

Korea monthly shipbuilding magazine

KORSHIP

Shipbuilding · Offshore · Oil & Gas · Offshore wind

2017. 12

Kormarine
Official Magazine

코마린
전시회 공식 매체

Application

CATCH THE WIND

Major Performance Gallery

A LOOMING REBOUND IN SHIPBUILDING AND OFFSHORE INDUSTRIES

Issue

Cobham Satcom showcased next-generation satellite communication solutions

Inmarsat launching transforms seafarer safety infrastructure 'SafetyNET II'

세계 유일 SIL2 무선 가스 검지기 'GasSecure GS01'





ADOS GTR 210



Application :

Chemical industry, Manufacture of paints and varnishes, Plastics processing plants, Sewage works, Biogas plants, Gas-fired boiler systems, Liquid gas storage houses, Laboratories, Oxygen concentration, measurements, Refineries, Cold storage houses, (ammonia monitoring), Paint spraying booths, Gas tankers, Container ships, Offshore platforms, Applications in aggressive environments

2016년 개정판

조선 & 해양 총람

Guide Offshore & Shipbuilding

조선&해양 총람 '2016년 개정판' 발행

월간 KORSHIP은 지난 2013년 조선해양 관련업계의 관심과 협조에 힘입어 국내 처음으로 '조선&해양 기업총람(Offshore & Shipbuilding Guide)'을 제작해 발행했습니다.

이번에 월간 KORSHIP은 국내 조선업계의 요구에 따라 '2016년 개정판'을 새롭게 발행하게 되었습니다. 2016년 개정판은 기존 2013년 총람 (1,008개 업체)에 비해 50% 이상 업체가 추가되어 총 1,600여 곳의 조선&해양 업체 정보가 수록되어 있습니다.

발행사: 프로콘 (Procon) / 월간 KORSHIP

발행일: 2016년 7월 20일

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& 2016년 개정판 조선해양 총람 구매와 관련해 기타 자세한 사항은 전화문의(02-2168-8896) 또는 본사 홈페이지(www.korship.co.kr)를 참조해 주십시오.



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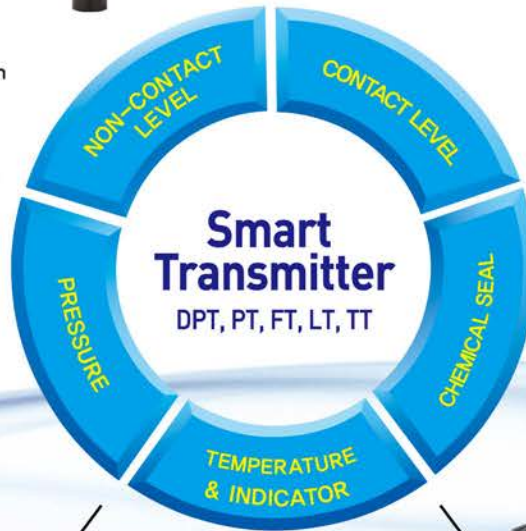


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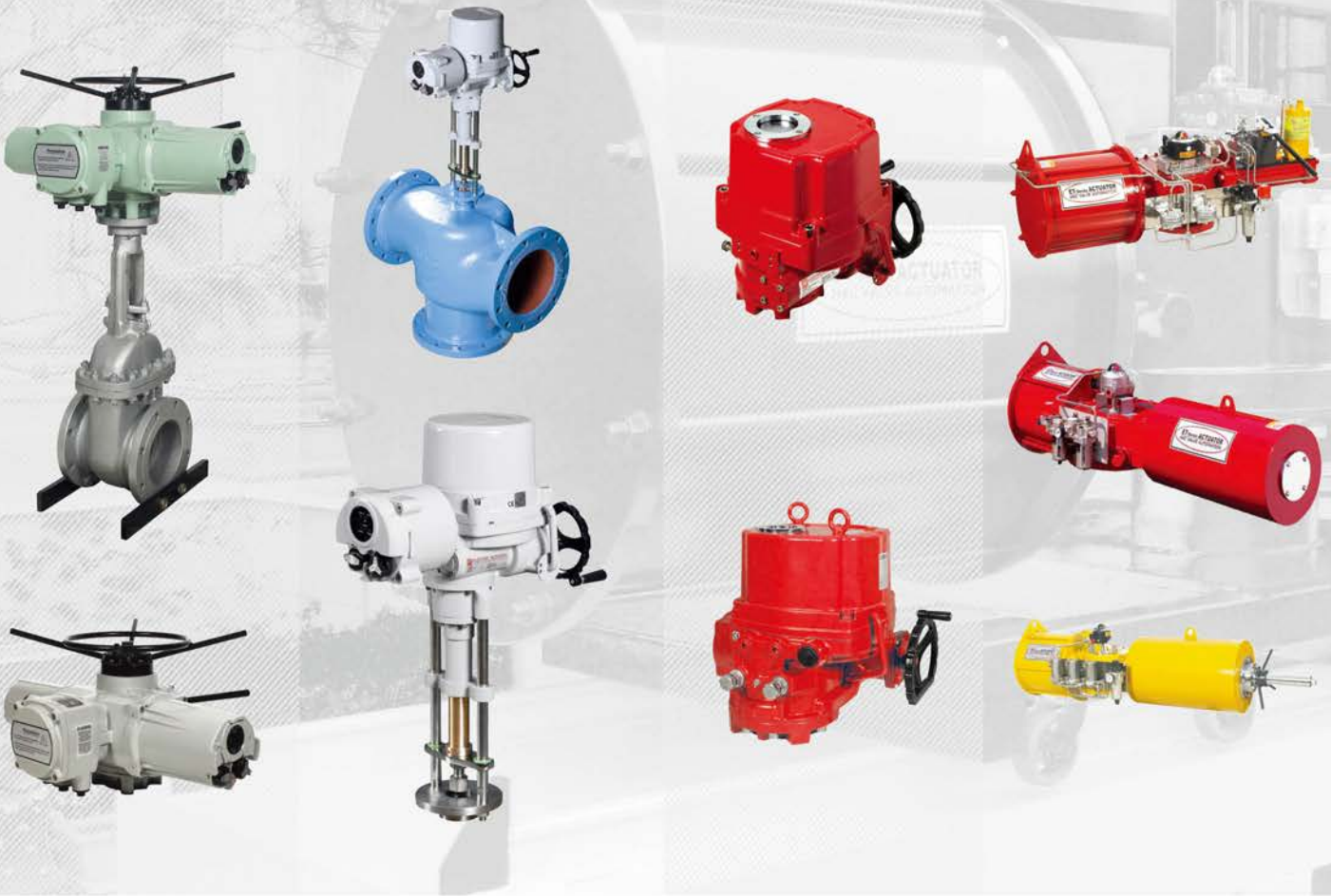
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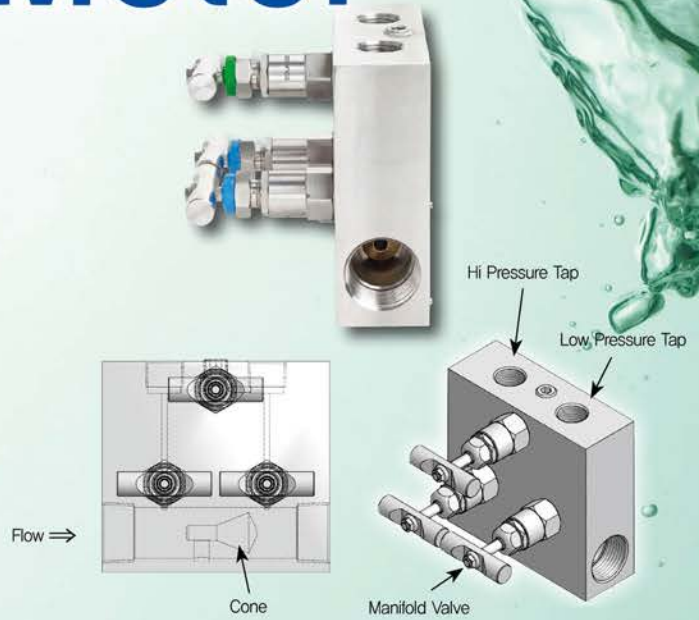
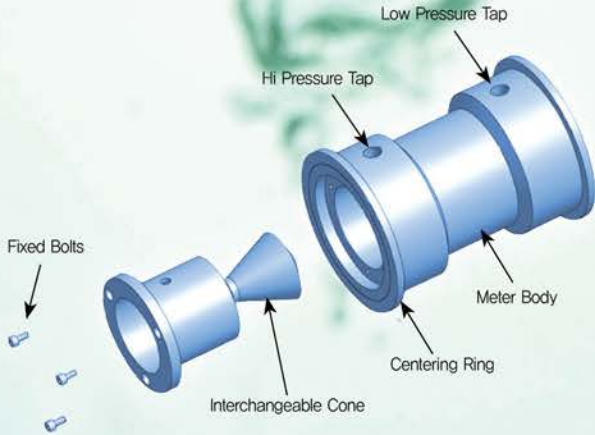
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Cone Meter



HFV-WM (Wafer type Cone Meter)

IVCM (Integral Valve Cone Meter)

DP HiCone Meter

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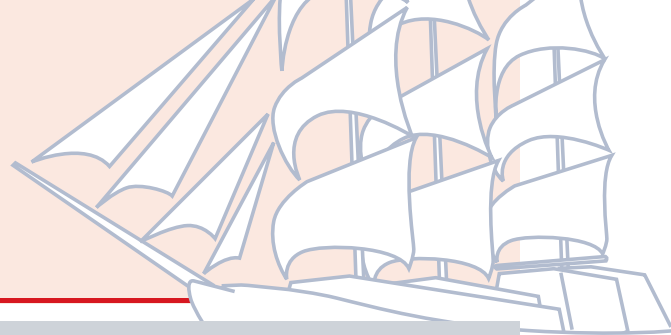
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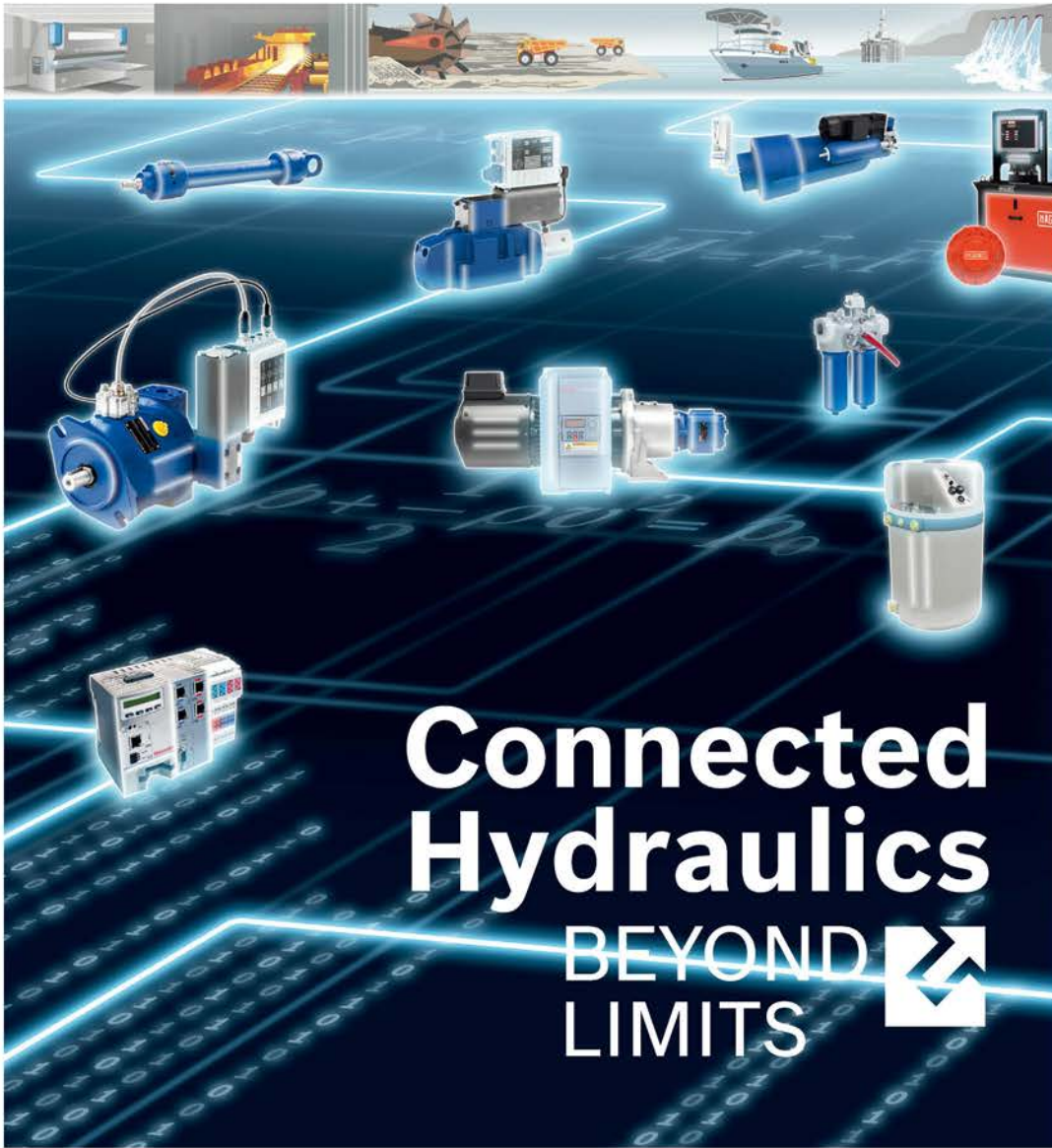
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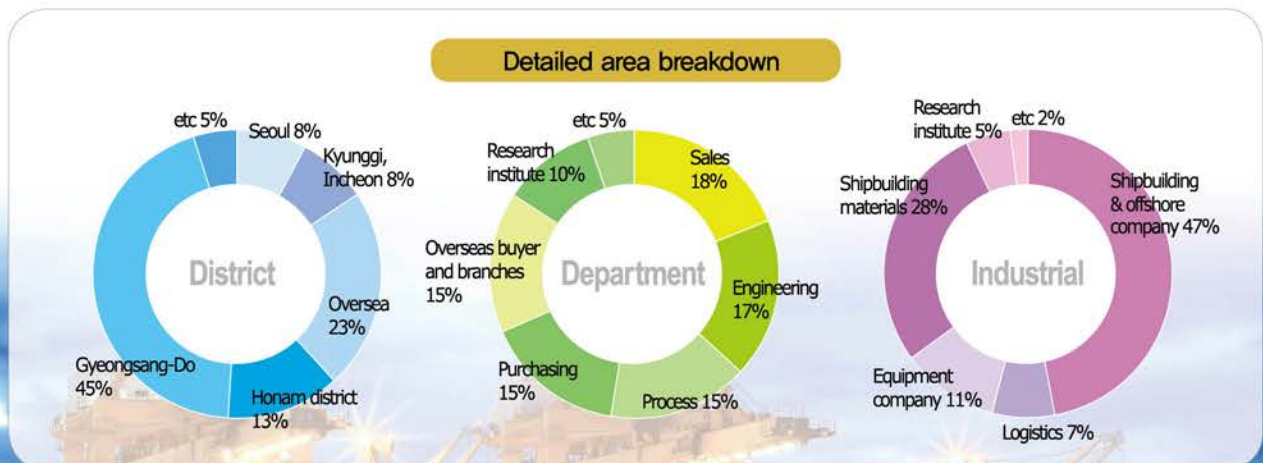
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DSME delivered a drillship

Daewoo Shipbuilding & Marine Engineering (DSME) announced on October 30 that it delivered a drillship worth KRW 620 billion ordered by the U.S.-based Transocean in 2012. As a result, DSME has handed over all the 5 offshore plants scheduled for delivery by this year.

The drillship delivered recently is DSME-12000 model developed independently by DSME with 238m in length and 42m in width. As the largest drillship ever built by DSME, it can operate in water depths of up to 3.6km and drill to a maximum depth of approximately 12km.

Transocean, the world's largest drillship operator, is a major customer of DSME, which has placed a total of 12 drillships

since its first contract with DSME in 2006. Despite downturn in the drilling market, Transocean has shown deep trust with DSME for its unmatched technological prowess and production capability to an extent that it paid significant

portion in advance out of total amount payable upon delivery. Thus, DSME successfully completed delivery of all the 12 drillships ordered by Transocean.

A source from DSME said, "We have successfully delivered all the 5 offshore proj-



ects this year as scheduled despite massive losses that we have suffered due to offshore plants over the last 2 years, and expect the production to become more stable, adding fresh momentum to the normalization of business."

대우조선해양, 드릴십 1척 인도

대우조선해양은 지난 2012년 미국 트랜스오션으로부터 수주한 6,200억원 규모의 드릴십 1척을 인도했다고 지난 10월 30일 밝혔다. 이로써 대우조선해양은 올해 인도예정이었던 5척의 해양플랜트를 모두 성공적으로 인도했다.

이번에 인도된 드릴십은 대우조선해양이 자체 개발한 DSME-12000 모델로, 길이 238미터, 폭 42미터 규모다. 이는 대우조선해양이 건조하는 드릴십 중

최대 규모로 최대 수심 3.6킬로미터의 심해에서 최대 약 12킬로미터까지 시추가 가능하다.

세계 최대 시추선사인 트랜스오션은 대우조선해양과 2006년 첫 계약을 체결한 이후 총 12척의 드릴십을 발주한 대우조선해양의 주요 고객사다. 특히 시추 시장의 침체에도 불구하고 트랜스오션은 대우조선해양의 높은 기술력과 생산능력을 믿고 인도대금의 상당 부분을 미리 지급하며 계약을 유지하는 등 깊은 신뢰 관계를 보여줬다. 이로써 대우조선

해양은 트랜스오션의 드릴십 12척을 모두 성공적으로 인도하게 됐다.

대우조선해양 관계자는 "지난 2년간 해양플랜트 때문에 대규모 손실이 발생하는 등 어려움이 있었지만, 올해 계획된 해양프로젝트 5척을 성공적으로 인도함에 따라 생산 안정화 등 경영정상화에 더욱 속도가 붙을 것으로 기대된다"고 말했다.

HHI made profits for 7 consecutive quarters

Hyundai Heavy Industries Group published the estimated consolidated business results of its major affiliates including Hyundai Heavy Industries (including shipbuilding affiliates such as Hyundai Mipo Dockyard and Hyundai Samho Heavy Industries) and Hyundai Robotics (including oil refining division and subsidiaries split off) for the third quarter of 2017.

According to the publication, Hyundai Heavy Industries (HHI) recorded sales of KRW 3 trillion and 804.4 billion and operating profit of KRW 93.5 billion while Hyundai

Robotics registered KRW 4 trillion and 415.8 billion in sales and KRW 555.2 billion in operating profit.

HHI posted a QoQ (quarter-on-quarter) decline in sales as a result of the slide in shipbuilding volume and completion of large-scale projects in offshore and plant segments. However, HHI maintained operating profit in the black with proactive efforts for reinvigoration of its business.

Meanwhile, Hyundai Robotics posted a QoQ upturn in both sales and operating profit thanks to improved profitability of the

oil refining division, robust profits from subsidiaries split off and HHI's gain on valuation of investment using the equity method of accounting, etc.

Hyundai Oilbank recorded sales of KRW 3 trillion and 339.2 billion and operating profit of KRW 274.7 billion on the back of strong refining margins and an upswing in profits from petrochemical segment.

Hyundai Construction Equipment registered KRW 613.2 billion in sales and KRW 44.2 billion in operating profit, while Hyundai Electric recorded KRW 469.1 billion in sales

and KRW 30.3 billion in operating profit. Both maintained stable performance but-tressed by constant efforts to streamline business operations after split off. A source from HHI said, "With proactive

efforts to improve business management, we have maintained surplus even amid internally and externally unfavorable busi-ness environment. As the thin orderbook is expected to aggravate difficulties, we will

continue to revamp business structure to overcome crisis and further ramp up our competitiveness so as to thicken our order-book."

현대중공업, 7분기 연속 흑자 달성

현대중공업그룹은 현대중공업(현대미포조선, 현대 삼호중공업 등 조선 계열사 포함)과 현대로보틱스 (정유부문, 분할 신설법인 포함) 등 그룹 주요 계열사의 2017년도 3분기 연결기준 잠정실적을 발표했다. 공시에 따르면 이번 분기 현대중공업은 매출 3조 8,044억원과 영업이익 935억원, 현대로보틱스는 매출 4조 4,158억원과 영업이익 5,552억원을 각각 기록했다. 현대중공업은 조선부문의 건조물량 감소와

해양·플랜트부문 대형공사 완료로 매출은 전 분기 대비 줄었으나, 선제적인 경영개선 노력 등에 힘입어 영업이익은 흑자를 유지했다. 현대로보틱스는 정유부문의 수익개선, 분할회사들의 견고한 수익과 현대중공업 지분법평가이익 등을 통해 전 분기 대비 매출과 영업이익이 증가했다.

현대오일뱅크는 정제마진 강세 지속과 석유화학 분야 수익 확대로 매출 3조 3,392억원, 영업이익 2,747억원을 기록했다. 현대건설기계와 현대일렉트릭은

지속적인 경영효율화 작업을 통해 각각 6,132억원과 4,691억원의 매출, 442억원과 303억원의 영업이익을 거두며 분할 이후 안정적인 실적을 이어갔다. 현대중공업그룹 관계자는 "대내외 어려운 경영환경 속에서도 선제적인 경영개선계획 실시를 통해 흑자를 지속할 수 있었다"며, "일감 부족에 따른 어려움이 지속될 것으로 예상되는 만큼, 체질개선을 통한 위기극복과 수주경쟁력 제고에 총력을 기울이겠다"고 밝혔다.



New Flow Meter Cuts Capital Costs at Shale Field Well Pads in Half

Emerson has launched a new smaller version of its industry-leading Roxar Multiphase Meter (MPFM) 2600 - a small size, cost-effective and modular flow meter specifically designed to address the flow profiles of North American shale fields and provide a meter suitable for the lifetime of the wells.

Through switching from one separator per well to one Roxar multiphase meter per well, operators can reduce facilities capital investments at the well pad by over 50 percent, supporting Emerson's Project Certainty initiative as operators strive for Top Quartile Performance in capital efficiency in unconventional assets.

Other operator benefits include improved and more accurate well allocation; a reduced well pad footprint; and reduced environment exposure as tanks are pushed downstream to central facilities where they can be more efficiently monitored for regulatory and environment compliance, delivering operational excellence.

The new compact MPFM 2600 is part of the scalable Roxar Multiphase Meter product family built on measurement principles used in over 1,500 meter installations

worldwide, and enables shale operators to monitor the flow from the well stream continuously and in real-time.

The cost-effective meter, which has an internal diameter of just 35 mm (1.38 inches), specifically aims to address unconventional fields' unique well characteristics. In addition to the same world-class functionality and performance of other Roxar Multiphase Meters, the compact version comes with improved algorithms and models, and a brand new, ease-of-use operator interface. The interface streamlines installation and commissioning and provides improved graphical views for trending, visualization of well data, and configuration of the meter.

"One of the greatest challenges in shale fields today is generating accurate flow rate and fluid information from wells that have artificial lift, high gas fractions, high water cuts, unpredictable flow regimes and low operating pressures," said Patrick Babka, vice president and general manager, Roxar at Emerson Automation Solutions.

"That's why this new compact Roxar MPFM 2600 is such a 'game changer' for the



shale industry, providing direct and accurate wellhead monitoring and metering in a compact and highly cost-effective design, delivering cost savings at the well pad, and enabling shale operators to pursue a one meter per wellhead solution for allocation and increased well production. Going forward, Emerson aims to continue closely collaborating with operators to meet fast changing market needs."

에머슨, 콤팩트 Roxar 다상 유량계 출시

에머슨이 북미 셰일 필드의 유량 프로파일을 다루고 웰(well)의 생애 주기 동안 적절한 유량을 제공하기 위해 설계된 업계 최고의 비용 효율적인 콤팩트 모듈러 유량계, Roxar Multiphase Meter (MPFM) 2600의 소형 버전을 새롭게 출시했다.

한 개의 유정에 세퍼레이터 한대를 사용하던 것을 Roxar Multiphase Meter로 전환할 경우 웰 패드 시설의 자본 투자를 50% 이상 줄일 수 있고, 새로운 자산의 자본 효율성과 관련하여 Top Quartile을 달성할 수 있도록 노력함으로써 에머슨의 프로젝트 확실성(Project Certainty) 계획을 지원한다.

또 다른 운영상 이점으로는 유정 별 생산량의 정확한 계산, 유정 패드가 차지하는 공간 감소, 규제 및 환경 준수를 위해 탱크가 보다 효과적인 모니터링이 가능한 중앙 시설로 배치되면서 최소화될 수 있는 환경 노출 등이 있으며 이는 운영 효율성으로 이어진다고 할 수 있다.

신규 콤팩트 MPFM 2600은 전 세계에 설치된 1,500개가 넘는 유량계에서 사용되는 측정 원리를 기반으로 만들어진 확장 가능한 Roxar 다상 유량계 제품군에 속한다. 셰일 오퍼레이터들은 이를 통해 지속적으로 실시간으로 유정의 유량을 모니터링할 수 있다.

단 35mm(1.38인치)의 내부 직경을 지닌 비용 효율적인 유량계는 특히 독특한 필드의 유정 특성에 적용되기 위해 개발되었다. 세계적 수준의 기능성과 성능을 갖춘 다른 Roxar 다상 유량계와 더불어 콤팩트 버전은 향상된 알고리즘과 모델뿐만 아니라 새롭고 사용하기 쉬운 오퍼레이터 인터페이스도 갖추고 있다. 이러한 인터페이스는 설치 및 시운전 공정을 간소화하고 트렌드를 보다 향상된 그래픽으로 보여주며, 유정관련 정보의 시각화 및 유량계 설정을 제공한다.

에머슨 오토메이션 솔루션즈의 Patrick Babka는 “오늘날 셰일 필드가 마주한 가장 큰 과제는 인공회수, 높은 가스 함유율, 높은 수분 함유량, 예측 불가능한

유량 상태 및 낮은 운전 압력 조건의 유정에서 정확한 유량과 유체에 대한 정보를 구하는 것”이라며, “새로운 Roxar MPFM 2600은 작고 비용 효율적인 설계를 통해 직접적이고 정확한 웰헤드 모니터링과 계량을 가능하게 함으로써 웰패드의 비용 절약을 이끌어내고 셰일 오퍼레이터들이 할당 및 향상된 웰 생산을 위한 웰 당 단일 유량계의 솔루션을 사용할 수 있도록 하는 셰일 산업의 ‘전환점’이라고 할 수 있다”고 말했다.

Roxar MPFM 2600은 전기 임피던스 측정, 현장에서 교체가 가능한 삽입형 벤츄리(venturi), 감마 시스템 이렇게 세 개의 주 모듈로 이루어져 있다. 이 모듈들은 함께 유체 상태별 함유량과 유량을 결정하는데 사용된다. 이 유량계는 역류 측정, 웰 시험 및 할당 계량 등과 같은 어플리케이션에서 활용 가능하며 유량 및 유체 상태 별 함유량의 변화를 즉각적으로 탐지하여 지불해야 할 사용료를 계산해주며, 정확한 조치가 취할 수 있도록 해준다.



Nexans Opens the Latest High Voltage Test Laboratory at its Calais Center of Excellence

The high voltage (HV) market is requiring an increasing number of tests at higher and higher voltage levels. In order to support this growing business, Nexans has decided to significantly enhance its testing capacity by building in Calais, France, a new state-of-the-art direct current (DC) laboratory that allows to test simultaneously three independent qualification loops.

Nexans Opens the Latest High Voltage Test Laboratory at its Calais Center of Excellence Each loop is composed of multiple cable sections and joints and is connected to the electrical network through two terminations. It is designed to represent the various configurations existing in power grids. The generators, rated for voltages up to 1.2 million volts, operate in a controlled environment, which guarantees the optimum equipment availability required for performing ageing tests typically lasting more than one year.

This new laboratory is dedicated to HVDC cables, a market of primary importance for

high-capacity links and connection of renewable energy sources, such as the Dolwin 6 offshore wind-park. For this large project brought to life by TenneT, Nexans Germany was recently awarded a contract

to supply and install two 90-km-long HVDC cables that will transport up to 900 MW of wind power, enough to transmit enough electricity for almost one million German homes.

The Calais Center of Excellence for HV testing occupies 6,500 m² and is now composed of 12 HV test laboratories equipped with world-class generators operating up to 1.5 million volts. It is COFRAC-certified (ISO 17025) and addresses both alternating current (AC) and DC applications. The Center of Excellence is a critical asset for qualification of the cable systems developed by



Nexans for its customers and for supporting the Group's industry-renowned innovation program. The Center played a key role in qualification of Nexans' 500 kV AC and 525 kV DC systems.

In addition to electrical testing, highly skilled and experienced experts of the Calais Center of Excellence perform electrical, thermal and mechanical modeling along with physico-chemical analyses and thermo-mechanical tests. Such in-depth approach allows to develop a detailed understanding of phenomena involved in HV cable systems, both resistive and

superconducting, in order to ensure that Nexans cables and accessories will meet customer needs at commissioning and in the long run. Finally, the teams of the Calais Center of Excellence contribute to continuous improvement of installation techniques as well as technical training of Nexans' cus-

tomers and partners.

“As the global energy needs continue to grow, the world will require extremely reliable cable systems for power transmission at ever higher voltage levels for both AC and DC applications”, said Dirk Steinbrink, Nexans' Senior Executive Vice President,

High Voltage and Underwater Cable Business Group. “With its new laboratory, the Calais Center of Excellence will be positioned as one of the leading hubs for helping our clients address the challenges of the future.”

넥상스, 프랑스 깔레에 최신 초고압 시험 연구소 개관

초고압(HV) 시장에서는 전압 수준이 올라감에 따라 더 많은 횡수의 테스트와 더 높은 전압 테스트를 요구한다. 이 성장하는 비즈니스를 위해 넥상스는 프랑스 깔레에 있는 기존 시험 설비를 대폭 확충하여 대형 시험 연구소로 새롭게 단장하기로 결정했다. 이 최신식 직류(DC) 실험실에서는 세 개의 독자적인 품질 폐회로에서 동시에 테스트가 가능하다. 각 폐회로(루프)는 여러 개의 케이블 섹션과 조인트로 구성되어있으며, 두 개의 단말 장치를 통해 전기 네트워크에 연결되어 있다. 이는 현재 전력 그리드에서 사용되고 있는 다양한 구성컨피규레이션을 보여주기 위해 설계되었다. 최대 120만 볼트까지 전기를 생성할 수 있는 발전기는 통제된 환경에서 작동되며, 특히 일년 이상 진행되는 노화 시험에 필요한 최적화된 설비를 보장한다. 이 새로운 실험실은 초고압 케이블과 돌원 6 오프

쇼어 풍력발전단지과 같은 신재생에너지에 필요한 고용량 링크와 커넥션 시장 전용으로 만들어 졌다. 테넷T가 진행하는 이 대형 프로젝트는 넥상스 독일이 최근 수주한 계약으로, 풍력을 최대 900MW까지 송전가능한 두 개의 90km 초고압 케이블을 공급 설치한다. 이는 약 100만 독일 가정에 공급할 수 있는 전력량에 해당한다.

초고압 시험용 깔레 실험실은 6,500m²의 면적으로, 현재 최대 150만 볼트까지 작동하는 세계 최고의 발전기와 함께 12개의 초고압 시험 연구소를 갖추고 있다. 이는 COFRAC(ISO 17025) 인증을 받았으며, 교류 및 직류 장비가 모두 사용가능하다. 깔레 시험 연구소는 케이블 시스템 시험에 있어 핵심적인 자산으로, 이는 우리 고객과 업계에서 잘 알려진 그룹 산업 혁신 프로그램을 지원하기 위해 넥상스가 개발한 것이다. 이 연구소는 넥상스의 500kV 교류 및 525kV 직류 시스템 시험에서 핵심적인 역할을 했다. 전기 시험에 더해, 깔레 시험 연구소에는 고도의 숙

련된 전문가들이 물리-화학 분석과 열-가공 시험과 함께 전기, 열, 그리고 기계 모델링을 수행한다. 이러한 심층적인 접근방식으로 초고압 케이블 시스템에서 나타나는 저항성 및 초전도성 현상에 대한 상세한 이해가 가능하며, 이를 통해 넥상스 케이블 및 액세서리 제품이 장기적으로 고객의 요구에 부응할 수 있도록 보장한다. 최종적으로 깔레 시험 연구소의 팀은 넥상스 고객과 파트너사의 기술 훈련과 더불어 설치 기술의 지속적인 개선에 기여하게 된다.

“글로벌 에너지 산업이 계속해서 성장함에 따라, 세계는 교류와 직류 장비의 초고압 송전에서도 완전히 신뢰할 수 있는 케이블 시스템을 필요로 하게 될 것이다. 새롭게 단장한 깔레 시험 연구소는 우리 고객들이 미래에 마주하게 될 문제를 해결 하는데 선도적인 허브로 자리할 것”이라고 넥상스 초고압 및 해저 케이블 사업부 EVP 더크 스테인브링크는 말했다.

Danfoss, Has Hosted Marine & Offshore Business Networking Event 'Danfoss Night'

Danfoss, a global energy efficiency solutions company in Denmark has hosted Marine & Offshore business networking event 'Danfoss Night' in great success at Park Hyatt Busan on 25 Nov.

During KORMARINE exhibition, all leaders gathered in this bi-year event to see, talk and discuss the latest trend and technology for shipbuilding and marine industry. To continue the dialogue and knowledge sharing, Danfoss organized a Danfoss Night event where 50 experts and industry leaders shared their views and discuss the future of the shipbuilding and marine industry.

Steve Kim, General Manager of Danfoss Korea, said “We are very pleased to host

Danfoss Night and we see the sign that Marine market is taking an upturn after passing through the long tunnel of trough” and “Danfoss will continue to grow with our partners in order to play a significant role in responding to various regulations such as Eco Ship and Smart Ship to support green agenda”.

In addition, Thomas Lehmann, Ambassador of Denmark, left congratulatory message for the development of Danfoss Korea and



Marine & Offshore industry in Korea. And Mr Sungho Shin, Director of DNVGL which is leading Marine classification society, gave the in-depth insights on marine trend and it is clearly showing we need more energy-

efficient solutions to respond to the climate change and global warming.

Lastly, Soren Kvorning, president of Danfoss Asia pacific region, share his views on current challenges and the trend in Marine industry and the needed energy-efficient solutions to create a greener tomorrow. He spoke, "Korea is a frontier country among its neighborhood on supporting COP21

pledge. Government targets to cut 37% of CO₂ emission by 2050 and also enforce the legal regulations on greenhouse gas emissions for newbuilt ships to support International Maritime Organization's energy efficiency requirement. By 2025 all new ships will be a massive 30% more energy efficient than those built in 2014. Danfoss has solutions to achieve energy efficiency

on every applications in the ship."

After the speeches, industry leaders and experts continued discussion and exchange their views. The expectations to green technology is positive and well supported by political agenda and the trend for a sustainable future. The green technology is ready today to improve efficiency, safety and reliability for a greener marine.

덴포스, 조선해양 비즈니스 네트워킹 행사 '덴포스 나잇' 개최

덴마크의 글로벌 에너지 효율 솔루션 기업 덴포스(Danfoss)가 지난 11월 25일 파크 하얏트 부산에서 국내외 조선해양 산업 전문가들을 대상으로 비즈니스 네트워킹 이벤트 '덴포스 나잇(Danfoss Night)'을 성황리에 개최했다.

조선해양 산업 전문가 50여 명이 참석한 가운데 진행된 이 행사는 조선해양 산업 전반의 트렌드를 공유하고 친환경 비즈니스에 대한 중요성과 관련 에너지 이슈를 주요 주제로, 한국 조선해양 산업의 미래를 토론하는 자리로 마련됐다.

이날 행사를 개최한 덴포스 코리아 김영업 사장은 환영사를 통해 "조선해양 시장이 저점의 터널을 지나 상승세에 들어서는 이 시점에 국내외 조선해양 산업 전문가분들을 초청하여 덴포스 나잇을 개최하

게 되어 더욱 뜻깊다"며, "덴포스는 조선해양 산업 종사자 분들과 함께 오늘날 이 산업이 직면한 에코쉽(Eco Ship)과 스마트쉽(Smart Ship)의 새로운 트렌드에 앞장섬과 동시에 여러 규제에 큰 역할을 할 수 있도록 끊임없이 성장하겠다"고 말했다.

또한, 이날 행사에 방문한 토마스 레만(Thomas Lehmann) 주한 덴마크 대사는 덴포스 코리아와 한국의 조선해양 산업의 발전을 기원하는 축사를 남겼다. 5대 주요 선급 중 하나인 DNVGL의 신성호 본 부장은 연사로 참석해 '조선해양 산업의 친환경 비즈니스'를 주제로 한 발표를 통해 조선해양 산업에서의 친환경 에너지 시스템에 대한 심층적인 통찰력을 제공했다.

소렌 크오닝(Soren Kvorning) 덴포스 아시아 태평양 지역 대표는 "글로벌 조선해양 산업 트렌드에 대한 발표와 함께 한국 조선해양 산업의 비전에 대한 의

견을 제시했다. 그는 발표를 통해 "유엔기후변화협약 당사국 총회 참여국인 한국은 2050년까지 이산화탄소 배출량을 37% 줄이고, 온실가스 배출에 대한 법적 규제를 시행하여 2025년까지 모든 선박이 2014년에 건설된 선박보다 30% 이상의 에너지 효율을 높이는 데 주력하게 될 것으로 보인다"며, "한국 조선해양 산업이 에너지 효율을 달성하는 데 최적화된 각종 솔루션을 보유한 덴포스와 함께 내일의 친환경 해양 산업을 설계해 나갈 수 있길 바란다"고 덧붙였다.

발표 세션 이후 행사에 참석한 조선해양 산업 리더 및 전문가들은 한국 조선해양 산업에 대한 토론을 이어나가며 통찰력 있는 인사이트를 공유했다. 그린 비즈니스에 대한 기대는 오늘날의 정치적 아젠다와 지속 가능한 미래를 꿈꾸는 트렌드와도 맥락을 나란히 하고 있어 그 의미가 더욱 크다.

Shell Marine Launches New Cylinder Oil for Optimised Engine Performance

Shell Marine has officially launched Shell Alexia 140, a two-stroke engine cylinder oil whose exceptionally high base number aims to deliver the ultimate protection for the most modern efficient engines against cold corrosion issues and the means of optimising oil feed rates when fuel grades change.

The launch follows receipt of a No Objection Letter (NOL) for commercial use of Shell Alexia 140 from MAN Diesel & Turbo and coincides with Shell Alexia 140's acceptance into full scale operations by two major customers. Shell Alexia 140 is now available from the ports of Rotterdam, Bremerhaven, Hamburg, Antwerp, Tanjung Pelepas, Busan and Salalah.

Shell Alexia 140's wider potential was acknowledged in September 2016, when Shell Marine disclosed its selection as the first test oil for 'ACOM' - MAN Diesel & Turbo's Automated Cylinder Oil Mixing process. Shell Alexia 140 joins Alexia S3 (BN25), Alexia S4 (BN 60), Alexia 50 (BN 70) and Alexia S6 (BN100), in a range covering fuel types from LNG to HSFO, operating regimes from full load to slow steaming, and engines of all ages.

"After 18 months of exhaustive laboratory testing and field trials, we are delighted to introduce Shell Alexia 140 formally to market," said Jan Toschka, Shell Marine Executive Director. "Its combined characteristics make

it the right choice whether the owner wants to protect ultra-efficient engines against cold corrosion or optimise feed rates across vessel operating conditions."

"We welcome the always pioneering character of Shell Marine that resulted in this latest addition to its comprehensive range of two stroke engine cylinder oils," said Panos Deligiannis Tankers, Neda Maritime Agency Technical Director. "Protecting our engines is critical, and matching the right cylinder oil with vessel operating profile and engine specific requirements is a crucial parameter for ship/engine worthiness and efficient maintenance, whatever the fuel grade being burned."



Kongsberg receives first DNV GL cyber security type approval for its K-IMS system

As the shipping industry digitalizes, vessels are becoming sophisticated hubs of connected systems and sensors that generate and exchange data both onboard and back to shore. This connectivity increases the need for cyber security and for ways of verifying the cyber safety of installed systems.

“At Kongsberg we have been delivering solutions for remote support and data collection for many years,” said Bent Erik Bjørkli, VP Digital Performance at Kongsberg Maritime. “Over the last few years, however, we have seen an increasing focus from our customers in the cyber security of the connected systems on their vessels. This was why we were so interested to work together with DNV GL on the development of the new type approval. With the new type approval, we can now demonstrate the security of our systems through an independent verification process.”

For the past year, DNV GL and Kongsberg have combined their efforts to develop a new type approval programme for the cyber security assessment of control sys-

tem component “Security Assessment of Control System Components, DNVGL-CP-0231”. The pilot system has been K-IMS, a core component in Kongsberg’s digital ecosystem Kognifai. Designed in accordance with the principles in IEC 62443-4-2 and IEC 61162-460, the type approval programme focuses on verifying both the technical reliability and cyber security of control systems.

“We would like to thank Kongsberg for choosing to work with us on this project, and we are very pleased that K-IMS is the first product to have received the new type approval,” said Odd Magne Nesvåg, Head of Control Systems at DNV GL – Maritime. “With the new ‘Security Assessment of Control System Components’ type approv-



Roar Simensen, Product Adviser – Connected Vessels & Information management at Kongsberg Maritime AS (left), receives the new type approval from Knut Omberg, Principal Engineer at DNV GL – Maritime (right).

al programme, we have developed a rigorous certification regime to demonstrate the cyber security capability of onboard systems. By choosing this new voluntary type approval for their systems, maritime vendors now have a way to show their customers they meet a set of independently developed and verified quality standards in an area that is becoming ever more important in today’s connected maritime industry.”



ABB sets out electric, digital, connected approach for shipping

ABB focuses on harnessing the full potential of its power, control and automation solutions through a program of digital integration that will bring about a step change in vessel and fleet management.

“We are living through one of the most exciting periods in the history of the maritime industry,” said Juha Koskela, Managing Director, ABB Marine & Ports. “We believe the next generation of ships will be electric, digital and connected as the industry moves towards the use of new energy sources and automated ship operations. Electric. Digital. Connected. encapsulates ABB’s drive to deliver solutions that make

the maritime industry safer, more efficient and more sustainable based on a holistic perspective.”

Ships featuring pure electric power and propulsion are simpler in terms of layout compared to those running on combustion engines alone, and less exposed to wear and tear. Today, more than 1300 ships employ ABB electric systems, achieving up to 20% efficiency gains over conventional shaftline sys-



tems. The automotive industry’s wider adoption of hybrid electric systems and autonomous control sets the stage for the anticipated

developments in the maritime industry. Based on greater efficiency and sustainability, electric propulsion will become a maritime imperative rather than an alternative. Electric power plants on board vessels optimize fuel consumption, maximize operational flexibility and allow for new energy sources, such as batteries and fuel cells. There is already evidence of this in place. Last week, ABB announced the delivery of the first fuel cell system for Royal Caribbean. “Electric power and propulsion systems also provide a unique platform for digitalization,” said Mikko Lepisto, Head of Digital Solutions at ABB Marine & Ports. “They are inherently connected, which makes it sig-

nificantly easier to apply automation and software solutions. This allows our customers to collect and analyze more data, make better decisions and ultimately improve performance. Furthermore, greater connectivity to shore and ever-increasing computing power, including machine learning, make it possible to exploit advanced analytics that feed into tools for energy efficiency and maintenance optimization.”

For shipyards, too, the case for more electric, digital and connected ships is compelling. “Because we integrate our electric, automation and digital solutions in the design phase, shipyards can reduce cost, schedule and risk,” Lepisto continued.

ABB has already invested heavily in shore-side expertise, advanced analytics, software solutions and engineering availability. ABB Ability™ is a suite of digital and connected solutions that includes ABB Ability™ Marine Advisory System - OCTOPUS vessel operations and energy management optimization, for example. More than 700 vessels are already connected to ABB Ability™ Collaborative Operation centers, availing themselves of 24/7 troubleshooting, maintenance planning, benchmarking, and predictive interventions, improving overall vessel performance.



Alfa Laval PureSOx the choice for SOx abatement on over 100 vessels

A total of 109 vessels representing a diverse array of marine industry customers have put their trust in the Alfa Laval PureSOx platform for compliance with IMO SOx emissions regulations. Coincidentally, the 100th vessel to choose PureSOx was an newbuild project owned by Danish company DFDS, who also purchased the very first PureSOx scrubber back in 2009 for use aboard the RoRo vessel Ficaria Seaways.

With over 75 PureSOx systems in operation today, Alfa Laval has the marine industry's most extensive list of reference installations for any single SOx scrubber technology. This represents every PureSOx commissioned since the first installation, including those on board a number of other ships in the DFDS fleet. The shipping company currently has a total of 16 PureSOx scrubbers in operation on 13 of their vessels.

“The close, ongoing partnership we've been fortunate to build with DFDS and many other customers have been a great benefit for Alfa Laval,” said Erik Haveman, Sales Director, Exhaust Gas Cleaning at

Alfa Laval. “They have been instrumental in helping us to better understand the needs facing marine customers when it comes to installing and commissioning SOx scrubber systems.”

In the eight years since the first PureSOx system was installed aboard the Ficaria Seaways, Alfa Laval has been involved in a wide range of installation projects. Of the more than 100 vessels where PureSOx has been selected to meet emissions rules, 41 have been newbuild projects while over 60 have been for retrofits. “With this experience, our technicians have developed extensive expertise for finding solutions to match different customers' unique needs,” explained Erik Haveman.

Additionally, the customers purchasing PureSOx systems represent the full spectrum of the marine industry. The PureSOx platform can be found in operation on ves-



sels ranging from RoRo and container ships to tankers and cruise liners.

“We are proud that customers from across the marine industry put their trust in Alfa Laval,” said Erik Haveman. “It's been a testament to PureSOx as the market's most complete SOx scrubber platform, as well as to the level of support we can offer as a true partner to our customers.”



MacGregor celebrates opening of its Head office in Singapore

MacGregor, part of Cargotec, announced plans in September to establish its Head office in Singapore and ending a period of more than three years of having operated with a virtual head office.

To celebrate the opening of the Singapore head office, MacGregor held a ribbon cutting ceremony on 1 November 2017 with invited guests including Paula Parviainen, Finnish Ambassador in Singapore, Margriet Vonno, Dutch Ambassador in Singapore, Tan Kong Hwee, member of the Economic Development Board of Singapore (EDB) and customers.

“Cargotec aims to be a leader in intelligent cargo handling, serving logistics industries with its three business areas. The maritime industry landscape has changed and we have seen consolidations, increasing bene-

fits of digitalisation and strong changes in the market environment,” said Mika Vehviläinen, CEO, Cargotec.

“For MacGregor this is an exciting and important opportunity. The future growth of the shipping and consumer logistics is happening more and more in Asia. Therefore, it is very important to be close to the leading market and we are proud to have the home for MacGregor head office in Singapore. There are many good reasons for the decision, but the



Grand opening ribbon cutting - (from left to right) Michel van Roozendaal, Finnish Ambassador Paula Parviainen, Dutch Ambassador, Margriet Vonno, Mika Vehviläinen, Tan Kong Hwee, EDB.

main driver is innovation and being close to the source and capabilities Singapore can offer in that respect.”



Ecospeed enters yacht owners demand copper-free coating alternatives

Subsea Industries has begun actively marketing its Ecospeed coating in the luxury yacht market following the introduction of stringent regulations aimed at reducing the impact of leisure craft operations on the marine environment.

The Antwerp-based sustainable coatings specialist will market its non-toxic hard coating initially in the United States, where there is increasing scrutiny of copper-based antifouling systems on the hulls of all types of pleasure boats.

“There is a momentous drive to remove copper from the antifouling coatings typically used on the hulls of pleasure yachts” said Kelly Townsend, Subsea Industries’ US-based Sales Manager. “Since our Ecospeed product contains zero chemicals and is completely non-toxic to marine life, it has the potential to meet the yacht sector’s requirement for a clean, reliable

and cost-effective alternative to copper-based coatings.”

There has already been a number of studies published that found pleasure boat antifouling products to be the primary source of copper and biocidal contamination in US marinas.

The US Department of Pesticide Regulation (DRP), for instance,

published a study in January that found excessive levels of copper and other toxic compounds were resultant of the ‘frequency of in-water hull cleaning and the use of abrasive and aggressive practices’.

The study found spikes in copper leaching,



Subsea Industries has begun marketing its Ecospeed coating in the luxury yacht as copper-coatings come under scrutiny.

increased dissolved copper content and released paint particulates in to the marinas’ studied. However, as Townsend said “Ecospeed hulls can be legally cleaned in-water because the hard-type, glass flake coating is proven to remain intact during

the cleaning process. Ecospeed hulls can be cleaned by pressure washing but the best way is to clean in-water using mechanical brushes as this results in a hydrodynamically smoother surface which is harder to foul and reduces fuel consumption.”

Since the study, the DPR has now proposed a ‘Cu AFP Regulation’ that would

require ISO leach rate data with every copper AFP product applied. It also recommended that from July 2018, no new or currently registered copper AFP product above 9.5µg/cm²/day would be registered, except when labelled for commercial vessel use only and prohibited from use on recreational vessels.

It is widely anticipated that California will fol-

low Washington state’s lead in introducing legislation to reduce the amount of copper leaching into marinas and harbours.

In 2011, Washington became the first state to adopt a no-copper paint rule. And from 1 January 2018, no new recreational boat up to 65 feet can arrive with copper on its hull and no copper can be sold or applied to a boat after 1 January 2020.

현대중공업, 최신 상륙함 ‘노적봉함’ 진수

현대중공업은 지난 11월 2일 울산 본사에서 해군의 신형 상륙함(LST-II, 천양봉급) 4번함 ‘노적봉함’을 진수했다. 이날 노적봉함 진수식에는 강환구 현대중공업 사장과 전제국 방위사업청장, 김판규(중장) 해군참모차장 등 90여명이 참석했다.

상륙작전이 주 임무인 노적봉함은 4,900톤급으로 길이 127미터, 최대 속력은 23노트(약 40km/h)이며 120여명의 승조원이 함정을 운용한다. 이 함정은 완전 무장한 상륙군 300여명 및 고속상륙주정(LCM), 전자, 상륙돌격장갑차(KAAV) 등을 탑재하고 상륙기동헬기 2대를 이착륙시킬 수 있다.

노적봉함은 평시에는 기지와 도서에 대한 병력, 장비 및 물자 수송 임무를 수행하고 국지

분쟁 시에는 신속대응 전력을 수송한다. 필요 시에는 유엔평화유지군(PKO) 등의 국제협력활동을 지원하며, 재해·재난 구호 등 비군사적·인도주의적 작전도 함께 수행할 예정이다.

해군은 국내 명산의 봉우리를 상륙함의 함명으로 사용해온 관례에 따라 충무공 정신을 계승하기 위해 전라남도 목포시에 위치한 유달산 ‘노적봉’을 신형 상륙함 4번함의 함명으로 명명했다.



한편, 노적봉함은 인수시험평가를 거쳐 2018년 11월에 해군에 인도되며, 전력화 과정을 마친 후 2019년에 작전 배치될 예정이다.

국산 기술로 개발한 무인선, 해양강국을 향한 닻 올려

해양수산부와 선박해양플랜트연구소(KRISO)는 2011년부터 총사업비 270억 원을 투입하여 ‘다목적 지능형 무인선 국산화 개발 사업’을 추진하고 있다. (주)세이프텍리서치 등 민간기업 11곳과 함께 연구개발을 진행하여 무인선 개발을 추진했으며, 이번에 시연회를 갖는 것은 지난 2014년 말 개발된 아라곤1호에 이어 두 번째로 개발된 아라곤2호이다.

무인선 이름인 ‘아라곤’은 ‘바다의 용’이라는 의미이며, 스스로 경로를 인식하고 장애물을 회피하여 운항할 수 있는 ‘자율운항 기능’과 긴급상황 등 발생 시 육상에서 경로를 조정할 수 있는 ‘원격조정 기능’을 갖추었다.

아라곤2호는 무게가 3톤이고 최대속도가 43노트에 달하며, 최고파고 2.5m에서도 운항이 가능하도록 튼튼하게 제작되었다. ‘14년 개발된 1호에 비해 무게가 약 0.4톤 가벼워지고 속도가 약 10노트 빨라지는 등 성능이 향상되었으며, 해양조사와 감시업무를 동시에 수행할 수 있도록 설계되었다.

앞으로 아라곤2호는 조업감시 업무를 비롯하여 해양 관측·조사, 오염방제, 수색구조 등 다양한 분야에 투입될 예정이며, 사람이 직접 탑승하여 업무를 수행하기 어려운 지역에서도 활동하게 된다. 해양조사 업무 등에 무인선을 활용할 시 선박 운항 및 유지·관리에 필

요한 인력을 줄일 수 있게 되어, 운영비용이 크게 절감될 것으로 기대된다.

해양수산부는 무인선 기술을 바탕으로 방위사업청과 함께 군용으로 활용 가능한 무인수상정 개발도 추진하고 있다. 또한 올해 3월 무인선의 핵심기술인 자율운항기술을 민간기업(세이프텍리서치)에 이전하여 무인선의 상용화 기반을 마련했다.

해양수산부는 앞으로 무인선에 특화된 선형설계, 유체성능 추정기술 등 무인선의 핵심기술들을 추가로 민간기업에 이전할 계획이다. 또한 아라곤 2호와 같은 소형 무인선에서 한발 더 나아간 대형 자율운항선박 개발·운

영에 필요한 기술을 확보하기 위해 관계부처와 협력해 연구를 추진할 예정이다. 해양수산부 관계자는 “이번에 개발된 아라곤 II호는 조업감시, 해양환경 조사, 구인·구난

등 공공 분야에서 폭넓게 활용될 수 있을 것으로 기대된다”며, “무인선에 활용된 자율운항, 선체설계 기술을 활용하여 국방 분야뿐만 아니라 영국, 노르웨이 등 세계 각국의 개발

경쟁이 치열한 무인 화물선 분야에서도 우리나라의 입지를 강화해 나가겠다”라고 밝혔다.

● ● ● ● INTRA, 운영 효율성 향상을 가져올 새로운 애플리케이션 발표

컨테이너 운송 업계 최대의 중립적 전자거래 플랫폼이자 소프트웨어 및 정보 제공업체인 INTRA는 2개의 새로운 클라우드 기반 제품 및 개선 사항을 발표했다. 첫번째는 화물 운송 업체와 NVOCC를 위한 새로운 컨테이너 예측 및 할당 솔루션 도구(C-FAST)로 고객의 예상 컨테이너 양과 운송 업체 용량 가용성을 매치해주는 애플리케이션이다. 두번째는 해양 공급망 전문가를 위해 준비된 것으로 선적 계획 경험을 최적화하는 Ocean Schedules 오퍼링의 향상된 버전이다.

이번 발표는 싱가포르에서 약 200 명의 업계 수석 지도자들이 참석한 INTRA 아시아 기술 정상 회의(Asia Technology Summit), 즉 디지털화 및 신기술이 해양 산업 분야를 어떻게 변화시키고 있는가를 나누고 또한 INTRA가 당사 기술 백서 - 청사진 2032 : 해양 컨테

이너 선적에 변화를 일으키고 있는 신기술 - 에 대한 개요를 말하는 포럼에서 이루어졌다. INTRA의 새로운 C-FAST 애플리케이션은 다수의 고객 및 운송 업체 계약 데이터를 수집하여 미리 고객 출하를 예측하고 할당하는, 수동 공정으로는 복잡하고 시간 소모적일 수 있는 주요 문제를 해결해 준다. INTRA C-FAST는 회사마다 최대 40%의 운영 향상을 달성하고 여러 운영 지역에 걸쳐 연간 4백만 달러에 이르는 비용을 절감할 수 있다. INTRA C-FAST는 계약 관리를 최적화하고 고객 예측 및 운송 업체 가용성 약정을 수행함으로써 향상된 매칭 역량을 통해 고객 기쁨을 향상시켜 주는 자동화된 할당 솔루션을 제공하여 인상적이고 이해하기 쉬운 화물 조종 권고 사항을 제시한다. 쉽게 도입되는 고객 예측, 운송업자 약정 및 계약으로 시작하

는 C-FAST는 의사 결정을 최적화하기 위해 항구별 수량 약정, 계약 유형 및 운송 업체 공간 계약상의 의무를 고려한다. 또한, 계획에서 실제 예약에 이르기까지 다시 보드에서의 검토가 가능해 해양 지도자가 명년 비용 및 운송 업체 공급 업체의 최소 수량 약속을 계획하는 데에도 도움이 된다.

INTRA의 CEO인 존 페이(John Fay)는 “해상 운송 업계는 점점 더 상호 연결되어 기업의 운영 및 재정적 개선을 가능하게 하는 기술로 전격적 디지털화를 추진하고 있다”면서 “우리의 목표는 보다 효율적인 물류 관리를 최적화하고 제공할 수 있는 최상의 제품과 서비스로 고객이 디지털화를 완전히 수용하도록 돕는 일이다. C-FAST를 도입함으로써 새로운 세대의 해양 스케줄을 제공하는 것은 훨씬 더 커다란 단계의 시작일 뿐이다”라고 말했다.

● ● ● ● 록웰 오토메이션, 북미 최대 행사인 ‘오토메이션 페어’ 성공적으로 개최

록웰 오토메이션은 지난 11월 15-16일 양일에 걸쳐 미국 휴스턴에서 개최된 오토메이션 페어(Automation Fair) 2017에 전세계 수천 명의 제조 및 관련 업계 전문가들이 참여하여 성황리에 막을 내렸다고 밝혔다.

스마트 제조 분야의 산업 자동화 및 정보 솔루션의 글로벌 리더인 록웰 오토메이션과 그 파트너 네트워크 (PartnerNetwork™) 회원 사들이 주최하는 오토메이션 페어는 제조업체와 장비제조업체들이 자동화 투자를 최적화하여 비즈니스 목표를 달성하여 스마트 제조를 구현할 수 있도록 최신 산업사물인터넷 기반의 제품과 솔루션을 선보이는 북미 최대의 행사다. 올해 26번째로 개최되는 본 행사에서는 양일간 박람회 뿐 만 아니라, 다양한 부대 행사 및 고객 행사가 함께 개최되어

이목을 끌었다. 수백 명의 프로세스 자동화 전문가들은 오토메이션 페어 본 행사 전인 11월 13일과 14일에 개최되었던 프로세스 솔루션 유저그룹(Process Solution User Group, 이하 PSUG)에도 참여했다. PSUG는 최고의 프로세스 자동화 이벤트로, 이번 행사에서 고객 사례 연구와 최신 공정 자동화 기술에 대한 실습 및 기술 세션을 제공했고, 참가자들은 조직에 적용하는 방법에 대한 다양한 방법과 노하우를 습득했다.



오토메이션 페어 박람회 하루 전, 14일에 열린 글로벌 미디어 포럼인 ‘자동화 전망 (Automation Perspectives)’에서는 록웰 오토메이션의 사장 겸 CEO인 블레이크 모렛

(Blake Moret)은 “사물인터넷(Internet of Things)은 가치를 창출하고, 생산성을 높이는 새로운 방법을 제시한다”며, “공장에 있는 장치에서 데이터를 가져와 유용한 정보로 바꾸고 고객에게 긍정적인 결과를 가져올 수 있도록 한다”고 전했다.

오토메이션 페어2017본 박람회에는 자동화 분야의 최신 혁신을 선보이는 140여개의 부스가 설치되었다. 이번 행사에는 참여자들이 최신 제어, 전력, 제조 및 엔터프라이즈 정보 기술을 사용해 보고 지식을 확장할 수 있도록 마련된 9개의 포럼, 19개의 실습 랩, 93개

의 기술 세션이 포함되었다. 로크웰 오토메이션은 최근 팩토리토크 분석 플랫폼(FactoryTalk Analytics Platform)에 추가된 프로젝트 시오(Project SCIO)와 산업 자동화용 인공 지능(AI) 모듈인 프로젝트 셉록(Product Sherlock)을 공개하고 관련 기술 혁신 기업에 투자 계획을 밝히는 등 데이터 기반의 확장형 분석 플랫폼 및 정보 솔루션 분야에 대한 투자 및 관련 플랫폼 개발에 힘써 왔다.

한편, 로크웰 오토메이션은 지난 8월 2017 회계연도 연간 실적을 발표하기도 했다. 로크웰

오토메이션의 2017 회계연도 매출액은 63억 1,130만 달러로, 2016 회계연도 58억 7,950만 달러에서 7.63% 증가했다. 자동차, 식품 및 음료, 반도체, 화학물질과 금속과 같은 대부분의 업종에서 광범위한 성장이 돋보였으며, 잠시 주춤했던 석유 및 가스가 의미 있는 성장세로 전환됨에 따라 전반적인 성장세를 가져왔다는 점을 확인했다.

이번 오토메이션 페어에서 이런 지속적인 성장을 보여주는 업계 리더로서의 면모를 유감 없이 보여주며 성공적인 행사였다는 평가를 받았다.

슈나이더 일렉트릭, 밸브 및 액추에이터 선정틀 공개

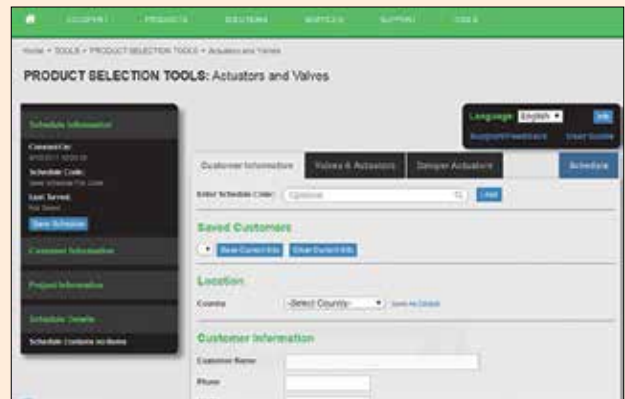
슈나이더 일렉트릭은 자사의 밸브 어셈블리, 댐퍼 액추에이터를 선정하는 과정을 간소화해주는 포괄적이고 새로운 디지털 도구를 발표했다. 빌딩 자동 제어 엔지니어 및 업계 담당자는 간편하고 직관적인 방식으로 밸브 및 액추에이터 선정틀을 사용하여 신속 빌딩 및 기축빌딩 개보수에 가장 적합한 제품을 선택할 수 있다.

슈나이더 일렉트릭의 밸브 및 액추에이터 글로벌 제품 담당자인 브랜든 헤이(Brandon Hay)는 “슈나이더 일렉트릭은 수천 개의 제품이 포함된 광범위한 밸브 및 액추에이터 포트폴리오를 보유하고 있다. 빌딩 프로젝트를 진행할 때 카탈로그 인쇄물과 작업 엑셀 시트를 사용하여 이러한 도구를 선택해야 하는 기존의 프로세스는 시간이 오래 걸릴 뿐 아니라 오류가 발생하기 쉽다”라며, “새롭게 제공되는 밸브 및 액추에이터 선정틀을 통해 풍부한

한 정보를 쉽고 빠르게 얻을 수 있어 특별한 적용 분야를 위한 최적의 슈나이더 일렉트릭 제품의 사양을 보장할 수 있다”고 말했다.

사용자가 최신 제품 설명, 데이터 시트, 액세서리, 상세 사양 등에 접근할 수 있도록 밸브 및 액추에이터 선정틀은 실시간으로 계속 업데이트된다. 제품 옵션을 세분화하여 특정 작업 범위에 맞게 조정해주는 지능형 애플리케이션 파라미터 계산기를 이용, 고객의 요구에 가장 잘 부합하는 밸브와 액추에이터를 선택할 수 있다.

사용자는 최적화된 프로필과 프로젝트 세부



사항을 작성하여 현재 프로젝트를 손쉽게 참조할 수 있으며, 회사 이미지와 로고를 업로드하여 최적의 밸브 스케줄을 관련 업체에 제출할 수도 있다. 또한 밸브 스케줄을 저장하여 추후 프로젝트 템플릿으로 사용할 수 있다.

다쏘시스템, 고유동성 유체 역학 시뮬레이션 전문 기업 '엑사' 인수

다쏘시스템은 글로벌 제품 엔지니어링 시뮬레이션 소프트웨어 분야 혁신기업 엑사 코퍼레이션(Exa, 이하 엑사)과 최종 인수계약을 체결했다. 엑사 이사회의 만장일치로 체결된 합병계약조건에 따라 계약체결 10일 이내 다쏘시스템은 발행 및 발행예정인 엑사 보통주를 주당 24.25달러에 공개 매입하며 약 400억

달러에 달했던 엑사의 지분을 완전히 인수했다. 지난 1월 31일 마감된 엑사 회계연도 기준 총 수익은 7,200만 달러다.

다쏘시스템은 엑사의 래티스볼츠만 유체 시뮬레이션 기술과 완전 산업화 솔루션 그리고 우수한 경험을 보유한 350여 명의 시뮬레이션 전문가들을 결합해 3D익스피리언스 플랫

폼 고객에게 입증된 기술력을 바탕으로 이전보다 확장된 포트폴리오를 제공할 계획이다. 이번 인수를 통해 다쏘시스템 고객들은 공기역학, 항공 음향학, 열관리 등 다양한 산업 부문에서 발생하는 복잡한 유체 역학 관련 문제를 과거 대비 현저히 빠르고 정확한 방식으로 해결할 수 있게 됐다.

역사의 소프트웨어는 자동차 및 운송, 항공 방위, 천연자원 등의 산업군에서 150개 기업의 설계 업무 진행 시 고도의 유동성을 띠는 유체 역학을 검증하는 데 활용되고 있으며, BMW, 테슬라, 도요타, 미항공우주국(NASA), 엠브라에르, BP(British Petroleum) 등 세계적 기업을 고객으로 보유하고 있다. 특히 자동차 및 운송 부문에서는 거의 모든 기업이 역사의 솔루션을 사용할 만큼 공기역학, 항공 음향학, 열관리 시뮬레이션 과정에서 폭넓게 활용되고 있다.

엔진 냉각 또는 날개 양력 등을 포함한 유체 역학 시뮬레이션은 제품, 자연, 생물의 물리적 동작을 검증하는데 있어 매우 중요한 요소이다. 특히, 유체 역학 환경이 빠르게 변화하는 다양한 상황이 존재하기 때문에 고유동성 유

체 역학 시뮬레이션 분야에서는 제품과 물리적 동작을 각각의 환경에 따라 정확하게 파악하는 것이 매우 중요하다. 이러한 부분에 있어 역사 솔루션이 보유한 정확성과 적시성은 다양한 적용 상황에 있어 기타 유체 역학 시뮬레이션 대비 차별화된 최상의 효과를 제공하는 것이 특징이다.

다쏘시스템은 기존 역사 고객에게 이전과 동일한 서비스를 제공하는 동시에 자사 산업 솔루션 경험 포트폴리오에 역사 솔루션을 통합 시킬 예정이다. 이를 통해 다중 물리 및 멀티스케일 업계에 새로운 산업 기준을 제시하고 동시에 두 회사의 합병을 바탕으로 고객과의 협업 및 기술적 상호작용을 대폭 증진시킬 계획이다. 향후 다쏘시스템 고객은 고유동성 유체 역학 시뮬레이션을 바탕으로 다양한 적용 상

황에서 더욱 빠르게 유체 행동 모델을 생성하고 이를 분석할 수 있게 될 것으로 기대된다. 다쏘시스템 부회장 겸 CEO 버나드 살레는 “다쏘시스템과 역사는 과학 및 산업 분야에서 통합된 목표와 가치를 서로 공유하고 있다. 이는 제품, 자연, 삶의 조화를 바탕으로 3D의 스피리언스 세계를 제공하겠다는 다쏘시스템의 약속에 있어 매우 중요한 부분”이라고 말하며 “고유동성 유체 역학 시뮬레이션은 다쏘시스템의 다중 물리 및 멀티스케일 시뮬레이션 부문 전략에 있어 매우 중요한 부분인데, 자동차 및 운송 분야를 포함해 다양한 산업군에서 높은 지식을 보유한 역사 애플리케이션을 바탕으로 기존 고객은 물론 미래의 고객에게까지 다쏘시스템 산업 솔루션 경험을 전달하게 될 것”이라고 설명했다.



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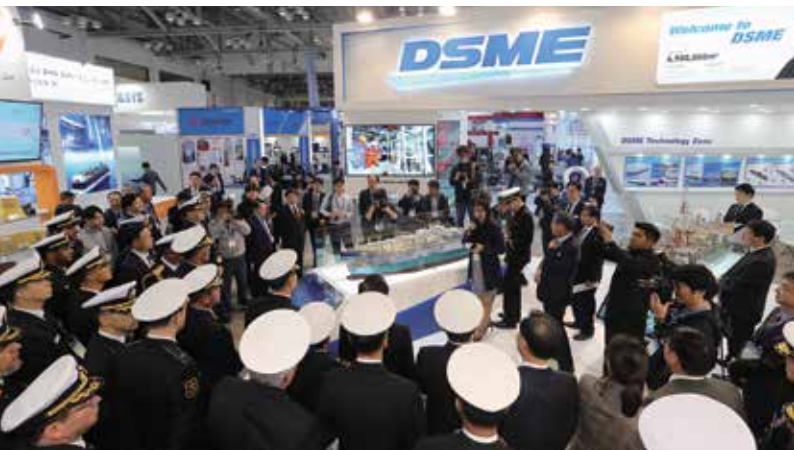
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Global shipbuilding and offshore professionals gathered under one roof in Korea: Part 2

- Major exhibitors showcased innovative solutions en masse



KORMARINE 2017 which opened at BEXCO (Busan Exhibition & Convention Center), Busan on October 24 ended with great success on October 27, wrapping up its 4-day run. This year's event drew approximately 1,000 exhibitors from 45 countries despite recession in shipbuilding industry.

B&R presented 'APROL', a DCS platform for shipbuilding and offshore applications



B&R (Bernecker + Rainer Industrie-Elektronik GmbH), a global machine and factory automation provider, presented redundancy systems, industrial Ethernet protocol POWERLINK and openSAFETY technology, etc., including the 'APROL' solution, a DCS (Distributed Control System) platform for ship automation related to alarm and control systems, energy control, and status monitoring, during the KORMARINE.

APROL solution is a DCS that integrates key technologies of B&R, such as PLC, touch panel, Safety I/O, and SW solution, etc., into single package. According to B&R, DCS is a solution that can efficiently control and utilize the big data on the basis of industrial IIoT in relation to smart ships recently thrust into limelight in shipbuilding and offshore industry. Particularly, DCS has unique capability to process the big data by using the powerful communication protocols of B&R, such as POWERLINK and openSAFETY.

B&R's strength in the DCS market is that it has a platform to



process massive volumes of data in relation to Industrial 4.0 and IIoT. This platform enables control of all equipment that can be practically connected to IIoT. Currently, B&R is aggressively targeting the market for small and medium-sized vessels such as LNG carriers, bulk carriers, and cargo ships.

Last year, B&R entered into a strategic alliance agreement for phased application of its automation solutions to various automatic control systems (ship automation control system, energy efficiency control system, smart switchboard system and others) of Hyundai Heavy Industries (HHI).

Coldharbour Marine unveiled BWMS solution for large-scale vessels

Coldharbour Marine Limited is a UK-based design, engineering business with nearly four decades of inert gas and water treatment experience. The company has a long history in the inert gas generation sector, and has in recent years developed Sea Guardian™ inert gas generator – a clean, green, compact 3G



technology for use in LNG carriers and large tankers.

Coldharbour Marine launched BWMS business in full scale in 2012 and was thrust into limelight in shipbuilding industry when it supplied BWMS products to existing VLCCs for the first time worldwide. Specifically, Coldharbour Marine's GLDTM BWMS allows vessels to process the ballast water in tanks during navigation. So, ship owners can preclude re-growth of marine organisms during long-distance voyages without interruption of terminal works during ballast operations.

Andrew Marshall, CEO of Coldharbour Marine, said, "Our innovative BWMS solution has been developed for over a decade and is very efficient because it handles the BWMS with inert gas generator during navigation. Particularly, it almost perfectly resolves re-growth problem with high reli-

ability, meeting the requirements of environmental regulations curbing contamination caused by waterborne pathogenic microorganisms.”

This BWMS applies two-tier treatment process: primary treatment of microorganisms with diffusion of inert gas injected through GLDTM system fitted inside the pipes of ballast water tank and secondary treatment with bubbles produced by ultrasonic shock waves from water circulation. As a result, microorganisms are treated 99%. Additionally, this solution, suitable for large-scale Aframax or larger vessels, is more economical in retrofit market targeting existing vessels, as well as newbuild vessels. Specifically, it does not require separate installation space and treats the ship ballast water without need for pump or power-consuming device.

Andrew Marshall said, “It is very important to provide highly reliable products to customers. We want to be recognized for excellence of our products based on honesty, technology and quality in Korean market. Coldharbour Marine’s products are well worth the investment. We will exert our best efforts to highlight the strengths of our products during the KORMARINE.”

Danfoss armed with innovative technologies makes foray into Korean market



Danfoss with strong focus on shipbuilding and offshore industries has proven the reliability and performance of its products incorporating the leading-edge technologies. Danfoss showcased a number of refrigeration and air-conditioning solutions, including the AC drive family, its flagship products, during KORMARINE 2018. It attracted the attention of visitors to its hybrid propulsion solution demonstration

Interview

Soren Kvornig President, Danfoss Asia-Pacific Region



Danfoss has cemented its leadership position in global market with aggressive investment in shipbuilding and offshore industry. Our technologies and solutions meet the requirements for energy conservation and carbon dioxide emission mitigation which have emerged as a key issue in shipbuilding and offshore industry. Various solutions launched by Danfoss are already meeting the requirements of ever more stringent environmental regulations set forth by the IMO (International Maritime Organization), and as a result, bring the benefit of tremendous cost reduction to ship owners. An example is the demonstration of hybrid propulsion system showcased by Danfoss Drive Division during the KORMARINE.

Danfoss has witnessed intensifying focus on eco-ship, smart ship, etc., conformant to the requirements of international environmental regulations over the last 5 years through the prism of European shipyard and also found that these challenges have taken technological capabilities to advanced level in shipbuilding and offshore industry. So, Korea, the global shipbuilding and offshore powerhouse, is very important market to us.

Finally, Danfoss has been paying attention to the active governmental support underpinning the growth of shipbuilding and offshore industry in Korea. We will continue to be a strong supporter based on innovative technologies and products, which will be crucial for Danfoss to further solidify its position in Korean market.

showcasing the performance of Danfoss drive products, along with VACON® 3000 drive, a high-pressure solution

product launched recently. The VACON® 3000, unveiled during the KORMARINE, is an AC drive operating at voltages from 3,300V to 4,160V which improved the existing VACON® 100.

This drive solution with an output of up to 6MW is offered as a modular product tailored to the needs of the space-constrained shipbuilding and offshore industry, unlike standard solutions in conventional cabinet format. The hybrid propulsion solution demonstration at its booth showcased an in-line type shaft generator drive system exemplifying the excellence of Danfoss's technologies for high-performance AC drives and inverters.

Meanwhile, the Refrigeration and Air-Conditioning Division of Danfoss exhibited the MBT 5116 exhaust gas temperature sensor applying the Pt100/Pt1000 element technologies. This product was designed to monitor exhaust gas temperatures precisely to improve engine uptime and control the exhaust gas.

Roxtec, the choice for safety of high-end vessels and offshore facilities



Roxtec, a provider of module-based sealing solutions, has stood out in many different industries.

Roxtec participated in KORMARINE and presented its innovative sealing products applicable to various vessels including offshore plants. Founded in 1990, Roxtec offers various types of MCT (Multi Cable Transit) products incorporating the Multidiameter™ technology applicable to cables and pipes and has made remarkable strides in various fields such as shipbuilding and offshore industry, plant, wind power, defense, railroad and construction.



Mikael Helmersson, CEO of Roxtec

Roxtec's MCT solutions can be applied to any location where cables or pipes pass. Multidiameter™ technology for sealing increases safety by reducing damage from EMC, fire, gas, water, dust, and explosion, etc. Particularly, Multidiameter™ technology enabling simplified design and easy installation has been lauded for bringing about revolution in the fields of cable routing and pipe installation. In addition, it can be applied to various cables and requires no extra cost in subsequent cable extension work.

Mikael Helmersson, CEO of Roxtec, said, "We have the world's unrivalled sealing technology that meets the demanding requirements of our customers and guarantees product reliability, which I am proud of. We have achieved almost two-fold growth over the last 5 years and expect to seize even more opportunities in many fields other than shipbuilding and offshore industry." He went on saying, "We have competitive edge in the ship and equipment sectors that require high safety and demanding product conditions, such as LNG carriers, FPSO (Floating Production Storage and Offloading), FSRU (Floating Storage Regasification Unit), drillship, naval vessels, cruise ships, etc., in shipbuilding and offshore industry. Particularly, this solution is the industry's most reliable solution that reduces damage caused by EMC in terms of safety."

In shipbuilding and offshore industry, this technology has found wide-ranging application in high value-added ship sectors including offshore facilities, LNG carriers or FSRU with high price tags. Currently, the MCT solution is applied in a variety of ways, including cables and pipes that pass between deck and bulkhead, marine equipment and cabinets, and offshore plant equipment.

Roxtec has a wide range of standard products including standard Ex and EMC solutions that provide the industry's

best performance based on various certifications such as certification for fire safety (A class, H class Jet Fire), watertightness (Water Pressure 4 bar) and air-tightness (Gas pressure 2.5 bar), as well as explosion-proof certification (IECEX, ATEX) and EU-MED certification.

Mikael Helmersson, CEO of Roxtec, said, "We are fully committed to protecting the lives and properties of customers under the banner, 'We Seal Your World'. Korea, the global shipping and offshore powerhouse, is a very important strategic point for us. We are making the best efforts from the aspect of product development and services to help Korean shipyards and subcontractors maintain growth path."

Azbil showcased the excellence of its surveillance and control solutions for LNG carriers



Making the 111th anniversary this year, Azbil showcased various solutions which represented the culmination of many years of extensive experience and know-how acquired under the corporate philosophy of 'Human-centered automation'.

Among the products that attracted attention were included the Harmonas-DEO™, the Distributed Control Systems (DCS), industrial IoT-based solutions, InnovativeField Organizer (IFO) for safe operation and maintenance of plants, GasCVD for measurement of natural gas methane and calorific value, analyzer for natural gas, and gas chromatograph HGC for measurement of natural gas.

Harmonas-DEO™ has come into the spotlight in the field of surveillance and control solutions that enable LNG carriers to navigate safely to their destination. Azbil has a track record of



supplying it to more than 100 vessels since it launched business in this field in 1963.

The main controller which consists of triple layers further increases reliability in terms of stability, a differentiated feature. Additionally, it has a scalable system enabling real-time tracking of operational status and a variety of applications providing support for manufacture, information analysis and integrated management.

Particularly, Azbil has further strengthened its performance through IFO which provides unprecedented new value such as stable operation/maintenance of plant and optimization of equipment maintenance, along with PLUG-IN Valstaff, a software package specializing in diagnosis of control valve.

Wago presented redundancy control solution for shipbuilding and offshore applications



Wago showcased automation solutions targeting the shipbuilding and offshore markets such as wire connectors and terminal block series applying the push-in technology,

including the redundancy control solution, as the originator of spring technology. Although Wago terminal blocks are widely known in ship sector, Wago focused on presenting its entire product portfolio during the KORMARINE.

Wago which focused on promotional campaign presented its redundancy control solution available in 2 systems: dual-LAN and ring-LAN. Even when one of the two master controllers has a problem, ultra-fast recovery can be achieved because the remaining controller replaces it. Therefore, this solution is suitable for the most demanding shipbuilding and marine applications.

In addition, various types of wire connectors, such as WAGO 221, 222, 224, and were also presented. These products are push-in type connectors, increasing the ease and speed of works compared to screw and conical type wires, and eliminated the concern about loosening.

Inmarsat further expands its capability in satellite communication sector

Inmarsat, a global satellite communication provider, focused on the Application Provider program (CAP) during the KORMARINE.

The Inmarsat Certified Application Provider programme (CAP), connected via Fleet Xpress and hosted on the Inmarsat Gateway platform; and then be able to maximise their efficiency in a way that



Stein A. Orø, Vice President Sales, Inmarsat Maritime

is constantly verifiable and compliant with European Union (EU) Monitoring Reporting and Verification and the International Maritime Organisation (IMO) Ship Energy Efficiency Management Plan. Currently, it is focusing most intensively on ship operation efficiency.

Stein A. Orø, Vice President Sales, Inmarsat Maritime, said "if traditional satellite communications business aimed to increase connectivity so far, CAP represents more comprehensive and expanded business. So, we are focusing on



shipyards in Korea during the KORMARINE." He went on saying, "CAP will be the first step towards development of IoT-based smart ship required recently by shipbuilding and offshore industry, and the ultimate goal is the automated ship." "The CAP programme allows third parties to work with Inmarsat to develop content-rich applications to populate the digital maritime world enabled by Fleet Xpress."

Through its CAP programme, Inmarsat aims to support and enable products that become part of an eco-system of applications to broaden and enhance services beyond connectivity and enable 'value-adds' for end-users. Applications covering real-time analysis of data for engine monitoring, weather information and fuel consumption rates can deliver real gains in operational efficiency, safety and compliance, IT security and crew welfare.

Last September, Inmarsat signed a ground-breaking Memorandum of Understanding (MoU) with Samsung Heavy Industries (SHI), establishing a relationship to leverage the 'smart ship' connectivity offered by Fleet Xpress at the vessel construction stage.

The new service, which has been christened 'Smart Ship' by SHI, will allow owners to enhance efficiency by harvesting data from hull-monitors and equipment sensors onboard in real-time, utilising Inmarsat's dedicated bandwidth for CAP.

Krosys & Evoqua strengthen SeaCURE® System position in Korea

Evoqua Water Technologies' partnership with Krosys was strengthened with the unveiling of a SeaCURE® Ballast Water Treatment System during the Kormarine 2017.

The electrochlorination unit (ECU) skid showcases the



Korean engineering company's competence in building, installing and commissioning Evoqua's high-end ballast water treatment technology in the Korean newbuild and retrofit markets.

JaeWook Bae, Team Manager of the BWMS Business Team at Krosys, said "We are very proud of the success we have achieved to date in establishing the SeaCURE system in the Korean shipbuilding sector. This latest development means the world's best shipyards now have local access to the world's best ballast water treatment technology."

The development represents another success for both companies, following the order Krosys secured earlier this year for SeaCURE systems to two 115,000dwt crude oil tankers destined for Singaporean interests.

Ian Stentiford, Global VP Electrocatalytic Systems, Evoqua Water Technologies, added: "The manufacturing and distribution agreement we signed with Krosys in 2015 to provide our cutting edge electrochlorination technologies to the Korean market has quickly borne fruit with expert service and short response times for our customers in South Korea."

"Krosys was selected because of its expertise in engineering marine water treatment technologies combined with its local market knowledge. This means Korean-built vessels not only benefit from our design and system technology, but that technology can now be sourced and supported locally from Krosys."

Krosys serves the Korean market from its facility in Busan, in the heart of South Korea's ship building industry. To date, the business has delivered more than 2000 fresh water generators and is a dominant supplier of reverse osmosis (RO) fresh water generators for the Korean navy. It can now add ballast water treatment to that list.

Phoenix Contact presented redundancy solutions for stable operation



Phoenix Contact presented an alternative to build reliable automation solutions such as Maritime HMI based on TP TPM 3120, maritime communication protocol integration (NMEA 0183, NMEA 2000 and SAE J1939) and MGuard security router, including AXC 3050-based redundancy controller.

Meanwhile, Phoenix Contact focused on its redundancy controller solutions whose market has recently been expanding. Stable operation is very important for high value-added vessel and offshore plants such as FPSO/FSRU, LNG carriers. The Phoenix Contact's ring redundancy controller is ideal for monitoring and alarming systems of many devices including marine engines, power generation, fire detection devices, etc.

Phoenix Contact designed it in such a way that it could enable remote setup of redundancy systems to reduce cable length and minimize installation costs. As the integrated switch of these modules supports the MRP client function, individual IO stations of automation system (with or without control functions) can be directly built into double-ring structure of Ethernet network.

According to a source from Phoenix Contact, shipbuilding and offshore markets have witnessed a rising demand for redundancy controllers for safety since several years before. This redundancy solution, consisting of a PLC and ring-network configurable switch, provides maximum availability of vessels or offshore plants by preventing switchover time through primary controller and backup controller in the event of an error.

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ABB Ability™ Marine Pilot Vision looks beyond human vision for ship automation

ABB has unveiled a new situational awareness solution that will make vessel operations safer and more efficient. The solution can be used by officers anywhere onboard a ship and marks the next step towards remotely controlled and ultimately autonomous ships.

ABB Ability™ Marine Pilot Vision takes advantage of the latest advances in sensor technology and computer vision to offer multiple real-time visualizations of a vessel's surroundings and new ways of perceiving its situation. A virtual model of the ship is superimposed on real surroundings, making it possible to see the operation from a third person's perspective. The officer can switch between views instantaneously, making it easier to predict vessel motions and be alert to previously hidden obstacles or collision risks. The resulting improvement in situational awareness has significant benefits for safety and operational efficiency.


"The launch of ABB Ability™ Marine Pilot Vision addresses an important step in the ongoing digitalization of ship operations," said Juha Koskela, Managing Director at ABB Marine & Ports. "This new solution indicates an important landmark in ABB's digital strategy and offering for our customers. It also demonstrates the aspiration and technology leadership that ABB has to offer for the maritime industry." The ABB Ability™ Marine Pilot Vision will be introduced to the general public for the first time during the renowned tech event Slush, which is being held in Helsinki between 30 November and



1 December.

"Computer vision has advanced significantly in recent years. With this new solution, ABB is leveraging that in order to present the ship and its environment in ways beyond ordinary perception. Crucially, we can do this in real-time in an intuitive fashion, which does not distract the crew from their work. In this sense, Ability™ Marine Pilot Vision extends the capabilities of the human senses," said Mikko Lepisto, Senior Vice President of Digital Solutions at ABB Marine & Ports. "The solution can easily be installed on conventional vessels to improve situational awareness. What's more, it enables new shoreside remote services, as well as totally new design options for

new vessels as it provides unrestricted views of the surroundings from any location on board and even on shore."

"ABB believes that the next generations of vessels will be electric, digital and connected. Our recent fuel cell solution launch and ABB Ability™ Marine Pilot Vision give substance to this," Koskela continues. "Ultimately, Vision delivers a completely new user experience in ship operations. It also brings remotely-operated or unmanned ships into clear view. Unmanned ships will be dependent on fault tolerant and reconfigurable critical systems. Fuel cells, energy storage and renewable energy solutions fit perfectly with these targets, without compromising energy efficiency." 

Inmarsat launching transforms seafarer safety infrastructure 'SafetyNET II'

SafetyNET II is the new generation international broadcast and automatic reception service for Maritime Safety Information (MSI).

Inmarsat has launched a vital new service, SafetyNET II, for Maritime Safety Information Providers (MSIPs), marking a key stage in upgrading the Global Maritime Distress and Safety System (GMDSS), which helps to save thousands of lives at sea each year.

Inmarsat's new generation international broadcast and automatic reception service for Maritime Safety Information (MSI), enables MSIP's to transition their communications to web-based messaging. As a web-based service, SafetyNET II introduces broadcast scheduling, continual monitoring, message cancellation, multiple text input methods, among other functions and usability improvements.

Following exhaustive testing with six host countries, SafetyNET II is fully available for the delivery of safety-related messages to vessels including weather forecasts, navigational warnings and piracy alerts. It also provides additional reassurance to ships in distress, by modernising the infrastructure supporting the International Maritime Organization's GMDSS in a way that can enhance search and rescue operations.

Another enhancement sees the introduction of read-receipts, so Search and Rescue (SAR) personnel know whether messages responding to distress calls have been picked up. It's a seemingly small change, but one that



assists SAR decision-making. During the trial period, SafetyNET II was instrumental in saving lives, with its use proving pivotal in two rescues overseen by authorities in New Zealand.

"SafetyNET II is an important and highly effective, next generation safety service. Direct input from MRCCs and other MSI providers was instrumental in developing and refining the solution to fit end-user requirements", said Peter Broadhurst, Senior Vice President, Safety & Security, Inmarsat Maritime. "Most MSIPs are familiar with web-based interfaces which means the training requirement is lower. They can focus on new functionalities, such as the ability to schedule navigational warning repeat messages."

MSIPs also often have to work within tight budgets. Using a web-based platform means they do not need to spend on specialised hardware or divert stretched resources for IT upkeep. Inmarsat recognised that the new system needed to be both future-proofed and backwards compatible. SafetyNET II is no longer limited to ships featuring Inmarsat C terminals. Ships with FleetBroadband will automatically benefit from enhanced resilience, as messages will have multiple pathways to reach the bridge.

To ensure redundancy, SafetyNET II is supported from two custom-built and synched data centres, one in London (United Kingdom) and the other in Burum (the Netherlands). 

Asia Pacific Maritime 2018 to address present-day issues and chart new paths

Over 40 key movers and shakers in global maritime to lead global discourse on hot-seat issues affecting the maritime industry

The 15th Asia Pacific Maritime (APM), Southeast Asia's most established maritime, workboat and offshore exhibition and conference will be held at Marina Bay Sands in Singapore from 14~16 March next year. The biennial event will expect to play host to more than 1,500 international exhibiting companies from 60 countries, and over 15,000 trade visitors from Asia.

Although signs of slow recovery in the global maritime sector this year brought relief to an industry that has been depressed in recent years, some industry leaders are holding onto cautious optimism that the global maritime industry will start to ease in 2018, encouraged by indicators such as the recovering energy sector. The digitalisation wave also signals renewed opportunities for players to explore and implement innovative ways to operate with maximum efficiency and effectiveness.

In the face of these industry changes, APM introduces the inaugural APM Leaders' Forum (14 March 2018) in celebration of its 15th edition. Marking the start of the three-day conference, sessions will see industry masterminds discuss and debate the outlook, opportunities and threats in 2018, digital disruptors, digitalisation, women in maritime, the new normal in the industry and shipbuilding in Asia.



2018 will also see APM presenting its strongest line-up of keynote and conference speakers, with over 40 key shakers and movers in the maritime, workboat and offshore industry. They will lead thought-provoking dialogues as they deep dive into hot issues affecting the maritime industry.

"Over the last 30 years, APM has become a crucial business platform connecting the global maritime world to Asia. Not only to do business, but to enable discussions on regional developments and major industry shifts, by bringing together business leaders and experts in their respective fields to share their knowledge, insights and forecast that will help industry players

reshape their business strategies, navigate new frontiers and discover new business opportunities, which is especially important in this market climate," said Yeow Hui Leng, Senior Project Director, Asia Pacific Maritime.

Future of maritime at the inaugural APM Leaders' Forum

The first session to kick off the inaugural APM Leaders' Forum will explore what 2018 has in store for the maritime industry.

Distinguished industry leaders and shipowners such as Hassan Basma, Founder & Chief Executive Officer, HBA Offshore; Peter Sand, Chief Shipping Analyst at BIMCO; Su Yin Anand, Co-founder &

Director, Young Professionals in Shipping Network; and Capt. Vinay Singh, Managing Director, Anglo-Eastern Ship Management (India) and Director, Maritime Association of Ship Owners, Ship Managers & Agents (MASSA) will helm the panel, to shed light on the prospects, opportunities and challenges in the new year.

These include the future of LNG growth, harnessing the power of big data and new smart shipping technologies, maritime talent, and ratification of the Ballast Water Management Convention by the International Maritime Organization. The session will also uncover how shipowners can stay profitable amid changing market dynamics, the pressing concerns of cyber security in today's digital era and Asia's future for oil and gas trade flows.

Recognising that the stakes today are much higher compared to just a few years ago, Capt. Vinay Singh said "The shipping industry has been going through a rough phase for the last few years. Not only will we see more mergers and acquisitions in 2018, stricter international regulations, environmental concerns, and increasing pressure to reduce operating costs will continue to affect the challenging landscape, until we start seeing signs of recovery. But the biggest disruptive change could be the launch of unmanned ships in the near future, which will put pressure on existing shipowners to cut costs to stay competitive."

Digitalisation is changing the landscape of shipping

With the global maritime shipping industry at the tipping point of digitalisation, the inaugural APM Leaders' Forum will also delve into one of the industry's hottest areas.

Capt. Mohit Batra will be speaking at this ground-breaking session alongside Morten Lind-Olsen, Chief Executive Officer, Dualog; KD Adamson, Futurist & CEO, Futureautics; Kenneth Lim, Chief Technology Officer, Maritime Port Authority, Singapore; as well as Lim Sim Keat, Managing Director (Transport & Logistics), IMC Industrial Group as they discuss the latest digital disruptors – from autonomous shipping to big data and new IT innovations, the dynamic changes they will bring to the maritime industry, and how the value chain will be redefined.

Women Leaders in Maritime

Acknowledged as the world's foremost shipping and maritime domain futurist, Ms Adamson will be joined by other female industry veterans at the helm of the maritime industry to drive the conversation on the role and contribution of women in the maritime sector, particularly in Asia.

This all-women powerhouse includes Elaine Ong, Chief Financial Officer, BW LPG; Magdalene Chew, Director & President, Asia Legal LLC & Women International Shipping and Trading Association (WISTA); Martha Lamp Sandvik, Shipbroker, Lorentzen & Stemoco AS; Monal Srivastava, Regional Head of Human Capital, Admin (Subcontinent Region), DP World; Sigrid M Schrødtter Teig, Chief Process Officer, Western Bulk; and Su Yin Anand, Co-founder & Director, Young Professionals in Shipping Network.



Prominent Representation of Shipowners at APM 2018

Another valuable perspective at next year's APM conference will come from the prominent presence of shipowners as they share their views across a wide range of issues impacting the global maritime industry.

This includes influential figures such as Bui Viet Hoai, Deputy General Director, Vietnam National Shipping Lines (VINALINES) and Vice Chairman, Vietnam Shipowners' Association; Capt. Michael Elwert, Group Chief Executive Officer, Elektrans; Elaine Ong, Chief Financial Officer, BW LPG; Gernot Ruppelt, Senior Vice President, Chartering and Business Development at Ardmore Shipping Corporation; Hassan Basma, Founder and Chief Executive Officer, HBA Offshore; Lim Sim Keat, Managing Director (Transport & Logistics) at IMC Industrial Group; Peter Sand, Chief Shipping Analyst at BIMCO; Sigrid M Schrødtter Teig, Chief Process Officer, Western Bulk; and Venkatraman Sheshashayee, Chief Executive Officer and Executive Director, Miclyn Express Offshore (MEO). 

Cobham Satcom showcased next-generation satellite communication solutions

Cobham, a provider of high performance and reliability solutions, solidifies its leadership position in Korean market.

The U.K.-based Cobham provides solutions related to wireless, audio/video and data communication, including satellite communication, in aerospace, shipbuilding & offshore, and defense industries. Particularly, it has established a leading position in the market with its AVIATOR, EXPLORER, SAILOR and Sea Tel brands that have proven performance and technology worldwide.

Recently, Cobham SATCOM attracted attention from the industry when it announced the SAILOR 4300 for Iridium CertusSM, the world's first next-generation satellite communication service.

SAILOR 4300, a Broadband Core Transceiver (BCX) type terminal, provides highly reliable link over Iridium NEXT satellite network with ideal speeds and can find wide-ranging applications in various fields including videoconferencing, multi-user Internet/VPN, IoT (Internet of Things) and telemedicine, alongside regular usage including email, etc.

Stephan Romer Jorgensen, Sales Director, APAC at Cobham SATCOM, said, "SAILOR 4300, launched recently, further expands our portfolio of antenna products and complements



Stephan Romer Jorgensen sales director, Cobham Satcom Asia-Pacific

SAILOR VSAT antenna, ensuring the highest performance and reliability for ship owners and service providers. This antenna is suited for ordinary commercial vessels and small vessels and distinguished for excellent precision with the beam width of 0.6 degrees. We are ready to make this product available in the market from the end of this year and will proceed with aggressive sales strategy through 5 distributors in Korea."

In this year's exhibition, Cobham SATCOM showcased its key products such as SAILOR 60 GX and SAILOR 600 VSAT

Ku in tandem with promotional campaign for them. SAILOR 60 GX is the smallest, lightest and most advanced antenna for the new Inmarsat Fleet Xpress High Throughput Satellite (HTS) maritime broadband service. SAILOR 600 VSAT Ku is the most advanced 60 cm class Ku-band antenna.

Meanwhile, Cobham SATCOM is working with custom software house Kanda and Osterhout Design Group (ODG) smartglasses to build an Augmented Reality (AR) wearable solution for maritime service technicians. With AR already established as an efficiency-


enhancing tool for business and industrial applications, the project will demonstrate how companies can introduce additional value for their customers using this exciting technology. The smartglasses provide step-by-step guidance to their wearer during conversion installations, making paper manuals obsolete and greatly speeding up and simplifying the process.

The AR smartglasses solution will reduce costs for vessels and fleets when they are switching to a different

satcom service but keeping the same antenna on board. The technician wearing the glasses will receive all the information required in their line of sight; ensuring that strict quality and technical guidelines are followed. By making sure the antennas are installed correctly during the conversion process, the satellite service provider and the end-user can be sure that the antenna will perform more reliably so that the vessel gets the best connection to the satellites and therefore the



SAILOR 4300

most reliable broadband and voice services. 

MacGregor davits meet expanding offshore wind farm demands

MacGregor, part of Cargotec, has won new davit orders from Spanish shipyard Astilleros Zamakona. They are destined for a service operation vessel (SOV) owned by the Danish company Esvagt AS. The contract includes an order for one of MacGregor's largest davit systems, specially-designed to ensure safe transfers in rough weather. Equipment deliveries are scheduled for November 2018 and the order was booked in Cargotec's fourth quarter 2017 order intake.

“We are glad to continue our cooperation with Zamakona and Esvagt with the delivery of these advanced davit systems to a growing and interested market,” said Høye G. Høyesen, Vice President, Advanced Offshore Solutions, MacGregor. “Esvagt already knows and trusts our davits, operating a large number in its fleet, so this order speaks volumes for their performance and reliability.”

The vessel will feature one of MacGregor's largest davits, a 15-tonne lifting capacity MacGregor HMD G150 system designed for daughter craft, and a smaller six-tonne capacity HMD A60-type davit, designed for man-overboard/rescue and workboats. The davits will transfer technicians, tools and spares as part of their offshore wind farm duties.

The HMD G150 davit includes a high-speed constant-tensioning winch system, shock-absorbing system, anti-pendulum system and an automatic parking cradle for daughter craft. The anti-pendulum system, together with an adjustable painter-line boom and a guiding system, ensures the safe launch-and-recovery of daughter craft in rough weather con-



6-tonne capacity HMD A60-type davit, designed for man-overboard/rescue and workboats

ditions.

The A60 davit also includes a high-speed constant-tensioning winch system, shock-absorbing system, guiding system and an automatic parking cradle. Additionally, both davits will meet the shipowner's high standards for noise and vibration limits.

Standardisation can help enable the digital transformation of shipping

DNV GL has released a position paper setting out the importance of standardisation to enable the growth of digital applications in the maritime industry.

Classification society DNV GL has released a new position paper setting out the importance of standardisation in enabling the growth of digital applications in the maritime industry. Drawing from the experiences gained from digital pilot projects focused on ship sensor data, the paper examines how standardisation can enable the effective collection, storage, exchange, analysis and use of data, while contributing to improved data quality and sensor reliability.

Whether for operational optimization, model calibration for digital twins, design optimization or other applications, the maritime industry is exploring the opportunities offered by digital technologies. The first demonstration and pilot projects are already well underway and the industry is asking what is needed to transform these into fully scalable products. The answer could be a greater emphasis on standardisation.

“Standards are used in many industries to advance efficiency, safety and environmental performance,” said Pierre Sames, Group Technology and Research Director, DNV GL. “With the rise of the Internet of Things in shipping, we believe that many stakeholders can benefit from developing a standardisation strategy to take advantage of a more digital maritime industry.”

DNV GL’s new position paper focuses on the collection of ship sensor data, as increased sensor availability lets us collect both existing and new types of data more efficiently, with the result that more data is available than ever before. But as more data is being collected, exchanged

and prepared for use, the origin, quality level, context, and legal status can become less transparent – the result being that end users are less likely to trust and therefore use the data.


“At DNV GL we have been involved in many digitalisation pilot and demonstration projects,” said Steinar Låg, Senior Researcher in Maritime Transport at DNV GL. “By looking at the results of these projects we identified several technical barriers that are hampering the data flow and usage. Too much time is spent matching and structuring different systems, while data collection products from different vendors often have incompatible outputs – making it difficult to combine the data of multiple systems. This makes the processes less efficient and more difficult for shipowners to obtain a complete picture of a vessel or their fleet.”

The report discusses the need for stan-



standardisation in six key areas: Ship data models, sensor naming and referencing, maritime taxonomies and code books, sensor metadata, shipboard data recorder, as well as sensor quality and reliability. However, as future technologies develop, there may be a need for new standards to support other applications, such as model-based simulations and autonomous ships.

“At DNV GL we will continue to work with industry stakeholders on new standards at the same time as we develop new rules, class notations, recommended practices and type approval programmes,” said Pierre Sames.

“Standards are a key factor in removing barriers and enabling the growth of digital applications in the maritime industry and we hope this study will inspire others to invest in the development and adoption of standardisation.” 

세계 유일 SIL2 무선 가스 검지기 'GasSecure GS01'

드레가(Draeger)가 높은 안정성이 요구되는 조선해양 분야에 적합한 무선 가스 검지기(Detector)를 출시하다.

의료 및 안전 기술 분야의 글로벌 선도 기업인 드레가가 이번에 출시한 '탄화수소 가스 검지기(GS01)'는 안정성 부문에서 이미 그 탁월한 성능을 검증 받았으며, 업계 최초의 무선형 적외선(IR) 가스 검지기로 업계의 주목을 한 몸에 받고 있다.

이 가스 검지기는 조선해양 산업과 같이 높은 안전성 및 정밀도가 요구되는 산업 분야에 적합한 제품으로서 탄화수소 가스의 유무를 감지하고 화재 및 폭발 위험을 경고한다. 특히 저전력 제품으로 설계되어 소형 배터리로 최대 2년 동안 사용이 가능하고, 프로젝트의 설치 비용과 시간을 최대 60%~80%까지 획기적으로 줄일 수 있다는 점이 특징이다.

어드너 베어-올슨(Adne Baer-Olsen), 드



어드너 베어-올슨(Adne Baer-Olsen), 드레가 가스 검지기 비즈니스 책임자

레가 가스 검지기 비즈니스 책임자는 "기존 가스 검지기 솔루션은 엔지니어링, 설치 공간, 유지보수 등 비용에 대한 부담이 크다. 특히나 선박 및 해양설비의 경우 높은 안정성을 요구하고 있는데, GS01은 이러한 직면한 문제들을 가장 이상적으로 해결할 수 있는 제품이다"라고 말했다.


이 가스 검지기는 특허받은 MEMS(Micro Electro Mechanical System) 기술을 적용해 한 단계 진보한 적외선(IR) 센서 기술을 갖추고 있으며, 단일 빔/삼중 파장 IR로 탄화수소를 탐지 및 측정해 그 값을 사용자에게 제공한다. 특히 SafeWireless™ 통신 시스템으로 신뢰성이 향상됐고, 5초 이하의 빠른 응답 속도와 높은 정확성을 보장한다.

특징

- 탄화수소 감지 0~100% LEL (메탄, 프로판)
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- 크기 300 x 110 x 170mm
- 중량 2.8kg
- ATEX/IECEx 인증
- ISA100 Wireless™



또한 이 가스 검지기는 교정된 제품으로 공급되기 때문에 재교정이 필요 없으며, 평균 5mW의 저전력 소모로 배터리 수명을 24개월까지 연장시켜 지속적이고 안정적으로 사용할 수 있다. SIL2 인증 획득으로 하드웨어, 소프트웨어, 무선 통신을 포함한 안전 계기 시스템과 호환 가능하다. 따라서 육상 플랜트 및 가스 기지 터미널을 비롯해 FPSO/FLNG 등 석유/가스 생산 플랫폼에 적용이 가능하다.

어드너 베어-올슨(Adne Baer-Olsen) 책임자는 "GS01은 세계 유일의 SIL2 무선 가스 검지기로써 설치시 이 캐비닛, 정션박스(Junction Box), 케이블, 케이블 트레이, 멀티 코어 케이블 등이 필요 없기 때문에 설치시 중량을 최대 80%~90% 줄일 수 있다. 이는 곧 조선소 및 선주사의 입장에서 비용과 직결된다. 물론 안정성을 높이기 위한 검지기의 재배치 및 변경시에도 추가적인 비용이 발생하지 않는다"고 설명했다. 



Emerson Expands Plantweb™ Digital Ecosystem, Creates Industrial IoT Foundation for Next-Generation Digital Workforce

Emerson Automation Solutions



As manufacturers accelerate digital transformation and workforce evolution, today Emerson unveiled significant enhancements to its Plantweb digital ecosystem, the industry's most comprehensive Industrial IoT automation platform.

"Manufacturing jobs are rapidly becoming data-centric roles, requiring immediately actionable information for experts across the enterprise," said Peter Zornio, chief technology officer for Emerson Automation Solutions. "Through a deep understanding of customers' vision for organizational effectiveness and business performance improvement, Emerson is innovating breakthrough products and services to accelerate that organizational transformation."

A 2017 Industry Week survey of manufacturing leaders revealed more than 60 percent of those surveyed indicated active pilot projects in IIoT, but only five percent identified clear business objectives at the heart of their programs. Of the 205 industry executives responding, 34 percent stated that lack of clear technology strategy was a barrier while 61 percent confirmed that a scalable approach to investment is preferred.

"A clear message from the industry is that a one-size-fits-all, vendor-prescribed IIoT approach won't work," Zornio continued. "They want to identify specific business challenges, target technology to improve performance, then scale up their investment based on results achieved. That's why we have architected Plantweb to enable companies to get started where they can gain the greatest near-term impact."

Built on the foundation of best-in-class process control and safety systems, Plantweb expands on existing automation infrastructure to make the promise of Industrial IoT scalable and achievable, with a broad portfolio of Pervasive Sensing technologies, an extensive suite of analytical software tools, secure and robust data infrastructure devices and expert services.

During the 2017 Emerson Global Users Exchange event in Minneapolis, Emerson introduced extensive enhancements to the Plantweb digital ecosystem portfolio, including:

Pervasive Sensing: Emerson's Pervasive Sensing is the foundation of the Plantweb digital ecosystem, providing enhanced visibility into process performance and asset health, so experts have the information needed to drive operational improvements. This increasingly robust network of sensing, measuring and monitoring technologies features more than 50 wireless devices for temperature, pressure,



corrosion, vibration, acoustic and more. The portfolio has been expanded to include the new wireless Rosemount 928 toxic gas and Therm-o-Disc Power Meter monitoring products.

Secure First Mile™: As global adoption of Industrial IoT increases demand for robust cybersecurity strategies, Emerson's Secure First Mile provides secure transfer of actionable data from Operational Technology (OT) systems to authorized internet-based applications, services or mobile users. Emerson's data-security portfolio has been enhanced through certification by ISA Secure, the industry standard for secure systems deployment. Additionally, to accelerate adoption of new service relationships like Emerson's Connected Services, the Plantweb Secure First Mile works with a variety of standard security models to integrate with customer IT infrastructure to create a secure connection best suited to the existing technology architecture. This includes cloud-to-cloud or direct Edge connection to field level sensor and instruments via Azure IoT technology.

Plantweb Insight™: Emerson's Plantweb Insight is a scalable and lightweight, web-based software platform that helps users instantly make sense of plant data by leveraging Pervasive Sensing technologies and pre-built analytics to provide relevant-time monitoring and identification of abnormal situations for specific asset classes. Plantweb Insight now includes applications for air-cooled heat exchangers, corrosion, heat exchangers, network management and pres-



sure relief devices.

Plantweb Advisor™: Emerson's Plantweb Advisor Suite is a scalable set of software applications that utilize deeper analytics to provide reliability and energy specialists with critical information about equipment health and efficiency as well as energy consumption and emissions. Originally introduced as the Energy Advisor, Health Advisor and Performance Advisor applications, the Plantweb Advisor suite has been expanded to provide analytics applications for metrology and mining.

Always Aware™: Formerly known as Always Mobile, Emerson's new Always Aware suite of solutions builds on previous mobility capabilities, expanding them to focus on delivering role-based, relevant-time information and alerts to plant personnel, regardless of locations, enabling more effective collaboration and driving actions to improve asset and process performance. Updates include RFID asset management tags and AMS ARES™ integration with various interfaces such as AMS Device Manager, AMS Machinery Manager, Plantweb Insight and Plantweb Advisor to streamline workflows, enhance collaboration and enable more effective response.


Services: Emerson is expanding its role as a trusted industry partner with consulting and service offerings that complement its leading portfolio of automation and IIoT-based technologies. These services provide companies with access to the information and engineering expertise needed to establish a successful path to Top Quartile performance as well as empower their personnel with the competencies and skillsets needed to become invaluable assets to their organizations. Services include:

- Connected Services – offering remote assessment of a plant's equipment and processes by Emerson experts to empower customers with the information needed to improve efficiency and avoid unplanned downtime. Updates include new capabilities for subscription-based services that require limited to no capital cost. These include industrial Wi-Fi network management for system health monitoring of Cisco Wi-Fi networks, and engineered Plantweb solutions such as management of Plantweb Insight and Advisor applications by Emerson personnel.

- Software as a Service (SaaS) – leveraging the cloud to transform project engineering and a plant's long-term operations by enabling engineering configuration and virtual testing online as well as virtualization of a plant's control systems for simulation, testing and operator training.
- Operational Certainty Consulting – combining the business justification for investment with a scalable roadmap governed by business impact achieved is the mission of Emerson's new Operational Consulting team... more than 100 industry experts helping deliver digitally enabled infrastructures with optimal organizational process approaches that generate significant financial returns.
- Workforce Skills Development – focusing on enriching the skills of today's workforce through the Control Performance Academy, the industry's first comprehensive competency development program, capable of equipping inexperienced engineers with the equivalent of 5-10 years' worth of training in as little as 18 months; and Interactive Plant Environment, a fully-immersive, hands-on training experience for control systems personnel.

Foundational Solutions: The underpinning of modern plant automation, these technologies provide the core process control and safety systems critical to plant operations. Enhancements to Plantweb include the DeltaV Live Operator interface, which utilizes Human Centered Design principles to integrate thousands of data points in the plant and improve control system functionality with a more efficient, intuitive interface that can be used in project design as well as daily operations.

To help customers understand the impact these new technologies can have on personnel productivity and organizational effectiveness, Emerson brought the next-generation digital workforce to life with the "Digital Workforce Experience" during Emerson Exchange. The immersive, role-based simulation demonstrated firsthand how various manufacturing roles are evolving and the impact they have on business performance.

"The industry's technology evolution over the past 30 years has delivered tremendous improvements in efficiency," Zornio said. "Now it's time to fuel the next-generation workforce with the actionable insights they need to become even more strategic assets in their companies." 

온도/ 습도/ 이슬 · 노점 기체속도/ 가스/ 압력/ 신호 전송기

온도/ 습도 신호 전송기



THM80X
합금외함 고정밀형
온습도전송기



THS80X
정밀형 온습도
신호전송기



THS30X
경제형 온습도
신호전송기



THS307
옥외 겸용
온습도 전송기



THR13/THR03
온습도 표시
신호전송기



THS13/14
선형 신호전송기

온도/ 습도/ 노점, 이슬점 측정기



THS88
노점 전송기



THS07
탐촉자형
온습도 전송기



THS86/87
삽입형
노점표시 전송기



SD05
복합형 신호 표시기



TP01
2선식 머리부착형
RTD 온도 신호전송기



TP02
레일부착 (궤조)형
온도신호 전송기

기체/ 가스 측정기



FTM84/85
고정밀 열선풍속전송기
(합금외함, 고속용)



FTS34/35
중속 유속
신호전송기



FTS14
열선풍속
전송기(저속)



FTS07
열선 풍속 전송기
(탐촉자형, 경제형)



AFMT+PMD33
평균 흐름률 측정관/
차압전송기



THG03
실내용 CO2 온습도
표시 전송기

가스/ 압력/ 신호 측정기



GTH53
복합가스 신호전송기



GS33/34
CO2 신호전송기



GM33/34
CO 신호전송기



L051/52
수위감지
신호전송기



THM80X
다기능 디지털
신호 표시 감시기



DPT02
레일부착 궤조형
신호변환기



Plantweb™ 솔루션 확장을 통한 IIoT 기반 조성

에머슨 오토메이션 솔루션즈



제조 기업들이 디지털 전환과 디지털 인력으로서의 진화 속도를 높이고 있는 가운데 에머슨은 2017 에머슨 글로벌 사용자 컨퍼런스 (2017 Emerson Global Users Exchange)에서 업계 최고의 산업용

사물인터넷 자동화 플랫폼인 플랜트웹 디지털 에코시스템(Plantweb digital ecosystem)에 획기적인 개선 사항을 발표했다. 2017년 Industry Week가 상위 제조기업을 대상으로 한 설문조사에



따르면 응답자 중 60%가 산업용 사물인터넷 시범 프로젝트를 실행하고 있다고 대답했으나 사업 목표를 정확히 파악하고 있는 응답자는 5%에 불과한 것으로 나왔다. 응답자인 205명의 임원들 가운데 34%는 기술 전략의 부족이 장애물이라고 답했고 61%는 확장 가능한 투자 방식 접근법을 선호한다고 응답했다.

에머슨 CTO인 Peter Zornio는 “고객들은 도전 과제를 구체적으로 파악하고 싶어하고, 성과 개선에 필요한 기술을 정확히 알고, 그 결과에 기반해 투자를 늘리기를 원한다”며, “에머슨은 기업들이 단기간에 최대 효과를 얻을 수 있는 지점에서 시작할 수 있도록 플랜트웹을 구축했다”라고 설명했다.

업계 최고의 공정 제어와 안전 시스템에 기반해 구축된 플랜트웹은 기존의 자동화 인프라를 확장해 산업용 사물인터넷을 통해 얻을 수 있는 이점을 확장/달성 가능하게 해준다. 플랜트웹은 광범위한 퍼베이시브 센싱 기술 포트폴리오와 분석 소프트웨어 툴 세트, 그리고 안전하고 강력한 데이터 인프라 장치와 전문 서비스를 제공한다.

에머슨은 플랜트웹 디지털 에코시스템 포트폴리오에 대한 다음과 같은 개선 사항들을 공개했다.

퍼베이시브 센싱(Pervasive Sensing): 에머슨의 퍼베이시브 센싱은 플랜트웹 디지털 에코시스템의 근간으로 하며, 공정 퍼포먼스와 자산 상태에 대한 가시성(visibility)을 강화했다. 따라서 전문가들이 운

영 개선에 필요한 정보를 얻을 수 있다. 한층 강력해진 센싱, 측정 및 모니터링 기술 네트워크는 50개 이상의 무선 온도, 압력, 부식, 진동, 음향 등의 장치를 수용한다. 해당 포트폴리오는 새로운 무선 Rosemount 928 유독가스 및 더모디스크(Therm-o-Disc) 파워 미터 모니터링 제품까지 포함하도록 확장되었다.

시큐어 퍼스트 마일(Secure First Mile™): 산업용 사물인터넷의 세계적 도입으로 강력한 사이버보안의 전략적 수요가 늘어나는 현재, 에머슨의 Secure First Mile 은 실행 가능한 정보를 운영 기술(OT) 시스템에서 안전한 인터넷 기반 어플리케이션, 서비스, 또는 모바일 사용자에게 안전하게 전송한다. 에머슨의 데이터 보안 포트폴리오는 보안 시스템 관련 업계 표준인 ISA Secure 인증을 받아 더욱 강화됐다. 또한 에머슨의 Connected Services와 같은 새로운 서비스의 도입을 촉진하기 위해, 플랜트웹 Secure First Mile은 다양한 표준 보안 모델과 호환이 가능하고 고객의 IT인프라의 통합이 가능하다. 이에 따라 기존의 기술 아키텍처에 딱 맞는 안전한 연결을 제공한다. 여기에는 클라우드에서 클라우드로의 연결, 또는 Azure IoT 기술을 통한 필드 레벨 센서와 계기의 직접적인 엣지 연결도 포함된다.

플랜트웹 인사이트(Plantweb Insight™): 에머슨의 플랜트웹 인사이트는 확장 가능한 웹 기반의 가벼운 소프트웨어 플랫폼으로, 퍼베



이시브 센싱 기술과 미리 구축한 분석기법으로 주요 시간대별 모니터링과 특정 자산군의 비정상 활동을 파악해 사용자들이 시설의 데이터를 즉시 활용할 수 있게 도와준다. 플랜트웹 인사이트는 공랭식 열교환기, 부식, 열교환기, 네트워크 관리 및 압력 릴리프 장치를 위한 어플리케이션을 포함하고 있다.

플랜트웹 어드바이저(Plantweb Advisor™): 에머슨의 플랜트웹 어드바이저 세트는 신뢰성과 에너지 전문가들에게 장비 상태와 효율, 에너지 사용과 배출량에 대한 중요 정보를 제공하는 분석 기법을 활용하는, 확장 가능한 소프트웨어 어플리케이션 세트이다. 에너지 어드바이저, 상태 어드바이저 그리고 퍼포먼스 어드바이저라는 이름으로 출시됐으며, 에머슨은 측정 및 마이닝 분야에 분석 어플리케이션을 제공하기 위해 플랜트웹 어드바이저 세트를 확충했다.

올웨이즈 어웨어(Always Aware™): 이전 이름은 Always Mobile이였으며, 에머슨은 이 새로운 Always Aware 솔루션 세트로 이전의 이동성(mobility)에 더해, 역할 기반의 주요 시간대별 정보와 경보를 시설의 근무자들에게 위치와 관계없이 전달, 자산과 공정의 퍼포먼스를 개선할 수 있는 보다 효과적인 협업과 조치가 가능하도록 해준다. 업데이트에는 RFID 자산 관리 태그 및 AMS ARES™와 AMS Device Manager, AMS Machinery Manager, 플랜트웹 인사이트(Plantweb Insight) 그리고 플랜트웹 어드바이저(Plantweb Advisor) 등 다양한 인터페이스의 통합이 포함되어 있다. 이로 인해 업무 흐름 간소화, 협업 증진, 그리고 보다 효과적인 대응 등이 가능하다.


서비스: 에머슨은 자동화와 산업용 사물인터넷 기반의 기술 포트폴리오를 뒷받침하는 컨설팅과 서비스를 제공하는 신뢰받는 산업 파트너로서의 역할을 확장하고 있다. 이러한 서비스로 기업들에게 상위 25% 기업이 될 수 있는 정보와 엔지니어링 전문 지식을 제공하고 있고, 각 기업의 인력이 소중한 자산이 될 수 있게 기술과 역량을 개발하도록 돕는다.

- 케넥티드 서비스 - 시설의 장비와 공정을 에머슨의 전문가들이 원격 평가한다. 고객들은 효율 증대와 계획하지 않은 다운타임 방지에 필요한 정보를 얻을 수 있다. 업데이트 된 부분은 자본 비용이 거의 들지 않는, 구독 기반의 새로운 기능들이다. Cisco WiFi 네트워크의 시스템 상태 모니터링을 위한 산업용

WiFi 네트워크 관리, 그리고 에머슨에서 관리하는 플랜트웹 인사이트와 어드바이저 어플리케이션 등의 플랜트웹 솔루션 등이 해당된다.

- 서비스형 소프트웨어(Software as a Service (SaaS)) - 클라우드를 사용해 프로젝트 엔지니어링과 시설의 장기 운영을 변화시킨다. 엔지니어링 구성과 가상 온라인 테스트, 그리고 시설의 제어시스템 가상화로 시뮬레이션, 테스트, 그리고 작업자 교육 등을 제공한다.
- 운영상의 확실성 컨설팅 - 에머슨의 새로운 운영상의 확실성 팀의 미션은 사업 효과 달성을 위한 확장 가능한 로드맵을 확실한 투자와 적절히 조합하는 것이다. 100명 이상의 업계 전문가들이 디지털 인프라와 최적의 조직적 접근법을 제시해 큰 경제적 수익을 낼 수 있도록 돕는다.
- 직원 역량 개발 - 업계 최초의 역량 개발 프로그램인 제어 퍼포먼스 아카데미(Control Performance Academy)에서 초보 엔지니어들을 18개월만에 5~10년에 해당하는 교육을 받도록 한다. 인터랙티브 플랜트 환경(Interactive Plant Environment)으로 아주 생생하고 직접적인 경험을 제어 시스템 작업자들에게 제공한다.

기초 솔루션 (Foundational Solutions): 현대 플랜트 자동화의 토대인 기술들은 시설 운영에 중요한 핵심 공정 제어와 안전성 시스템을 제공한다. 플랜트웹의 개선 사항에는 인간 중심 설계의 원칙을 활용해 시설 내 수천 개의 데이터 포인트를 통합하고 프로젝트 설계와 일상 운영에 사용할 수 있게 보다 효율적이고 직관적인 인터페이스 제어 시스템의 성능을 개선한 DeltaV Live Operator interface도 포함된다.

Peter Zornio는 “지난 30여년 간 업계의 기술 진보는 엄청난 효율 개선을 가져왔다”며, “지금은 차세대 인력이 기업의 전략적인 자산이 되도록 실행 가능한 통찰력으로 무장시킬 때이다”라고 덧붙였다. 



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Catch the WIND

Windfarm support vessels face extremely challenging conditions and demanding workloads. That makes the need for dependable technology to ensure safe and consistent operations essential to operators such as UK-based Seacat Services, which serves the growing investment in sustainable power throughout the North Sea.

Rolls-Royce

For Seacat Services Managing Director Ian Baylis, reliability is the key to his young company's reputation. Baylis has built up a respected brand and business with his UK-based windfarm support vessel operator, and he attributes that success to the dependability of Rolls-Royce technology. "The biggest challenge for our business is keeping the vessels available," he says. "If we keep the vessels available we get a reputation for reliability, and if we have that reputation

then we get work. It's as simple as that."

That reputation for reliability means the company has never lost a client and continues to grow apace, generating new clients as a result of positive word of mouth.

Baylis attributes the reputation for reliability to two factors. "First is the selection of the vessel design, and second is the shipyard and the equipment on board. Rolls-Royce is an integral part of that. Rolls-Royce kit is solid and reliable,



Seacat vessels Resolute and Defender carry technicians and supplies to the West of Duddon Sands windfarm, a joint venture between ScottishPower Renewables and DONG Energy, located in the Irish Sea off Cumbria.

we've never had a technical hour's downtime as the result of a Rolls-Royce product and the fleet has already clocked up around 30,000 hours."

Equipment is only as good as the skilled and motivated people who operate it. Baylis also attributes industry-leading levels of reliability to his "fantastic support team", both on board the ship and at the company's Cowes base.

Seacat Services was formed in 2010 with the aim of providing support to the rapidly developing offshore wind industry in the construction operation and maintenance of offshore windfarms. Following extensive market research, which included Baylis spending time skippering vessels out to windfarms, he and his partner created a business plan, raised the independent finance required and ordered their first two vessels, from South Boats on the Isle of Wight, in May 2011.

"By the time those boats were built we'd already ordered four more," Baylis says. "Our first ever day of paid work was 6 July 2012."

"Boutique" quality

Seacat Services currently operates nine specifically constructed multipurpose vessels, with two further vessels currently under construction at South Boats. Depending on the number of contracts at any one time, the company employs around 70 people at sea and a further 14 in supporting roles in Cowes.

Ultimately, the plan is to operate a fleet of 12 to 14 vessels, providing a "boutique" quality service.

The company has secured contracts across all the North Sea states, working with some of the biggest names in the offshore wind sector, including Siemens Wind Power Solutions and DONG Energy.



The majority of the company's business is in Danish and German waters, with between 20 and 30 per cent in UK waters. Baylis is keen to have the opportunity to work on projects closer to home and is watching with interest plans for offshore wind developments along the south coast.

Challenging conditions

The life of a windfarm support vessel is a tough one. Vessels work around the clock on 12 or 24-hour contracts. Seacat operates some of the industry's larger vessels, supporting windfarms further from shore in more challenging conditions. During the construction phase of windfarms, the company supports customers who conduct their operations remotely. Typically, a ship will operate with two crews working alternate 12-hour shifts, with the crews living on a hotel ship located near the installation. At the beginning of their shift the crew take over responsibility for the vessel and begin their day picking up and ferrying passengers, usually teams of between two and four people to and between offshore assets, such as turbines and sub-stations.

Work on windfarm construction projects is very varied. The majority of Seacat's work has involved supporting cable contractors, pulling cables into the base of the foundations, hanging them off and terminating them. They've also supported turbine technicians commissioning and servicing the turbines themselves as well as a variety of secondary work streams, painting, temporary electrical supply and drone inspection.

A windfarm support vessel can visit 20 or 30 locations during one 12-hour shift. The record, according to Baylis, is 44. At the end of the shift the vessel returns the technicians to where they came from, either the hotel ship or back to land. The vessel is then handed over to the relief crew and that day's crew gets some sleep, ready to begin again 12 hours later.

"Two things matter in this business," says Baylis. "Reliability in getting the technicians to the site and environment, providing a pleasant journey for the passengers on board. Our job is to ensure the technicians get to the site quickly and in a fit condition to do the work that they're there to do."

To that end, Seacat vessels are built to a high specification and are considered to be among a handful of operators who have top-quality tonnage within the industry.

Their vessels have a superstructure that is independent of the vessel's hull, soft-mounted on big rubber mounts, paint-

“TWO THINGS MATTER IN THIS BUSINESS ...
RELIABILITY IN GETTING THE TECHNICIANS TO THE
SITE AND ENVIRONMENT, PROVIDING A PLEASANT
JOURNEY FOR THE PASSENGERS ON BOARD”

ed with sounddeadening coatings and with acoustic paneling inside. All are designed to reduce noise and vibration to a minimum for comfort and safety, and so transport the technicians to work in the best condition possible. A great deal of attention is also paid to the vessel's hull design so the platform is as stable as it can be, in order to reduce sea sickness as well as reducing noise and vibration. The saloon is designed to be big, light and airy, maximising views of the horizon to reduce the danger of sea sickness. Attention is also paid to the specification of the saloon. Seating is as comfortable as possible and cooking facilities and entertainment are provided, including satellite TV, video games console, DVD player and high-speed satellite internet.



Time in transit is also important. Main propulsion power for the company's latest vessels will be provided by MTU 12V 2000 M72 high-speed diesels, two per vessel, each with a power rating of 900kW. In combination with Rolls-Royce Kamewa 56A3 waterjets, the propulsion system will power the vessels to speeds of up to 30 knots.



Offshore support vessels including the Seacat Courageous, above, serve windfarms throughout the North Sea, including the Meerwind facility, pictured below. The fleet relies heavily on Rolls-Royce technology.



The Seacat Vigilant, using Rolls-Royce waterjets and MTU engines, stands ready for action in the North Sea.

Excellent performance

When working, windfarm support vessels must push hard against fender posts at the turbine to hold themselves in position despite tides, winds and waves, while technicians or equipment are transferred.

Good manoeuvrability is vital for maximum safety. Rolls-Royce waterjets provide an excellent combination of speed, static thrust and manoeuvrability. All elements of the Kamewa 56A3 waterjet pump unit, consisting of impeller, impeller housing, stator and steering nozzle, are manufactured from stainless steel and are extremely durable in demanding applications. Pump performance has been improved to deliver very high static thrust, exceptional cavitation margins and excellent performance over the whole speed range.

“WE’RE ABSOLUTELY SOLD ON ROLLS ROYCE PRODUCTS BECAUSE THEY HAVE TREATED US FANTASTICALLY”


- Ian Baylis, Seacat Services Managing Director

The compact control system is intuitive and makes operations easier and safer. It is pre-calibrated, making the startup

procedure easy and quick. Engine RPM and clutch controls are integrated to the control system and there are several safety interlocks to avoid potentially hazardous situations.

Rolls-Royce products are at the heart of Seacat’s operations. Its fleet is currently fitted with 22 MTU engines and 18 Kamewa 56A3 waterjets. Seacat chose Rolls-Royce and MTU independently as two market leaders, Rolls-Royce for their waterjets and MTU for their engines.

According to Baylis, having Rolls-Royce and MTU together has helped create a great marketing story for the company. It allows them to show clients that they rely on one product with one point of accountability and that adds to their reputation for reliability.

“Our vessels’ availability is the cornerstone of that reputation for reliability,” he says. “In selecting our machinery we have to be sure that we do everything we can to try and ensure the vessel is available 100 per cent of the time. We average well over 90 per cent and there’s been no downtime due to Rolls-Royce products since we started. We’re absolutely sold on the products because they have treated us fantastically.” 

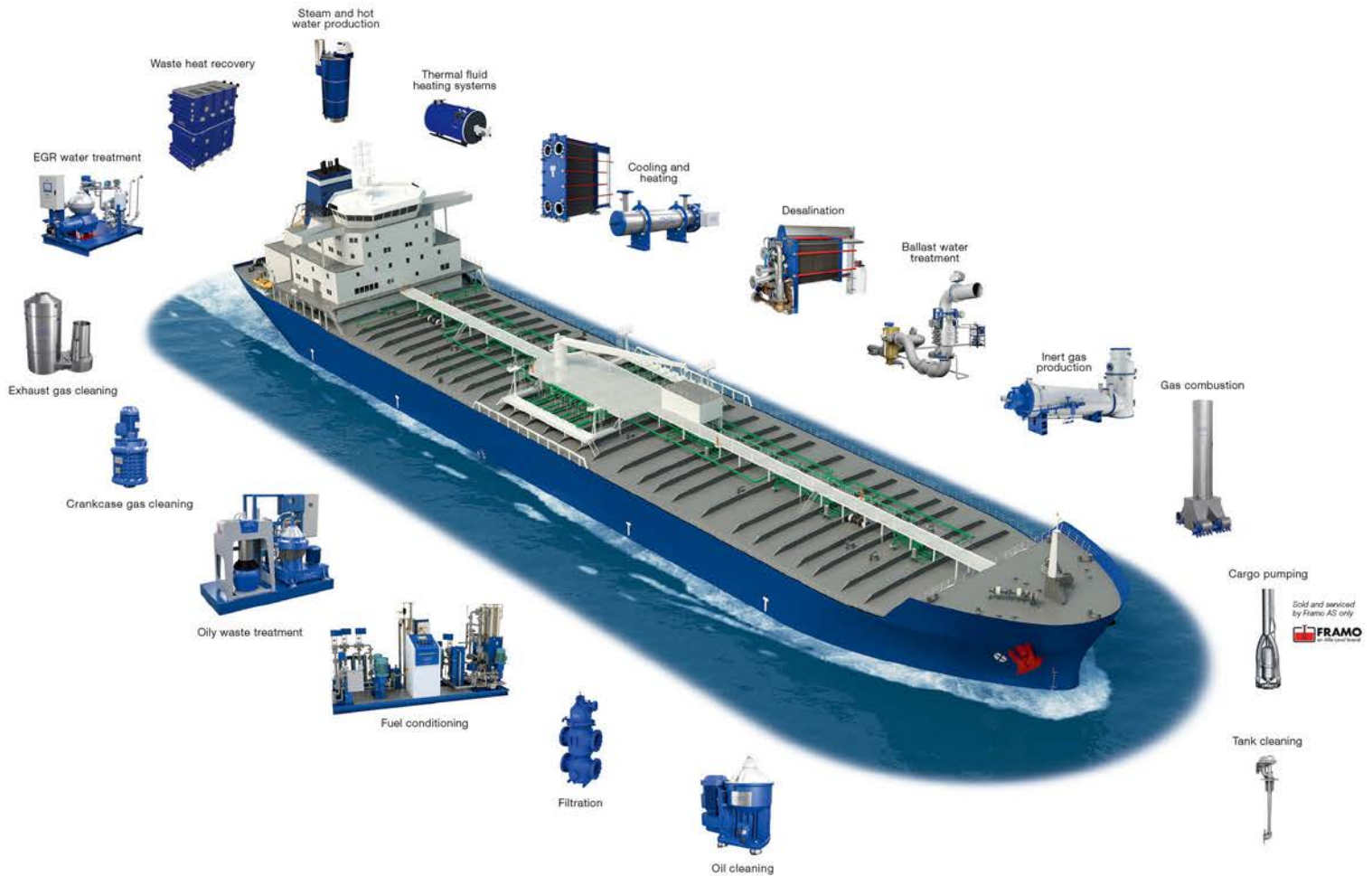
“This article originally appeared in In-Depth, the marine customer magazine of Rolls-Royce.”

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The "Adèle" has been lauded as one of the most beautiful gems in the international yacht market.

"ADÈLE" SAILS USING MODERN AUTOMATION

Classical lines, with carbon fiber rigging and a fast hull: "Adèle," built in 2005 by the Dutch Vitters shipyard is still a looker – even after ten years on the world's oceans. Swede, Jan-Erik Osterlund, commissioned the 55-meter-long yacht with an aluminum hull so that he could spend two years sailing around the world. Since then, "Adèle" has found a new owner – and a completely new automation technology based on the WAGO-I/OSYSTEM 750. The Royal Huisman shipyard in the Netherlands won the contract for the refit.

WAGO

By Norman Südekum & Joris Van Liempt

Anyone who travels by megayacht generally has plenty of time. However, it also holds true that no owner wants to spend time stuck in a harbor because of malfunctions, no matter how well-appointed a marina's megayacht facilities may be. Therefore, owners invest in high reliability and correspondingly redundantly structured automation technology. This was the case during the refit of the 150-foot "Adèle."

Modern control and communication technology had been installed during the original construction of the two-masted yacht. At that time, data connection occurred via DeviceNet. The core of the automation system was formed by three controllers for communication, monitoring and lighting control. However, the multiple mutual dependencies for traditional sailboats between the subsystems increased malfunctions. So "Adèle" was never able to fulfill the high expectations of her owner.

Available due to decentralized automation architecture

A comprehensive retrofit ten years later sought to

solve this problem. During her sojourn in the shipyard between 2015 and 2016, the yacht specialists at the Royal Huisman yard replaced "Adèle's" batteries for the electrical supply, updated the lighting to LED technology, modernized the HVAC technology, and expanded the drive train – including a general overhaul of the generator. The Dutch also replaced the old control technology with the WAGO-I/O-SYSTEM 750 and DeviceNet with ETHERNET. Because the network aboard "Adèle" must always work – even if individual components fail or the communication link is interrupted, Royal Huisman decided to integrate automation technology that is equipped with redundant Ethernet networks for communication.

The automation and communication technology from WAGO was selected because it has all of the necessary approvals for maritime use. In this specific case, certification was required from the largest global classification agency, DNV GL.

The drive to use internationally certified components reflects Royal Huisman's interest in complying with global standards in new construction and retrofits. And because ships like "Adèle" ravel



Her interior provides greater ambiance than a luxury hotel.

around the world, “a reliable and fast replacement part supply chain was relevant” for Royal Huisman, in addition to the certification, according to Pascal Koek. As Royal Huisman’s Software Developer, Koek offers another argument in favor of WAGO technology.


“The type of communication structure, the flexibility of the system and its compact design make WAGO’s automation solutions very attractive to us.”

Flexible technology for individual dream yachts

According to Koek, the flexibility of WAGO’s system is particularly valuable in new construction. “Thanks to the modularity of the WAGO-I/O-SYSTEM, we can individually adapt and flexibly expand the automation to specific ships,” he explains. “The type of communication structure, the flexibility of the

system and its compact design made WAGO’s automation solutions very attractive to us,” Koek adds.

Attractive is just one word for the yachts built in Vollenhove on IJsselmeer. “If you can dream it, we can build it,” emphasizes Koek. Royal Huisman, a leading global shipyard for motorized and sailing yachts up to 90 meters, has earned its storied reputation by merging quality, service and innovation with traditional craftsmanship. “We make dreams into reality,” states the software developer as he beams with pride.

The dreams are made from majestically modeled aluminum using hypermodern technology, yet are built using traditional methods. It generally takes two to three years between the first sketches and construction before the owner takes delivery. “And despite all of our experience, we are always delighted and amazed every time a yacht leaves our shipyard, because every boat is different,” Koek summarizes. 



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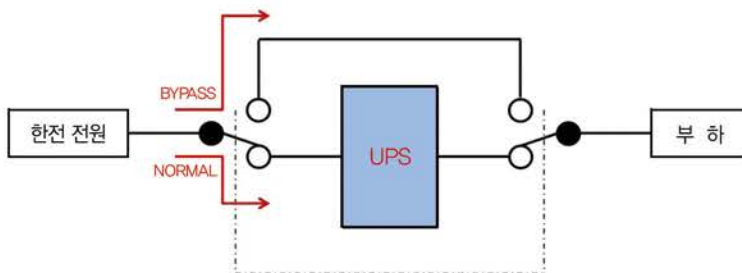


◆ UPS Bypass Switch의 장점

- ▶ 최고의 신뢰성
 - 완벽한 내구성
 - 100여년간 스위치만 만든 Kraus & Naimer
 - Kraus & Naimer는 세계적 기업으로 전 세계 어디서든 구매 가능
- ▶ 다양한 확장성
 - 10A ~ 2400A 용량
 - Normal - Bypass
 - Normal-Test-Bypass (UPS Test mode 가능)
 - System 구성의 필요에 따라 회로 구성 가능



◆ UPS 구성 예시



◆ 안전성

- ▶ 차단기를 사용할 경우
 - 세 개의 차단기를 순서대로 차단/투입시켜야만 하는 불편함
 - 오동작 가능성 높음
- ▶ UPS 스위치를 사용할 경우
 - 손쉬운 Normal - Bypass 전환 가능
 - 긴급 상황시 비인가자도 전환 가능
 - 기계적 인터록 구성으로 오동작 가능성 없음

◆ Application

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벤틀리의 AECOsim Building Designer CONNECT Edition, 주요 프로젝트의 BIM 확장성 문제 극복

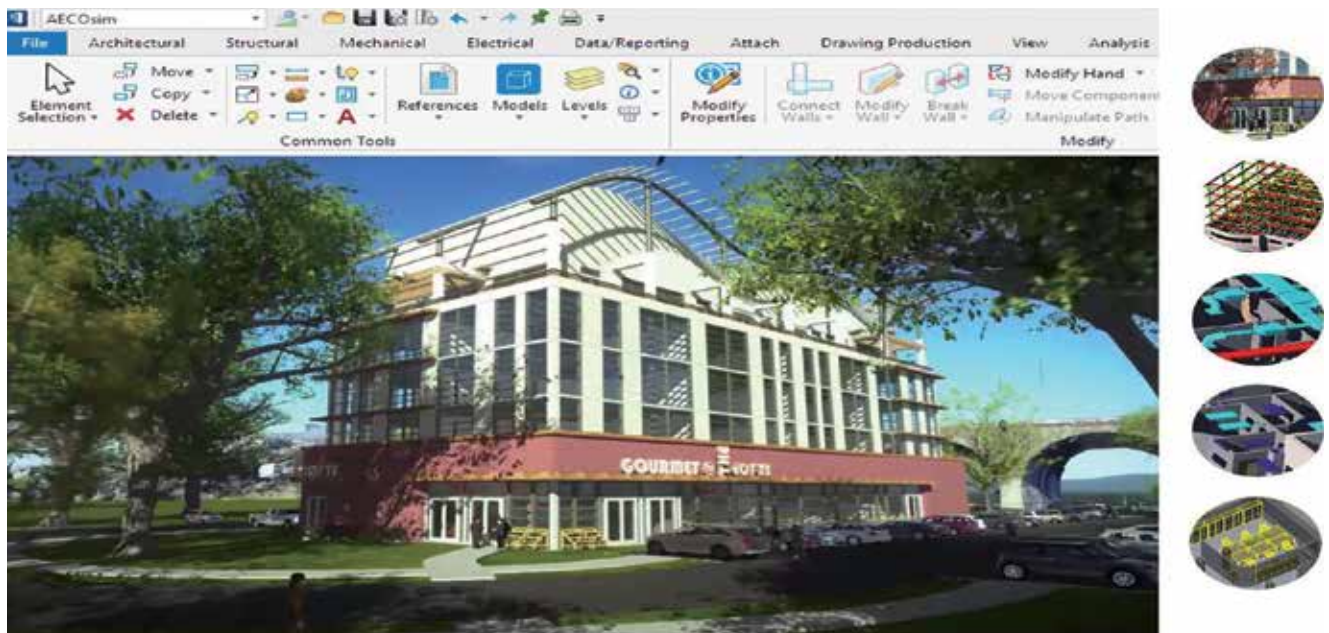
– CONNECT Edition의 종합 모델링 환경 활용

벤틀리시스템즈

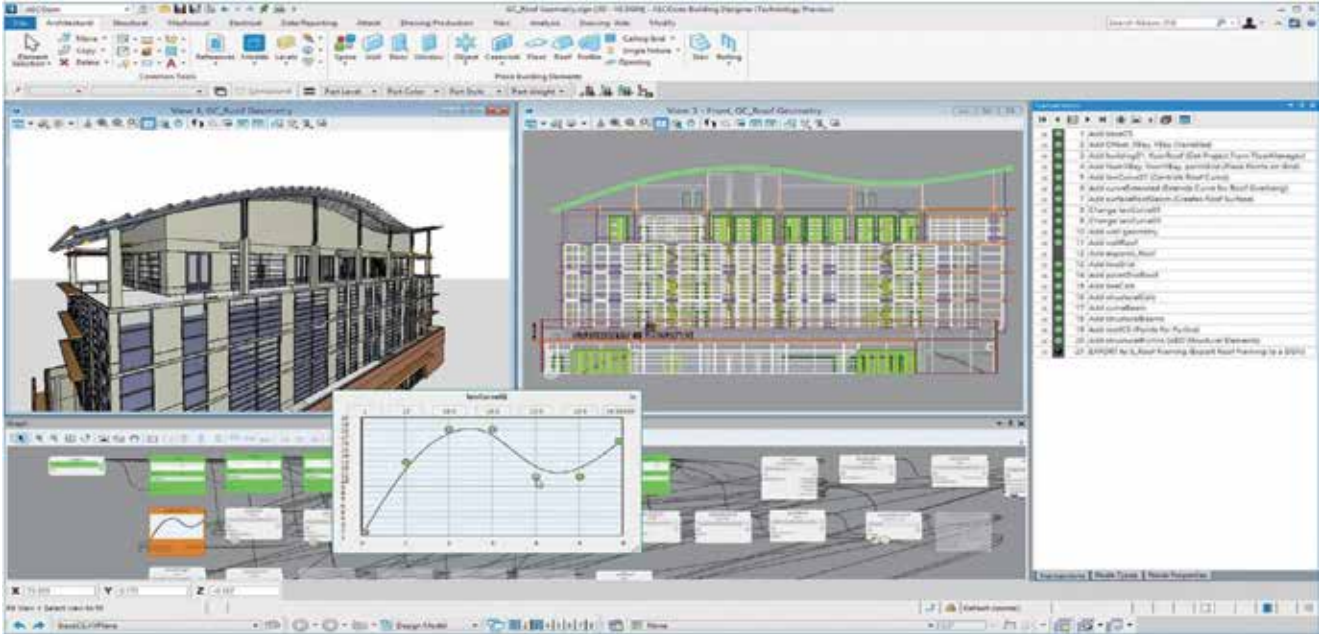
인프라 발전을 위한 종합 소프트웨어 솔루션을 제공하는 글로벌 리더인 벤틀리시스템즈(Bentley Systems, Incorporated)는 벤틀리의 건물 정보 모델링(BIM) 애플리케이션인 AECOsim Building Designer CONNECT Edition을 발표했다. 이 소프트웨어는 대형 규모 또는 엔지니어링 복잡성과 일반적인 수직 시공 및 수평 인프라(도로, 철도, 유틸리티 등)가 결합된 과제를 가진 건물 프로젝트를 위해 설계되었

다. 이러한 프로젝트에서 설계 및 프로젝트 납품 업체는 다수의 프로젝트 납품 분야와 협력업체, 합작 투자 조직을 아울러 책임지는 경우가 많다.

AECOsim Building Designer V8i 사용자들은 광범위한 프로젝트 유형에서 활용 가능한 애플리케이션의 다재 다능함을 확인할 수 있다. 벤틀리의 2017 Be Inspired Awards 출품작 중 63개 프로젝트, 최종



AECOsim Building Designer CONNECT Edition은 벤틀리 최고의 다분야 건물 설계 애플리케이션으로 설계, 엔지니어링 분석, 문서 생산, 시각화를 위한 BIM 프로세스를 실현하며 건축가, 구조, 기계, 전기 엔지니어를 위한 통합 도구를 제공한다.



GenerativeComponents는 AECOsim Building Designer 내에 Product Companion 기능으로 설치되어 반복적인 설계 아이디어를 탐색하고 설계 제약 조건 및 관계를 포함한 설계 의도를 반영하는 전산 설계 기능을 제공한다.

결선 진출자 51팀 중 15팀이 AECOsim을 사용했는데 교량, 공항, 올림픽 경기 시설, 광산업, 제조, 해양, 지자체, 전력 생산, 유틸리티 송배, 상하수도 처리 시설 등 프로젝트 분야가 다양하다. 또한 출품작들은 반복적인 설계 아이디어를 탐색하고 제약 조건 및 관계를 포함한 설계 의도를 반영하는데, AECOsim Building Designer는 품질과 성과를 개선하는 전산 설계 기능을 제공하는 Generative Components 기능을 제공해 출품작들이 사용할 수 있었다.

새로운 AECOsim Building Designer CONNECT Edition은 모든 벤틀리 CONNECT Edition 애플리케이션과 종합 모델링 환경을 공유한다. 종합 모델링 환경 구축 이전에는, 엔지니어와 건축가는 복잡한 데이터 교환 과정에서 정보 손실과 반복적인 변환에 항상 고심해야 했다. 또한 형상 모델링 목적으로 원래 용도와 맞지 않게 BIM 애플리케이션을 강제 실행하여 BIM 인텔리전스가 손상되곤 했다.

AECOsim Building Designer CONNECT Edition은 건축가, 구조 엔지니어, MEP 엔지니어의 작업을 단일 애플리케이션으로 통합하고 CONNECT Edition의 종합 모델링 환경을 활용하여 확장성을 향상했다. 신규 출시 버전은 벤틀리의 모든 다분야 설계, 분석, 시공 모델링 애플리케이션 포트폴리오와 변환이 요구되지 않으며 매끄러운 상호 운용성을 제공한다.

MicroStation CONNECT Edition을 포함한 모든 CONNECT Edition

애플리케이션은 CONNECT Edition의 문서 센터에서 기본으로 제공되는 성과품 생성 자동화의 이점을 누릴 수 있다. 문서 센터는 도면 세트 조직화의 일관성, 품질, 효율성을 크게 개선한다. AECOsim Building Designer는 또한 사진 및/또는 스캔을 통해 기존 조건을 포착하고 벤틀리의 ContextCapture를 통해 엔지니어링 지원 현실 매쉬로 변환한다. 이 작업으로 실제 지리 좌표 상황을 AECOsim 설계 환경으로 가져오는 현실 모델링의 이점을 누릴 수 있다.

벤틀리시스템즈의 산타누 다스(Santanu Das) 설계 모델링 담당 수석 부사장은 "CONNECT Edition 애플리케이션을 완성한 지금은 벤틀리에게 가장 떨리는 시간이다. AECOsim Building Designer CONNECT Edition은 종합 모델링 환경을 통해 끊임이 없는 워크플로우에서 콘텐츠와 데이터를 공유하여 사용자가 생산성을 개선하고 다분야에 걸쳐 공동 작업을 할 수 있게 해준다. 벤틀리는 BIM 기술을 지속적으로 발전시키고 있다. AECOsim Building Designer 버전은 사용자가 규모나 다분야 복잡성에 상관없이 프로젝트에서 공동 작업을 수행하고 모든 관계자를 위한 결과물 생성을 자동화하도록 돕는다. CONNECTservices는 벤틀리 애플리케이션 가입자가 사용할 수 있으므로 ProjectWise의 공동 작업 이점이 모든 AECOsim Building Designer 사용자에게 제공된다"고 말했다.

모든 벤틀리 애플리케이션 가입자는 CONNECTservices를 사용할



벤틀리 LumenRT는 멋진 시각화를 실행해 설계에 생동감을 주고 커뮤니케이션을 돕는 컴패니언 애플리케이션이다.


수 있다. 벤틀리는 사용자 조식이 디지털화 진행시 직면하는 문제를 해결하기 위한 노력을 아끼지 않았다. 디지털 세계에서 사용자는 지금까지와는 다른 방식으로 학습하고 장소와 상관없이 작업을 수행하며 매우 다양하고 분산된 팀들과 공동 작업을 하고 있다. Microsoft Azure를 활용하는 CONNECTservices는 모든 벤틀리 애플리케이션 기반으로 사용된다. 여기서 CONNECTservices에 대해 자세히 알아볼 수 있다.

바르셀로나의 엔지니어링 및 건축 업체인 EiPM은 AECOsim Building Designer CONNECT Edition 얼리 어답터로 이 애플리케이션을

사용해 복잡한 프로젝트를 납품하고 있다. EiPM의 사비에르 콜(Xavier Coll) BIM 관리자 겸 프로젝트 관리자, 연구 개발 담당자는 “이것은 비약적인 발전이다. 새로운 인터페이스는 완전히 깔끔하고 사용자 친화적이며 모든 도구의 인터페이스에서 상호 운용성과 사용성의 극적인 개선이 이루어졌다. 더욱 직관적인 워크플로우는 생산성과 신뢰성 향상에 기여한다. 새 버전은 시중에서 만날 수 있는 최고의 종합 BIM 모델링 소프트웨어라고 단언한다”고 말했다.

CONNECT Edition 소개

벤틀리 인프라 엔지니어링 소프트웨어의 CONNECT Edition은 종합 모델링 환경을 기반으로 인프라 프로젝트 납품을 지원하고 설계부터 시공과 운영에 이르기까지 프로젝트와 자산의 성과를 개선한다. CONNECT Edition 애플리케이션의 특징인 CONNECTservices는 프로젝트 팀의 공동 작업 향상을 실현하고 벤틀리 소프트웨어 숙달을 보장하며 어디서든 작업할 수 있는 개인 이동성으로 개인 역량을 강화한다.

CONNECT Edition은 Microsoft Azure의 보급 범위와 컴퓨팅 파워를 활용하고 온프레미스 서버, 데스크톱 애플리케이션, 벤틀리 앱을 포함하는 하이브리드 환경을 지원해 인프라 발전을 위한 전례 없는 수준의 정보 이동성을 제공한다. 



기존 조건에 대한 설계 상황을 제공하기 위해 포인트 클라우드와 현실 모델이 설계 모델에 참조될 수 있다.



Korean shipyards claimed global top spot in monthly new order intake in 3 months. According to Clarkson, new orders at Korean shipyards stood at 130,000 CGT (9 vessels) in August this year. Global order placement showed an one-third decrease to 510,000 CGT (33 vessels) from the previous month (157,000 CGT with 44 vessels). Chinese shipyards and Japanese shipyards took the second spot and third spot, respectively, with 110,000 CGT (7 vessels) and 40,000 CGT (2 vessels).

Cumulative global orders up to the previous month stood at 12.73 million CGT (489 vessels), increasing by 3.70 million CGT compared to the same period of the previous year (9.03 million CGT with 404 vessels). By country, Chinese shipyards claimed the top spot with 4.22 million CGT (195 vessels) and Korean shipyards took the second spot with 3.48 million CGT (104 vessels).

Japanese shipyards took the third spot with 1.09 million CGT (58 vessels).

Price for ultra-large containership with a capacity of 16,000TEU or higher, which is the flagship vessel of Korean shipyards, and newbuilding price for 174,000m³ LNG carriers slid by USD 1 million apiece. Meanwhile, Clarkson Newbuilding Price Index hit 124 points in August, rising by 1 point in a month.

Here, we take a close look at the performance of major domestic shipyards, the world's leading players with strong growth in new orders as shown currently in the Clarkson data, such as Hyundai

Heavy Industries (HHI), Daewoo Shipbuilding & Marine

Engineering (DSME), Samsung Heavy

Industries (SHI) and others based on

the order backlog data. 

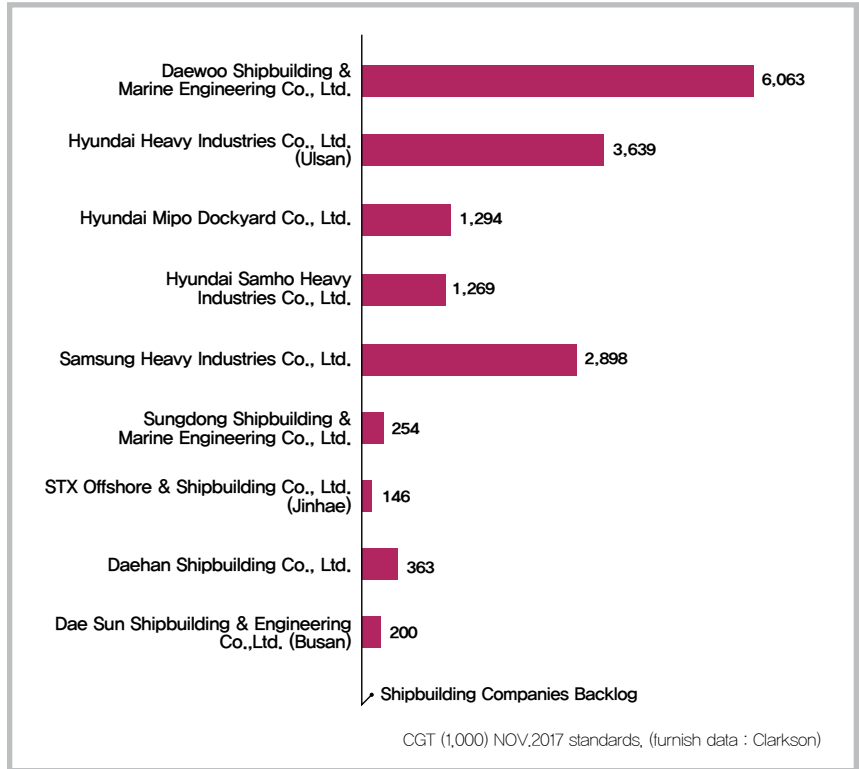
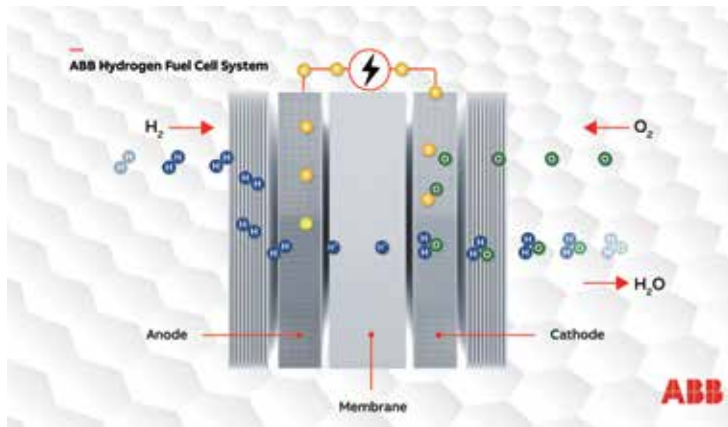


Photo: Sungdong Shipbuilding & Marine Engineering Co., Ltd.

ABB to deliver first fuel cell system for Royal Caribbean



ABB's fuel cell system is aimed to be piloted on board a Royal Caribbean International vessel and will be the first fuel cell system to provide an energy source for a luxury cruise ship.

Last year was the first time that mobile power from fuel cells exceeded stationary installations, according to The Fuel Cell Industry Review 2016, and the maritime industry is quickly recognizing the potential of a technology that delivers emissions-free simplicity, maintainability and efficiency.

"Our goal is to take the smoke out of the smokestacks, said Harri Kulovaara, Executive Vice President of Maritime and Newbuilding, Royal Caribbean Cruises Ltd. "We are dedicated to innovation, continuous improvement, and environmental responsibility, and using fuel cell technology gives us the opportunity to deliver against all three of

these pillars."

"This pilot installation demonstrates that fuel cell technology is now firmly in sight of the cruise industry," said Juha Koskela, Managing Director, ABB Marine & Ports. "Fuel cells have been the next big thing for 25 years, but now they are reality."

Fuel cells generate energy by exploiting an electrochemical reaction at the interface between the anode or cathode and the electrolyte membrane. They involve no combustion, converting fuel directly to electricity and heat.

"At ABB, we believe that the next generations of vessels will be electric, digital and connected. Fuel cell technology matches exactly that. Fuel cells have significantly higher efficiency than combustion engines and allow energy to be concentrated more densely than in petroleum fuels. If you use renewables to produce the hydrogen the entire energy chain is clean and truly emission free," Koskela continued.

The pilot installation, including control, converter and transformer technology from ABB, will generate 100 kW of energy, and has been fully developed, maritized, assembled and tested by ABB Marine & Ports. ABB selected an FCvelocity[®] proton exchange membrane (PEM) pure hydrogen fuel cell engine from Ballard Power Systems for its pilot system.

Cobham SATCOM Ku-band VSAT specified for FPSO newbuilds

Cobham SATCOM is to deliver VSAT communication systems for two FPSOs currently under construction in China, with an option for a further four next year. The order for the Ku-band SAILOR VSAT equipment was concluded by Au Shing International (HK) Ltd, a systems integrator that joined Cobham's Asia-Pacific distribution network in

March 2016.

The undisclosed European shipowner is an existing Cobham customer and has previously installed Sea Tel and SAILOR VSAT equipment on its vessels. The reliability, performance and quality of



existing installations were cited as key factors in selecting Cobham SATCOM for the latest order. The FPSOs are being built at a shipyard of China Merchants Heavy Industry Co., Ltd. in Nantong, in Jiangsu Province.

"We are delighted to be working with Au Shing and to be celebrating such a prestigious contract so early in our relationship with them," said Stephan Jorgensen, Regional Director, APAC, Cobham SATCOM. "We have already been talking with Au Shing on how we can develop our cooperation further by expanding our relationship to encompass land solutions."

Preparations for deploying the Sea Tel 9711 IMA systems are already underway, with installation on the first of the newbuilds due to take place in December. The second will take place in spring 2018.

Due to the layout of the FPSOs, the VSAT antenna will be fitted some 150m away from the vessel's superstructure, which is considerably farther than a typical installation. To prevent any attenuation in the signal as it traverses this distance, fiber optic cable will be used instead of conventional coaxial cable to link the antenna to the above deck unit (ADU) situated in the superstructure. The ADU connects to the

modem, which is the interface to the vessel's IT network.

Au Shing vice president Mrs Sun Rong explained "The decision to use a fiber optic was taken to avoid the risk of signal loss in abnormal situations and ensure no degradation in connection quality. This attention to optimizing system performance will ultimately pay-off as improved end-user experience."

High specification Sea Tel VSAT systems have become the default communications technology for floating offshore platforms, including FPSOs, jack-up rigs, floating storage regasification units (FSRUs). With long deployments and relatively high numbers of personnel on board, operators have long recognized the importance of providing high-level crew welfare. Today, this invariably includes reliable access to the Internet. VSAT is realistically the only satellite technology that can provide sufficient bandwidth to satisfy this requirement. Because crew welfare is the primary driver, the customer is also considering TVRO from Cobham SATCOM to further expand entertainment options on board.

The Sea Tel 9711 is a 3-axis stabilized integrated maritime antenna system that features a 2.4m diameter radical offset diameter antenna for operation in both C- and Ku-bands. It has a switchable feed and sub-reflector, which in combination with specially designed software, allows the system to switch between the two frequencies without manual intervention, thus eliminating any downtime on the vessel's IT network.

TOTE to Convert MAN 58/64 Engines to LNG

TOTE Maritime Alaska, a daughter company of TOTE Inc., the leading American marine-transportation group, recently contracted MAN PrimeServ – MAN Diesel & Turbo's after-sales division – to convert the 'North Star' and 'Midnight Sun' to dual-fuel operation on liquefied natural gas (LNG).

The roll on/off ships are currently both powered by 4 × MAN 58/64 engines and will be retrofitted to MAN 58/64 retrofit units. The contract – signed in April 2017 and announced during the High Horsepower (HHP) Summit, a conference and



MAN Diesel & Turbo's Headquarter in Augsburg (from left): Stefan Eefting - Senior Vice President and Head of MAN PrimeServ Augsburg; Peter Keller - Executive Vice President of TOTE; Per Rud - Senior Vice President and Head of After Sales - Marine & Power Plants.

expo on the use of natural gas – covers the design, development and testing of a first-of-its-kind dual-fuel kit, which will serve as foundation

for the largest LNG conversion in North America. A key influence in TOTE's decision to retrofit the vessels to LNG is to significantly reduce the most harmful emissions that result from burning diesel. "TOTE Maritime Alaska is excited to convert its fleet to LNG power which will result in a significant reduction in air emissions including particulate matter, sulphur oxide (SOx) and nitrogen oxide (NOx). This significant investment of time and money is a reflection of our commitment to the environment, our customers and the state of Alaska" noted Michael Noone, President of TOTE Maritime Alaska.

Dr. Thomas Spindler, Head of Upgrades & Retrofits at MAN PrimeServ Augsburg, said "To meet TOTE's requirements, we have developed a solution based on our well-proven 51/60DF retrofit. Accordingly, the engineering approach to the 58/64 retrofit is very familiar to us, and this project represents a straightforward conversion procedure."

WinGD X-DF Engines Power CMA CGM's Record Containerships



As the latest high point in an unbroken run of prestige contracts for its low-speed X-DF dual-fuel engines with low-pressure gas admission, Winterthur Gas & Diesel Ltd (WinGD) is pleased to announce that French shipping line CMA CGM, based in Marseille, has chosen WinGD's largest, 92 cm bore, dual-fuel low-speed engine to power what are presently the largest containerships ever ordered.

The 12-cylinder X92DF engines (12X92DF) will power a series of nine "mega" containerships, each with a record capacity of 22,000 TEU. The vessels ordered by CMA CGM will be built at the yards of Hudong-Zhonghua Shipbuilding (Group) Co., Ltd. and Shanghai Waigaoqiao Shipbuilding

Co., Ltd. They are due to enter service in 2020 on routes between Asia and Europe and are designed to have the potential to sail complete Asia-to-Europe voyages on liquefied natural gas (LNG). The 12X92DF engines will be rated 63,840 kW at 80 rpm, making them the most powerful gas and dual-fuel engines ever built.

Beyond leveraging the operating economy and reliability of WinGD's X-DF engines, with this futuristic move CMA CGM is endorsing the outstanding performance of WinGD's dual-fuel engines with low-pressure gas admission as a way of addressing existing and upcoming regulations from the International Maritime Organization. "Given the low NOx emissions of dual-fuel engines using lean burn combustion and the extremely low sulphur content of natural gas, by choosing our X-DF engines and LNG, CMA CGM is automatically complying with all existing and future emissions regulations," said Volkmar Galke, General Manager of Sales at WinGD.

For CMA CGM, Ludovic Gérard, Vice President of Owned Fleet commented "With this move to LNG energy, CMA CGM is moving ahead for a greener shipping. We selected WinGD engines for the main propulsion on the grounds of their experience in dual-fuel engines and

our positive feedback on the two-stroke Generation X engines".

The regulations already met by the WinGD X-DF dual-fuel engines include the limits on NOx in Emission Control Areas (ECAs) imposed by IMO Tier III and the 0.5% limit on sulphur in fuel which will be introduced in 2020, as well as possible limits on particulates. "The built-in efficiency of our lean-burn dual-fuel engines is also complemented by the favourable ratio of carbon-to-hydrogen in methane – the main constituent of natural gas – which mean that our X-DF engines are already low emitters of CO2 compared to liquid fuelled engines," Galke continued. "Our X-DF engines are thus an excellent starting point for playing a full part in achieving the 30% improvement in overall vessel efficiency up to 2025 specified by the IMO's Energy Efficiency Design Index (EEDI)."



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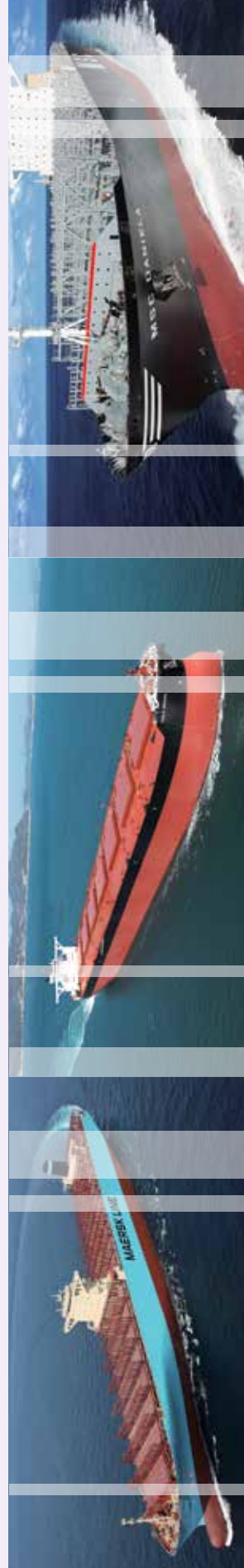
Korea Shipbuilding Orders

Korea Shipbuilding Orders awarded to domestic shipyards in 2015~2017

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

		75,000 tons product carriers	4 vessels	USD 170 million	Tsakos, Greece	The first of 2018	Sungdong Shipbuilding & Marine Engineering
Jun		180,000m ³ LNG carriers	2 vessels	USD 400 million	SK E&S, Korea	The first of 2019	Hyundai Heavy Industries
		50,000 tons bulk carrier	1 vessels	-	Ishin Marine Transport, Korea	The end of 2017	Hyundai Mipo Dockyard
Jul		31,000 tons Car ferry	1 vessels	-	Weidong Ferry	The end of 2018	Hyundai Mipo Dockyard
Sep		180,000m ³ LNG carriers	2 vessels	USD 367 million	Europe ship owner	-	Samsung Heavy Industries
		2,800 ton convoy	1 vessel	USD 297 million	Korean Navy	The end of 2020	Daewoo Shipbuilding & Marine Engineering
		2,600 ton frigates	2 vessels	USD 324 million	Department of National Defense, Philippines	2020s	Hyundai Heavy Industries
Oct		Patrol killer medium	3 vessels	USD 173 million	Korean DAPA	2019s	Hanjin Heavy Industries & Construction
		157,000 DWT oil tankers	2 vessels	USD 220 million	Viken, Norway	-	Samsung Heavy Industries
		113,000 DWT oil tankers	2 vessels	USD 170 million	Nordic American Tankers Limited, Norway	-	Samsung Heavy Industries
		157,000 DWT oil tankers	3 vessels	USD 170 million	IRISL, Iran	2th quarter 2018	Hyundai Heavy Industries
Dec		14,500 TEU container ships	4 vessels	USD 700 million	Bernhard Schulte, Germany	The end of 2018	Hyundai Mipo Dockyard
		49,000 tons products carriers	6 vessels	-	SFL, France	3th quarter of 2019	Daehan Shipbuilding
		LNG Bunkering Vessel	1 vessel	-	Fukuji Kisen, Japan	-	Hyundai Mipo Dockyard
Jan		114,000 tons product carriers	2 vessels	-	CLdN, Luxembourg	The first of 2017	Hyundai Mipo Dockyard
		50,000 tons oil tankers	1 vessel	USD 117.8 million	Greece ship owner	-	Hyundai Mipo Dockyard
Feb		RO-RO Ship	2 vessels	-	Enesel, Greece	The end of 2018	Hyundai Heavy Industries
		50,000 DWT product carriers	1 vessel	-	Europe ship owner	The end of 2019	Daewoo Shipbuilding & Marine Engineering
		300,000 DWT VLCCs	2 vessels	-	Sovcomflot, Russia	3th quarter of 2018	Hyundai Samho Heavy Industries
Mar		173,400m ³ LNG carriers	2 vessels	USD 240 million	Solvang ASA, Norway	2019s	Hyundai Samho Heavy Industries
		114,000 tons oil tankers	4 vessels	-	Neda Maritime, Greece	2019s	Hyundai Samho Heavy Industries
		21,000m ³ LPG carriers	2 vessels	-	Maran Tankers Management, Greece	2018s	Daewoo Shipbuilding & Marine Engineering
Apr		VLCCs	1 vessel	USD 250 million	Sentek Marine, Singapore	The first of 2019	Hyundai Samho Heavy Industries
		318,000 tons VLCCs	3 vessels	-	Oceania ship owner	The first of 2019	Samsung Heavy Industries
		300,000 DWT VLCCs	2 vessels	-	Korea ship owner	The end of 2018	STX Offshore & Shipbuilding
May		VLCCs	4 vessels	-	Korea Line, Korea	The end of 2019	Samsung Heavy Industries
		11,200 DWT product oil & chemical tanker	3 vessels	USD 100 million	Metrostar Management, Greece	The end of 2018	Daehan Shipbuilding
		7,500m ³ LNG carriers	2 vessels	USD 117.8 million	CLdN, Luxembourg	The end of 2019	Hyundai Mipo Dockyard
Jun		114,000 DWT oil tankers	2 vessels	-	Maran Tankers Management, Greece	-	Daewoo Shipbuilding & Marine Engineering
		RO-RO Ship	2 vessels	-	Vitol	The first of 2019	Hyundai Heavy Industries
Jul		318,000 tons VLCCs	4 vessels	USD 420 million	Hyundai Merchant Marine, Korea	The first of 2019	Daewoo Shipbuilding & Marine Engineering
Aug		84,000m ³ LPG carriers	2 vessels	USD 120 million	Bahri, Saudi Arabia	The first of 2020	Hyundai Mipo Dockyard
		300,000 tons VLCCs	5 vessels	USD 800 million	Polaris Shipping, Korea	The first of 2021	Hyundai Heavy Industries
Sep		81,000 DWT bulk carriers	4 vessels	USD 400 million	Polaris Shipping, Korea	The first of 2021	Hyundai Heavy Industries
		325,000 tons VLCCs	10 vessels	-	-	-	-
Oct		325,000 tons VLCCs	5 vessels	USD 400 million	-	-	-

*Note : Based on the press release and public announcements of each shipyards, internal estimation of Monthly KORSHIP (estimation until Nov 15, 2017)



Offshore plant orders awarded to domestic shipyards in 2011-2017

Offshore Plant Orders

Data	Type	Number of vessel	Amount	Ship owner	Delivery	Shipyard	
2011	Jul	Drillship	2 vessels	USD 1.1225 billion	Maersk, Denmark	July 2014	Samsung Heavy Industries
	Aug	LNG-FSRU	1 vessel	USD 280 million	Excellerate Energy, U.S.A	First quarter of 2014	Daewoo Shipbuilding & Marine Engineering
		Semi-submersible Rig	2 units	USD 1.1 billion	Songa Offshore, Norway	Second half of 2014	Daewoo Shipbuilding & Marine Engineering
	Sep	Well Intervention Vessel	2 vessels	USD 420 million	Eide Marine Services AS, Norway	2013	STX Finland
		Drillship	1 vessel	KRW 600 billion	Noble Drilling, U.S.A	Second half of 2014	Hyundai Heavy Industries
	Oct	Fixed Offshore Platform	-	USD 1.4 billion	Chevron, U.S.A	Second half of 2014	Daewoo Shipbuilding & Marine Engineering
		Drillship	1 unit	USD 550 million	Offshore drilling company, Americas	-	Daewoo Shipbuilding & Marine Engineering
		Platform Supply Vessel	1 unit	-	Toms Offshore Supply AS, Norway	First half of 2013	STX OSV
		Offshore Plant Module	2 units	-	-	From 2013 to 2014	STX OSV
	Nov	Platform Supply Vessel	4 units	KRW 2 trillion	Island Offshore, Norway	Consecutively from the 3rd quarter of 2013 to the 1st quarter of 2014	Daewoo Shipbuilding & Marine Engineering
		Pipe Laying Support Vessel and various facilities	2 units	USD 500 million	Odebrecht, Brazil	August of 2014	Daewoo Shipbuilding & Marine Engineering
	Dec	Offshore facilities (Gas platform and various facilities)	-	USD 900 million	Major multinational oil companies	2nd half of 2014	Hyundai Heavy Industries
CPF (Central Processing Facility)		-	KRW 2.6 trillion	INPEX, Australia	4th quarter of 2015	Samsung Heavy Industries	
Jan	Semi-submersible rig	1 unit	USD 620 million	Odfeil, Norway	by mid 2014	Daewoo Shipbuilding & Marine Engineering	
	LNG-FSRU	-	-	Hoegh, Norway	-	Hyundai Heavy Industries	
Mar	Offshore Platform	1 unit	USD 560 million	DONG E&P AS, Danish	April 2015	Daewoo Shipbuilding & Marine Engineering	
	FPSO	1 unit	USD 2.0 billion	INPEX, Australia	April 2016	Daewoo Shipbuilding & Marine Engineering	
Apr	Drillship	1 vessel	USD 645 million	Enesco plc	Third quarter 2014	Samsung Heavy Industries	
	Semi-submersible Drilling Rig	2 units	USD 1.1 billion	Songa Offshore, Norway	Mid 2015	Daewoo Shipbuilding & Marine Engineering	
May	Drillship	1 vessel	USD 600 million	Seadrill, Norway	Second half of 2014	Samsung Heavy Industries	
	Drillship	1 vessel	USD 655 million	Diamond Offshore Drilling Limited., U.S.A	4th quarter of 2014	Hyundai Heavy Industries	
Jun	Semi-submersible drilling rig	1 unit	USD 700 million	Fred Olsen Energy, Norway	March 2015	Hyundai Heavy Industries	
	LNG-FPSO	1 unit	-	Petroleum Nasional Berhad, Malaysia	June 2015	Daewoo Shipbuilding & Marine Engineering	
Jul	Drillship	1 vessel	USD 645 million	Enesco plc	-	Samsung Heavy Industries	
	Gas Compression Platform	1 unit	USD 420 million	(Leiter of Award)	Second half of 2015	Hyundai Heavy Industries	
Aug	LNG-FSRU	8 vessels	-	Excellerate, U.S.A	Between early 2015-2017	Daewoo Shipbuilding & Marine Engineering	
	Drillship	1 vessel	USD 620 million	Rowan, U.S.A	First half of 2015	Hyundai Heavy Industries	
Sep	Drillship	1 vessel	USD 623 million	-	-	Samsung Heavy Industries	
	Drillship	4 vessels	USD 2.06 billion	Transocean, U.S.A	One-by-one from mid 2015	Daewoo Shipbuilding & Marine Engineering	
Oct	Drillship	1 vessel	USD 560 million	Atwood Oceanics, U.S.A	-	Daewoo Shipbuilding & Marine Engineering	
	LNG-FSRU	1 vessel	USD 270 million	Hoegh LNG, Norway	First half of 2015	Hyundai Heavy Industries	
Nov	Drillship	1 vessel	USD 700 million	-	2nd half of 2015	STX Offshore & Shipbuilding	
	offshore platform (Top side)	1 unit	USD 1.77 billion	Statoil, Norway	The end of 2016	Daewoo Shipbuilding & Marine Engineering	
Dec	Gas Production Platform (topside)	1 unit	USD 1.1 billion	Statoil, Norway	Mar 2016	Hyundai Heavy Industries	
	LNG-FSRU	1 vessel	-	BW Maritime, Singapore	2015	Samsung Heavy Industries	
Jan	Floating Production Unit (FPU)	1 unit	USD 1.3 billion	Total, France	First half of 2016	Hyundai Heavy Industries	
	Tension Leg Platform (TLP)	1 unit	USD 700 million	Total, France	First half of 2015	Hyundai Heavy Industries	
Mar	FPSO	1 unit	USD 1.9 billion	Chevron, U.S.A	-	Hyundai Heavy Industries	
	Semi-Submersible Drilling Rig	1 unit	USD 750 million	Diamond Offshore, U.S.A	Nov of 2015	Hyundai Heavy Industries	
2012	Jul	Drillship	1 vessel	USD 645 million	Enesco plc	Second half of 2015	Daewoo Shipbuilding & Marine Engineering
Sep	Drillship	1 vessel	USD 620 million	Rowan, U.S.A	First half of 2015	Hyundai Heavy Industries	
							Oct
Nov	Drillship	1 vessel	USD 560 million	Atwood Oceanics, U.S.A	-	Daewoo Shipbuilding & Marine Engineering	
							Dec
Jan	offshore platform (Top side)	1 unit	USD 1.77 billion	Statoil, Norway	2nd half of 2015	STX Offshore & Shipbuilding	
							Feb
Mar	LNG-FSRU	1 vessel	-	BW Maritime, Singapore	Mar 2016	Hyundai Heavy Industries	
							Apr
May	Tension Leg Platform (TLP)	1 unit	USD 700 million	Total, France	First half of 2016	Hyundai Heavy Industries	
							Jun
Jul	Semi-Submersible Drilling Rig	1 unit	USD 750 million	Diamond Offshore, U.S.A	Nov of 2015	Hyundai Heavy Industries	

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

*Note : Based on the press release and public announcements of each shipyards, internal estimation of Monthly KORSHIP (estimation until Nov 15, 2017)





A looming rebound in shipbuilding and offshore industries

- Global orders are expected to pick up after 2019

Eight out of ten global shipbuilding companies expect a recovery of shipbuilding and offshore markets to their previous levels and a constant increase in operating income within the next 3 years. In fact, shipbuilding and offshore markets are recently showing signs of recovery after severe order drought that gripped global shipbuilding industry in 2015 and last year. According to Clarkson, global shipbuilding orders amounted to 2.96 million CGT with 71 vessels last September, which is the largest monthly order this year. Based on that, domestic shipbuilding and shipping industries anticipate a rebound in global shipbuilding market to its previous levels after 2019.

Shipbuilding and shipping industries are expected to enter another period of boom if domestic shipbuilding companies complete rigorous restructuring in time for the return of global shipbuilding market to its previous levels.

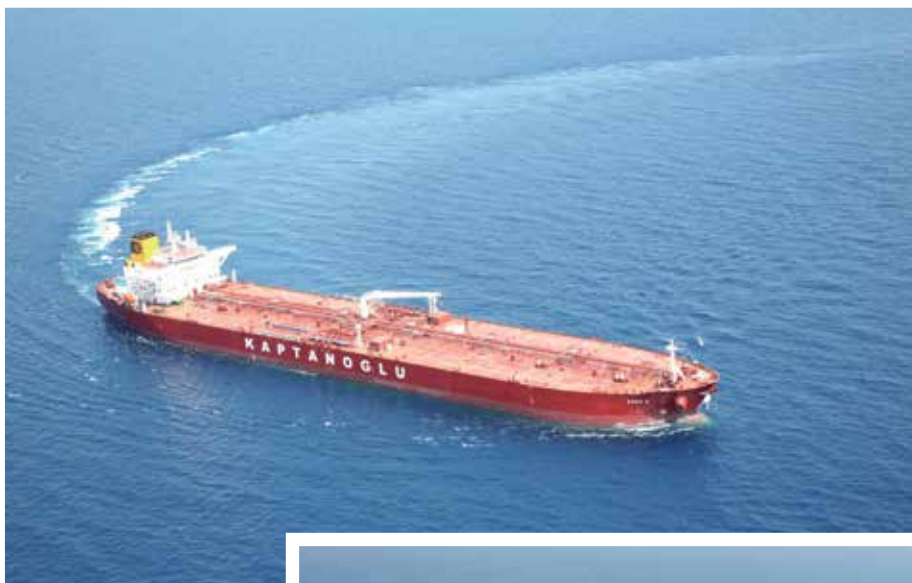












New Clarimar MF wastewater management system

ACO Marine



ACO Marine has unveiled a new Clarimar MF wastewater management system for yachts operating with no more than 12 passengers.

Using the same patented technology applied to the larger Clarimar MF models used in the commercial, offshore and military sectors, the new Clarimar MF (LY3) is an enhanced biological wastewater management system designed specifically to meet the requirements of yachts built to comply with the Large Commercial Yacht (LY3) Code.

The LY3 Code applies to yachts which are 24m and over in load line length, are in commercial use for sport or pleasure, but do not carry cargo or more than 12 passengers.

The Clarimar MF (LY3) offers a simple, more cost-effective solution for yachts where compliance with Section 4.2 of the revised IMO MEPC 227 (64) rules relating to nitrogen and phosphorous removal is not required.

Designed and built in Europe from high quality AISI 316 stainless steel and compatible with all vacuum and gravity-based sanitation systems, the Clarimar MF (LY3) is a high capacity black and grey water treatment system capable of treating all wastewater streams from a small, space-saving footprint. Its modular design offers simple installation and requires minimal operator intervention and maintenance.

ACO Marine has already been contracted to supply a Clarimar MF (LY3) unit for installation to an 80m yacht under construction by a Northern European builder. A further two units will be delivered in the New Year for other European yacht projects.

ACO Marine will be showcasing the new Clarimar MF (LY3) at booth 11.215 in the Super Yacht Pavilion of the METSTRADE show, taking place at the Amsterdam Rai between the 14th and 16th November 2017. On show will be a Clarimar MF-6SS unit which is due to be installed on a second 80m yacht.

-TEL: +420-230-230-371
-<http://www.acomarine.com>

New
Product

New Hempadur Ultra-Strength Fibre 47510

Hempel



Hempel is launching its new cargo hold coating – Hempadur Ultra-Strength Fibre 47510. This innovative coating offers customers an outstanding return on investment by delivering up to 40 per cent reduction in cargo holds maintenance costs.

This next generation cargo hold coating is specifically designed to withstand the harsh conditions experienced by cargo holds, hatch covers and hatch coamings of bulk carriers. It offers superior corrosion protection and long major repair intervals for owners and operators, as well as application simplicity for shipyards and applicators.

Hempadur Ultra-Strength Fibre 47510 incorporates a unique combination of superior mechanical resistance, fibre and self-toughening technology for improved cargo hold protection. The Hempel's patented fibre technology delivers superior coating flexibility in critical cargo hold areas, whilst the self-toughening technology is activated by cargo heat, boosting the coating's mechanical, chemical and thermal resistance.

Incorporating Hempel's patented fibre technology, this heavy-duty coating exhibits superior resistance to abrasion, impact, cracking and chemical attack, combined with an easy to clean smooth surface. It is a self-priming, two-component, high build, pure epoxy coating which can be applied

at a surface temperature of as low as $-5^{\circ}\text{C}/22^{\circ}\text{F}$. Its fast curing properties allows a rapid return to service – as short as just three days from coating to loading the first hard cargo – to minimise off-hire costs.

Hempadur Ultra-Strength Fibre 47510 at a glance:

- Excellent cargo resistance with a 10-year major repair interval
- Best in class resistance against self-heating cargoes to reduce hold maintenance costs
- 76 per cent volume solids and low volatile organic compounds (VOC)
- Excellent resistance against abrading and cargo gouging damages to reduce maintenance during operation
- Fast return to service after coating application – three days to carry first hard cargo – minimising vessel downtime
- Offers easy hold cleaning between cargoes for high cargo flexibility
- High productivity and application simplicity for shipyards and applicators as application is achieved over a wide range of temperatures ($-5^{\circ}\text{C}/22^{\circ}\text{F}$ to $+40^{\circ}\text{C}/104^{\circ}\text{F}$)
- Complies with FDA regulation in respect of dry foodstuffs

-TEL: +82-51-679-9300
-http://www.hempel.com

Oil Record Book Bilge Overboard Security system

Rivertrace Ltd.



(Left) The Smartsafe ORB (oil record book) Bilge Overboard Security system, (Right) Oil Discharge Monitoring Equipment (Smart ODME)

Producers of water quality monitoring products Rivertrace, will be showcasing its the Oil Record Book Bilge Overboard Security system (Smartsafe ORB) and Smart ODME products, during Marintec.

Smartsafe ORB records the oily water discharge process of any oil water separator (IMO-MEPC 60.33 or 107.49) thus avoiding the common mistakes of manual entries and log variations in the oil record book.

The Oil Discharge Monitoring Equipment (Smart ODME) has been designed to provide means of monitoring, recording and controlling the ballast discharge in accordance with the requirements of MEPC 108(49). Discharge limits are set at 30 litres per nautical mile, and the total discharge is expressed as a proportion of the previous cargo for dirty ballast. The Smart ODME includes all components required to meet MEPC 108(49) and is designed for ease of installation and maintenance.

Mike Coomber, Managing Director, Rivertrace said "Marintec is a key international exhibition for Rivertrace, allowing us to engage with our customers and the industry. We are committed to ongoing product development, ensuring our product range remains at the forefront of available technology and consistently pushes the boundaries of oil-in-water analysis. Exhibitions such as Marintec play a vital role in delivering this."

-TEL: +44-(0)-1737-775-500
-http://www.rivertrace.com

New
Product

석유 및 가스 생산업체용 다중 유정 패드 솔루션

로크웰 오토메이션



수평 시추 기법 등 시추 기술의 진보는 석유 및 가스 생산업체들이 생산구역에서 하나의 유정을 굴착하는 것이 아니라 다중 유정 패드로 여러 개의 생산 정을 굴착할 수 있도록 만들어 주었다. 더불어, 운영업체와 장비제조업체들은 제어 시스템에 대한 접근방식을 변경하여 변화하는 사용 사례에 맞게 최적화할 수 있게 되었다. 로크웰 오토메이션의 유정 매니저(Well Manager) 솔루션은 석유 및 가스 생산업체들이 단일 솔루션으로 유정 패드의 모든 기능을 제어해 구현 간소화, 실시간 데이터에 대한 가시성 확보, 생산 효율성 향상, 비용 절감 등 다양한 혜택을 누릴 수 있게 해준다.

기존에 석유 및 가스 생산업체들은 패드의 전역에 여러 제어를 사용해 다중 유정 패드를 구축했다. 로크웰 오토메이션의 솔루션은 로드 펌프, 플러저 리프트, 전기 잠수 펌프, 동공 이송식 펌프, 자분정 등 모든 유정 패드 운영에 단일한 컨트롤러를 사용한다. 단일 업체가 공급하는 단일한 컨트롤러로 모든 운영을 전환하면 유지보수 비용이 절감되고 고정 제어에 도움이 되며 교육과 지원이 간소화되는 장점이 있다.

유정 매니저 솔루션은 다중 유정 패드의 통합을 가속화할 수 있도록 사전 엔지니어링된 상태로 공급된다. 이 솔루션은 확장 가능하며, 흐름 관리, 인공 리프트 제어, 현장 전반의 데이터 가시성을 통해 한 현장에서 최대 32개의 유정을 지원할 수 있다. 데이터가 제어 시스템으로부터 직접 추출되기 때문에, 수동 데이터 보고에 의존하는 경우 보

다 무결성이 훨씬 더 높다. 이 솔루션은 추후 확장을 염두에 두고 구축되어, 초기 구현 후 현장에 추가되는 유정과 장비를 지원할 만한 준비를 갖추고 있다.

이 솔루션은 또한 자가 선언된 유정들을 자동으로 파악하고 생산 환경으로 통합해준다. 이러한 자동 발견 기능이 직원의 개입을 불필요하게 만들어 주기 때문에, 오류 발생 위험이 줄어들고 특수 기술에 의존할 필요가 없어진다. 또한 새로운 유정을 수분 내에 기동할 수 있게 되어, 생산업체들은 유정으로부터 가치 있는 생산 데이터를 보다 신속하게 확보할 수가 있다.

유정 매니저 솔루션은 로크웰 오토메이션이 제공하는 포괄적인 ConnectedProduction 제품군의 일부로, 유정 및 표면 공정에서 소유권 이전까지, 모든 기존 자동화 시스템과 지능형 현장 장비를 연결할 수 있도록 지원한다. 기업은 먼저 필요한 특수 솔루션만 선택해 사용하다가, ROI가 정당화되면 보다 광범위한 사례로 확장할 수 있다. 추가되는 솔루션의 각 섹션은 연결성을 제공하도록 특별히 구축되어 데이터를 유용한 인텔리전스로 전환하는데 도움이 된다. 이 제품은 기존 투자를 활용하기 때문에, 전체 인프라를 교체하거나 개조할 필요가 없다.

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

KOMEA (Korea Marine Equipment Association)

Member List

AMIR Marine Co., Ltd.

Location : YEONGDO-GU, BUSAN
 Website : www.amir.co.kr
 Main Products : Piston Ring
 TEL : +82 51 413 9600

AMS Co., Ltd.

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

A-TECH

Location : GANGSEO-GU, BUSAN
 Website : www.atech2004.co.kr
 Main Products : Small davit, Air motor, Air winch
 TEL : +82 51 832 0723

BC TAECHANG IND. Corp.

Location : JUNG-GU, BUSAN
 Website : www.bcinternational.co.kr
 Main Products : Ultimate solution for onboard crew
 maintenance, Deck scaling machine
 TEL : +82 51 442 6191

Bethel Engineering Co., Ltd.

Location : NAMYANGJU-SI, GYEONGGI
 Website : www.nmg.kr
 Main Products : Magic Grating (Steel grating)
 TEL : +82 31 593 2712

B-I INDUSTRIAL Co., Ltd.

Location : GANGSEO-GU, BUSAN
 Website : www.b-i.co.kr
 Main Products : Fire Detection System, Gas Detection System,
 Navigation Watch Alarm System, Moisture Detection System
 TEL : +82 51 441 5670

BIP INDUSTRIES Co., Ltd.

Location : GEUNJEONG-GU, BUSAN
 Website : www.bn-bip.com
 Main Products : Wall panel, Ceiling panel, Bathroom unit, Cabin
 unit, Floating floor, TLQ, Marine furniture, Marine door, etc.
 TEL : +82 51 519 2000

BOGO Co., Ltd.

Location : SAHA-GU, BUSAN
 Website : www.bogoco.co.kr
 Main Products : Telephone system, Lighting fixture
 TEL : +82 51 294 7771

BO MYUNG METAL Co., Ltd.

Location : GANGSEO-GU, BUSAN
 Website : www.bmmetal.co.kr
 Main Products : Cooper & Cooper-Alloy Pipes & Plates, Fittings,
 Flanges
 TEL : +82 51 266 4101

Bumhan Industries Co., Ltd.

Location : CHANGWON, GYUNGNAM
 Website : www.bumhan.com
 Main Products : Air compressor, N2 generator, High pressure
 control valve
 TEL : +82 55 251 6070

BY CONTROLS, Inc.

Location : GIMHAE-SI, GYUNGNAM
 Website : www.bycontrols.com
 Main Products : Watertight door, Pilot door, Hydraulic hatch, etc.
 TEL : +82 55 345 6110

BYT Co., Ltd.

Location : GANGSEO-GU, BUSAN
 Website : www.byhd.co.kr
 Main Products : HARDWARE, OUTFITTING, MARINE
 OUTFITTING, NEW PRODUCTS
 TEL : +82 51 974 5000

CENTURY Corp.

Location : YANGSAN-SI, GYUNGNAM
 Website : www.capeind.com
 Main Products : Cylinder liner, Man B&W Sulzer (Wartsila) Type
 www.capeind.com YANGSAN-SI, GYUNGNAM
 TEL : +82 55 370 1234

CHK Co., Ltd.

Location : GANGSEO-GU, BUSAN
 Website : www.chkj.co.kr
 Main Products : Ref. container socket, Junction box
 TEL : +82 51 831 9500

ChungSol Marine Co., Ltd.

Location : GANGSEO-GU, BUSAN
 Website : www.chungsolmarine.co.kr
 Main Products : Window wiper, Straight line type, Clear view
 screen, Window, Door, Hatch
 TEL : +82 51 832 2226

ChungSong Industry Co., Ltd.

Location : GIMHAE-SI, GYUNGNAM
 Website : www.koweld.co.kr
 Main Products : Welding auto carriage, LWS, etc.
 TEL : +82 55 329 9500

CMR KOREA Co., Ltd.

Location : KUMJUNG-GU, BUSAN
 Website : www.cmrkorea.com
 Main Products : Marine telephone system, Public address
 system, Communal aerial system, Marine CCTV system, Marine
 clock system, Anemometer system, Rudder angle indicator
 system, Temperature sensor, Pressure sensor
 TEL : +82 51 521 2883

Dae Chang Metal Co., Ltd.

Location : SAHA-GU, BUSAN
 Website : www.dcm.co.kr
 Main Products : Propeller boss, Chain wheel cam, Dummy ring,
 Valve body, etc.
 TEL : +82 51 264 0831

Dae Heung Cooler Co., Ltd.

Location : POCHON-SI, GYEONGGI
 Website : www.cooler.co.kr
 Main Products : Heat exchanger
 TEL : +82 31 532 9667

DAE KWANG IND Co., Ltd.

Location : GANGSEO-GU, BUSAN
 Main Products : SUS PIPE FITTING FLANGE
 TEL : +82 51 831 5886

Daechun Industrial Co., Ltd.

Location : GIMHAE-SI, GYUNGNAM
 Website : www.daechun.co.kr
 Main Products : Multi-core tube, Stainless steel tube
 TEL : +82 55 345 2288

DAEHA Co., Ltd.

Location : GANGSEO-GU, BUSAN
 Website : www.daehatech.co.kr
 Main Products : Hydraulic Pressure Testing Equipment, Cylinder,
 Pump, Torque Wrench
 TEL : +82 51 326 1870

DAEJIN SAT Co., Ltd.

Location : ULJU-GUN, ULSAN
 Website : www.daejinsat.com
 Main Products : Ceiling panel
 TEL : +82 52 225 2361

DAEJUNG Co., Ltd.

Location : SASANG-GU, BUSAN
 Website : www.daejung.net
 Main Products : Fiber Rope, Pet/PP Mat, Sports Net
 TEL : +82 51 304 2511

DAEJUNG VALVE Co., Ltd.

Location : DALSEO-GU, DAEGU
 Website : www.djvalves.com
 Main Products : Butterfly Valves, Oil Field flow-line components,
 Control Valves, Actuators, Special Valves
 TEL : +82 53 584 2276

Daemmstoff Industrie Korea Ltd.

Location : SAHA-GU, BUSAN
 Website : www.daemmstoff.com
 Main Products : KVM SEALING COMPOUND, MANGANA
 TETAINING COMPOUND (PUTTY, FIRE STOP, PANDA-90, etc.)
 TEL : +82 51 261 7073

Daeyang Electric Co., Ltd.

Location : SAHA-GU, BUSAN
 Website : www.daeyang.co.kr
 Main Products : Lighting fixtures, Instruments, SAUV, UUV
 TEL : +82 51 200 5221

DAEYANG INSTRUMENT Co., Ltd.

Location : SAHA-GU, BUSAN
 Website : http://dic.daeyang.co.kr/08_affiliate/affiliate_01.php
 Main Products : Precision instruments - Anemometer, Rudder
 angle indicator, etc.
 TEL : +82 51 200 5212

DaiHan Anchor Chain MFG. Co., Ltd.

Location : NAM-GU, INCHEON
 Website : www.dhac.co.kr
 Main Products : Anchor chain, Offshore mooring stud, etc.
 TEL : +82 32 862 0091

DHMC Co., Ltd.

Location : GIMHAE-SI, GYUNGNAM
 Website : www.dhmc-rudder.com
 Main Products : Rudder, Block, etc.
 TEL : +82 55 346 3663

DECKWIN. Co.

Location : YEONGDO-GU, BUSAN
 Website : www.deckwin.com
 Main Products : Cable winch, Windlass, Mooring Winch, Capstan etc.
 TEL : +82 51 405 7890

DINGJIN MPTECH

Location : GIMHAE-SI, GYUNGNAM
 Main Products : Part for Marine Engine, Shaft System
 TEL : +82 55 720 7000

DK Tech Corporation

Location : GIMHAE-SI, GYUNGNAM
 Website : www.dklok.com
 Main Products : Instrumentation fitting & valve
 TEL : +82 55 338 0114

DMC Co., Ltd.

Location : GIMHAE-SI, GYUNGNAM
 Website : www.dongnam-crane.co.kr
 Main Products : Offshore crane, Deck cranes, Floating cranes
 TEL : +82 55 720 3000

DNP Co., Ltd.

Location : GANGSEO-GU, BUSAN
 Website : www.dnpco.kr
 Main Products : Accommodation system
 TEL : +82 51 831 4551

Dong Hae M-Tech Co., Ltd.

Location : SEO-GU, INCHEON
 Website : www.east-sea.co.kr
 Main Products : Grab bucket, Orange grab, Motor grab, Wood
 grab, etc.
 TEL : +82 32 583 8061

Dong Kang M-Tech Co., Ltd.

Location : GANGNAM-GU, SEOUL
 Website : www.dkmtech.com

Main Products : Water jet, Night navigator
TEL : +82 2 553 0181

Dong Woo Machinery & Engineering Co., Ltd.

Location : CHANGWON, GYUNGNAM
Main Products : Engine room overhead crane, F.O hose handling davit, etc.
TEL : +82 55 295 3261

Dong-A Valve Ind. Co.

Location : GANGSEO-GU, BUSAN
Website : www.donga-valve.com
Main Products : Manufactured low & high pressure valves, Flap check (duo-check) valve, etc.
TEL : +82 51 831 1500

Dongbang Marine Co., Ltd.

Location : GANGSEO-GU, BUSAN
Website : www.dbmarine.co.kr
Main Products : MARINE FIRE DETECTION & ALARM SYSTEM, MARINE FIRE EXTINGUISHING SYSTEM
TEL : +82 51 205 1585

DONGHWA ENTEC

Location : GANGSEO-GU, BUSAN
Website : www.dh.co.kr
Main Products : Heat exchanger, Plate cooler, etc.
TEL : +82 51 970 1000

DongHwa Pneutec Co., Ltd.

Location : GANGSEO-GU, BUSAN
Website : www.dhkomp.co.kr
Main Products : Air/gas compressor
TEL : +82 51 974 4800

D-I Industrial. Co., Ltd.

Location : JINJU-SI, GYEONGNAM
Website : www.d-i.co.kr
Main Products : Marine Transmission, Power Take off, Steering System
TEL : +82 55 760 5500

DooSan Engine Co., Ltd.

Location : CHANGWON, GYUNGNAM
Website : www.doosanengine.com
Main Products : Marine diesel engine, Diesel engines for power generation
TEL : +82 55 260 6000

DRB Holding Co., Ltd.

Location : YEUNGDEUNGPO-GU, SEOUL
Website : www.dreworld.com
Main Products : Marine rubber fender, Industrial rubber sealing & gasket, Industrial rubber track, Rubber damper
TEL : +82 2 2168 9133

ELSCOM Inc.

Location : SASANG-GU, BUSAN
Website : www.elscom.co.kr
Main Products : Explosion-Proof Products, Distribution Board Components, Solar Cable/PV JB
TEL : +82 51 329 8990

Emerson Process Management Korea Ltd.

Location : SEONGNAM-SI, GYEONGGI
Website : www.emersonprocess.co.kr
Main Products : Pressure, Temperature, Level, Analytical & Flow Measurement, Valves, Tank radar level gauging, etc.
TEL : +82 2 3438 4600

ENTECH (Engineering & Technology Co., Ltd.)

Location : CHANGWON-SI, GYEONGNAM
Website : www.thkic.com
Main Products : Engine Bed/Frame box, Crane Pedestal, Tubular (SAW Pipe), Air Reservoir, Jacket, Pile, Wind Tower
TEL : +82 70 4628 8844

ESAB SeAH Corp.

Location : CHANGWON, GYUNGNAM
Website : www.esab.co.kr
Main Products : Flux cored wire
TEL : +82 55 289 8111

Flutek, Ltd.

Location : SEONGSAN-GU, GYEONGNAM
Website : www.flutek.co.kr

Main Products : Axial piston pumps, Axial piston motors & reduction gear, Electro-hydraulic steering gear, Deck machinery, Staffa motor, ECO servo
TEL : +82 55 570 5800

FRIEND Co., Ltd.

Location : GANGSEO-GU, BUSAN
Website : www.thefriend.co.kr
Main Products : Engine valve spindle, Cable tray
TEL : +82 51 974 7911

GASTRON Co., Ltd.

Location : GUNPO-SI, GYEONGGI
Website : www.gastron.com
Main Products : Installation-Type Detector, Portable Gas Detector, Acid Leak Detecting Paint, Alarm Signalling
TEL : +82 31 490 0800

G.S HIGH-TECHER Co., Ltd.

Location : MIRYANG-SI, GYENGAM
Website : http://gshightecher.koreasme.com
Main Products : Air vent head, Convex coupling
TEL : +82 51 832 0456

GENERAL MARINE BUSINESS

Location : NAM-GU, INCHEON
Website : www.gmbmarine.com
Main Products : Marine system (ship shore comm. system, emergency shutdown system, etc.), Defense Eng. (Control & monitoring system integration, etc.), Manufacturing & services (new shipbuilding, module production)
TEL : +82 52 270 3500

GESKO Co., Ltd.

Location : GANGSEO-GU, BUSAN
Main Products : CNG Transportation&Refilling, Fire Fighting system, Engineering for Fire fighting system & Ballast treatment system, Annual inspection
TEL : +82 51 973 9913

GS-Hydro Korea Ltd.

Location : GANGSEO-GU, BUSAN
Website : www.gshydro.com
Main Products : Flare flange system, Retaining ring system
TEL : +82 51 266 8221

TECH FLOWER Co., Ltd.

Location : SASANG-GU, BUSAN
Website : www.haeon21.com
Main Products : Marine crane, Deck machinery
TEL : +82 51 320 8222

Haewon Ind. Co., Ltd.

Location : SAHA-GU, BUSAN
Website : www.haewon.net
Main Products : Water seal, Inflatable/mating ring
TEL : +82 51 831 4600

Halla Industrial Co., Ltd.

Location : SAHA-GU, BUSAN
Website : www.hallaiq.co.kr
Main Products : Non seal canned motor pump, Gear pump
TEL : +82 51 264 2201

Han Jo Co., Ltd.

Location : YOUNGDO-GU, BUSAN
Website : www.hanjoms.co.kr
Main Products : Lubrication oil filter, Fuel oil filter, Filter elements
TEL : +82 51 414 7201

Hankook Flexible Co.

Location : SASANG-GU, BUSAN
Website : www.hkflex.com
Main Products : Metallic flexible hose, Metallic expansion joint, Manufacturing of Metallic flexible hose assemblies
TEL : +82 51 508 6291

HanKuk Miboo Co., Ltd.

Location : GANGSEO-GU, BUSAN
Website : www.hankukmiboo.co.kr
Main Products : Spiral duct, Cold chamber, Deck covering, Level
TEL : +82 51 263 3621

HANLAIMS Co., Ltd.

Location : GANGSEO-GU, BUSAN

Website : www.hanlaims.com
Main Products : Instruments (Level gauge/Level switch) Tank remote sounding system/Cargo monitoring system, valve
TEL : +82 51 601 7016

HANSHIN ELECTRONICS Co., Ltd.

Location : YOUNGDO-GU, BUSAN
Website : www.ehanshin.com
Main Products : Public address sys., Telephone sys.
TEL : +82 51 412 5551

HANSUN ENGINEERING Co., Ltd.

Location : GANGSEO-GU, BUSAN
Website : www.slok.co.kr
Main Products : Instrument Tube Fittings, Instrument Valves, Filters, Condensate Pot
TEL : +82 51 899 6700

HEARTMAN Co., Ltd.

Location : GANGSEO-GU, BUSAN
Website : www.heartman.co.kr
Main Products : Fuel injection nozzle for marine diesel engine, Fuel injection plunger ass'y for marine diesel engine
TEL : +82 51 264 8826

HI AIR KOREA Co., Ltd.

Location : GIMHAE-SI, GYUNGNAM
Website : www.hiarkorea.co.kr
Main Products : Air handling unit, Spot cooler, Refrigeration condensing unit, Fire damper, Provision refrigeration plant, MGO cooling system, Packaged air conditioner, Ventilation fan, Spiral duct
TEL : +82 55 340 5000

Hi Tech Co., Ltd.

Location : GYUNGU-SI, GYUNGBUK
Main Products : T-Bar, Gas Protect Plate
TEL : +82 54 776 5310

HOSEUNG ENTERPRISE Co., Ltd.

Location : GANGSEO-GU, BUSAN
Website : www.hosent.co.kr
Main Products : Sewage Treatment System, Plasma Bilge Separator, E/R Package Unit, Tank Package Unit, Ventilator
TEL : +82 51 831 2233

HODU INDUSTRIAL Co.

Location : GANGSEO-GU, BUSAN
Website : www.hoducompany.com
Main Products : Catering furniture, Galley hood W/fire fighting, Galley E/Q (Deep fat fryer/Cooking range, etc.)
TEL : +82 51 271 3342

Hy-Lok Corporation

Location : GANGSEO-GU, BUSAN
Website : www.hy-lok.com
Main Products : Tube fitting & valve, Double lock & bleed valve, Cryogenic valve
TEL : +82 51 970 0800

HYUNDAI HEAVY INDUSTRIES Co., Ltd.

Location : DONG-GU, ULSAN
Website : www.hhi.co.kr
Main Products : Marine diesel engine & machinery w
TEL : +82 52 202 7291

Hyundai Elevator Co., Ltd.

Location : ICHEON-SI, GYEONGGI
Website : www.hyundaielevator.co.kr
Main Products : Lifts (elevator, escalator, moving walk), Logistics automation system, Parking system (automobiles, bicycles), SOC infrastructure systems (platform screen door, automatic folding canopy, gap zero, etc.)
TEL : +82 31 644 5114

Hyundai Fitting Co., Ltd.

Location : GIJANG-GUN, BUSAN
Website : www.hdfco.co.kr
Main Products : Flange
TEL : +82 51 831 0891

HLB Co., Ltd.

Location : ULJU-GUN, ULSAN
Website : www.hdboat.com
Main Products : Lifeboat, GRP rigid-type rescue boat
TEL : +82 52 240 3500

Hyundai Marine Machinery Co., Ltd.

Location : SEO-GU, INCHEON-SI
Website : www.hmmco.co.kr
Main Products : W.O. incinerator, Aux/blower, F.D fan
TEL : +82 32 583 0671

HYUNDAI WELDING Co., Ltd.

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

I.M.E. CORPORATION

Location : GIMHAE-SI, GYUNGNAM
Website : www.promarine21.com
Main Products : Engine valve spindle & seat
TEL : +82 55 346 1127

ILJIN AND Co., Ltd.

Location : GIJANG-GUN, BUSAN
Website : www.iljinamst.co.kr
Main Products : Fire detection system, Gas detection system, Emission monitoring system, Water spray & cargo spray system, etc.
TEL : +82 51 755 6191

ILSHIN ENGINEERING Co., Ltd.

Location : SIHEONG-SI, DYEONGGI
Website : www.ishineng.com
Main Products : Chemical equipment and Tanks
TEL : +82 31 499 4502

ILSUEUNG Co., Ltd.

Location : GANGSEO-GU, BUSAN
Website : www.ilsueung.co.kr
Main Products : Sewage Treatment plant, Fresh water generator, Oil purifier
TEL : +82 51 831 4110

IL-SUNG IND. Co.

Location : SASANG-GU, BUSAN
Website : www.ilsunghs.co.kr
Main Products : Hot water calorifier, Silencer (For M/E, G/E, fan), Mist eliminator, Washable
TEL : +82 51 312 4056

International Machine Tool Co.

Location : SASANG-GU, BUSAN
Website : www.clampimt.com
Main Products : Vertical clamp, Horizontal clamp, etc.
TEL : +82 51 314 2038

INTRA PRECISION MANUFACTURE Co., Ltd.

Location : DONG-GU, BUSAN
Website : www.intrapare.co.kr
Main Products : PISTON CROWN, CYLINDER LINER, CYLINDER COVER, PISTON SKIRT, WATER JACKET
TEL : +82 51 466 4635

JHK Inc.

Location : YANGSAN-SI, GYUNGNAM
Main Products : Container fittings, Lashing fittings
TEL : +82 55 346 2225

JINSEONG LINER & PISTON

Location : DAEDEOK-GU, DAEJEON
Website : www.jinseong.com
Main Products : Cylinder liner, Piston
TEL : +82 42 931 8558

JONGHAP MACHINERY Co.

Location : YANGSAN-SI, GYUNGNAM
Website : http://jonghap.biz
Main Products : Sewage treatment plant, T-bar auto welding machine
TEL : +82 55 370 2600

JUNG GONG IND. Co., Ltd.

Location : SAHA-GU, BUSAN
Website : www.jung-gong.com
Main Products : Marine window, Fire-resistant window, Marine wiper, Clear view screen,
TEL : +82 51 261 2911

JUNG-A MARINE

Location : GANGSEO-GU, BUSAN
Website : www.jung-a.co.kr
Main Products : Accommodation ladder, Pilot slant ladder, Wiper, CVS, Sunscreen davit,
TEL : +82 51 970 6420

JUNGSAN ENTERPRISE Co., Ltd.

Location : ULJU-GUN, ULSAN
Website : www.jungsan.com
Main Products : Marine engine parts
TEL : +82 52 254 3290

K.C. Ltd.

Location : GANGSEO-GU, BUSAN
Website : www.iccp-mgps.com
Main Products : Impressed current cathodic protection (I.C.C.P) system, Anti-fouling system (M.G.P.S), Shaft earthing device
TEL : +82 51 831 7720

Kangrim Heavy Industries Co., Ltd.

Location : CHANGWON, GYUNGNAM
Website : www.kangrim.com
Main Products : Marine boiler, Plant, LPG tank
TEL : +82 55 269 7700

Kangrim Insulation Co., Ltd.

Location : GIJANG-GUN, BUSAN
Website : www.kangrim.com
Main Products : Tank, Pipe insulation, Cold provision store
TEL : +82 51 200 6000

Keonchang Industry Co., Ltd.

Location : SAHA-GU, BUSAN
Website : www.keonchang.co.kr
Main Products : TOP CHARGING EQUIPMENT, HOPPER & CONVEYER, SIDE GUIDE ASSY
TEL : +82 51 203 0161

Keum Yong Machinery Co., Ltd.

Location : BUK-GU, DAEJU
Website : www.beumyong.com
Main Products : Exh. valve complete with spindle
TEL : +82 53 382 9044

Key Sung Metal Co., Ltd.

Location : GANGSEO-GU, BUSAN
Website : www.deysungmetal.com
Main Products : Marine valve
TEL : +82 51 831 3391

Keystone Valve (Korea)

Location : ANSEONG-SI, GYEONGGI
Website : www.keystonekorea.com
Main Products : All kinds of valves for offshore and shipbuilding
TEL : +82 51 604 4000

KHAN Co., Ltd.

Location : GEOJE-SI, GYEONGNAM
Website : www.khan-offshore.com
Main Products : Engineering services, Sea-trial & commissioning service, Facility for fabrication, Modification
TEL : +82 55 639 7600

Kion Printing & Packaging Inc.

Location : GIMHAE-SI, GYUNGNAM
Website : www.kiwon.com
Main Products : Marine equipment & vacuum system
TEL : +82 55 313 9913

KOC ELECTRIC Co., Ltd.

Location : GANGSEO-GU, BUSAN
Website : www.kocelec.com
Main Products : HV transformer (ATEX, WATER COOLED TYPE), UPS (Uninterruptible Power Supply), Bus way/Bus duct
TEL : +82 51 970 6302

Kokaco Co., Ltd.

Location : YOUNGDO-GU, BUSAN
Website : www.kokaco.com
Main Products : Exhaust Valve Spindle&Bottom Piece Grinding Machine
TEL : +82 51 403 4114

Komeco Co., Ltd.

Location : GIJANG-GUN, BUSAN
Website : www.komeco.net
Main Products : Tacho sys., Electronic equip.
TEL : +82 51 724 5070

Kongsberg Maritime Korea Ltd.

Location : GIJANG-GUN, BUSAN
Website : www.km.kongsberg.com
Main Products : Alarm monitoring system, Cargo monitoring system, Offshore technology
TEL : +82 51 749 8600

KOREA FILTER Co., Ltd.

Location : GIJANG-GUN, BUSAN
Website : www.korea-filter.co.kr
Main Products : STRAINER, OIL FILTER, AIR FILTER, AUTO STRAINER
TEL : +82 51 727 8360

KOTO Technical Co.

Location : SAHA-GU, BUSAN
Website : http://kotoff.com
Main Products : Maintain & repair items (all hydraulic systems, Adjust alignment, centering)
TEL : +82 51 417 8501

KORVAL Co., Ltd.

Location : SAHA-GU, BUSAN
Website : www.korval.co.kr
Main Products : Control Valves, Regulating Valves, Heat Sensor, Shut-Off Valves
TEL : +82 51 790 9700

KSP Co., Ltd.

Location : GANGSEO-GU, BUSAN
Website : www.kspvalve.com
Main Products : Exhaust valve complete, Exhaust valve spindle
TEL : +82 51 831 6274

KSV (Korea Special Valve) Co., Ltd.

Location : YOUNGDO-GU, BUSAN
Website : www.ksv-valve.co.kr
Main Products : Valve spindle and Valve seat for marine diesel engine
TEL : +82 51 415 4466

KTE Co., Ltd.

Location : GANGSEO-GU, BUSAN
Website : www.kte.co.kr
Main Products : High voltage switchboard, Side thruster, Low voltage switchboard, Side thruster control system, Group starter panel, Alarm monitoring system, Electric equipment, etc.
TEL : +82 51 265 0255

Kuk Dong Elecom Co., Ltd.

Location : SAHA-GU, BUSAN
Website : www.kukdongelecom.com
Main Products : Lighting fixture
TEL : +82 51 266 0050

KTMI Co., Ltd.

Location : GANGSEO-GU, BUSAN
Website : www.saejinintech.com
Main Products : Emergency towing system
TEL : +82 51 971 9911

KUKDONG ELECTRIC Co., Ltd.

Location : JINCHEON-GUN, CHUNGBUK
Website : www.nexans.co.kr
Main Products : WIRE All kinds of cables for offshore and shipbuilding including JIS, BS, IEC, DIN, IEEE, etc.
TEL : +82 2 2140 3064

KUMGOKSTEEL INDUSTRY. Co., Ltd.

Location : SEO-GU, INCHEON
Website : www.kgsi.co.kr
Main Products : Steel Gratings, Manhole Covers and Steel Products
TEL : +82 32 564 6759

Kum Kang Precision Co., Ltd.

Location : SAHA-GU, BUSAN
Website : www.kkmarine.co.kr
Main Products : Marine valve, valve for engine, air reservoir tank
TEL : +82 51 262 4894

KANGNAM JEVISCO Co., Ltd.

Location : BUSANJIN-GU, BUSAN
 Website : www.jevisco.com
 Main Products : Shop primer, Anti-corrosive coatings, Anti-fouling coatings, etc.
 TEL : +82 51 892 4221

Kwanglim Marine Tech. Co., Ltd.

Location : GANGSEO-GU, BUSAN
 Website : www.kimt.co.kr
 Main Products : Steel Door, Hull Apteher Blank, Radar Mast, Hi-Pressure Water Mist Fire Fighting System
 TEL : +82 51 313 0055

KWANG SAN Co., Ltd.

Location : GANGSEO-GU, BUSAN
 Website : www.kwangsan.com
 Main Products : AIR VENT HEAD, EXP. JOINT, HEATING COIL, AIR VENT HEAD, EXP. JOINT, HEATING COIL, PIPE SPOOL, ETC.
 TEL : +82 51 974 6316

Kwang Seong Co., Ltd.

Location : GIMHAE-SI, GYUNGNAM
 Website : www.kwangsung.com
 Main Products : PIPE CABLE HANGER, SPARE PART SEAT, ETC.
 TEL : +82 55 338 2271

Kyung Eun Ceramics Co., Ltd.

Location : GIMHAE-SI, GYUNGNAM
 Website : www.ke-ceramics.com
 Main Products : Ceramic packing
 TEL : +82 55 345 7761

Kyungjin Shipping Co., Ltd.

Location : CHANGWON-SI, GYEONGNAM
 Website : www.kyungjinshipping.com
 Main Products : Exports & Imports of Marine Equipment, Shipping Agent Service, Shipbroking Service, Trading
 TEL : +82 55 224 4383

Kyungsung Industry Co., Ltd.

Location : GANGSEO-GU, BUSAN
 Website : www.e-clamp.com
 Main Products : LNG carrier sus corner & anchor strips & Pipe clamp, etc.
 TEL : +82 51 831 4960

LDC-KOREA Co., Ltd.

Location : HAEUNDAE-GU, BUSAN
 Main Products : Traders (Marine Equipment), Ship Repair
 TEL : +82 51 266 4037

Leeyoung Industrial Machinery Co., Ltd.

Location : ULJU-GUN, ULSAN
 Website : www.leeyoung.co.kr
 Main Products : Lashing bridge, T-bulkhead block, Covered-block, Engine casing & funnel, Upper deck & module unit, etc.
 TEL : +82 52 231 5800

LHE Co., Ltd.

Location : GIMHAE-SI, GYUNGNAM
 Website : www.lhe.co.kr
 Main Products : Plate heat exchanger, Fresh water generator
 TEL : +82 55 340 0625

LS Cable & System

Location : ANYANG-SI, GYEONGGI
 Website : www.lscns.com
 Main Products : Power cable, Marine & offshore cable, Telecom cable, SUBMARINE CABLE, WINDSOL, SUPERCONDUCTIVITY
 TEL : +82 51 310 6781

LUXCO Co., Ltd.

Location : SAHA-GU, BUSAN
 Website : www.luxco.co.kr
 Main Products : Electrical equipment for internal combustion engines, Magnetic products, etc.
 TEL : +82 51 260 1300

MIN SUNG Co., Ltd.

Location : GANGSEO-GU, BUSAN
 Website : www.minsung.co.kr
 Main Products : Steel outfitting, Access hatch, Swing away hatch,

Cable tray, Electric cable box, etc.
 TEL : +82 51 305 8862

Mirae Industries Co., Ltd.

Location : HAMAN-GUN, GYEONGNAM
 Website : www.miraewinch.com
 Main Products : Winch, Chain Stopper, Capstan
 TEL : +82 55 587 8520

MODERN INTECH Co., Ltd.

Location : SASANG-GU, BUSAN
 Website : www.mo-dem.com
 Main Products : Fire retardant curtain, Mattress, Upholstery furniture, Fire retardant fabric, Carpet, Rubber flooring
 TEL : +82 51 325 0260

MRC (Marine Radio Co., Ltd.)

Location : YOUNGDO-GU, BUSAN
 Website : www.mrcorea.com
 Main Products : Public address system, Auto telephone sys.
 TEL : +82 51 414 7891

MSL Compressor Co., Ltd.

Location : POCHHEON-SI, GYEONGGI
 Website : www.mslcomp.com
 Main Products : Breathing air compressor
 TEL : +82 31 541 7000

Mt.H Control Valves Co., Ltd.

Location : GANGSEO-GU, BUSAN
 Website : www.mth.co.kr
 Main Products : Main starting valve, Crankcase relief valve, Cyogenic safety valves & control valve
 TEL : +82 51 974 8800

NK Co., Ltd.

Location : SAHA-GU, BUSAN
 Website : www.nkcf.com
 Main Products : Ballast water treatment sys., CO₂ sys.
 TEL : +82 51 200 0152

NOW Co., Ltd.

Location : YANGSAN-SI, GYEONGNAM
 Website : http://nowcan.co.kr
 Main Products : Duct, Damper, Fitting, Piston, Ring, Cylinder
 TEL : +82 55 387 4811

ONNURIPLAN Co., Ltd.

Location : BUCHEON-SI, GYEONGGI
 Website : www.onnuriplan.com
 Main Products : Dust & Gas Masks, Sanitary Mask Covers, etc.
 TEL : +82 32 681 7780

Oriental Precision & Engineering Co., Ltd.

Location : GANGSEO-GU, BUSAN
 Website : www.opco.co.kr
 Main Products : Crane, Windlass & Mooring Winch, Life Boat Davit
 TEL : +82 51 202 0101

OSCG Co., Ltd.

Location : SASANG-GU, BUSAN
 Website : www.oscg.net
 Main Products : Cable gland and accessories, GRP junction box
 TEL : +82 51 305 3910

OTS Co., Ltd.

Location : SUNCHEON-SI, JEONNAM
 Website : www.otshi.co.kr
 Main Products : Crane, Winch, A-Frame
 TEL : +82 61 724 4100

PANASIA Co., Ltd.

Location : GANGSEO-GU, BUSAN
 Website : www.worldpanasia.com
 Main Products : Ballast water treatment system/level instrument, Seawater coarse filtration/ Emission gas control system, Engineering services
 TEL : +82 51 831 1010

Pie Plus Co., Ltd.

Location : GANGSEO-GU, BUSAN
 Website : www.piplus.co.kr
 Main Products : Crankshaft, Rudder stock, Motor shaft
 TEL : +82 51 831 9338

PROSAVE Co., Ltd.

Location : GIMHAE-SI, GYEONGNAM
 Website : www.prosave.co.kr
 Main Products : Crankcase Explosion Relief Valve, Smart High Velocity Pressure/ Vacuum Relief Valve, Air Release & Vacuum Breaker Valve
 TEL : +82 55 313 3511

S&W Co., Ltd.

Location : SAHA-GU, BUSAN
 Website : www.snowcorp.com
 Main Products : Cam/cam shaft, Valve/seat ring, Engine bolts/ nuts, Bolts
 TEL : +82 51 205 7411

S. A. M-Tech

Location : NAMDONG-GU, INCHEO
 Website : www.samartkr.com
 Main Products : Engine control lever, Engine control cable, Hydraulic steering system, Stern drive, Helm pump, Cylinder, etc.
 TEL : +82 32 815 3614

SG Safety Corp.

Location : PYEONGTAEK-SI, GYEONGGI
 Website : www.sgsafety.net
 Main Products : Inflatable rubber products, Ship ballast water treatment system, Life rafts, Speed boats, River boats, Fishing boats, Water tanks, High-speed boats
 TEL : +82 31 651 3012

SAMGONG Co., Ltd.

Location : GANGSEO-GU, BUSAN
 Website : www.sam-gong.co.kr
 Main Products : Oil purifier, Ship window, Ship accommodation ladder, Cathodic protection system, Elevator type tower gangway, Ship ballast water treatment system, Quick release mooring hook & road monitoring system
 TEL : +82 51 200 3040

Samin Information System Co., Ltd.

Location : HAEUNDAE-GU, BUSAN
 Website : www.saminis.com
 Main Products : Ecolnspection, Ecoserver Package
 TEL : +82 70 7771 2104

SAMKUN CENTURY Co., Ltd.

Location : MIRYANG-SI, GYEONGNAM
 Website : www.samkunok.com
 Main Products : F.W. supply unit, BWTS, PE coating, Paint
 TEL : +82 70 4034 0226

SAMYANG METAL IND. Co., Ltd.

Location : SAHA-GU, BUSAN
 Website : www.cuniship.com
 Main Products : flanges, fittings
 TEL : 82 51 266 6655

Samyoung Machinery Co., Ltd.

Location : GONGJU-SI, CHUNGNAM
 Website : www.sym.co.kr
 Main Products : Cylinder head, Cylinder liner, Piston & carrier, etc.
 TEL : +82 41 840 3000

Samyoung M-TEK Co., Ltd.

Location : HAMAN-GUN, GYEONGNAM
 Website : www.symtek.co.kr
 Main Products : MBS, Chain wheel, Cylinder cover, etc.
 TEL : +82 55 589 7000

SAMYUNG ENC Co., Ltd.

Location : YOUNGDO-GU, BUSAN
 Website : www.samyungenc.com
 Main Products : AIS/GMDSS radio equip, etc.
 TEL : +82 51 601 5555

Sandong Metal Industry Co., Ltd.

Location : GUMI-SI, GYEONGBUK
 Website : www.smi-sdhithec.com
 Main Products : Manifold, Plug valve, Choke valve, Integral Fittings
 TEL : +82 54 472 8311

Saracom Co., Ltd.

Location : YEONGDO-GU, BUSAN
 Website : www.saracom.net
 Main Products : GMDSS equipment
 TEL : +82 51 600 9000

Scana Korea Hydraulic Ltd.

Location : GIMHAE-SI, GYUNGNAM
Website : www.scana.co.kr
Main Products : Actuators, HPU and local control panel, Offloading systems/winches and mooring system/turret/swivel, etc.
TEL : +82 55 343 9007

SEJIN IND Co., Ltd.

Location : CHANGWON, GYUNGNAM
Website : www.sejin89.co.kr
Main Products : Tank top unit, Module unit, Purifier unit, Supply unit, etc.
TEL : +82 55 239 4700

Seobu Electric Ind. Co., Ltd.

Location : SAHA-GU, BUSAN
Main Products : Ground Monitor
TEL : +82 51 264 0670

SEOUL ELECTRIC CABLE Co., Ltd.

Location : UMSUONG-GUN, CHUNGBUK
Website : www.seoulcable.com
Main Products : Offshore & shipboard cables
TEL : +82 43 879 7200

Seun Electric Co., Ltd.

Location : SAHA-GU, BUSAN
Website : www.seunelectric.co.kr
Main Products : Battery charger, Alarm sys.
TEL : +82 51 208 4641

SEWON INDUSTRIES Ltd.

Location : HAMAN-GUN, GYEONGNAM
Website : www.sewon-ind.com
Main Products : High velocity P/V valve, Air vent head, Expansion joint, Flame arrester / Breather valve
TEL : +82 55 580 7200

SHINHAN HEAVY INDUSTRIES Co., Ltd.

Location : ULJU-GUN, ULSAN
Website : www.shinhanheavy.co.kr
Main Products : Deckhouse, Rudder
TEL : +82 52 240 5000

Shin Heung ENG Co.

Location : GANGSEO-GU, BUSAN
Website : www.shinheungeng.co.kr
Main Products : Curtain, Upholstery, Sofa & Chair, Mattress, Carpet, Roller blind
TEL : +82 51 817 6455

Shin Myung Tech Co., Ltd.

Location : YANGSAN-SI, GYUNGNAM
Website : www.smdavit.com
Main Products : Air motor, Winch, Davit, Crane, Reel, Capstan, Pump, etc.
TEL : +82 55 363 7091

Shin Sung eng Co., Ltd.

Location : GANGSEO-GU, SEOUL
Website : www.ishinsung.com
Main Products : Air Con. Plant, Ref. Plant
TEL : +82 2 2600 9602

Shin Yeong Co., Ltd.

Location : GIMHAE-SI, GYUNGNAM
Website : www.sy-ind.com
Main Products : Manhole, Access hatch
TEL : +82 55 346 0034

Shin-A Co., Ltd.

Location : SAHA-GU, BUSAN
Website : www.shina-ent.com
Main Products : Navigational/communication equip.
TEL : +82 51 204 6221

Shin-A Metal Tech Co., Ltd.

Location : BUK-GU, ULSAN
Website : www.shinametal.com
Main Products : Engine metal bearing, Bearings for medium & small engines, Main bearing shells, Segment & segment holder, Guide shoe, Top & bottom end bearing, Mesta bearing
TEL : +82 52 298 2100

Shindong Digitech Co., Ltd.

Location : YEOUNGDO-GU, BUSAN
Website : www.shindong.com
Main Products : Navigation & communication, Internal communication equipment
TEL : +82 51 461 5141

Shinshin Machinery Co., Ltd.

Location : GIJANG-GUN, BUSAN
Website : www.sspump.com
Main Products : VID (Cooling F.W & S.W pump), EHC (Volute casting centrifugal pump), NLG (External gear pump)
TEL : +82 51 713 0000

Silla Metal Co., Ltd.

Location : GANGSEO-GU, BUSAN
Website : www.sillametal.com
Main Products : Fixed pitch propeller (FPP), Controllable pitch propeller (CPP, Shafting, Stern equipment)
TEL : +82 51 831 5991

Simulation Tech Inc.

Location : GEUMCHEON-GO, SEOUL
Website : www.simulationtech.co.kr
Main Products : Voyage data recorder
TEL : +82 2 3281 0960

SKMARINTEC Co., Ltd.

Location : GIMHAE-SI, GYUNGNAM
Website : www.skmarintec.co.kr
Main Products : Electrolytic Sewage Processing Equipment
TEL : +82 55 314 4620

SMECO Co., Ltd.

Location : YEONGI-GUN, CHUNGNAM
Website : www.smecopiston.com
Main Products : Piston, Piston liner
TEL : +82 44 864 3030

SMS Co., Ltd.

Location : SAHA-GU, BUSAN
Website : www.sms-marinesystem.com
Main Products : Hatch cover, Lashing bridge, Ro-Ro equipment, Hydro door
TEL : +82 51 290 1000

CAPE INDUSTRY Ltd.

Location : YANGSAN-SI, GYUNGNAM
Website : www.capeind.com
Main Products : Cylinder Liner
TEL : +82 55 370 1234

SPECS Corporation

Location : BUNDANG-GU, SEONGNAM
Website : www.specs.co.kr
Main Products : Oil Mist Detection System for Engine Room (AOMD), Oil Mist Detection System for Diesel Engine (COMD), Shaft Torque Power RPM Meter (TPM), etc.
TEL : +82 31 706 5211

STACO Co., Ltd.

Location : GANGSEO-GU, BUSAN
Website : www.staco.co.kr
Main Products : Wall & ceiling panel, Unit toilet
TEL : +82 51 831 7000

STACO CHALMERS Co., Ltd.

Location : GANGSEO-GU, BUSAN
Website : www.staco.co.kr
Main Products : Unit Cabin, Unit Toilet, Marine Door
TEL : +82 51 831 7000

STX Engine Co., Ltd.

Location : CHANGWON, GYUNGNAM
Website : www.stxengine.co.kr
Main Products : Marine diesel engine, Military diesel engine, power plant diesel engine, electronic communication equipment
TEL : +82 55 280 0114

STX Heavy Industries Co., Ltd.

Location : CHANGWON, GYUNGNAM
Website : www.sth.co.kr
Main Products : Turbocharger, Diesel engine parts, Industrial components, Shipbuilding machinery, Cargo pump system, Casting parts
TEL : +82 55 280 0700

Suh Han Ind. Co., Ltd.

Location : SAHA-GU, BUSAN
Website : www.suhhani.co.kr
Main Products : Cable tray and duct, Hot dip galvanizing, Ship window
TEL : +82 51 204 1920

SUNBO INDUSTRIES Co., Ltd.

Location : SAHA-GU, BUSAN
Website : www.sunboind.co.kr
Main Products : Package module unit, Tank top unit, E/R block, etc.
TEL : +82 51 260 5551

Sung Jin Geotec Co., Ltd.

Location : GANGSEO-GU, BUSAN
Website : www.sjtkor.com
Main Products : Ship block, Fin tube, Header pipe
TEL : +82 52 228 5801

Sung Kwang Bend Co., Ltd.

Location : GANGSEO-GU, BUSAN
Website : www.skbend.com
Main Products : Butt welding pipe fittings
TEL : +82 51 330 0200

Sung Mi Co., Ltd.

Location : GIMHAE-SI, GYUNGNAM
Website : www.sung-mi.co.kr
Main Products : Door frame, Wall panel, Ceiling panel, Door hardware, Unit toilet
TEL : +82 55 329 1117

SUNG SIN INDUSTRIES Co., Ltd.

Location : GYEONGJU-SI, GYEONGBUK
Website : http://sungsin.koreasme.com
Main Products : Hatch coaming, T-Block, Water mist catcher, Water separator, Louver
TEL : +82 54 776 6441

Sungil SIM Co., Ltd.

Location : GANGSEO-GU, BUSAN
Website : www.sungilsim.com
Main Products : Pipe bending, Pipe spool, Marine Engine, Gas turbine
TEL : +82 51 831 8800

Suro Propeller & Machinery Co.

Location : YOUNGDO-GU, BUSAN
Website : www.suropump.co.kr
Main Products : Propeller, Propeller shaft
TEL : +82 51 415 0445

T.K. Corporation Co., Ltd.

Location : GANGSEO-GU, BUSAN
Website : www.tbend.co.kr
Main Products : Butt-welding fittings, Forged fittings, Flanges
TEL : +82 51 831 6600

TAE KWANG Co., Ltd.

Location : GANGSEO-GU, BUSAN
Website : www.tbend.co.kr
Main Products : Pipe Fittings, Fitting & Valve
TEL : +82 51 831 6550

TAE YOUNG TRADING Ltd.

Location : NOWON-GU, SEOUL
Website : www.marine-material.com
Main Products : Receptacles & wire accessories, Flood light, Deck light, Reflector lamps, HRF mercury lamps, Sodium lamps, Marine electrical equipment
TEL : +82 2 2272 1960

Taekyung Heavy Industries Co., Ltd.

Location : CHANGWON-SI, GYUNGNAM
Website : www.tkic.com
Main Products : Engine Bed/Frame Box, Air Receiver/Gas Receiver/Steel Outfittings, Tubular(SAW Pipe), etc.
TEL : +82 70 4628 8844

TANKTECH Co., Ltd.

Location : SAHA-GU, BUSAN
Website : www.tanktech.co.kr
Main Products : Water-mist fire fighting system for engine room and accommodation, LNG fuel tank system, Offshore steel structure
TEL : +82 51 979 1600

TechMarine S/W Co., Ltd.

Location : DONG-GU, BUSAN
 Website : www.techmarine.net
 Main Products : Loading computer program, CAOS, Stowage program, LOFOS, LMS
 TEL : +82 51 467 7003

Techcross Inc.

Location : GANGSEO-GU, BUSAN
 Website : www.techcross.com
 Main Products : Ballast water management system
 TEL : +82 51 603 3500

TETRADYNE

Location : GURO-GU, SEOUL
 Website : www.tetradyne.co.kr
 Main Products : Marine Monitor, Marine Panel PC
 TEL : +82 2 323 4972

TMC Co., Ltd.

Location : CHEONAN-SI, CHUNGNAM
 Website : www.tmc-cable.com
 Main Products : Marine cables, Oil & rig cables, Onshore cables, Special cables, Optical fiber cables
 TEL : +82 41 589 6500

TOPSAFE Co., Ltd.

Location : GIMHAE-SI, GYUNGNAM
 Website : www.topsafe.co.kr
 Main Products : High-velocity pressure vacuum valve, Breather valve, Flame arrester, Emergency vent cover, Detonation flame arrester
 TEL : +82 55 338 9986

TTS INTERNATIONAL Corp.

Location : GANGSEO-GU, BUSAN
 Website : www.ttsi.co.kr

Main Products : Cuni Pipe, Cuni Flange, Cuni Fitting
 TEL : +82 51 832 9977

VISER Co., Ltd.

Location : GIMHAE-SI, GYUNGNAM
 Website : www.viser.co.kr
 Main Products : PHE GASKET, Valve seat, Dust packing, etc.
 TEL : +82 55 346 5575

WARTSILA ACCOMMODATION SYSTEMS KOREA, Inc.

Location : GOSEONG-GUN, GYEONGNAM
 Website : www.waskorea.co.kr
 Main Products : Unit toilet, Unit cabin, Wall panel, Ceiling panel
 TEL : +82 55 673 7315

WhaYoung Co., Ltd.

Location : MIRYANG-SI, GYUNGNAM
 Website : www.whayoung.co.kr
 Main Products : Fuel pump ass'y for ship engine
 TEL : +82 55 359 1100

WONIL Co., Ltd.

Location : MASAN-SI, GYEONGNAM
 Website : www.ms-wonil.com
 Main Products : Cylinder cover, Common rail unit, Silencer, Spraying plate, Rotor shaft
 TEL : +82 55 253 1500

Woo Chang Ind. Co., Ltd.

Location : GIMHAE-SI, GYUNGNAM
 Main Products : Weather-tight steel door, Louver vent, Steel window box, Mooring fitting
 TEL : +82 55 337 1651

WOOJOO M & E Co., Ltd.

Location : SAHA-GU, BUSAN
 Website : www.wjme.com
 Main Products : Exp. junction box, Warning alarm, etc.
 TEL : +82 51 264 9130

Yoo Won Industry Ltd.

Location : SAHA-GU, BUSAN
 Website : www.yowonind.com
 Main Products : Steering gear, Filter, Deck M/C
 TEL : +82 51 205 8541

You Jeon Industry Co., Ltd.

Location : CHANGWON, GYUNGNAM
 Main Products : Marine engine parts, Engine bed
 TEL : +82 55 297 2121

YoungkWang Machine Co., Ltd.

Location : GYEONGJU-SI, GYEONGBUK
 Website : www.ykmc.com
 Main Products : Skid unit, Pressure vessel, Heat exchanger
 TEL : +82 54 776 6456

Younglim Timber Co., Ltd.

Location : NAMDONG-GU, INCHEON
 Website : www.younglim.com
 Main Products : Wood Fire Retardant, Flooring Board, Furniture, Wood for Interiors
 TEL : +82 32 811 9051

YOUNGIL PRECISION Co., Ltd.

Location : HAMAN-GUN, GYEONGNAM
 Website : http://younglico.kr
 Main Products : Valvetrain components for all kinds of 4-Stroke Diesel Engine's
 TEL : +82 55 585 2915

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