased a variety of essential equipments for the shipbuilding and maritime applications, such as GMDSS



SAILOR® 6000 GMDSS Console

(Global Maritime Distress and Safety System), BNWAS (Bridge Navigational Watch Alarm System), and loading computer, in addition to SAILOR® 500 Fleet Broad Band.

Particularly, SAILOR products have become almost synonymous with GMDSS. Thus, more than 1/3 of all commercial vessels covered by the international conventions have already chosen the high quality products and service that the SAILOR® brand provides.

SAILOR GMDSS products and consoles not only fulfill the IMO requirements, they are also a sound investment in the future. The SAILOR GMDSS consoles provide a large number of attractive conveniences and safety facilities - either as complete solutions or as stand-alone products.



SAILOR® 500 Fleet Broad Band

Taegwang Heavy Industry co., Ltd.

- Waste Heat Recovery Chiller

Taegwang Heavy Industry (THI) showcased the eco-friendly waste heat recovery chiller (WHRC), developed by its own technology, while actively targeting the global ship owners, shipyards, and officials related to ships. Along with that, THI presented large salvage crane suitable for use in the offshore plant sector, installation technology, fishing boats, special

crane for salvaging the yachts, etc.

THI's WHRC recovers the waste heat from marine engine and instantly cools the recovered heat



Waste Heat Recovery Chiller, developed by THI

down to -20°C using the special heat exchange system. It can be applied to the area that requires HVAC (Heating, Ventilation, and Air Conditioning), such as the freezing/refrigerated storage of fish, refrigerated food storage, cabin air-conditioner, etc. THI's WHRC, which use the waste heat as energy source, is a breakthrough product that obviates the

need for supplying the fossil fuel (electricity, oil) to activate the mechanical compressor in existing freezers. THI's WHRC already completed the test successfully, fitted to the fishing boats of the Canada-based Clearwater and Spain's Celero Fishing Boat Association.

Mixpole Co., Ltd.

- Network camera for imaging security



AXIS Q6032-E PTZ dome network camera



Real-time Video Enhancer - WiseCon Video Enhancer System



Network camera products of AXIS

AXIS Communications launched the world's first network camera in 1996 and is at the forefront of the shift from the analogue to digital technology. Currently, Mixpole is supplying the imaging security solutions such as network camera, video encoder, application SW, etc., the flagship products of AXIS, which are suitable for the shipbuilding and marine applications.

AXIS product range includes about 40 types of products such as the fixed type, fixed dome, rotation type, integrated network camera, thermal imaging camera and has wide-ranging applications in the production line and process remote monitoring, manufacturing automation system efficiency improvement, accident detection, etc, which are the imaging security solutions for all industries.

The imaging security solution of AXIS uses the ETRAX® and ARTPEC® chip, the core technology. Moreover, the network technology of AXIS provides improved capabilities such as

the motion detection, PoE(Power over Ethernet), HDTV, two-way audio, heat detection, etc.

AXIS Q6032-E PTZ dome network camera attracted attention in Marine Tech Korea 2012. This outdoor-ready dome network camera is suitable for use in demanding environment such as sea, polar regions, etc., and is integrated into a single unit with the housing, allowing for quick and easy installation in security and surveillance application environment.

Particularly, IP66-rated AXIS Q6032-E does not require the external housing and therefore is cost-efficient, and has the Arctic Temperature Control to ensure that the camera operates even at 40°C (-40°F). Additionally, the PoE controls the image, pan, tilt, zoom, and supplies the power, and requires only one cable, thus making the installation easier. The camera using the high PoE can connect the network to the uninterruptible power supply (UPS) and therefore can operate even during a power outage.



Parker Hannifin Korea

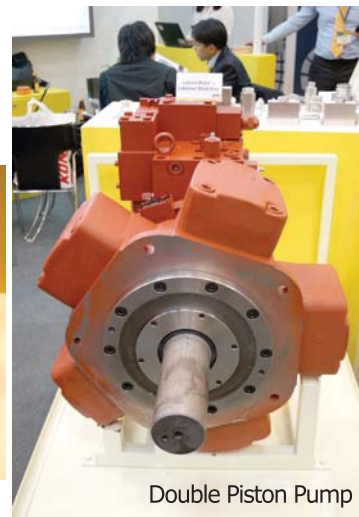
- Solutions targeting the oil & gas sectors



Sub-sea Power Cable, Tube Fitting, Quick Couplings



Calzoni Motor + Lokomec Block A'ssy



Double Piston Pump

Parker Hannifin Korea, a leader in the motion & control, showcased various products, such as precision cooling, hose, hybrid valve, tube, filter, calzone motor, etc., which targeted the oil and gas sectors, during the Offshore Korea 2012.

Specifically, Parker Hannifin Korea supplies safe and cost-effective solutions in 7 sectors: automation, climate & industrial controls, fluid connectors, hydraulics, instrumentation, etc. In the fluid connector sector, Parker Hannifin Korea supplies hose system for high pressure to the oil and gas market. Its fluid connectors have excellent flexibility, enabling the safe and cost-effective use of methanol used to cause the pres-

sure necessary to push up the oil from deepwater. Along with that, Parker Hannifin Korea supplies the next-generation water pressure pump and motor in the hydraulics sector. This new H1A axis piston pump made up the perfect hydrostatic transmission.

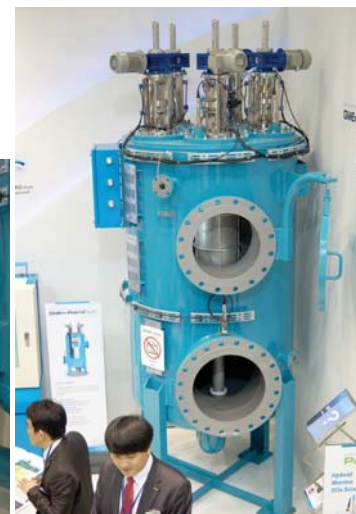
Also, Parker Hannifin Korea presented various hydraulic and pneumatic quick coupling products made of different materials, which ranged in size from 1/8 to 2-1/2 inches. Moreover, Parker Hannifin Korea showcased a variety of hydraulic products, such as flange, valves, tubing, etc., which incorporated the excellent technology and extensive experience of the company.

PANASIA Co., Ltd.

- Green Technology: GloEn-Patrol™

PANASIA showcased GloEn-Patrol™ and De-NOx SCR system, the BWTS (Ballast Water Management System) incorporating its leading green technology, during the Offshore Korea 2012.

PANASIA successfully commercialized its BWTS in December 2009. GloEn-Patrol™, the BWTS, developed by PANASIA, is a 100% physical treatment system based on the



GloEn-Patrol™ GIII by PANASIA

filter and UV sterilization technology. It is an eco-friendly product that prevents secondary contamination and corrosion of hull and suppresses sediment buildup. Furthermore, it has the advantage of simple installation and easy maintenance and repair. PANASIA's GloEn-Patrol™ recorded new orders for 124 vessels and delivery of 35 vessels last year (cumulative orders standing at 171 units, along with the delivery of 47 units, after commercialization).

In SMM held in Germany this year, PANASIA announced small-footprint GloEn-Patrol™ GIII, the Generation III fitted

with MEGA filter and MEGA UV unit. These ballast water treatment systems have a capacity of 3000m³/hr (filter) and 1500m³/hr (UV unit), respectively, which is more than twice the capacity of existing products.

PANASIA is one of the front line developer in the technology in De-NOx SCR system for Marine application based on the over 20 years marine industry experienced and it has a wide range application such as 2 stroke main engine, 4 stroke generator engine and boiler to ensure compliance of IMO Tier III Nox emission standard.

Ra In Ho Co., Ltd.

- World record 43,200 ton transfer system

Ra In Ho, which participated in the Offshore Korea 2012, is the only domestic company competing with global companies in the field of transporters used to transport loads such as ship parts and modules, etc., at shipyards. It has supplied its transport systems to many domestic and overseas shipyards, including Hyundai Heavy Industries (HHI), Samsung Heavy Industries (SHI), SPP shipbuilding, Sungdong, Sekwang and others, and has carved out the largest share of domestic market.

Ra In Ho obtained ISO9001 and ISO14001 certifications in 2003 and was named the INNO-BIZ, and has treaded a fast growth path. Particularly, Ra In Ho created the world's largest transporter capable of carrying 1,050 tons of ship blocks in 2009, proving its technological prowess.

The mainstay products which Ra In Ho manufactures and supplies include Ship Section Carrier (SSC), Module Transporter (MTP), Rail Transporter (RTP), Load Out System, Coupling System, etc.



Module Transporter by Ra In Ho

In particular, SSC is an individually operated equipment usually driven by one engine (for capacities of max. 600 ton) or two engines (for capacities of 500 ton upwards). Transporters are equipped with one or two cabins located beneath front and rear and of the equipped with one or two pre outfitted blocks in case of single operated transportation, or for very big ship blocks while creating a coupling system with other transporter models of SSC or MTP.

Ra In Ho has proceeded with multifaceted business strategies targeting overseas markets until recently, and is expanding into overseas markets such as China, India, Vietnam, Brazil, etc. Additionally, the company set up a subsidiary specializing in the parts, lease of transporters and after-sales-services as part of effort to make another leap forward.



Ra In Ho's booth in the Offshore Korea 2012



Pentair Valves & Controls

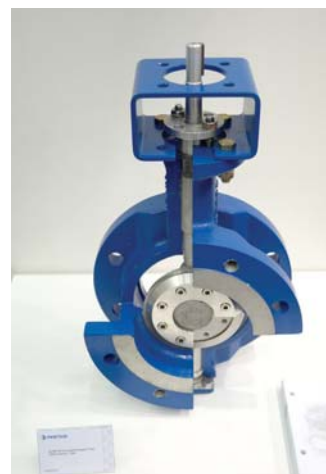
- Expansion into the oil & gas markets

Pentair Valves & Controls is a joint formed by Pentair and Tyco Flow Control to create the synergic effects between the offshore sector and oil & gas sectors. Before Pentair Valves & Controls was established, Tyco Flow Control launched a new project management center in Houston, United States, to cope with the growing requirements of customers in the oil and gas sectors.

Pentair Valves & Controls is one of the world's leading manufacturers and marketers of valves, actuators and controls, providing market-leading products, services and solutions, for the most challenging applications throughout oil and gas, power, mining, chemical, food and beverage and building and construction industries. Particularly, oil and gas operations are complicated by environmental concerns, remote and harsh environments, geo-politics and government regulation. Pentair has the experience, knowledge, products and solutions to help meet these challenges.



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30,000 Series double flanged triple offset valve

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- BIFFI : Double acting and spring return electric, pneumatic, hydraulic, electro-hydraulic, gas-hydraulic and sub-sea actuators with customized control systems

S-WIN Co., Ltd.

- OilZero Module & Deliquescent Air Dryer

S-WIN have many products as a venture business, which are Deliquescent Dryer, instrument & control automation system, water model simulator, acryl fabrication, air spindle and electric furnace.

The deliquescent air dryer, which was showcased by S-WIN during the Marine Tech Korea 2012, attracted much attention from visitors. The unpowered deliquescent air dryer operates by utilizing a desiccant to absorb the moisture in the compressed air without the need for a powered mechanism, eliminating the need for complex maintenance and enabling any operator to install and run the air dryer.

The only maintenance required is the refilling of the desiccant approximately 2~3 times per year by checking the level via the sight glasses on both sides of the vessel. In addition, the deliquescent air dryer solves the problem of secondary condensation occurring in units where the process takes place



OilZero Module

more than 100 meters from the machine room and external moisture infiltrates into the piping due to the molecular pressure difference within and without the piping (pinhole effect). Besides, Oilzero Module was presented. The Oilzero Module is a specially engineered compressed air filter for virtually eliminating oil and lubricant carryover, while drastically reducing the pressure drop associated with traditional coalescing filters. Each OilZero filter has a long-lasting element that uses the principles of Brownian Motion and depth of penetration to minimize pressure loss and remove oil.

Ship repair professional information management solution Poseidon 3.0



Poseidon 3.0

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5. Thorough accounting management
6. Its accumulated technology Know-How
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10. Android App interlocking

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M/MG Series



BX Series



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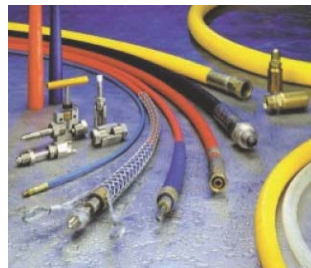
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Industrial Hose



High Pressure Hose



Multitube



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Mooring Line



Umbilical & Cable



Quick Coupling



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ENGINEERING YOUR SUCCESS.



HHI developed the world's first dual fuel engine package

LNG engine has been thrust into the limelight as the global environmental regulations are tightened up. Hyundai Heavy Industries (HHI) developed the world's first dual fuel engine package for ship. This engine package can selectively use the liquid fuel and gas fuel and has enhanced the cost-effectiveness and convenience in operation.

HHI held a demonstration of this dual fuel engine package in conjunction with the large-scale dual fuel engine (2-stroke), dual fuel HiMSEN engine (4-stroke), and LNG fuel supply system (Hi-GAS) in the presence of approximately 30 delegates from clients, including the ship owners, classification societies, shipyards and others in its Ulsan Headquarters.

This large dual fuel engine, which is used to propel the ship through the water, was jointly designed and produced with the Denmark-based MDT. However, the dual fuel HiMSEN engine for ship and power generation and LNG fuel supply system were developed independently by HHI.

The large-scale dual fuel engine for the propulsion of ship requires 35,600 horse power and can selectively use the liquid fuel and gas fuel as necessary. It can reduce the exhaust gas emissions and provide the same performance as diesel engine, thus decreasing the environmental impact and maximizing cost-effectiveness. Dual fuel HiMSEN engine with a capacity of 5,150 horse power, which recently received the final type approval from the classification society, also successfully completed the test that was performed in conjunction. Meanwhile, the LNG fuel supply system was



designed to ensure stable supply by compressing the LNG, which is cooled down to extremely low temperature of -163°C , to up to 300bar(atmospheric pressure=1 bar).

Particularly, the dual fuel engine package can be applied to nearly all commercial vessels, such as LNG carriers, oil tankers, containerships, etc., and therefore is expected to fulfill the requirements of ship owners in such a way that complies with the rigorous environmental standards. HHI plans to commercialize this dual fuel engine package December

this year upon completion of the test for the final type approval.

The market for LNG-powered engine system is expected to expand gradually as the regions designated as the SOx emission control area - such as United States, Norway, Europe, North Sea - are expanding with the IMO Sox regulations slated to come into force in 2015.

Lee Tae-yeong, Managing Director (Engine Sales Division) of HHI, said, "We are receiving many inquiries from customers since we established the infrastructure for the production of dual fuel



HHI held a demonstration of its large-scale dual fuel engine, LNG fuel supply system(Hi-GAS), and dual fuel HiMSen engine at its Ulsan Headquarters.

engine package solution that provides the best performance, as well as the production of engines. We will be also better positioned to win new shipbuilding orders when the IMO regulation comes into force.”

HHI, the world's largest maker of marine engine, has captured 30% share in the global market. In September 2007, it established a joint venture in Yeongam, South Jeolla Province, with the Finland-based Wartsila to manufacture medium-sized dual fuel engine(4-stroke). ⚓

Emerson releases DeltaV™ Version 12 process automation system

Emerson Process Management has announced a major new release of its DeltaV digital process automation system. New features in DeltaV™ Version 12 (v12) build on the system's ability to help users simplify complex operations for increased productivity and value.

Key features in the new release include the recently announced expansion of Emerson's innovative electronic marshalling, combining the proven performance and reliability of the DeltaV Safety Instrumented System (SIS) with the installation flexibility and space savings of its Electronic Marshalling technology. This new SIS offering greatly simplifies design, installation, wiring and commissioning of SIS projects, while at the same time increasing capacity and reducing footprint.

Based on human centered design (HCD) principles, the new logic solver architecture uses Electronic Marshalling and characterization module (CHARM) technology to eliminate the need for conventional marshalling, which simplifies both installation and commissioning processes.

The v12 release also includes integrated virtualization technology which enables users to easily consolidate computer resources and reduce implementation and maintenance costs. DeltaV Virtual Studio makes it easy to create virtual DeltaV systems from pre-built templates and preconfigured virtual networks. The v12 release can also allay users' growing systems security concerns. The new Emerson Smart Firewall product in v12 allows users to easily set up a safe and secure network for the automation system, locking down the the control system network against unauthorized downloads and hacking without costly consulting from security experts.

For process industry users who produce in batches, the v12 release includes an easy-to-use analytics application that provides real-time quality predictions while the batch is in process. Using sophisticated models, it can trace the causes of manufacturing variations that can render a product below specifications or unmarketable. The application can help users correct manufacturing problems before the batch becomes irreparably compromised.



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SHI set up an offshore engineering venture in the United States

Samsung Heavy Industries (SHI) and Samsung Engineering joined hands to set up an offshore engineering joint venture in Houston, United States together with a U.K.-based engineering company. This joint venture will undertake the FEED, detailed design, etc., for offshore production facility projects. As a result, SHI will expand its capability to carry out EPCI projects and be better positioned to win new orders.

SHI and Samsung Engineering announced that they would establish an offshore engineering joint venture in Houston, United States through the joint capital investment with the U.K.-based AMEC.

This joint venture was named, 'AMEC Samsung Oil & Gas, LLC'. Samsung will hold 51% stake (51% owned by SHI, and 49% owned by Samsung Engineering), and the remaining 49% will be held by AMEC. At the incipient phase, the joint venture will be staffed by 100 technicians and engineers dispatched from the 3 companies. AMEC is a world's leading engineering company along with the U.S.-based Mustan and Norway-based Aker Solution. Particularly, AMEC carried out basic design (FEED: Front-End Engineering and Design), detailed design, project management, etc., in many offshore development projects driven forward by world's oil giants such as Shell, BP, Conoco Phillips, Petrobras, etc.

For SHI, this joint venture represents a significant step forward in expanding the business capabilities to better fulfill the demand in the fast-growing offshore plant market, according to the industry sources. Specifically, this joint venture will play a key part in the FEED and detailed design for the offshore production facility projects to be awarded to SHI in the period ahead. In addition, this joint

venture will give SHI the capability to carry out EPCI (Engineering, Procurement, Construction & Installation) projects.

SHI aims to develop this joint venture into a specialized engineering company capable of undertaking the topside FEED and detailed design for offshore plants.

Moreover, the number of employees in the joint venture will increase to approximately 500 by 2018 through direct recruitment.

Douglas-westwood, a market research organization, predicted that the investment in the floating production facilities would reach USD 91 billion over the next 5 years, and furthermore, approximately 120 offshore production facilities would be built with investment by 2017.

Considering that, SHI is focusing on strengthening its sales capability in the offshore plants, including the drillship, and exerting effort to secure offshore plant production infrastructure such as the offshore floating dock. Additionally,



Gang Seong-yeong, Managing Director of Samsung Engineering, Samir Brikho, CEO of AMEC, and Park Jung-heum, Vice-President of SHI, are shaking hands after signing an agreement to form a joint venture in London on Oct 24 (from the left).

SHI is advancing into the subsea sector - where the crude oil is extracted and transported from deepwater oil fields - to turn itself into a total solution provider for the plant industry that covers offshore and subsea sectors.

An official from SHI said, "We have worked closely with the engineering companies that have global capabilities in our attempt to cope with the expansion of offshore plant market, and our efforts have paid off. This joint venture will allow us to achieve the EPCI capability for large-scale offshore production facilities and put ourselves in a better position to win contracts." 

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Korean shipyards retain top spot

Korean shipyards won new orders worth a combined USD 18.9 billion from January to September this year, reaffirming the Korea's status as the world's largest shipbuilding country. Particularly, Korean shipyards showed strong performance in the field of high value-added vessels and offshore plants related to resource exploitation and transportation.

The Ministry of Knowledge Economy (MKE) announced that the domestic shipyards won a combined 5.2 million CGT worth USD 18.9 billion which accounts for 36.3% of new orders placed worldwide until the third quarter of this year, thus maintaining the top spot in the global shipbuilding industry.

Despite the 58.6% year-on-year decline in new order intake due to the sluggish shipbuilding market conditions, domestic shipyards maintained the leading position in the field of high value-added vessel, such as tankers, gas carriers (LNG carrier, LPG carrier, etc), and offshore plants (drillship, FPSO, etc) which are related to the resource exploitation and transportation and retained the top spot in terms of new order volume and total order value. The cumulative new orders placed worldwide stood at 14.34 million CGT as of the third quarter, a 48.1% decrease compared to the same period of previous year, amid the glut of vessels and the prolonged global recession.

Based on the type of vessels, new orders for containership, bulk carrier, and LNG carrier plunged sharply compared to the previous year. New orders for tanker, offshore plant and support vessel, etc., were kept at the previous year's level, while new orders for LPG carrier increased. Meanwhile, the newbuilding price index stood at 127.1 points (as of August, 2012), falling for 14th consecutive months.

In addition, the volumes of ships built worldwide decreased 5.7% year-on-year to 37 million CGT in the same period, and as a result, the order backlog continued to decline. The global order backlog stood at 96.54 million CGT as of late September 2012, a 24.8% decrease compared to 2011.

Dominating the drillship sector with technological competitiveness

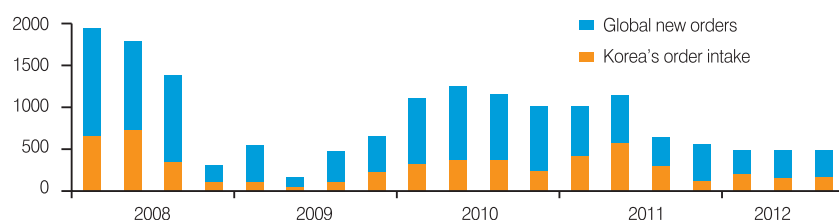
Domestic shipyards won a combined 5.2 million CGT which comprises 36.3%

of new orders placed worldwide until the third quarter of this year. Also, they swept all new global orders for FPSO (1 unit, USD 2 billion), CPF (1 unit, USD 2.7 billion), FSO (1 unit, USD 430 million), FSU (1 unit, USD 250 million), LNG-FPSO (1 unit, USD 770 million), and LNG-FSRU (1 unit, USD 280 million).

In addition, domestic shipyards swept all new global orders for drillships (15 units, USD 8.2 billion, except the orders for 15 drillship which the Brazil's ship owners placed at Brazil's domestic shipyards) and LNG carriers (13 units, USD 2.7 billion, except the orders that Chinese and Japanese ship owners placed at their own domestic shipyards), along with approximately 70% of all new global orders for LPG carriers and approximately 55% of new orders for tankers placed worldwide, thus reaffirming Korea's status as world's largest shipbuilding country. Particularly, new orders for offshore plants rose sharply to account for approximately 70% of total new order value.

Meanwhile, domestic shipyards' export fell 28% year-on-year to approximately USD 32 billion this year. The decline in the export is due to the decrease in new order volumes and low price of vessels, most of which were ordered when the shipbuilding market was reeling from global financial crisis that began in 2008.

(Unit: 10,000 CGT)



Global new order placement and domestic order intake by quarter after 2008 (Source: Clarkson)

Hammelmann High pressure systems in the Marine, Oil & Gas industry

High pressure pumps – Cleaning systems - Process pumps

Founded in 1949 Hammelmann has decades of experience in the development and manufacture of high pressure systems for all branches of industry.

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
- Removing burnt primer from weld seams
- 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.

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Pressures up to 4000 bar



Process pumps

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Typical fluids

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





LS Cable & System secured a USD 435 million submarine cable project

LS Cable & System broke its own record that it set in 2008 in winning new contracts for power cable nationwide, thus proving its technological prowess in the submarine cable sector. This new contract is significant, considering that LS Cable & System beat prominent overseas competitors to win this contract and will supply the submarine cable developed by its own technology.

The submarine power cable, the most technology-intensive product in the cable sector, enables power transmission between countries or between main land and islands, and has seen a soaring demand every year in relation to the electrical power-related policies among countries, offshore wind power generation, nuclear power plant projects, etc.

LS Cable & System announced that it received LOA (Letter of Award) from Qatar Petroleum in October for a contract worth USD 435 million to supply the submarine cable. That represents the largest single contract ever awarded to a domestic company for the supply of submarine cable and is the largest power cable export contract in history.

This project involves the installation of 132kV cable with a total length of 200km over the distance of 100km to ensure uninterrupted power supply between Ras Laffan Industrial City, 80km north from Doha, the Capital of Qatar, and Halul island. This 132kV cable, which consists of 3 core power & optical fiber cables, will be used to transmit 100MW power.

Under this turnkey contract, LS Cable & System will undertake entire construction processes, including the onshore construction in Ras Laffan, delivery and laying of submarine cables, construction of new substation in Halul Island and link-

age to the existing substations.

LS Cable & System was awarded this full turn-key contract encompassing the engineering, procurement, commissioning, supervision, which attests to the company's excellent production technology and ability to carry out submarine power cable laying project.


Significantly, this contract paves the way for a domestic company equipped with its own technology to make inroad into the global submarine cable market which has been dominated by overseas companies.

LS Cable & System won this contract in recognition of its excellent technology and know-how in submarine cable sector, beating the competition from Japanese companies which have extensive know-how in the field of submarine cable, such as JPS, Viscas, etc., and the consortium formed by Nexans and Prysmian, the global leaders.

An official from LS Cable & System said, "Having won this contract, LS Cable & System proved that it is the first mover, not the fast follower, in the global cable market. Our track record in successfully completing major projects both at home and abroad played a key part in winning this contract. We will exert our best effort to actively target global submarine cable market."

Submarine cable of LS Cable & System



The global submarine cable market has witnessed fast growth, expanding twofold from KRW 1.5 trillion in 2008 to KRW 3 trillion in 2011. LS Cable & System has won major submarine cable projects from overseas clients in a row, including the project to lay 20V submarine cable with a total length of 10km which linked the Tidore island and Ternate in the archipelago north of Indonesia and the project to lay the 33kV submarine cable to transmit the power to the island region of Sarawak in Malaysia. Moreover, LS Cable & System completed a turnkey project at the end of previous year which linked the submarine cable from the east of Long Island, New York, to Captree Island for uninterrupted power transmission. 

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A typical movable bridge which benefits from AC drives used with the bridge control system.

Bridging customer needs

- A movable bridge application arises out of embedded control programs in ABB low-voltage drives

Embedded control programs installed in ABB industrial drives provide a cost-efficient and application-specific solution for many of the most common drive applications. From ubiquitous pumps and fans, to more specialized applications like cranes and winches, the embedded control programs ensure that the drives not only speak the right language, but that they are delivered with the builtin functionality that is required to meet the most common customer requirements. These applications are designed and built using ABB's many years of experience of working with customers across a wide range of control applications. Sometimes, embedded control programs can themselves become the basis for new control solutions. This was the case when ABB was asked to provide a solution for a bridge control system.

ABB

Mikael Holmberg, ABB Low Voltage AC Drives Helsinki, Finland

Movable bridges share many common control requirements with materials handling applications like cranes and winches. Therefore, ABB's existing crane control program offered the ideal starting point.

Developed for the ACS800 industrial drives, the crane control program provides step-less speed and torque control for the hoist, trolley and long-travel movements. This is used on:

- Industrial cranes, mainly electrical overhead travelling (EOT) cranes
- Harbor cranes
- Construction/tower cranes
- Marine and deck cranes

The drives with the crane control program can work in either standalone or master-follower mode. In standalone mode, the drive is used simply for independent control of the crane movements. In a master-follower arrangement, several drives are interlinked, with one of the drives operating as the master to the other drives. This allows coordination and load sharing for different types of motors connected to the same system. This configuration can be used in speed-speed, speed-torque or speed-synchro mode.

Embedded control programs installed in ABB industrial drives provide a cost-efficient and application-specific solution for many of the most common drive applications.

The functional programming provides the capability to switch between master, follower or standby mode. This ensures that the master and follower are not fixed, but can be changed at will simply by providing each drive with a selection switch. This provides a high level of redundancy for the crane application.

Antisway control

Complementing the crane control program, the anti-sway control program for indoor cranes using ABB industrial drives provides a built-in solution to prevent load sway. This program estimates the time constant of the hoist by continually measuring its position and load properties, and factors in the swing velocity and angle to calculate the compensating



Figure 1. ABB's ACS800 low voltage industrial drives

speed reference for the long travel and trolley movements of the crane. Because the embedded anti-sway program calculates the sway, no external sensors are needed. Reducing the part count for an effective solution is an added customer benefit.

Using crane control as the basis for winch control

Marine winches have many similarities to cranes when it comes to their drive control requirements. ACS800 industrial drives with marine certification provided the ideal hardware platform, and the crane control program was the perfect starting point, for the creation of a winch control program. These incorporate all the functions usually required for winch applications. The control program is commonly used on anchor winches, mooring winches (auto-mooring), roll-on, roll-off gate ramp winches, towing winches and research winches.

The winch control program provides built-in features that replace traditional, costly hydraulic winch control systems. This eliminates high maintenance costs and performance inefficiencies, while improving operator safety and overall system reliability. The drive itself replaces contactors and other low voltage products used to bring winch motors direct-on-line, instead ramping the motor smoothly to the correct speed/torque. This reduces the impact on the ship's electrical network during winch operation.

The anchor control function provides a perfect example of the winch control program's built-in protection functions. These include slip detection, which detects any high load on the chain should it become snagged when raising the anchor. Such a high load creates a speed difference between the



Figure 2. Waste handling crane

winch drum and the motor shaft and activates a load switch. The speed/torque of the winch motor is immediately reduced to a level set by the winch manufacturer. This prevents damage to the motor shaft, winch drum or clutch between the drum and motor.

Torque control, the common requirement

All these embedded crane and winch control drive applications must fulfil one common requirement - very precise and powerful torque control. The key to the success of the control programs in ABB's industrial drives is the patented direct torque control (DTC) motor control platform. This delivers the performance levels and protection functions demanded by materials handling applications.

Built-in application software provides customers with solutions designed to the requirements of many different installations while speaking the language of their specific application.

In contrast to the way that conventional AC drives control input frequency and voltage, DTC uses motor flux and torque as primary control variables. This allows accurate control of speed and torque with or without pulse encoder feedback from the motor shaft. A key benefit of DTC is that it enables the drive to achieve full torque at zero speed without the need for a feedback encoder. Using a feedback encoder can be a problem on board a vessel as the harsh climate on deck can often damage the encoder itself or interfere with the feedback

signal to the motors.

Furthermore, DTC offers an exceptionally fast response time of 25 microseconds in the control loop between the application (eg, crane or winch) and the motor control embedded in the drive. This is approximately 10 times faster than the typical response time possible through conventional flux vector control.

DTC's ability to work with a wide range of motors helps reduce retrofit costs when upgrading from older control methods. For example, when retrofitting a threespeed/three-winding marine winch with an ABB industrial drive, the existing motor can still be used, and the drive will use only one of the three motor windings. This significantly reduces upgrade costs and downtime.

Embedded software comes with the benefits of adaptive programming which enables the user to integrate external control logic, create new functions or to modify existing logic.

DTC, in combination with the embedded control programs, enables the customer to specify a single product with the control solution built-in. No other control components are required, saving on overall systems costs as well as increasing reliability by reducing the number of possible failure points.

DTC: heart of the movable bridge control system

Building on the extensive experience gained from the crane and winch control programs, ABB developed a movable bridge control application featuring ABB industrial drives. These drives feed power to the electric motors which drive the span or deck of the bridge and control the bridge's mechanical disk or drum brakes.

They are increasingly being used on a variety of movable bridges, either as part of a new build or in a refurbishment or renovation program and tend to replace hydraulic drives or DC drives operating with DC motors.

The drives provide step-less, variable speed and torque control for the electric motors that are used to either lift or turn the deck around its axis, over a wide range of operating speeds and loading. They can positively control the speed of an AC

DTC, in combination with the embedded control programs, enables the customer to specify a single product with the control solution built-in, saving on overall systems costs as well as increasing reliability by reducing the number of possible failure points.



Figure 3. harbor grab crane

motor when the motor is being driven, or back-driven or overhauled, such as when a span heavy bascule or vertical lift bridge is being lowered. The control program, along with DTC, ensures accurate control of speed and torque with or without pulse encoder feedback from the motor shaft. It provides the accurate slow speed control with high torque levels essential for bridge applications.

Bridge control applications

In a movable bridge, when several drives are connected to the same system, the master-follower drive arrangement can be used. It enables coordination and load sharing for different kinds of motors operating within the system. However, other movable bridge applications require synchronized lifting. Within bridge applications there are two common master-follower control methods.

Follower in torque control mode

If two motors are connected to each other via a mechanical shaft, for instance when two motors are lifting opposite sides of a bridge at the same time, then the master drive is speed controlled. This determines how fast the bridge raises or lowers. The follower is torque controlled which results in the load

being shared exactly between the master and follower.

Follower in synchro control mode

If two motors are not connected to each other, such as when the bridge is designed for each motor to work independently in raising or lowering the bridge, yet at the same time, then the master is speed controlled. This determines how fast the bridge raises or lowers. In this instance, the follower is operated in synchro mode to enable symmetrical lifting. This means that the two parts of the bridge are synchronized to lift at the same time and at the same angle.

Symmetrical lifting with synchro control

Often the drives on either side of the bridge need to be perfectly synchronized when raising the bridge. To ensure the required level of accuracy, a standard incremental encoder

Direct torque control (DTC)

Direct torque control - or DTC - is the most advanced AC drive technology and has replaced traditional open- and closed loop type pulse-width modulation (PWM) drives. It is called direct torque control because it describes the way in which the control of torque and speed are directly based on the electromagnetic state of the motor but is contrary to the way in which traditional PWM drives use input frequency and voltage. DTC is the first technology to control the “real” motor control variables of torque and flux. Because these parameters are directly controlled, there is no need for a modulator - as used in PWM drives - to control the frequency and voltage. This in turn dramatically speeds up the response of the drive to changes in required torque. DTC also provides precise torque control without the need for a feedback device.



can be used to feedback the deck position with respect to each variable speed drive. The encoder is essential in synchronizing the drive, based on the position of the master as measured by the encoder. The synchro control routine, built into the drive's bridge control program, works together with DTC to provide the required level of synchronization. Synchro control can be used on a system with one master and up to four followers.

Electric motor mechanical brake control and torque memory
The bridge control program also features an integrated brake control logic that, in turn, utilizes torque memory and pre-magnetizing to open and close the mechanical brake safely and reliably. The mechanical brake may be inside the motor (disk brake) or outside the brake (drum brake). Alternatively, both can be used at the same time for additional safety. The brake control logic within the drive includes a function that enables the drive to hold the shaft stationary until the mechanical brake takes over. The "slow down" safety control function limits the speed to a preset level in critical zones. High and low limit sensors stop the drive at the end positions. The "fast stop" safety control function is used in emergency situations.

Speed monitor and speed matching

The speed monitor function ensures that the motor speed remains within safe limits to prevent overspeed. The speed matching function continuously compares the speed reference and the actual motor shaft speed to detect any possible difference. One of these functions will stop the motor immediately if a fault should occur in the operation of the motor.


Dedicated, application specific software

Embedded software works together with the advanced DTC platform in ABB's industrial drives to offer significant performance advantages and precise control for a variety of materials handling applications. Not only does it enable many crane and winch control applications to be up and running virtually 'out of the box' it also comes with the benefits of adaptive programming (AP). This enables the user to integrate external control logic, to create new functions or to modify existing logic - for example to enable variable ramp timing during the bridge opening cycle.

Built-in application software provides customers with solutions designed to incorporate the requirements of many different installations while speaking the language of their spe-



Figure 4. Winch - ropes from the dock

cific application. The control program's extensive built-in functionality provides a cost effective solution for customers who are aiming to minimize their use of external discrete components. Through working in close cooperation with customers, listening to their needs and moving in anticipation of market trends, ABB will continue to lead the development of embedded control programs for industrial drives. 

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Wash Primer for LNG Carrier Tank

- Background of developing LNG carrier-use Wash Primer

KCC Corporation

LNG carrier can be classified into several kinds of vessels depending on its type of cargo containment system that stores and carries LNG at ultra-low temperature such as -162°C . It is broadly classified into Moss type in an independent tank form and Membrane type in an integrated form.

Independent tank type consists of cargo tank, part that supports this tank, and hull that is the body of ship respectively. It is advantageous owing to its high resistance to external shock due to the sufficient strength of the tank itself. Meanwhile, the membrane type is intended to attach insulation and membrane that is a thin metal sheet inside the ship's cargo containment system so as to build a dual-structure thermal insulation system. Unlike the Moss type, this cargo containment tank doesn't bear the load but loads the cargo only.

Therefore, the hull structure bears the load directly. Accordingly, it is somewhat inferior to the independent tank type in terms of stability, while less expensive and more flexible in the variation of design than the Moss type. In the LNG carrier market,

Moss type was preferred to from the aspect of stability at early stage, but the trends are shifting into the selection of membrane type from the aspect of economy.

This trend is anticipated to continue and the market is expected to be dominated by the membrane system. Furthermore, Hyundai Heavy Industries (HHI), our major customer, is expected to have increasing demand in membrane type LNG carrier, and thus there has been the requirement of high-strength wash primer that is used for temporarily preventing corrosion inside the LNG carrier membrane tank. The existing wash primer for that purpose has been exclusively supplied by KANSAI, but was localized for the first time in Korea following the joint development with HHI Industrial Technology Research Institute to facilitate a smooth demand and supply in the future.

Wash Primer for LNG Carrier Use

Wash Primer is normally used for the purpose of increasing the adherence of successive painting materials to the metal



Moss Type LNG Carrier



Membrane Type LNG Carrier

Figure 1. Comparison between Moss type and membrane type LNG carrier

Table 1. MARK III M1001 Specification

NO	Item		Target Property
1	Shear Stress	Room temperature	12MPa or more
		Low temperature (-25°C)	10MPa or more
2	Tensile Stress	Room temperature	10MPa or more
		Low temperature (-25°C)	9MPa or more
3	Shear stress after being deposited in sea water		80% of the initial value or more

Figure 2. WASH PRIMER (VP185)

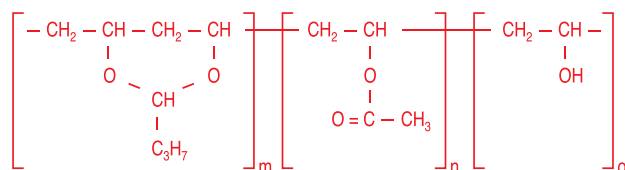


Figure 3. Testing Equipment



material and rust proof function, which is an etching primer consisting of PVB resin, phosphoric acid, and chromic acid pigment.

1) Polyvinyl Butyral (PVB) Resin



2) Phosphoric Acid

It forms phosphate salt film on the steel base surface, increasing the adherence to the base surface.

3) Zinc Tetroxy Chromate (ZnCrO4)

As a rust proof pigment, it forms an immobile layer on the steel base surface, allowing for rust-proof property and increasing the adherence to the base surface.

In order to apply the wash primer to the interior of the LNG carrier membrane tank, it requires the approval of GTT (Gaz Transport & Technigaz) France that possesses the patent on membrane type LNG carrier thermal insulation system. For this, it requires passing the test of MARK III M1001 directly conducted by GTT.

Items to be tested include shear stress and tensile stress tests that are aimed at evaluating the adherence of epoxy mastic and wash primer for the purpose of adhering the insulation inside the tank. Our wash primer (VP185) fully meets the required specification of MARK III M1001 test, and finally acquired GTT certificate. The following is the summary of MARK III M1001 specification. ⚓

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REC-Li200(Li-ion)



출력-112kN, 압착회수-200SQ : 80회

충전식다기능공구
REC-Li200M(Li-ion)



출력-112kN, 압착회수-200SQ : 80회

충전식다기능공구
REC-Li250M(Li-ion)



출력-127kN, 압착회수-250SQ : 50회

충전식다기능공구
LIC-5200MX(Li-ion)



출력-127kN, 압착범위-14-200SQ

충전식유압압착기
LIC-551F(Li-ion)



출력-52kN, 압착범위-10-185SQ, 압착회수-150SQ : 65회

충전식유압압착기
LIC-5510(Li-ion)



출력-106kN, 압착범위-16-400SQ, 압착회수-400SQ : 60회

충전식유압절단기
LIC-S524(Li-ion)



출력-84kN, 절단회수-와이어로프 (6×19)24φ : 65회

충전식유압절단기
LIC-585YC(Li-ion)



출력-80kN, 절단회수-600V-CV150SQ 3심(46φ) : 60회

충전식유압압착기
REC-5150A



고압-700BAR, 전압-DC28.8V, 무게-14kg

충전식유압펌프
REC-P2



출력-90kN, 압착회수-150SQ : 70회

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BP-14LN



타입: Li-ion, 전압-14.4V, 전류-3Ah

충전기
BP-25LNW



충전시간-25분

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600V-CV325mm ²	구리 31mm	90	180
600V-CV150mm ² ×3Core	구리 48mm	47	110
600V-CV500mm ²	구리 38mm	38	110
6000V-CVT500mm ²	구리 45mm	28.3	90
WR150mm ² ×3Core *다중 케이블 비닐 절연체	구리 47mm	47	80
IV500mm ²	연선 구리 35mm	47	140
IV500mm ²	경선 구리 21mm	151	270

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LIC-5431(Li-ion)



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LIC-5630(Li-ion)



출력-60kN, 압착범위-300SQ

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LIC-S540(Li-ion)



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충전유압절단기

REC-S540



출력-70kN, 절단회수-와이어로프
(6×19)22φ : 30회

충전유압절단기

REC-585YC



출력-80kN, 절단회수-600V-CV150SQ
3심(46φ) : 40회

충전유압절단기

REC-530Y



출력-60kN, 절단회수-19φ
ACSR : 160회

충전유압절단기

REC-S3550



출력-120kN, 절단회수-와이어로프
(6×12)30φ : 35회

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REC-Y33



절단회수-600V-WR60SQ
3심(32φ) : 125회

충전식절단기

REC-Y50



절단회수-600V-CV150SQ
3심(46φ) : 47회

충전식절단기

REC-50



절단회수-600V-CV150SQ
3심(46φ) : 47회

충전식절단기

REC-54



절단회수-600V-WR150SQ
3심(47φ) : 45회

충전식절단기

REC-54AC



절단회수-600V-WR150SQ
3심(47φ) : 75회

충전식절단기

REC-85CCP



절단회수-CCP, PEC, PEF(80φ) : 50회

충전유압천공기

REC-55PDF



출력-73kN, 최대두께-SUS 1.6mm

충전유압압착기

ECO-50



출력-52kN, 압착범위-10~185SQ,
압착회수-150SQ : 40회

충전유압압착기

REC-551F



출력-52kN, 압착범위-10~185SQ,
압착회수-150SQ : 45회

충전유압압착기

REC-5431



출력-106kN, 압착범위-16~300SQ,
압착회수-300SQ : 45회

충전유압압착기

REC-5510



출력-106kN, 압착범위-16~400SQ,
압착회수-400SQ : 40회

충전유압압착기

REC-3510



출력-106kN, 압착범위-16~400SQ,
압착회수-400SQ : 40회

충전유압압착기

REC-3610



출력-134kN, 압착범위-16~630SQ,
압착회수-400SQ : 35회

충전유압압착기

REC-5750



출력-60kN, 압착범위-300SQ

충전유압압착기

REC-5630



출력-60kN, 압착범위-300SQ

충전식다기능공구

REC-5200MX



출력-127kN, 압착범위-16~300SQ

충전유압압착기

REC-14M1



출력-19.6kN, 압착범위-2~14SQ

배터리

BP-70EI



타입-NiCd, 전압-DC14.4V, 전류-1.9Ah

배터리

BP-70MH



타입-NiMH, 전압-DC14.4V, 전류-3.0Ah

충전기

CH35EMC



충전시간-25분



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Darchem Thermal Protection

Darchem Thermal Protection is one of number of distinct business units operated by Darchem Engineering Ltd, a manufacturing company based in the North East UK providing solutions for its customer's high temperature problems. Whilst other business units are involved with aerospace, marine, automotive and power generation sectors, Darchem Thermal Protection primarily works for the Oil and Gas and Nuclear industries, supplying passive fire protection, radiant heat shielding and thermal insulation systems.

Darmattech PFP, Inc.



For more than 20 years Darchem has been a preferred supplier of passive fire protection (PFP) and radiant heat shielding to Operators, Engineering Procurement and Construction Contractors (EPCs), and to Original Equipment Manufacturers (OEMs) of flow and process control systems. Darchem PFP systems have been installed on offshore and onshore Oil and Gas installations in all global locations. Where specifications call for Jet Fire protection, a common requirement for offshore productions platforms and

Floating Production Storage & Offloading vessels (FPSOs), or Hydrocarbon Pool fire protection for refineries and petrochemical plants, Darchem can offer Lloyds Type Approval certified solutions to allow critical safety systems to operate throughout a defined time period for controlled plant shut-down in the event of fire or explosion.

Darmattech PFP, Inc. located in Korea, is an exclusive licensee of Darchem Engineering Limited in Asian territory & Australia for Darchem Fire Protection products from year 2003, and Darmattech is successfully undertaking marketing, manufacturing and supply operations of Darchem Products



Girassol FPSO Project

for Oil & Gas installations as well as nuclear fire protection systems toward customers in Korea and other neighbouring Asian countries.

Darchem also has established and is maintaining a Korean local branch office, registered as a Korean company, for the purpose of providing convenient contractual services to Korean clients.

Darchem's PFP and radiation shields systems being supplied and installed to the most of major offshore projects built and procured within Korea such as projects of BP, Total, Chevron, ExxonMobil, Woodside and other global operators. Applications for PFP include protection of valves and actuators and associated controls and instrumentation located within designated fire zones, as well as cable trays, pipe lines and process vessels. Radiant Heat Shielding is employed to protect plant structures, equipment, and personnel from sources of high heat flux or high wind effects.

DARMATT™ FLEXIBLE JACKET PFP SYSTEMS

Darchem Thermal Protection has developed DARMATT™ to provide a high performance flexible fire protection system providing from 15 mins to 180 mins protection against Hydrocarbon Pool Fire and Jet Fire conditions. Installation of Darmatt systems on critical process control equipment allows for a controlled shutdown of production and refining facilities in the event of a fire, and minimises danger and damage to equipment and personnel at onshore and offshore installations. Darmatt systems can be designed for the protection of actuators and valves, cable routes, electrical cabinets, pipe



Figure 1. Darmatt installed on valve & actuator

work, process vessels and other vital safety equipment located in fire zones. Darmatt is fully tested and certified for use in Hydrocarbon Pool (or engulfment) fires such as denoted by the UL1709 and BS476 (pt 20 amendment 6478) fire test curves and for temperatures up to 1,100°C.

Darmatt panels are constructed from uniquely compressed layers of insulating fibre and aluminium foil encapsulated by a sacrificial outer weather resistant vinyl cloth. The outer vinyl cloth can be provided in standard (<150°C operating temperatures) or high temperature versions (<700°C operating temperatures), and in colours specified by plant identification policies. The panels are fastened together by a patented wire lacing method giving improved tightness around equipment and enhanced integrity and durability over other systems that may be using 'Belts & Buckles' or Velcro fastening methods. Inspection hatches for quick access and penetrations for operating mechanisms, hydraulic tubing and position indicators etc. can be provided to facilitate problem-free operation and maintenance of equipment without the need to remove the Darmatt protection. Also, Darmatt can be fitted with DARVENT™ intumescent grills to allow for ventilation and cooling, whilst still providing the same level of certified fire protection performance.

The increased concern for safety on offshore platforms and FPSOs has led to the development of versions of Darmatt that can withstand Jet Fire for longer periods and greater blast overpressure. Additionally within the Darmatt panel construction a layer of stainless steel mesh is incorporated to shroud the internal layers of insulating fibres. Darchem Thermal Protection recommends DARMATT J180 for Jet Fire protection up to 1,250°C from between 15 minutes to 180 minutes as per standards OTI 95 634 and ISO 22899-1.

DARSHIELD™ RIGID ENCLOSURE PFP SYSTEMS

DARSHIELD™ Rigid Fire Protection solutions are the ultimate durable solution for the protection of critical process control equipment and instrumentation, incorporating uniquely designed enclosures manufactured from stainless steel skins encapsulating high performance thermal materials. Darshield can also be combined with Darmatt to provide hybrid options with additional benefits. Stainless steel rigid doors offer secure and regular access, whilst the flexible Darmatt is applied to non-access areas where space may be constrained.

The main features of the Darshield system are:

- *Bespoke design to meet customer fire specification and individ-*



Figure 2. Darshield Gastight SISU on FPSO

- Provide improved and securable access for equipment inspection and maintenance
- Can be fitted with DAR-VENT™ grills to allow ventilation and cooling.
- Retained performance over extended life span even in hostile environments.
- Highly resistant to corrosion and vibration.

Independent tests certify Darshield enclosures to provide protection for up to 120 mins Hydrocarbon Pool Fire to 1,100°C and Jet Fire to 1,250°C, and blast overpressures.

Two further variants of Darshield are also available, DAR-SPLASH™ for protection of riser sections within the 'splash-zone'; and a gas-tight sealed inner skin unit (SISU) to provide fire protection for riser ESDVs susceptible to gas leaks. Darsplash consists of fully seal-welded coated stainless steel sections, designed to be mounted from the riser hang-off to the lower limit of the splash-zone. As well as protection from burning hydrocarbon spills, Darsplash also protects the riser against fouling and wave action corrosion. The Darshield SISU system can protect ESDVs and actuators, flanges, and riser termination heads; and ensures that any leaking (potentially hazardous) gases are diverted seawards rather than inboard.

SPECIFYING PASSIVE FIRE PROTECTION

When sourcing PFP solutions for process equipment, there are important considerations beyond just providing a fire specification (H30, J60 etc) and equipment Tag List. The following information is very beneficial for engineering and manufacture of PFP systems:

- Defining the hydrocarbon fire conditions to protect from - Hydrocarbon Pool fire as per UL1709 or Jet Fire as per ISO 22899-1?
- What is the fire temperature? Usually 1,100°C for Hydrocarbon Pool fire and 1,200°C for Jet Fire.
- What is the protection period required? Common requirements range from H15 (Hydrocarbon Pool Fire for 15 mins) to J180 (Jet Fire for 180 minutes).

- What is the normal maximum ambient temperature for the site? (This is not the solar-radiated temperature.)
- If fire protection is linked to a valve, what is the normal process temperature for the valve?
- Characteristics of equipment to be protected, i.e. external dimensions & weight of each unit to be protected (valve, actuator, control panel, air tank, junction box, etc.)
- Quantity of units - with indication of number of units of similar configuration?
- Clarification of orientation of actuator on valve?
- Maximum temperature permissible (limiting or failure temperature) on the equipment protected? This is often different for the valve, actuator, and the controls.
- Are controls mounted on actuators or positioned remotely



Figure 3. Darflare installation on North Sea platform

RADIANT HEAT AND WIND SHIELDING SOLUTIONS

Darchem Thermal Protection offers two types of Radiant Heat Shield solutions based upon the imperative to reduce the incidental heat flux levels from flaring or possible fire scenarios.

DARFLARE™ is a horizontal chevron system designed to reduce radiant heat and protect underlying structures and personnel from the high heat flux levels experienced directly below flare tips. Darflare was developed in the early 1980s in collaboration with BP after they experienced problems with an existing heat shield on the Magnus offshore platform. The flare tip heat flux was higher than anticipated and the heat shield installed was buckling and distorting under normal operating conditions. After development and installation, the Darflare system resolved the problems and offered a heat flux



Figure 4. Darscreen wind shield for offshore platform stairway

reduction of over 90%. The Darflare system is designed, through convective airflow through the panels, to reduce the radiant heat on the cold face of the heat shield to below 100° C during flaring thereby ensuring that the structural steelwork is not compromised. The system is manufactured as a modular design with each panel made up of a fabricated perimeter consisting of a metallic edge

skin with a load bearing supporting grating fixed to the top surface 'hot face' of the panel. Formed thin sheet foils provide a contoured surface to promote cold air convection up through the panel to the 'hot face'. The bottom surface 'cold face' of the panel is supported by expanded metal to facilitate airflow and to hold the foil sheets in place. The panels are assembled with a proprietary fixing system, designed to allow the system to expand during flaring intervals while holding each panel in place to the supporting structure. To allow access for maintenance, hatchways can be incorporated in to the system, these are constructed using hinged access doors secured with shoot bolts, welded to the cold face of the shield.

DARSCREEN™ is an ideal solution for shielding against lower heat flux levels with heat reduction by up to 75% and is commonly employed as a vertical heat shield offering personnel protection on walkways, staircases, lifeboat stations, and muster points. Darscreen can also be employed as a wind shield providing an effective barrier against harsh offshore environments.

Darscreen is manufactured as a modular system with individual panels made of layers of woven mesh welded to a channel frame. Where load bearing is a requirement, grating can be welded to the top edge of the frame. Individual panels are kept to a manageable size to allow for ease of installation. Where solid system barriers would prevent natural lighting and could trap gas, the woven mesh system has excellent see-through properties and is naturally venting. The woven



Figure 5. Darmatt Jet Fire Test

mesh system also puts less loading from wind pressure on the supporting structures.

Thermal Protection has a continuous programme of research and development of Radiant Heat Shields for installation on offshore and onshore installations. The Engineering Dept works closely with customers to ensure bespoke solutions meet the performance required.

The principal features of Darflare and Darscreen radiant heat shields are:

- Maintenance and corrosion free during lifetime of installation
- Suited for intermittent and severe thermal cycling conditions
- Lightweight and simple to install
- See-through properties and naturally venting and self draining

TESTING AND CERTIFICATION

Passive Fire Protection systems are tested and certified by accredited organisations such as Lloyds, DNV and ABS to conform to the internationally recognised Jet Fire standard ISO 22899-1, and Hydrocarbon Pool fire curve as per UL1709. It is very important that PFP systems are chosen where the certification is valid and that the product in question meets the specification, quality and safety levels required, i.e. the system is 'fit-for-purpose'.

Unfortunately, whilst many suppliers of PFP offer seemingly valid certification to demonstrate their solutions perform to the necessary standards for Hydrocarbon Pool fire and Jet Fire protection, their test samples do not resemble real-life installations. Also, test criteria are usually based on fire protection of structural steel plates or circular vessels, with a limiting temperature of 400°C.

The purpose of PFP is that the equipment being protected



Figure 6. Project Services

must be able to function effectively, i.e. remain below its failure (or limiting) temperature, throughout the specified fire protection period. For example, in the oil and gas industry, most actuators and associated controls will fail around 100°C so test certificates showing conformance to a limiting temperature of 400°C for structural stainless steel alone should be considered insufficient. Questions should be asked as to how a proposed PFP solution is designed to protect specific equipment, and how can the supplier demonstrate that equipment failure temperatures will not be exceeded for the specified fire scenario. Furthermore, any supplier offering a uniform insulation thickness across a wide scope of equipment (valves, actuators, control panels etc) is not properly taking into account the volume and mass of each item, and resultant heat dissipation in the event of raised external temperatures.

Not only are Darchem's Fire Protection solutions tested to simulate real-life installations, but in cooperation with Lloyds, they have developed thermal transient software called Offtranp which governs the design of both Darmatt and Darshield PFP solutions, ensuring that these solutions have Type Approval Enclosure certification. This means that for every fire scenario and for any type of equipment to be protected, Offtranp determines the optimal insulation thickness to ensure temperatures are kept within operating parameters for the specified protection period. Offtranp calculations are often included in contract documentation to show that the supplied system is a certified bespoke design for each and every installation.

ENGINEERING AND PROJECT SERVICES

Darchem's Thermal Protection Engineering and Project Services team are able to extend customer support beyond

the simple execution of contracts. In addition to having extensive industry experience, coupled with the latest design skills, engineers are able to respond to urgent requirements and offer flexibility in handling all types of passive fire protection and heat shielding issues. These include responding efficiently to technical enquiries, draughting detailed GA drawings, writing bespoke Installation Procedure Manuals, and meeting all other customer documentation needs. Additionally, documentation can be translated into many different languages, to account for PFP installations in Russian, French, Portuguese, etc, speaking locations around the world.

Thermal Protection's Project Services team provides customers with an all round professional site service including front-end surveys, installation, supervision, inspection, and after-sales support. Resources are made available for both onshore and offshore installations in the UK and worldwide to meet customer expectations.

The Site Services Team has the capability to:

- Administer Global support
- Respond to urgent fast-track requirements
- Provide skilled engineers and technicians to perform or supervise site surveys, installation, training, and final walk-down inspections
- Co-ordinate design, manufacture and installation on critical programmes whilst accommodating operational constraints 

Information

For further information on Darchem Engineering's Passive Fire Protection and Radiant Heat Shielding solutions - Please visit www.darchem.co.uk, dtpsales@darchem.co.uk, +44 1740 630461 www.darmattech.com, info@darmattech.com, +82 (0)31 224-1520



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Emerson awarded multimillion-dollar contract to provide automation technologies, services for new BP FPSO

On the heels of being named BP's automation contractor of choice for offshore oil and gas operations in the North Sea, Emerson Process Management has been awarded a \$21 million contract to provide integrated control and safety systems for a new BP floating production, storage and offloading (FPSO) vessel. The new vessel, which will replace the existing Schiehallion FPSO, forms part of the North Sea Quad 204 project that will access the remaining hydrocarbon reservoirs in the Schiehallion and Loyal fields, located approximately 130 kilometers west of Shetland, UK.

The new 270-meter Quad 204 FPSO is designed to produce 130,000 barrels of oil a day and 2.2 million cubic meters per day of gas. In addition to serving as the main automation contractor for the Quad 204 FPSO, Emerson Process Management is also BP's preferred supplier of integrated control and safety systems for five offshore fields in the UK continental shelf, including the new Clair Ridge platforms.

The integrated Emerson solution will use Emerson's PlantWeb™ digital plant architecture, including its DeltaV™ digital automation system and DeltaV SIS™ process safety system, and AMS Suite predictive maintenance software. The DeltaV system will control and monitor platform operations using FOUNDATION fieldbus and HART® communication technologies.

Advanced process control software functionality within DeltaV will optimize facility performance, production and yield. The DeltaV SIS system will perform process and emergency shutdown functions, if needed, plus control fire and gas detection systems to enable secure control of oil production on the platform.

AMS Suite predictive maintenance software will be used for commissioning, configuration and to monitor field device diagnostics. A real-time performance management system, delivering information to executive level decision makers will be supplied by Emerson's METCO Services. Emerson's operator simulation-based training program will be used to train operators before start-up.

Additional contracts have been awarded to Emerson to supply its Rosemount® pressure, temperature, radar level transmitters and magnetic flowmeters; Rosemount Analytical gas chromatographs; and Daniel™ venturi and ultrasonic flowmeters.

Emerson provided the front end engineering and design (FEED) on the FPSO and with the vessel builder, Hyundai Heavy Industries Co. Limited, is responsible for design, configuration, build, acceptance testing, commissioning, installation and start-up support



에머슨, FPSO에 2100만 달러 규모의 자동화 기술 및 서비스 공급

North Sea에 선적용 석유 및 가스 운영을 위한 BP의 자동화 계약자로 선정된 에머슨 프로세스 매니지먼트는 이번에 2,100만 달러 규모의 새로운 BP의 부유식 생산, 저장 및 오프로딩(FPSO) 선박을 위한 통합 제어 및 안전 시스템을 제공할 계획이라고 밝혔다.

이 FPSO는 기존 Schiehallion FPSO를 대체하며, UK의 Shetland 서부 약 130 km에 위치한 Schiehallion 및 Loyal 현장에 위치한 탄화수소 저장소(reservoir)에 접근할 North Sea Quad 204 프로젝트의 일부를 구성할 예정이다. 새로운 Quad 204 FPSO는 하루에 130,000 배럴의 석유와 220만 m³의 가스를 생산하도록 설계되었다. 에머슨 프로세스 매니지먼트는 Quad 204 FPSO의 주 자동화 계약자로서 서비스를 제공할 뿐만 아니라, 새로운 Clair Ridge 플랫폼을 포함한 UK의 대륙붕에 위치한 다섯 곳의 원양 현장에 통합 제어 및 안전 시스템을 제공하는 공급자이다.

통합된 에머슨의 솔루션은 DeltaV™ 디지털 자동화 시스템 및 DeltaV SIS™ 프로세스 안전 시스템 그리고 AMS Suite 예측 유지관리 소프트웨어를 포함한 에머슨의 PlantWeb™ 디지털 플랜트 아키텍처를 이용할 예정이다. DeltaV 시스템은 FOUNDATION fieldbus 및 HART® 커뮤니케이션 기술을 이용하여 플랫폼의 운영을 제어하고 감시한다.

DeltaV의 향상된 프로세스 제어 소프트웨어는 시설의 성능 및 생산, 그리고 산출을 최적화하며, DeltaV SIS 시스템은 프로세스 및 긴급 가동중지 기능을 시행하게 된다.

또한, 필요시 화재 및 가스 검출 시스템을 제어하여 플랫폼의 석유 생산을 제어한다. AMS Suite 예측 유지관리 소프트웨어는 시운전, 환경설정에 활용되며, 현장 기기의 진단 루틴을 모니터링하는데 이용된다. 에머슨은 Rosemount® 압력, 온도, 레이더 레벨 트랜스미터 및 전자 유량계, Rosemount Analytical 가스 크로마토그래피, Daniel™ 벤투리관(venture), 그

리고 초음파 유량계를 공급하기로 추가 계약을 맺었다. 에머슨은 FPSO에 프론트 엔드(front end) 엔지니어링 및 디자인(FEED)을 제공했으며, 현대중공업과 함께 설계, 환경설정, 건설, 수납 시험(acceptance testing), 시운전, 설치 및 스타트 업 지원을 책임지고 있다.

HMD secured an order for 1 unit of eco-friendly 35,000m³ LPG carrier from JX shipping

Hyundai Mipo Dockyard (HMD) announced that it secured an order worth USD 49 million from the Japan-based JX Shipping for the construction of 1 unit of 35,000m³ LPG carrier on November 6. This vessel will measure 173.7m in length, 28m in width, 17.8m in height, and is scheduled for delivery to the ship owner by July 2014. JX Shipping, a shipping business subsidiary of JX Nippon Oil and Energy, has decided to place an order at overseas shipyard for the first time.

This LPG carrier will be equipped with the M-Electronically Controlled Engine, high energy efficiency engine, and have environment-friendly features to reduce fuel consumption. Particularly, this vessel's eco-friendly engine provides individual control of fuel spray and valve opening/closing by cylinder, thus slashing the fuel consumption and dramatically reducing the noise, vibration, exhaust gas emissions, according to HMD. In addition, this vessel adopts the design that minimizes wave resistance. The special structure fitted to the stern optimizes the flow of water to increase the efficiency of propeller and rudder.

HMD's relentless effort to develop eco-friendly vessels has been the key driver for winning this order. HMD has and increased the number of its R&D personnel and sharpened its technological edge in the construction of eco-friendly vessels. In July, HMD delivered a 50,000-ton eco-friendly product carrier (PC) which increased the fuel efficiency by over 30% compared to existing vessels.

This year, HMD won orders for 41 vessels worth approximately USD 1.9 billion, including the 4 PSVs (Platform Supply Vessels), from the market for small-to-medium vessels and special purpose vessels.

현대미포, 친환경 LPG선 3만5000m³급 1척 수주

현대미포조선(Hyundai Mipo Dockyard)은 지난 11월 6일 일본 JX Shipping으로부터 3만5000m³급 LPG운반선 1척을 4900백만 달러에 수주했다고 발표했다. 이 선박은 길이 173.7m, 너비 28m, 높이 17.8m이며, 2014년 7월 선주사에 인도될 예정이다.

현대미포조선이 이번에 수주한 LPG운반선은 전자제어식(M-Electronically



HMD and Japan's JX Shipping signed a contract for a 35,000m³ LPG carrier.

Controlled Engine) 고효율 엔진을 탑재하고 최적의 연료 절감 설계가 적용된 친환경 선박으로 건조될 예정이다. 특히 친환경 엔진은 연료분사 및 밸브개폐를 개별 실린더 별로 제어함으로써 연료절감은 물론, 소음과 진동 및 배기가스를 획기적으로 줄일 수 있다는 것이 회사측 설명이다. 또한 설계시부터 파도의 저항을 최소화할 수 있도록 개선된 선형 디자인이 적용되며, 선미에는 물의 흐름을 최적화 시켜주는 특수 구조물을 설치해 프로펠러와 러더(Rudder)의 효율을 극대화시켰다.

이번 수주는 현대미포조선의 친환경 선박 개발에 대한 끈임 없는 노력이 있었기에 가능했다. 현대미포조선은 친환경 기술개발 인력의 확충 및 기술력 제고를 통해 수주 경쟁력을 확보할 수 있었다. 한편 현대미포조선은 지난 7월 5만톤급 친환경 PC선을 인도한 바 있는데, 이 PC선은 기존 선박에 비해 연료 효율성이 30% 이상 향상됐다. 올해 들어 현대미포조선은 해양작업지원선(PSV) 4척을 포함해 중소형 및 특수선 시장에서 41척(약 19억 달러)을 수주했다.



SSME received an order for 2 units of 157,000-ton shuttle tankers

Sungdong Shipbuilding & Marine Engineering (SSME) announced on November 7 that it inked a contract to build 2 units of 157,000-ton shuttle tankers. These vessels ordered from the Greece-based Tsakos are the special purpose vessels that transport the crude oil from the offshore oil field to the land-based facility, and will be delivered to the ship owner by late 2014.

SSME expanded into the shuttle tanker market when it clinched an order for 2 vessels of the same kind from Tsakos, one of the world's top 10 tanker operators, in March 2011. There has been a heightened interest among the shipping companies in the shuttle tanker market which is expected to experience an upswing in the demand as the offshore oil exploitation gathers speed recently.

An official from SSME said, "We will harness our price competitiveness and production process innovation to cement our leading position with the efficient production and manpower structure capable of building both commercial vessel and special purpose vessel."

성동조선해양, 15만7000톤급 셔틀탱커 2척 수주

성동조선해양이 15만7000톤급 셔틀탱커 2척(옵션 1척 포함)을 계약했다고 지난 7일 발표했다. 성동조선해양이 그리스 차코스(Tsakos)사로부터 수주한 이 선박은 해상에서 생산된 원유를 선적해 육상의 석유기지로 운송하는 특수선으로 2014년 말경 인도될 예정이다.

성동조선해양은 세계 10대 탱커 선사인 차코스사로부터 2011년 3월 동선형의 선박 2척을 수주하면서 셔틀탱커 시장에 첫발을 내디뎠다. 셔틀탱커는 최근 해양 유전 개발이 확대되면서 점차 그 수요가 늘어날 것으로 전망되어 많은



The photo shows SSME Sales Division Senior Managing Director Gang Yang-soo, Tsakos Group Vice-Chairman Vasileios Papageorgiou, SSME President Ha Seong-yong, Tsakos Group Finance Director Eleftherios Pavlides, Tsakos Group Chairman Capt. Panagiotis N. Tsakos, Tsakos Energy Navigation President Nikolas P. Tsakos, and Tsakos Energy Navigation Chairman Dionysios John Stavropoulos (from the left).

조선사들이 주목하고 있는 시장이다.

성동조선해양 관계자는 "원가 경쟁력 확보와 생산 공정 혁신을 통해 상선뿐만 아니라 특수선에서 Offshore까지 모두 건조할 수 있는 생산체제와 인력구조를 갖춘 조선사로서의 입지를 앞으로도 더욱 공고히 해나갈 방침"이라고 밝혔다.

STX Europe received an order for a 100,000-ton large cruise ship

STX Finland, a subsidiary of STX Europe, announced that it signed a contract with the Germany-based TUI Cruises to build 1 unit of 99,300-ton large luxury cruise ship on November 5. STX Finland will build the 2 cruise ships ordered from TUI Cruises at the Turku shipyard in Finland, which will be delivered by 2014 and 2015, respectively.

This cruise ship is the same kind of vessel ordered by the same ship owner in September last year. It will measure 294m in length, 36m in width, and have 1,250 cabins, capable of accommodating 3,500 passengers and crews. STX Europe has an order backlog of 64 vessels, among which the order backlog of cruise ship and ferry stands at 9 units including the additional cruise ship order received this time.

Additional orders for cruise ships are expected, considering the expected surge in the number of cruise tourists in the United States, the largest market, despite the global economic downturn that has persisted throughout this year.

Jari Anttila, Vice-President of STX Finland, said, "This cruise ship will be deployed in the Mein Schiff line, the major cruise ship fleet of TUI Cruises. We will build the next-generation cruise ship of TUI that incorporates the world's best technology and design."



Image of the cruise ship ordered to STX Europe from TUI Cruises

TUI Cruises is the Germany-based shipping company created in 2008 as a joint venture between the Germany-based TUI AG, the largest travelling agency in Europe, and Royal Caribbean, the world's largest cruise ship operator. In 2009, TUI Cruises made a full-fledged entry into the cruise ship market through Mein Schiff, a cruise ship.

STX유럽, 10만톤 규모 대형 크루즈선 수주

STX 유럽의 자회사인 STX 핀란드는 지난 11월 5일 독일 TUI 크루즈(TUI Cruises)사로부터 99,300톤 규모의 대형 럭셔리 크루즈선 1척에 대한 건조 계약을 체결했다고 밝혔다. STX 핀란드는 TUI 크루즈사로부터 수주한 크루즈

즈 2척 모두 핀란드 투르크(Turku) 조선소에서 건조해 각각 2014년과 2015년 인도할 예정이다.

이번에 수주한 선박은 STX 유럽이 지난 해 9월 동사로부터 수주한 선박과 동급으로 길이 294m, 너비 36m 규모에 총 1,250개의 선실을 갖추고 있으며 승객과 승무원을 합해 총 3,500명을 수용할 수 있다.

STX 유럽은 현재 64척의 수주잔량을 확보하고 있으며, 이 중 크루즈·페리 부문의 수주잔고는 이번 크루즈선 추가 수주를 포함해 총 9척이다. 특히 올해 글로벌 경기침체에도 불구하고 최대 시장인 미국을 중심으로 크루즈선 이용 관광객 수가 증가할 것으로 예상되는 만큼 선사들의 크루즈선 추가 발주도 이루어질 것으로 보인다.

STX 핀란드 야리 안틸라(Jari Anttila) 부사장은 "이 선박은 TUI 크루즈사의 대표 크루즈 선대인 '메인 시프(Mein Schiff)' 라인에 투입될 예정"이라며 "STX유럽이 보유하고 있는 세계 최고 수준의 크루즈 디자인과 건조 기술을 총동원해 TUI사의 차세대 크루즈선을 성공적으로 건조할 것"이라고 밝혔다.

한편 TUI 크루즈사는 지난 2008년 유럽 최대 여행사인 독일 TUI사(TUI AG)와 세계 최대 크루즈 선사인 로열캐리비안(Royal Caribbean)사가 합작해 설립한 독일 선사로, 2009년 크루즈선 '메인 시프(Mein Schiff)' 호를 통해 크루즈 시장에 본격 진출했다.

STXOS secured an order for 1 state-of-art ultra deepwater drillship

STX Offshore & Shipbuilding (STXOS) was awarded a contract to build 1 state-of-art ultra deepwater drillship from a European ship owner on October 22. This contract is valued at approximately USD 700 million and includes 4 optional vessels. The total contract value amounts to USD 3.5 billion if the options are exercised.

The state-of-art drillship capable of operating in ultra deepwater is one of the most typical high value-added vessels that can be built by only a few shipbuilders including STXOS. This drillship will measure 230m in length, 38m in width, and 12m in height with a drilling capacity of up to 40,000 feet (12,192m) in water depths of 12,000 feet (3,657m). It will be built at Jinhae shipyard of STXOS and delivered by the second half of 2015.

This drillship will be equipped with the state-of-art facilities, such as BOP (Blow-Out Preventer) that can withstand the pressure of up to 20,000psi, the maximum allowable working pressure applicable to subsea drilling operation. BOP is the core equipment of the drillship,



Noble Globetrotter II, the 'compact drillship' built by STX Dalian

which prevents the accident resulting from the eruption of high pressure gas, water, crude oil, etc., from the oil well during the drilling operation.



STX has strengthened its competitiveness in offshore plant sectors, including the pipe-laying vessel, heavy lift crane vessel, FSO (Floating Storage Offloading), drillship, etc. In addition, it clinched an order worth USD 430 million for the construction of ultra large FSO from a North Africa-based oil company last month, continuing a smooth sail in the offshore plant sector throughout the second half of this year.

An official from STXOS said, "The ultra deepwater drillship market has seen a rise in charterage and high operation rate, which has led to a surging demand among major drilling companies. STX has been highly recognized in recognition for its world-leading technology in the field of offshore plants, including the drillship, and will continue to prove its competitiveness by winning new orders."

STX조선해양, 최첨단 극심해용 드릴십 1척 수주

STX조선해양은 지난 10월 22일 유럽 선주로부터 최첨단 극심해용 드릴십 1척을 수주했다. 이번 수주규모는 약 7억 달러이며, 옵션 물량 4척이 포함되어 있어 모두 발주될 경우 총 금액은 약 35억 달러에 달한다.

통상 극심해에서 시추작업을 진행할 수 있는 첨단 드릴십은 STX조선해양을 포함하여 일부 조선업체 정도만이 건조 가능한 영역으로 대표적인 고부가가치 분야이다.

STX조선해양이 이번에 수주한 드릴십은 길이 230m, 폭 38m, 높이 12m 규모로서 수심 12,000피트(3,657m)의 극심해에서 최대 4만피트(12,192m) 깊이까지 고

난도 시추작업이 가능하다. 이번 드릴십은 STX조선해양 진해조선소에서 건조하여 2015년 하반기에 인도될 예정이다. STX조선해양의 드릴십에는 20,000psi의 고압에도 견딜 수 있도록 확장 가능한 폭발방지장치(BOP, Blow-Out Prevent) 등 최첨단 설비가 장착될 예정이다. 20,000psi는 현재까지 드릴십의 해저시추작업에 적용되는 압력 중 최대 수치이며, BOP는 시추작업을 진행하는 동안 지층이나 유정 속의 고압가스, 물, 원유 등이 분출하여 사고가 발생하는 위험을 방지하기 위한 장치로서 드릴십의 핵심 장치이다.

STX는 해저 파이프 부설선을 시작으로 헤비리프트 크레인선, 부유식 원유 저장설비, 드릴십 등 해양플랜트 분야 건조 경쟁력을 강화해 왔으며, 지난달 북아프리카의 석유 회사로부터 4.3억 달러 규모의 초대형 부유식 원유 저장 설비를 수주한 데 이어 하반기 해양플랜트 분야 성과를 확대해 나가고 있다.

STX조선해양 관계자는 "극심해용 드릴십 시장은 높은 용선료와 가동율을 유지하고 있어 메이저 시추회사들 중 심으로 신조 수요가 빠르게 증가하고 있는 추세"라면서 "STX가 드릴십 등 해양플랜트 분야에서도 세계 최고의 기술력을 인정 받고 있는 만큼 수주 경쟁력을 지속적으로 입증해 나갈 것"이라고 말했다.

Waiting For Reader's Article

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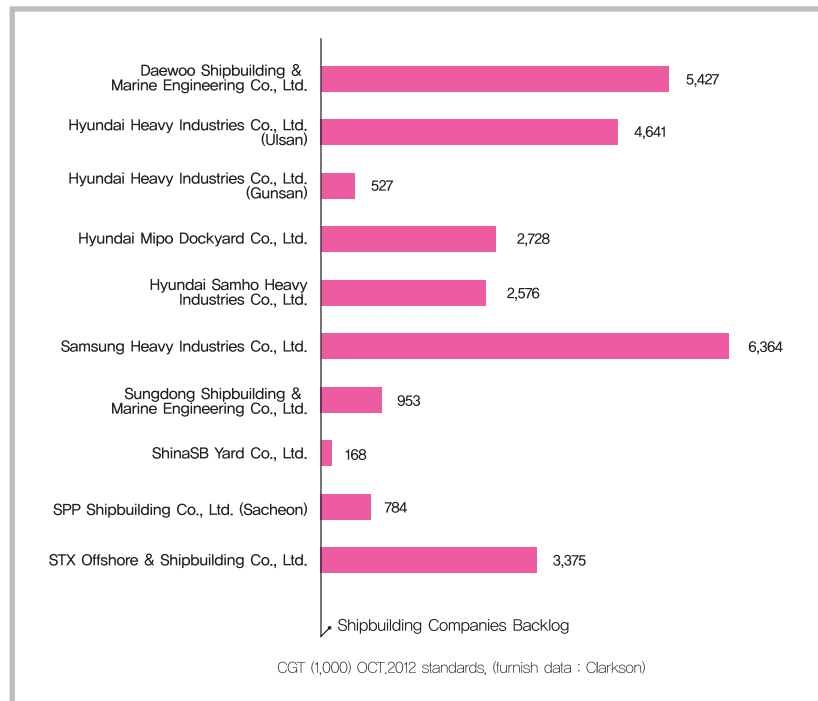
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Experts are optimistic about the prospects of the shipbuilding market next year amid recent increase in new orders for special purpose vessels such as drillship, PCTC, shuttle tanker although the newbuilding market has yet to show tangible signs of recovery due to the sustained uncertainty over the world economy. The optimistic forecast is based on the continued placement of new orders for bulkers and large containership, albeit in small quantities, in the market for ordinary commercial vessels and the growing interest in high efficiency and environment-friendly vessels among ship owners.



The external conditions are unfavorable, considering the European financial crisis, economic depression in the United States and Japan, and slowdown in China's economic growth. The overcapacity in the shipping companies has reached a serious level, and the reduced ship financing is placing constraints on newbuilding order placement. Only the blue-chip shipping companies with plenty of cash will be able to place orders for the latest vessels at low contract prices.


Fortunately, major domestic shipyards continue to sail smoothly, winning new orders for high value-added offshore plants and vessels, including LNG-FSRU, drillship, PCTC, LNG, etc despite difficulties facing the shipbuilding industry. 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 : Hyundai Samho Heavy Industries Co., Ltd.



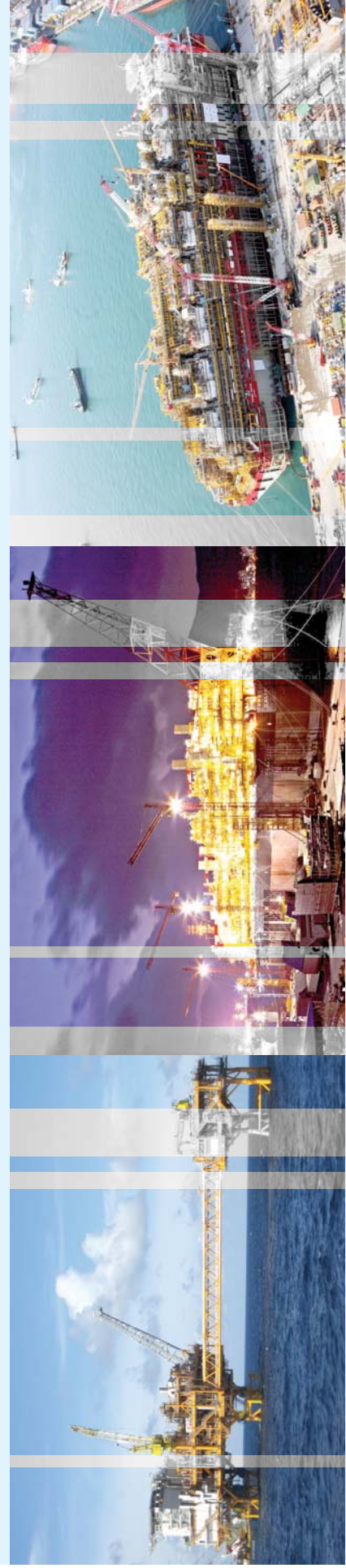
Offshore Plant Orders

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
February	Drillship	2 vessels	KRW 1 trillion	Noble Drilling, U.S.A	On a staggered basis until Sep 2013	Hyundai Heavy Industries
	Deepwater drillship	1 vessel	-	Atwood Oceanics, U.S.A	Second half of 2013	Daewoo Shipbuilding & Marine Engineering
	Offshore facility carrier	1 vessel	KRW 265 billion	Dockwise, Netherlands	October 2012	Hyundai Heavy Industries
	FPSO for the North Sea	1 vessel	USD 1.2 billion	BP (British Petroleum), U.K	Early 2015	Hyundai Heavy Industries
	Platform Supply Vessel	1 vessel	-	-	2012	STX OSV
	Fisheries Research Vessel	1 vessel	EUR 35 million	Ministry of Fisheries and Marine Resources, Republic of Namibia	Early 2012	STX Finland
	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
March	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
April	Drillship	1 vessel	-	Fred Olsen Energy, Norway	August 2013	Hyundai Heavy Industries
	Drillship	2 vessels	USD 1.12 billion	Maersk, Denmark	-	Samsung Heavy Industries
	Drillship	1 vessel	USD 680 million	Ocean Rig, Greece	October 2013	Samsung Heavy Industries
	Shuttle Tanker	2 vessels	USD 200 million	European Navigation, Greece	2013	STX Offshore & Shipbuilding
	Drillship	2 vessels	USD 1.12 billion	Rowan, U.S.A	Second half of 2013	Hyundai Heavy Industries
	Deepwater drillship	1 vessel	-	Vantage Drilling, U.S.A	Late May, 2013	Daewoo Shipbuilding & Marine Engineering
May	Offshore Platform (Top side)	-	USD 414 million	Statoil, Norway	-	Samsung Heavy Industries
	FPSO	1 vessel	USD 636 million	Teekay Petrojarl, Norway	Mid 2013	Samsung Heavy Industries
	Platform Supply Vessel	2 vessels	KRW 120 billion	Farstad Shipping, Norway	First half of 2013	STX OSV
	FSO	1 unit	-	PTSC, Vietnam	Early 2013	Sungdong Shipbuilding & Marine Engineering
	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
June	LNG-FSRU	2 units	USD 500 million	Hobegh LNG, Norway	Second half of 2013, first half of 2014	Hyundai Heavy Industries
	Multifunctional Deep Water Anchor Handling, Offshore Service Vessels	2 vessels	KRW 240 billion	Farstad Shipping, Norway	From the second quarter of 2013	STX OSV
July	Drillship	1 vessel	USD 680 million	Ocean Rig, Greece	November 2013	Samsung Heavy Industries
August	LNG-FSRU	2 vessels	USD 1,1225 billion	Maersk, Denmark	July 2014	Samsung Heavy Industries
	Semi-submersible Rig	1 vessel	USD 280 million	Excelerate Energy, U.S.A	First quarter of 2014	Daewoo Shipbuilding & Marine Engineering
September	Well Intervention Vessel	2 units	USD 1.1 billion	Songa Offshore, Norway	Second half of 2014	Daewoo Shipbuilding & Marine Engineering
	Drillship	2 vessels	USD 420 million	Eide Marine Services AS, Norway	2013	STX Finland
	Fixed Offshore Platform	1 vessel	KRW 600 billion	Noble Drilling, U.S.A	Second half of 2014	Hyundai Heavy Industries
	Drillship	-	USD 1.4 billion	Chevron, U.S.A	Second half of 2014	Daewoo Shipbuilding & Marine Engineering
October	Platform Supply Vessel	1 unit	USD 550 million	Offshore drilling company, Americas	-	Daewoo Shipbuilding & Marine Engineering
	Offshore Plant Module	1 unit	-	Troms Offshore Supply AS, Norway	First half of 2013	STX OSV
	Platform Supply Vessel	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	

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 / Odfjell	by mid 2014	Daewoo Shipbuilding & Marine Engineering
March	LNG-FSRU	-	-	Norway / Hoegh	-	Hyundai Heavy Industries
March	Offshore Platform	1 unit	USD 560 million	Danish / DONG E&P A/S	April 2015	Daewoo Shipbuilding & Marine Engineering
April	FPSO	1 unit	USD 2.0 billion	INPEX / Australia	April 2016	Daewoo Shipbuilding & Marine Engineering
April	Drillship	1 vessel	USD 645 million	Enesco plc	Third quarter 2014	Samsung Heavy Industries
May	Semi-submersible Drilling Rig	2 units	USD 1.1 billion	Songa Offshore, Norway	Mid 2015	Daewoo Shipbuilding & Marine Engineering
May	Drillship	1 vessel	USD 600 million	Seadrill, Norway	Second half of 2014	Samsung Heavy Industries
June	Drillship	1 vessel	USD 655 million	Diamond Offshore Drilling Limited., U.S.A	4th quarter of 2014	Hyundai Heavy Industries
June	Semi-submersible drilling rig	1 unit	USD 700 million	Fred Olsen Energy, Norway	March 2015	Hyundai Heavy Industries
July	LNG-FPSO	1 unit	-	Petrolim Nasional Berhad, Malaysia	June 2015	Daewoo Shipbuilding & Marine Engineering
July	Drillship	1 vessel	USD 645 million	Enesco plc	-	Samsung Heavy Industries
Aug	Gas Compression Platform	1 unit	USD 420 million	(Letter of Award)	Second half of 2015	Hyundai Heavy Industries
Aug	LNG-FSRU	8 vessels	-	Excelerate, U.S.A	Between early 2015~2017	Daewoo Shipbuilding & Marine Engineering
Sep	Drillship	1 vessel	USD 620 million	Rowan, U.S.A	First half of 2015	Hyundai Heavy Industries
Oct	Drillship	1 vessel	USD 623 million	-	-	Samsung Heavy Industries
Oct	Drillship	4 vessels	USD 2.06 billion	Transocean, U.S.A	One-by-one from mid 2015	Daewoo Shipbuilding & Marine Engineering
Nov	Drillship	1 vessel	USD 560 million	Atwood Oceanics, U.S.A	-	Daewoo Shipbuilding & Marine Engineering
Nov	LNG-FSRU	1 vessel	USD 270 million	Hoegh LNG, Norway	First half of 2015	Hyundai Heavy Industries
Nov	Drillship	1 vessel	USD 700 million	-	2nd half of 2015	STX Offshore & Shipbuilding

*Note : Based on the press release and public announcements of each shipyards, internal estimation of Monthly KORSHIP (estimation until Nov 15, 2012)





Marine Tech Korea 2012

- Cementing its status as a global exhibition

Exhibition Convention Center (CECO) for 4 days from November 13 to 16, 2012.

Marine Tech Korea 2012 featured large-scale facilities, including the shipyards, marine equipments, offshore plants, LNG carriers, offshore/port/logistics equipment, and various events, such as the export forum with invited buyers, academic seminars, etc., were organized in parallel.

Marine Tech Korea, a biennial event which was launched in 2006, provides the opportunity for domestic shipbuilding/offshore companies to make inroads into foreign markets and build relationship with world's prominent companies. ⚓

Marine Tech Korea 2012, co-organized by South Gyeongsang Province, Changwon City, Tongyeong and Geoje City, and sponsored by the Ministry of Knowledge Economy(MKE), was held at Changwon



Opening ceremony of Marine Tech Korea 2012



Daewoo Shipbuilding & Marine Engineering (DSME)'s booth





Samsung Heavy Industries (SHI)'s booth

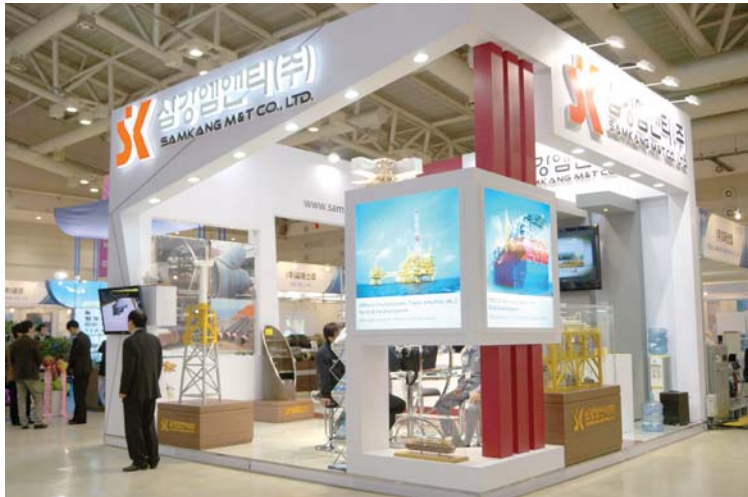
Sungdong Shipbuilding & Marine Engineering (SSME)'s booth



STX Offshore & Shipbuilding (STXOS)'s booth



Major Performance Gallery



Samkang M&T's booth

NK's booth

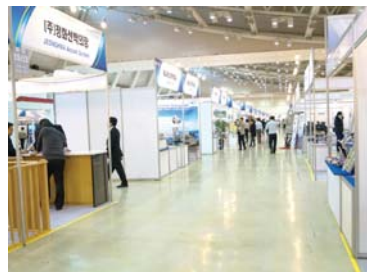


MESCO's booth





Korean Register (KR)'s booth



Dae Kyung's booth

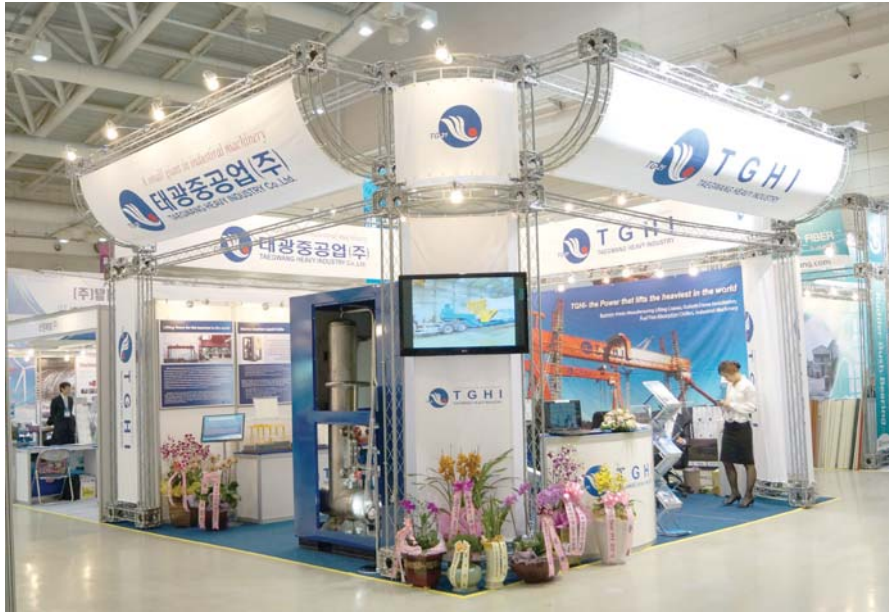


SULZER's booth



Korea Trutech Tools (KOTTCO)'s booth





Taegwang Heavy Industry (TGHI)'s booth



Mirae Industries' booth



CrystalBallast® Ballast Water Treatment system

Auramarine Ltd.

Auramarine has recently received an IMO type approval for its CrystalBallast® ballast water treatment system.

The approval was issued by DNV on behalf of the Norwegian Maritime Directorate after the successful land-based and shipboard testing in accordance with International Maritime Organisation's (IMO) "Guidelines for approval of BWM Systems (G8)" and DNV rules.

In addition, the electrical components were subjected to DNV's "Environmental test specification for instrumentation and automation equipment, DNV Standard for Certification No 2.4". These requirements are more stringent than the IMO requirements and include, for instance, also electromagnetic compatibility (EMC), vibration, low temperatures and damp heat testing.

Auramarine CrystalBallast® is a two-step process, with an efficient automatic filter to remove sediment and larger organisms, followed by an intensive medium pressure UV unit to disinfect and inactivate smaller plankton, bacteria and pathogens. According to Auramarine, the Combination of automatic filtration and ultraviolet light based ballast water treatment is becoming the leading technology, offering considerable benefits compared to other disinfection methods. Filter and UV disinfection is a proven purely physical and chemical-free disinfection process and it is not affected by salinity variations in seawater. Disinfection is fast and ballast water is ready to be discharged immediately after treatment without any by-products.



Ballast water is treated using filter and UV during ballast water intake and re-treated during ballast water discharge through the UV reactor only (filter bypassed). Re-treatment during discharge is necessary to eliminate possible re-growth of bacteria in ballast tanks due to cross contamination or incomplete intake disinfection. Both process steps have been carefully selected to provide a minimal pressure drop over the treatment system and a small and compact installation area.

Auramarine offers a full range of ballast water treatment systems from 75 m³/h to more than 3.000 m³/h. CrystalBallast® is available in both complete skid mounted modules for newbuilding projects, as well as prefabricated component kits for retrofits. Configurable design and compact size lead to affordable capital and installation costs, says Auramarine.

-TEL: +358-204-86-5030
-<http://www.auramarine.com>

New
Product

Vacon takes its product offering to the next level

Vacon Korea Ltd.

Global AC drive manufacturer Vacon strengthens its position as an industry leader in the AC drives market with the announcement of three new products at the Vacon Drives Conference: VACON® 100, VACON® 100X and VACON® 20X. All three new products are designed to improve Vacon's wide product offering in a manner that benefits customers and continues to help them optimize efficiency in application processes throughout all industries.

The flagship AC drive VACON 100 is one of the most important new products in the company's history. "The VACON 100 is a multipurpose drive that can be adapted for hundreds of different applications. It offers the lowest cost of ownership and the best usability. That's why we're really excited about it," said Heikki Hiltunen, Executive Vice President, Market Operations.

"With the features VACON 100 offers such as an easy-to-use fully graphical multilingual display and extended built-in block programming for drive customization, we're expecting it to be the AC drive of choice throughout a whole range of industries. Pumps, compressors, fans, conveyors - all these are applications which benefit massively from energy efficiency and improved productivity, and this product is ideal for these purposes," said Hiltunen continues.

Among its versatile features for easy system integration are a Safe Torque Off (STO) function, on-board Ethernet-based communication protocols such as EtherNet/IP, PROFINET IO and Modbus TCP as well as ATEX-certified motor over-temperature protection.

The VACON 100X and VACON 20X are part of Vacon's new range of decentralized AC drives for situations where space comes at a premium. These drives also bring cost savings as no additional enclosures are needed.

"With IP66/Type 4X enclosures, the VACON 100X and 20X are ready to be used in harsh conditions," said Hans Carlsson, Product Marketing Director, Motor Drives at Vacon. "By placing the drive as close to the motor as pos-



VACON® 100X & VACON® 20X

sible or in the most appropriate location allows considerable savings to be achieved as no separate electrical rooms, long shielded motor cables nor drive cabinets are required. This is one of the ways for our customers to achieve the optimum total cost for their drive solution," concludes Carlsson.

-TEL: +82-2-790-3352 (Seoul),
+82-51-784-6668 (Busan)
-http://www.vacon.com

Tron AIS-SART with MED approval

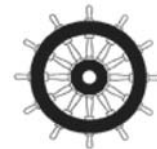
Jotron AS

Tron AIS-SART has been approved with a MED approval available from 5th October 2012.

Jotron AS played a pivotal role in the introduction and production of the AIS-SART - an alternative to the traditional Radar SART. The Tron AIS-SART will, from 5th October 2012, be "Wheel Marked" in accordance with European Council Directive 96/98/EC with latest Commission Directive 2011/75/EU (7th amendment).

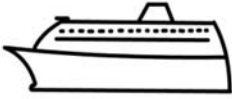
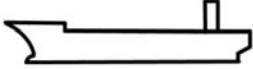
This means that from this date, the Radar SART and the AIS-SART can both be used as "Search and rescue locating devices" according to IMO SOLAS Amendment in Resolution MSC.256(84) giving the ship owner full freedom to choose either product as required by SOLAS Chapter III, Regulation 2.2.

-TEL: +47-33-13-9700
-http://www.jotron.com



Tron AIS-SART

Requirements:

Type of vessel	Size	Number
 Passenger	All	2
 Cargo	>500 GT	2
	>300 GT	1

Low friction and light weight for long travels

igus® Korea Co., Ltd.

Energy chain specialist igus introduces a new roller energy chain (based on the E2/000 family) and a modular plastic guiding profile. Both new products are particularly ideal for long travels. They are part of the permanently growing modular system for all types of movement.



Roller energy chains of the series 3500R for long travels

Economic roller energy chain

If the travel is too long for a pure sliding application, and a robust P4 roller energy chain is over-dimensioned due to its filling weight and its dynamic, light weight roller energy chains of the series 3500R - based on the proven two-piece energy chain family E2/000 - are the ideal solution. With this further development, long travels with low additional loads can be cost-effectively achieved. The known advantages of the design - safe, silent, durable and abrasionresistant - are maintained. The energy chain, which can be opened from the external radius, is particularly variable due to its modular interior separation. Easy to install, it is particularly suitable for horizontal applications. The modular design of the roller chain link allows the use of all widths of the standard series 3500.

The roller system with low friction, not only safely drives energy. It is especially energy-efficient compared to sliding

solutions. Travels up to 150 m at speeds up to 4 m/s can be achieved more economically.



Modular plastic guide profile "guidelite" for long travels also in harsh environments.

Efficient plastic guiding profile

The chain series 3500R can be safely guided in the newly developed "guidelite" system, a modular plastic guiding profile. While the lower run of the energy chain is guided in two L-shaped and glass-fibrereinforced guiding troughs, the upper run partially passes through guide brackets that are mounted in distances of one meter.

Because the upper run of the energy chain is only partly guided, it is designed for slow applications with low cycle numbers. Due to its open design it is particularly insensitive against dirt and for example can be used in greenhouses. In this case the energy chain is used to guide water hoses. Generally many other applications are imaginable, where the requirements in terms of speed, cycle numbers and additional loads are at the lower range. Apart from that "guidelite" can be used as a cheap supporting trough for free-supporting applications.

- TEL : +82-32-821-2911
- <http://www.igus.kr>

BMEA (Busan Marine Equipment Association)

Member List

ANSWER CO., LTD.

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

BANDO MARINE.

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

BERM YOUNG VALVE.

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

BMT CO., LTD.

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

BO KYOUNG IND., CO.

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

BOKYUNGTL CO., LTD.

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

BO MYUNG METAL CO., LTD.

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

BOYANG HARDWARE CO., LTD.

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

BUSAN INDUSTRY CO.

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

BUSUNG PLANT CO., LTD.

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

CEPHAS PIPELINES CO., LTD.

Head Office : Gangseo-gu Busan
 Homepage Add. :
 Main Products : Butterfly Valve
 TEL : +82-51-263-3661

CHK CO., LTD.

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

CHWANG HYEOP INSTRUMENTS.

Head Office : Gangseo-gu Busan

Homepage Add. : www.chkj.co.kr

Main Products : Telephone Booth, Work Shop, Cable Box, Spare Box
 TEL : +82-51-831-3607

CHANG WON ENVIRONMENT IND CO., LTD.

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

CMR KOREA CO., LTD.

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

DAECHANG METAL CO., LTD.

Head Office : Saha-gu Busan
 Homepage Add. :
 Main Products : Main Bearing support, Chain Wheel, Gear Wheel
 TEL : +82-51-264-0831

DAE-DONG ENTEC CO., LTD.

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

DAE HAN HEAT ELECTRIC MACHINERY IND.,CO.

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

DAEHEUNG IND. CO., LTD.

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

AQ TECK CO., LTD.

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

DAEHWA TECHNICAL CO., LTD.

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

DAEJUNG SPECIAL STEEL CO., LTD.

Head Office : Gangseo-gu Busan
 Homepage Add. :
 Main Products : Winch, Shaft, Gear Clutch
 TEL : +82-51-831-1133

DAEKYUNG CO., LTD.

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

DAERIM MACHINERY CO., LTD.

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

DAESAN ENGINEERING CO., LTD.

Head Office : Gangseo-gu Busan

Homepage Add. : www.daesan-eng.com

Main Products : E/R Package unit, Pipe Group Unit
 TEL : +82-51-831-0090

DAE SEONG MARINE TEC CO., LTD.

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

DAESUNG IND CO.

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

DAE WON HEAVY INDUSTRIES CO., LTD.

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

DAEWON METAL IND. CO., LTD.

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

DAEYANG ELECTRIC CO., LTD.

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

DAEYANG INSTRUMENT CO., LTD.

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

DAEYANG SP CO., LTD.

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

DA HEUNG ENG. CO., LTD.

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

DAOM METAL.

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

DEAIL MACHINERY.

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

DECKWIN CO., LTD.

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

DH-M CO., LTD.

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

DHP ENGINEERING CO., LTD.

Head Office : Dongnae-gu Busan

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

DINES CO., LTD.

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

DK INDUSTRIAL CO., LTD.

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

DK TECH CORPORATION CO., LTD.

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

DNP CO., LTD.

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

DOLIM PRECISION.

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

DONG-A VALVE IND.

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

DONGBANG SHIP MACHINERY CO., LTD.

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

DONGHAE INTEC CO., LTD.

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

DONG HUN ENTERPRISE CO.

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

DONGHWA ENTEC CO., LTD.

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

DONGHWA M&E CO., LTD.

Head Office : Kimhae Gyeongsangnam-do
Homepage Add. : www.donghwame.com
Main Products : Heat Exchanger
TEL : +82-55-340-6700

DONGHWA PNEUTEC CO., LTD.

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

DONGIL SHIPYARD CO., LTD.

Head Office : Saha-gu Busan
Homepage Add. : www.dongilshipyard.co.kr
Main Products : Rescue Boat Davit & Winch, Assembly, Line Hauler

TEL : +82-51-200-1211

DONGKYUNG INDUSTRY CO., LTD.

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

DONG NAM ENGINEERING CO., LTD.

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

DONGNAM PRECISION IND. CO., LTD.

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

DONG SUNG HIGHTECH.

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

DONGYANG G.T.S.

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

DONGYANG HYDTEC CO., LTD.

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

DONGYANG METAL CO., LTD.

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

DONGYOUNG ELECTRIC CO., LTD.

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

DSB ENGINEERING CO., LTD.

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

DSE BEARING CO., LTD.

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

DSK CO., LTD.

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

DUYOUNG INDUSTRIAL MACHINES CO., LTD.

Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Plate-Baffle
TEL : +82-51-831-2477

EM SYSTEC CO., LTD.

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

FRIEND CO., LTD.

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

GEO MAEK SHOT&PAINT CO.,LTD.

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

GEORIM ENGINEERING CO., LTD.

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

GISUNG ENGINEERING CO., LTD.

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

G. M. TEC CO., LTD.

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

G.S HIGH-TECHER CO., LTD.

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

G&S PRECISION IND CO., LTD.

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

HAE DONG METAL CO., LTD.

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

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

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

HAE SUNG INDUSTRIAL.

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

HAEWON INDUSTRIES CO.

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

HAEWON IND. CO., LTD.

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

HAEYANG FAMILY CO., LTD.

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

HAEYANG METAL CO., LTD.

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

HAEYANG PROPELLER CO., LTD.

Head Office : Gangseo-gu Busan

Homepage Add. :
Main Products : Marine Propeller
TEL : +82-51-831-4599

HANCHANG TRANS CO., LTD.

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

HANJULEVEL.

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

HANLA IMS CO., LTD.

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

HANLA IND CO., LTD.

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

HANMAUM KI-GONG CO., LTD.

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

HEARTMAN CO., LTD.

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

H.M.E.

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

HOSEUNG ENTERPRISE CO., LTD.

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

HWAJIN ENTERPRISE CO., LTD.

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

HWAJIN PF CO., LTD.

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

HWA SHIN PRECISION CO., LTD.

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

HYOSUNG STEEL TECHNOLOGIES CO., LTD.

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

HYUNDAI HYDRAULIC CO., LTD.

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

HYUNDAI ZINC METAL CO., LTD.

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

HYUNJIN MATERIALS CO., LTD.

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

ILDO MACHINE ELECT CO., LTD.

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

IL - SUNG INDUSTRY CO.

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

IN SUNG INDUSTRY CO.

Head Office : Saha-gu Busan
Homepage Add. :
Main Products : Profile, Steel Coalmining Insulation
TEL : +82-51-293-7550

JAESEUNG ENGINEERING CO., LTD.

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

JEILSANKI CO.

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

JEONG-AM SAFETY GLASS CO., LTD.

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

JEONG HWA ACCOMMODATION SYSTEM CO., LTD.

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

JEONG WOO COUPLING CO., LTD.

Head Office : Kimhae Gyeongsangnam-do
Homepage Add. : www.jwjoint.co.kr
Main Products : Pipe Coupling, Pipe Repair Clamp
TEL : +82-55-339-7666

JIN GU ENGINEERING.

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

JIN IL BEND CO., LTD.

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

JINKWANG ELECTRIC CO., LTD.

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

JINYOUNG METAL CO., LTD.

Head Office : Sasang-gu Busan

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

JMC HYDRAULICS.

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

JNC HI-TECHNOLOGIES.

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

JOKWANG I.L.I CO., LTD.

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

JONGHAP POLESTAR ENGINEERING CO., LTD.

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

JUNG GONG IND. CO., LTD.

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

JUNG - WOO MACHINERY CO., LTD.

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

KANG BACK INDUSTRY CO., LTD.

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

KANGIL CO., LTD.

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

KANGRIM HEAVY INDUSTRIES CO., LTD.

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

K.C. LTD.

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

KEO HUNG MACHINERY.

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

KEYSUNG METAL CO., LTD.

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

KOC ELECTRIC CO., LTD.

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

KOREA HYDRAULIC CO.

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

KOREA PHE CO., LTD.

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

KOREA STEEL SHAPES CO., LTD.

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

KOREA TRADING & INDUSTRIES CO., LTD.

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

KORINOX CO., LTD.

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

KORVAL CO., LTD.

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

KSP CO., LTD.

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

KSV

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

KTE CO., LTD.

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

KUKDONG ELECOM CO., LTD.

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

KUKDONG INDUSTRIAL ENGINEERING.

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

KUKJE METAL CO., LTD.

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

KUM HAW PRECISION CO.

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

KUMKANG ENGINEERING.

Head Office : Gangseo-gu Busan
 Homepage Add. :

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

KUMKANG PRECISION.

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

KWANGIL CORP.,

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

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

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

KWANG JIN IND. CO., LTD.

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

KWANG JIN TECH.

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

KWANG LIM MARINE TECH. CO.,LTD.

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

KWANG SAN CO., LTD.

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

KWANGWOON CO.,LTD.

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

KYEONG SIN FIBER CO., LTD.

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

KYOUNGWON BENDING CO.

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

KYUNGIL METAL CO., LTD.

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

KYUNGSUNG INDUSTRY CO., LTD.

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

LHE CO., LTD.

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

MANZU INDUSTRY. CO., LTD.

Head Office : Gangseo-gu Busan

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

MARINE RADIO CO., LTD.

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

MARINE TECHNICAL ENGINEERING CO., LTD.

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

MARSEN CO., LTD.

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

MAX TECH.

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

MCM CO., LTD.

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

MI JIN PRECISION.

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

MIJOO INDUSTRY CO., LTD.

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

MIRAE ENGINEERING CO., LTD.

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

MJ TSR CO., LTD.

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

MODERN INTECH CO., LTD.

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

MT.H CONTROL VALVES CO., LTD.

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

MYTEC CO., LTD.

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

NAMSUNG SHIPBUILDING CO., LTD.

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

NAMYANG METAL.

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

NARA CORPORATION CO., LTD.

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

NAVUTEC.

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

NEW-OHSEUNG CO., LTD.

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

NK CO., LTD.

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

NOKSAN FLANGE CO., LTD.

Head Office : Gangseo-gu Busan
 Homepage Add. :
 Main Products : Flange for ship
 TEL : +82-51-831-7956

OBOK ELECTRIC CO., LTD.

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

OK KWANG ENG CO., LTD.

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

OK KWANG METAL CO., LTD.

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

ORIENTAL PRECISION & ENGINEERING CO., LTD.

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

ORIENTAL PRECISION MACHINERY CO., LTD.

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

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

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

PACO HITEC CO., LTD.

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

PAL MI METAL IND CO., LTD.

Head Office : Jinhae Gyeongsangnam-do
 Homepage Add. :
 Main Products : Valve, Yoke, Fork, Knuckle, Carrier

TEL : +82-55-552-3840

PANASIA CO., LTD.

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

PI PLUS CO., LTD.

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

POONG JIN METAL CO., LTD.

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

PSM CO., LTD.

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

SAEJIN INTECH CO., LTD.

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

SAMBOO METAL CO., LTD.

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

SAMGONG CO., LTD.

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

SAMJOO ENG. CO., LTD.

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

SAMJUNG MACHINERY.

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

SAM KWANG HI-TEC CO., LTD.

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

SAMSUNG NONFERROUS METAL CO., LTD.

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

SAMYANG METAL IND. CO., LTD.

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

SAMYOUNG FITTING.

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

SDK CO., LTD.

Head Office : Gangseo-gu Busan
 Homepage Add. :
 Main Products : Winch, Hatch
 TEL : +82-51-832-1882

SEAPLUS CO., LTD.

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

SEBO METAL CO., LTD.

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

SEBO TECH CO., LTD.

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

SEIL SERES CO., LTD.

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

SEJIN BOLT CO., LTD.

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

SEUNG JIN E.N.G.

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

SEUN STEEL CO., LTD.

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

SEWOONG PRECISION MACHINERY CO., LTD.

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

SEYANG HIGH-TECH

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

SHILLA E&T CO., LTD.

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

SHINDONG DIGITECH CO., LTD.

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

SHINHWA INTERIOR & TECHNOLOGY CO., LTD.

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

SHINKWANG ACE ELECTRIC CO., LTD.

Head Office : Kimhae Gyeongsangnam-do
 Homepage Add. : www.skace.com
 Main Products : Cable Tray, Accessories

TEL : +82-55-332-3315

SHINMYUNG INDUSTRIAL CO., LTD.

Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Cable Tray Joint, Hanger
TEL : +82-51-831-5061

SHIN SHIN HEAVY INDUSTRIES CO., LTD.

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

SHIN SHIN MACHINERY CO., LTD.

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

SHINWOO METAL CO., LTD.

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

SHIN YOUNG AIR CLUTCH.

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

SILLA METAL CO., LTD.

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

SIN HUENG FLANGE CO., LTD.

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

SINWEOL GRATING CO., LTD.

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

SMS CO., LTD.

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

SM POWER TEC CO., LTD.

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

SNP CO., LTD.

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

STACO CO., LTD.

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

STA-JH CO., LTD.

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

STASB CO., LTD.

Head Office : Jinhae Gyeongsangnam-do
Homepage Add. :
Main Products : Marine Furniture, Door
TEL : +82-55-544-8070

STAUFF KOREA LTD.

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

STBEND CO., LTD.

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

STEEL KOREA CO., LTD.

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

SUHHEUNG ENGINEERING CO., LTD.

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

SUNBO IND CO., LTD.

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

SUNG CHANG CO., LTD.

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

SEOUNG HYUP MACHINERY.

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

SUNG IL CO., LTD.(SIM)

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

SUNG KWANG M/C.

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

SUNGWON ELECTRIC CO.

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

SUNG WON ENTERPRISE. CO., LTD.

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

SUNIL INSTRUMENT CO., LTD.

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

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

Head Office : Gangseo-gu Busan
Homepage Add. :
Main Products : Cargo Line, Ballast Line, Engine Room, I.G Line

TEL : +82-51-831-3777

S&W CO., LTD.

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

TAE HWA INDUSTRY CO.,LTD (THI)

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

TAEHWA KALPA SEAL.

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

TAE KWANG INDUSTRIES.

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Daily News of KORMARINE 2013



(Korea International Shipbuilding and offshore Marine Exhibition)

Monthly KORSHIP, the Korea shipbuilding & Offshore monthly magazine, will launch daily news service to keep your finger on the pulse of the KORMARINE 2013. KORMARINE 2013 will be open with great eclat at Busan Exhibition & Convention Center (BEXCO) , and Monthly KORSHIP will keep you updated with the latest news swiftly during the show as the official media of KORMARIE 2013 and we appreciate you cooperation in advance.

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)

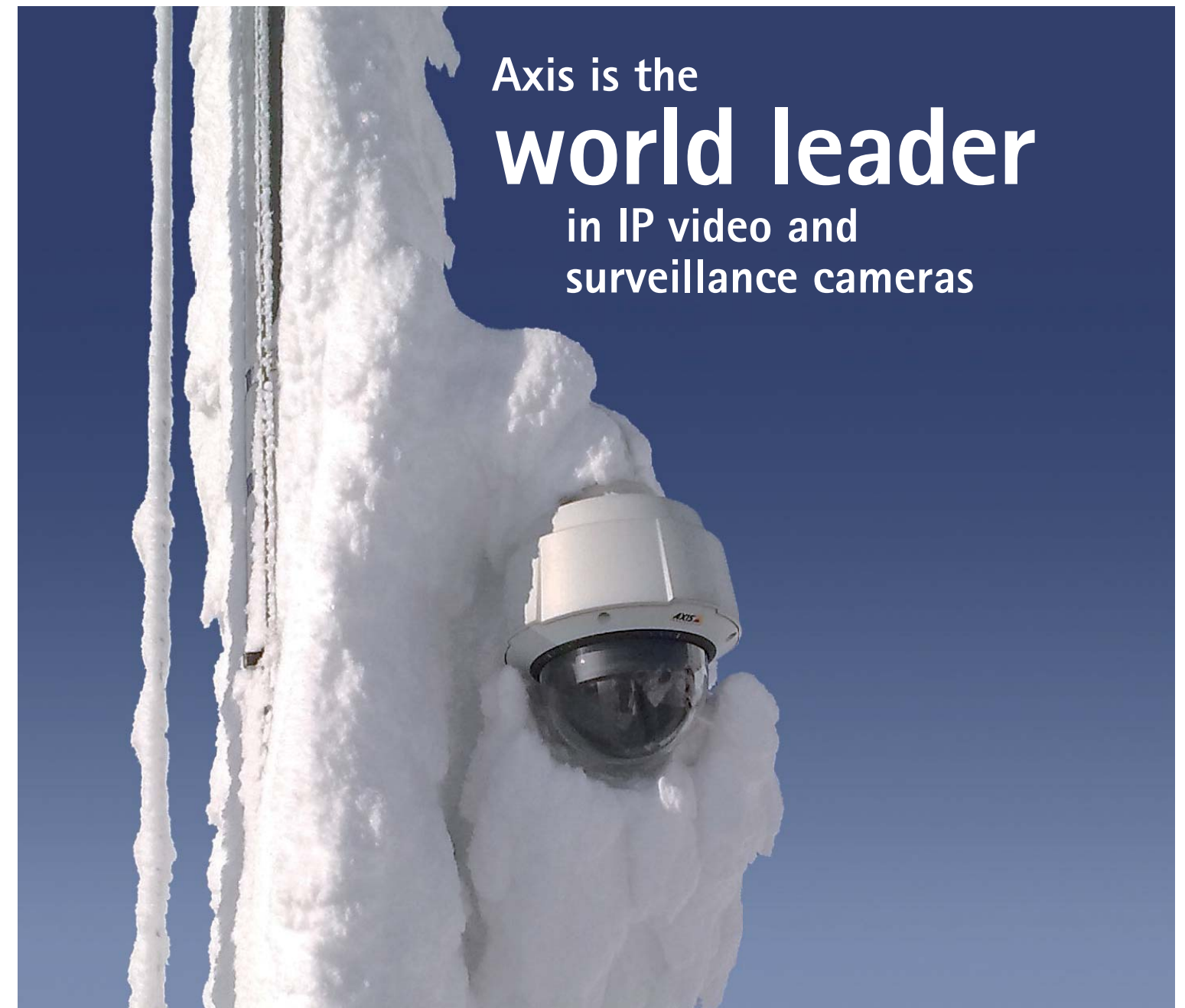
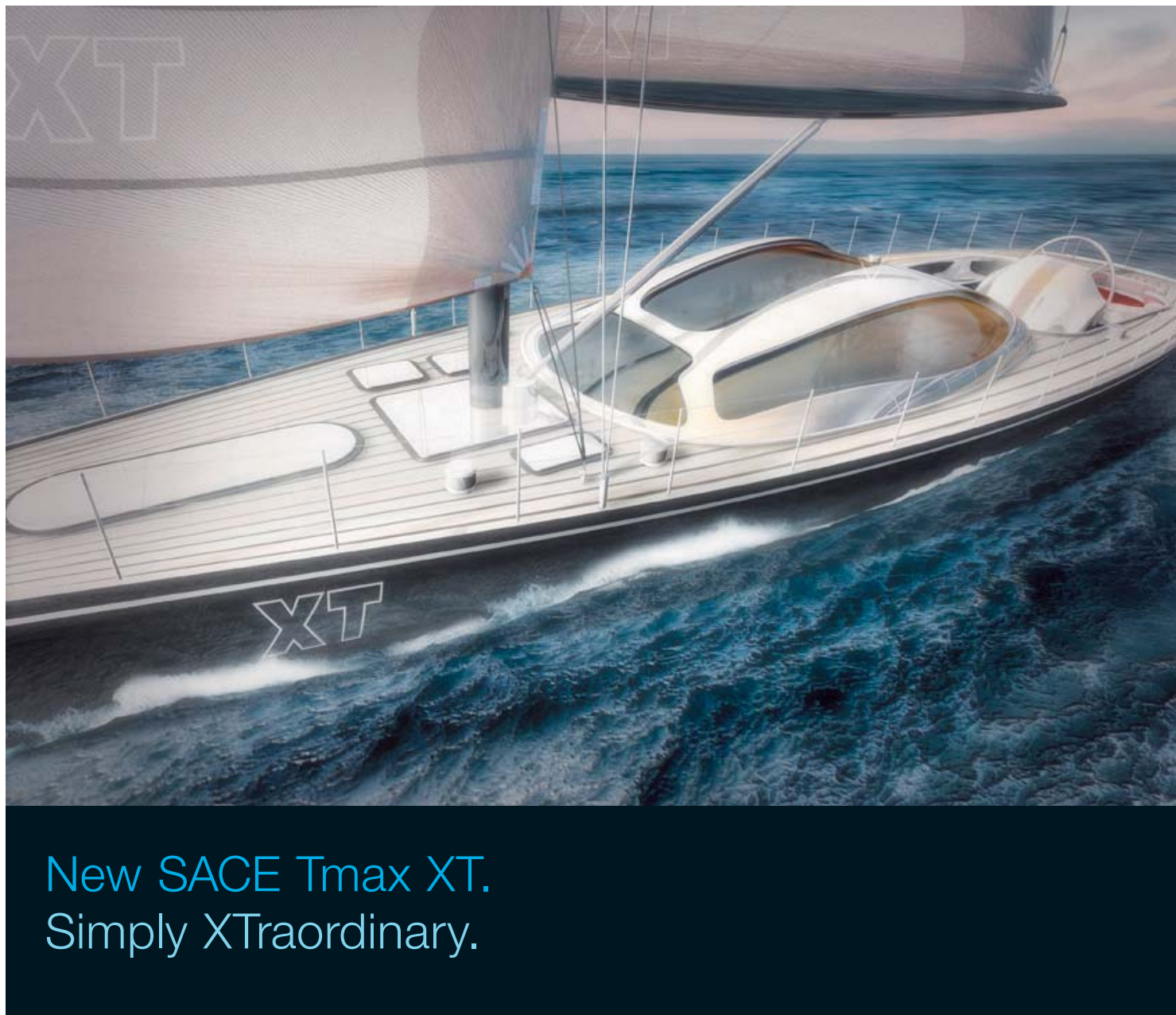
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