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# MARITIME REPORTER AND ENGINEERING NEWS

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March 2016

# Green Marine

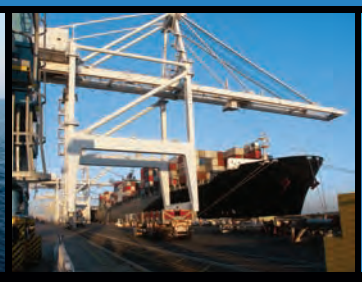
## & the path to Zero Emissions

**Interview**
**VADM Satoshi Nakajima**
**Vice Commandant for Operations**
**Japan Coast Guard**

**Training**
**Maritime Simulation Grows**

**Marine Fuel**
**Alternatives Gain Steam**



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William Stoichevski

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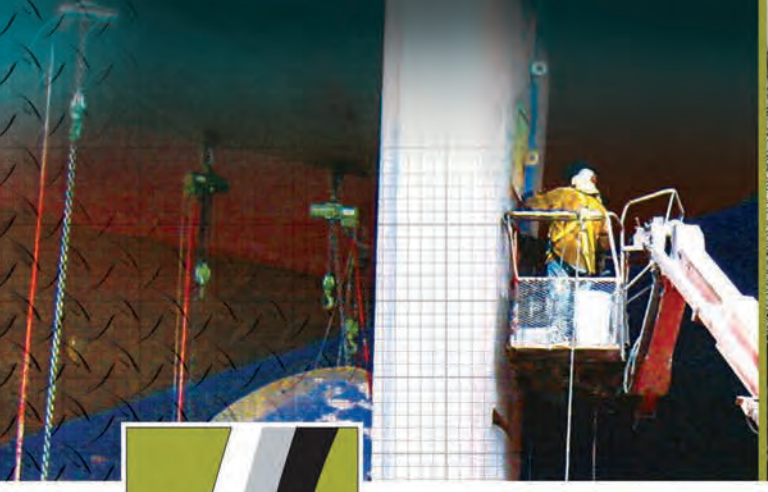

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Norway is on a battery-charged “clean fleets” drive which coincides with new EU emissions rules that preempt International Maritime Organization (IMO) consensus on how to pollute less. The best marine battery minds are now in Norway, and pictured are an artists conception of a Power Banks of battery cells aboard a conceptualized electric vessel. Story begins on page 44

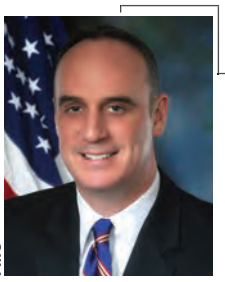
(Illustration Courtesy DNV GL)



# Green & Lean

Gerd Wessels, CEO of Wessels Group, is dead serious about building and maintaining an environmentally friendly fleet, including the world’s first containership retrofit from heavy fuel to LNG.

**By Peter Pospiech**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Goldberg

Waldorf

Bryant

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Based in Oslo Stoichevski began working for the Associated Press. In 2003, he left the AP to oversee and write for a number of print and electronic energy industry publications in the Norwegian capital. He has written thousands of offshore-focused reports from his North Sea vantage point. He started writing for Maritime Reporter in 2014.

**Waldorf**
Fritz Waldorf is Director of Sales and Marketing for Viking Systems International, which assists shipyards and ship designers with the efficient implementation of advanced analysis tools in the floating vessel design process.

# The Future is Clear

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GREG TRAUTHWEIN, EDITOR & ASSOCIATE PUBLISHER

Having sat in the editor's seat of *Maritime Reporter & Engineering News* for more than 20 years, it is always a thrill when we are able to 'step out' and present something we've never done before. As this is the 'Sea Japan' edition, it is my honor to present a one-on-one interview with VADM Satoshi NAKAJIMA, Japan Coast Guard, who shares with *Maritime Reporter & Engineering News* not only the rich history and current status of the service, but also the drivers for investment and the challenges faced by the Japan Coast Guard in a rapidly changing and sometimes contentious atmosphere. Our interview with VADM Satoshi NAKAJIMA starts on page 50.

While the Japan Coast Guard interview is unique in these pages, there are several additional areas of coverage you have seen many times ... and are sure to see many more times: The Environment and Training & Education.

Environmental mandates are shaping nearly every sector of the maritime market, from the way in which ships are designed, built, outfitted and operated during their lifecycle. To this end our 'Green Marine Solutions' section, starting on page 40, is filled with stories on the way in which several maritime companies are leading the charge toward zero emissions. It does not stop there, instead it really starts on page 20 with a series of three articles featuring topical conversation regarding latest decisions on emerging maritime fuels, from methanol to LNG to Biofuels.

Training & Education is another recurring theme in our pages. On page 14 we have the third and final installment of Murray Goldberg's trilogy on "Continuous Improvement." Starting on page 26 we have a 14-page section dedicated mainly to the latest trends and technologies in the field of maritime simulation.

マリタイムレポーター&エンジニアリングニュース誌の編集者を務めて20年以上になりますが、一歩踏み出して読者の皆様にこれまでにない新しいものを提供することができる時はいつも胸が高鳴ります。本号はSea Japan特集でもあり、海上保安庁の中島敏海上保安監との単独インタビューを掲載することができて大変光栄に思います。中島海上保安監には海上保安庁の豊かな歴史と現状だけでなく、急速に変化し、時に議論百出となる環境において日本の海上保安庁が直面している問題や投資の動因についてお話しいただきました。中島海上保安監とのインタビューは50ページに掲載されています。

海上保安庁のインタビューは本号にユニークな記事ですが、マリタイムレポーターの読者にはおなじみの分野もカバーしています。環境と訓練・教育については今後も繰り返し取り上げることになるのが確実でしょう。

船舶の設計、建造、艤装の方法からライフサイクルを通していかに船舶を運航するかに至るまで海事市場のほとんどすべての分野で環境上の義務が形成されつつあります。これを受けて、本号40ページから始まる「グリーンマリンソリューション」セクションでは、ゼロ排出に向けての努力の先駆けとなっている様々な海事企業のストーリーを取り上げました。それだけではありません。実際のところこの議論はメタノールからLNG、そしてバイオ燃料に至るまでの新たな舶用燃料に関する最新の決断に関する時事問題をフィーチャーした20ページからの3つの記事から始まります。

訓練・教育も本誌で繰り返し取り上げているテーマです。本誌14ページには「継続的改善」についてのマーリー・ゴールドバーグによる3回連載記事の最終回が掲載されています。26ページからは海事シミュレーション分野の最新のトレンドと技術に14ページを割いています。

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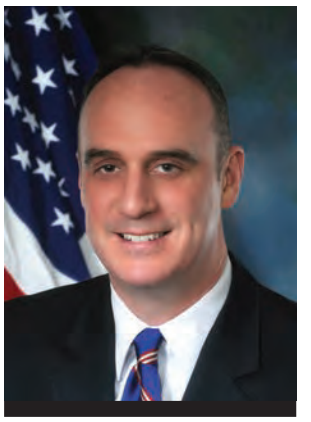
# On the Docks at Marcus Hook



By William P. Doyle
FMC Commissioner

(L-R) Sunoco Logistics' Tom Sitley, William P. Doyle, and Captain Mike Nesbitt

The last time I was in Marcus Hook, Pennsylvania was aboard the SS MORMACSKY tanker serving as an engineer. I had recently graduated from Widener University School of Law; studied all summer for the bar exam and I needed to make some money while I awaited my license to practice law. So, I did what I knew how to do—I packed my sea bag with coveralls, work boots, flashlight and batteries, channel locks and a crescent wrench—and up the gangway I went. That was January of 2001.

I had to opportunity to visit Marcus Hook again 15 years later on February 19, 2016. The old Sun Docks are now part of the Marcus Hook Industrial Complex. The complex is bustling. I saw cutting edge technology and newest and most sophisticated tankships afloat. On this occasion, Sunoco Logistics and INEOS Evergas Green ships invited me to view their operations. I boarded the JS INEOS INTREPID, which is expected to load ethane destined for Rafnes, Norway. It would be the first shipboard export of ethane ever from the United States.

Pennsylvania, Ohio and West Virginia have emerged as major natural gas liquids (NGLs) and liquid petroleum gas (LPG) producers. These three states can move their products to Marcus Hook via pipeline. I'll refer to both NGLs and LPGs as wet gas. Wet gases are ethane, propane, butane, isobutene and pentane. The end use products for wet gas include plastics used in laptop computers, detergent, home heating, small stoves, refrigeration, synthetic rubber, underarm deodorant and gasoline.

## Marcus Hook Industrial Complex

I drove my car this time to the Borough of Marcus Hook, passing Connolly's Pub and Clanks Pizza and then turned onto Green Street, parked my vehicle and entered the Marcus Hook Industrial Complex. I am pleased to say it is a vibrant place once again.

The Marcus Hook refinery was shuttered in 2011 after over a century of operation. Around the same time, two European petrochemical plants owned by INEOS were on the ropes—one in Scotland and the other in Norway. These two plants relied heavily natural gas and liquids produced from the North Sea. North Sea production was in steep decline. Thousands of jobs were at stake on both sides of the Atlantic. Leaders stepped forward with a plan that involved shale gas.

In late 2012, INEOS signed a 15-year deal with Range Resources Appalachia to supply ethane from Sunoco's Marcus Hook Industrial Complex. The ethane would be produced in western Pennsylvania and piped to Marcus Hook.

Today, massive new tanks are being constructed to hold ethane, propane or a mixture of NGLs. State of the art on-dock rail cars and terminal racks are in place. New dock spaces for tankships have been installed and pylons are being set for additional piers. Sunoco anticipates about 12 ships per month calling at its marine terminal. Sunoco's Marcus Hook Industrial Complex also supplies propane for Pennsylvania and many other mid-Atlantic and Northeast states. During peak demand, Marcus Hook trucks-out about 800 barrels of propane every 45 minutes for domestic use.

In all, Sunoco Logistics is in the midst of a $3 billion construction project. There are approximately 300 permanent jobs supporting the Marcus Hook complex. There is an additional 1,000 contractors shuffling in and out each day; and by this summer it is expected to increases to about 1,700 contractors per day.

## The Ships

I boarded the vessel JS INEOS INTREPID while it was berthed at Sunoco's marine terminal. It is one in a series of eight Dragon-class ships specifically designed to carry liquids from Marcus Hook. Evergas is the ship operator.

In January 2013, Evergas signed 15-year charter agreements with INEOS to transport ethane from the Sunoco's Marcus Hook Industrial Complex to Europe. Evergas first agreed to build four ships, and then the contact was extended to six, then again to eight—all purposely built to serve Marcus Hook.

Stenciled on the midsection of the hull are the words "Shale Gas for Progress." On the aft end of the vessel are seven flags painted on the hull representing the international interests of the entire operation. The flags are Scotland (location of Ineos Grangemouth petrochemical plant), Norway (location of Ineos Rafnes facility), United States (location of Marcus Hook Industrial Complex and natural gas supply), Switzerland (Location of Ineos headquarters), China (location of shipyard), Denmark (location of Evergas headquarters) and the United Kingdom (birthplace of Ineos' owner).

When I toured the vessel, what I found amazing was the size and scale of the equipment. The bridge is appears to be very large, in part, because the bridge wings are enclosed. It has the smallest engine room I have ever seen on a large self-propelled ship. The purifiers in the purifier room are small. The main engines and generators are small. The cargo control room is small.

The ship is outfitted with boil off gas compressors, cargo pumps, and an energy recovery system. It includes a purpose-built re-liquefaction plant for LPG and ethane.

Importantly, the Dragon-class ships are environmentally friendly. The engines have duel fuel capability and can run on LNG or ethane as a marine fuel. These capabilities improve efficiency and can significantly reduce emissions. The ballast water treatment system safeguards the marine environment. The vessels carry EP-class notation and a green passport; and comply with the energy efficiency design index (EEDI) regulations, as well as NOx and SOx Tier III standards.

The INTRPID bears a distinct dragon painted on its topside fuel tanks symbolizing its Chinese and Western heritage. The dragon chosen to sail and protect this ship is the King of Sun. It symbolizes power with the shades of red and purple representing the dazzling power of the sun. Interestingly, an urban legend is already beginning to emerge with respect to the dragons stenciled on these ships. Some say that the two streams shooting out of the mouth of the dragon resemble the number 52— as in 1952, the year Ineos' Chairman and CEO Jim Ratcliffe was born. Anyway, that discussion can be hashed out in the years to come down the street at Clanks.

Finally, I would like to thank Sunoco Logistics' Captain Mike Nesbitt, Tom Sitley, Brittany Carter and Evergas' Mihir Navalkar for the time they took showing me around the facility and aboard the ship. Thank you.

**Posted Blog on MaritimePtofessional.com From the desk of FMC Commissioner Doyle (byWilliam P. Doyle) on February 29, 2016**

## The Author

On January 1, 2013, the United States Senate confirmed President Barack Obama's nomination of William P. Doyle as a Commissioner of the Federal Maritime Commission. He served over a decade as officer in the U.S. Merchant Marine as a marine engineer aboard numerous classes of vessels. Doyle is a graduate of the Massachusetts Maritime Academy.

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# Responder Immunity

## An Analysis

DENNIS BRYANT



On February 16, 2016, Judge Carl J. Barbier of the United States District Court for the Eastern District of Louisiana granted summary judgment in favor of the various commercial oil spill response companies involved in the federal government's response to the Deepwater Horizon (DWH) oil spill in the Gulf of Mexico in 2010. The responders had been sued by numerous individuals claiming that they incurred damages, including personal injury and/or medical monitoring claims for exposure or other injury resulting from the post-explosion and spill clean-up efforts. Plaintiffs fell into five categories: (1) crew involved in the Vessels of Opportunity (VoO) program; (2) workers involved in decontaminating vessels; (3) other marine personnel not involved in the VoO program; (4) clean-up workers and beach personnel involved in onshore clean-up efforts; and (5) residents who lived and worked in close proximity to coastal waters who alleged exposure to oil and/or dispersants. The plaintiffs asserted negligence, gross negligence, negligence per se, nuisance, and battery on the part of the responders. In addition to compensatory damages, they sought punitive damages and declaratory relief; Florida plaintiffs also sought medical monitoring awards, as allowed by state law.

Following extensive discovery, the clean-up responder defendants filed a motion for summary judgment. Plaintiffs were given one more chance to provide some specificity to their broad claims of misconduct by the clean-up responders but were unable or unwilling to do so. At that point, the court could have simply dismissed the case on the ground that there was no genuine dispute as to any material fact. The court noted, though, that the clean-up responders had gathered substantial evidence that their clean-up activities were at the direction of the federal government involving an oil spill of national significance. Plaintiffs' counsel objected to admission of that evidence, but the court overruled the objections.

### FOSC Authority

The court found that, in accordance with the Clean Water Act, the President had delegated full authority to control the oil spill response to the Federal On-Scene Coordinator (FOSC), including the actions undertaken by private parties. In accordance with the Clean Water Act, the Oil Pollution Act of 1990 (OPA 90), and the National Contingency Plan, the effective and immediate removal of a discharge and the efficient, coordinated, and effective action to minimize the damage from the discharge are best achieved if the President, acting through the FOSC, directs all levels of response – federal, state, and private – so as to eliminate the confusion that impeded past responses by establishing a clear chain of command and responsibility. This spill response regime imposes a duty on private entities such as defendant clean-up responders to obey the FOSC's direction during the response effort. The evidence clearly showed that the FOSC, after consulting with numerous parties and considering the advantages and disadvantages of the various actions, specifically ordered the various actions, including use of chemical dispersants, involved in plaintiffs' complaints.

### Clean Water Act Derivative Immunity

The court then turned to the application of law to the facts of this spill response. Parties acting under the direction and control of the federal government in the exercise of legitimate federal authority are entitled to the benefit of derivative immunity. In other words, if in the exercise of federal authority a federal agency is immune from liability, then a private party acting for and at the direction of the federal agency is also immune from liability. The Clean Water Act provides: The United States Government is not liable for any damages arising from its actions or omissions relating to any response plan required by this section. The National Contingency Plan is such a response plan. It follows that, if the federal government was immune from liability for plaintiffs' alleged damages, then the clean-up responders who were acting on behalf of the federal government and at the specific direction and oversight of the FOSC are also entitled to immunity.

### Federal Tort Claims Act Discretionary Function Immunity

To the extent that some of the claims could have been addressed under the Federal Tort Claims Act (FTCA) if brought against the federal government, the court considered such possibility. It noted that the FOSC's decisions during the response and clean-up effort involved an element of judgment or choice and were based on considerations of public policy. For example, the FOSC engaged in a comprehensive analysis before deciding that the use of dispersants to mitigate the impact of the oil spill was appropriate, requiring a robust assessment of net environmental benefits and monitoring activities at the wellhead, in the benthos, water column, water surface, and along the shoreline. The court found that these are precisely the types of governmental decisions that are afforded discretionary function immunity and shielded from second-guessing via an action in tort. As the government would be entitled to discretionary function immunity under the FTCA, it follows that this immunity extends to the clean-up responder defendants.

### State Law Preemption

Finally, the court noted that some of the claims brought by the plaintiffs

sounded in state law. Under the Supremacy Clause of the Constitution, federal law may preempt state law when compliance with both federal and state regulations is a physical impossibility or when the state law stands as an obstacle to the accomplishment and execution of the full purposes and objectives of federal law. Permitting these state law claims to proceed against defendant clean-up responders could cause clean-up responders in the future to refuse or hesitate to provide their services to mitigate the impact of future spills. It is precisely this second-guessing of the government's decisions that would stand as an obstacle to federal law. Thus, the doctrine of implied conflict preemption prevents these types of claims against clean-up responders acting at the direction and with the oversight of the federal government from going forward.

## CWA Liability Exemption

The Clean Water Act includes a provision exempting from liability for damages actions taken or omitted to be taken by a person in the course of rendering care, assistance, or advice consistent with the National Contingency Plan or otherwise as directed by the President relating to a discharge or the substantial threat of a discharge of oil or a hazardous substance.

This provision, though, has two important caveats as respects clean-up responders. It does not apply with respect to personal injury or wrongful death and it does not apply if the person was grossly negligent or engaged in willful misconduct. In the instant case, plaintiffs' complaints included allegations that they suffered personal injury and that the defendants were grossly negligent.

## Conclusion

The court here, though, sidestepped these issues, finding that implied conflict preemption is consistent with the purpose of CWA liability exemption and going directly to the heart of the matter. It ruled that since the defendants were acting as agents of and at the direction of the federal government, those defendants could only be held liable for the alleged injuries if the federal government could have been held liable if it had engaged in this conduct directly. Since the federal government is clearly immune from such liability, it follows that the clean-up responders are also immune.

This well-reasoned decision, a case of first impression, has addressed and overcome the final theoretical obstacle to responder immunity that has haunted clean-up responders since enactment of the Clean Water Act. While district court decisions have no precedential effect, this one, rendered by a respected jurist, will carry great weight and is expected to resolve the responder immunity question for the foreseeable future.

As alluded to by the court, it is of little moment that we have the most robust spill response regime in the world if no one will show up to do the work for fear of litigation. That fear has now been largely dissipated.

## The Author

Dennis L. Bryant is with Maritime Regulatory Consulting, and a regular contributor to Maritime Reporter & Engineering News as well as online at MaritimeProfessional.com.

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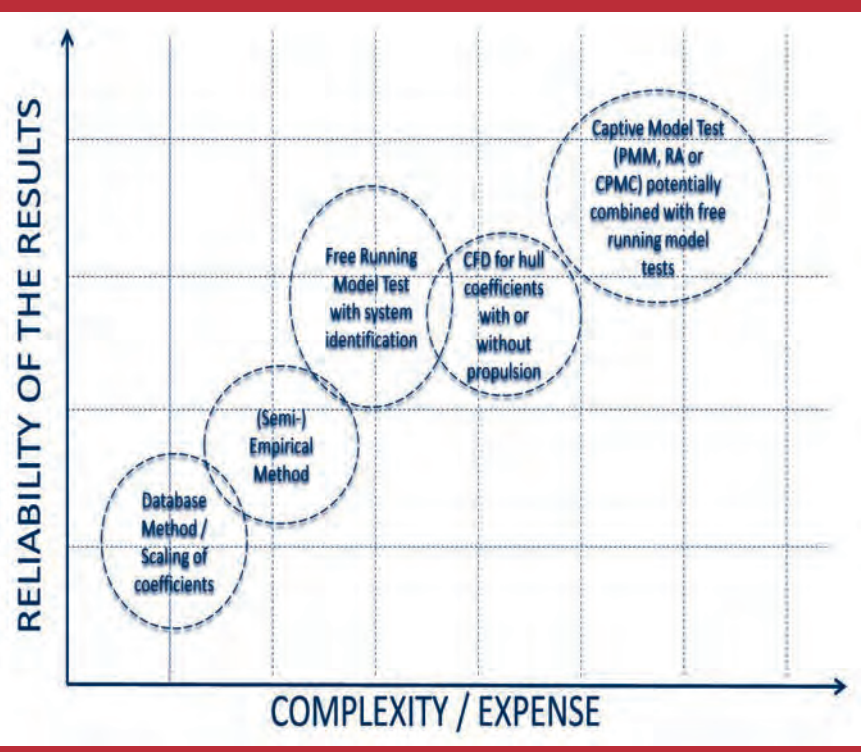
# Accurate Calculation Models for Maneuvering Simulation

FRANS QUADVLIEG


Example of a ship being tested with the use of MARIN's computerized planar motion carriage. This methodology works for model sizes between 2 and 10 meters.




The five methodologies to obtain maneuvering simulation models for surface ships

Traditionally, simulation models are based on forces measured during (captive) model tests. However, over the past decades, more methodologies have become available.

MARIN strives to have all these methodologies in-house and up-to-date. The preferred methodology to determine a maneuvering model is dependent on the required accuracy for the study, the risk and the reliability of the prediction for the ship type. Additionally, the environment and time schedule of the customer are important considerations. The following methodologies are used to arrive at simulation models for surface ships.

- The database method uses existing, trusted simulation models and scales coefficients to arrive at a new simulation model. When the target ship is very close to ships for which there is already a lot of information available, the methodology is reliable and the results can be used for feasibility studies.
- Semi-empirical methods are using hull, rudder and propeller data to determine maneuvering properties. These methodologies have more flexibility: unconventional ship hulls can be addressed for example, at least as long as the shape of the hull is not too far from the data on which the semi-empirical method is based.
- Free running model tests are a well-known and highly reliable way of obtaining maneuvering trajectories. In the latest development, a simulation model is created by improving a semi-empirical method by system identification using the results of the free running tests.
- CFD use for maneuvering simulation models has been a long-term development at MARIN and recent results show that these methods work well. [1]
- Captive model tests have been used since the 1960s. Over the last years, MARIN has been investigating quasi-stationary tests, which has led to an efficiency gain [2].

By having many technical possibilities in the portfolio, as well as insight into the applicability and validity, MARIN can objectively recommend the best way to obtain a simulation model to its customers.

*[1] 'Review of the SIMMAN2014 Workshop on the State of the Art of Prediction Techniques for Ship Manoeuvrability', Quadvlieg*

*[2] 'Instationary Captive Model Tests', Hallmann & Quadvlieg, MARSIM 2015*

## The Author

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# Continuous Improvement

## Part 3 Implementing Continuous Improvement in Familiarization Training

MURRAY GOLDBERG

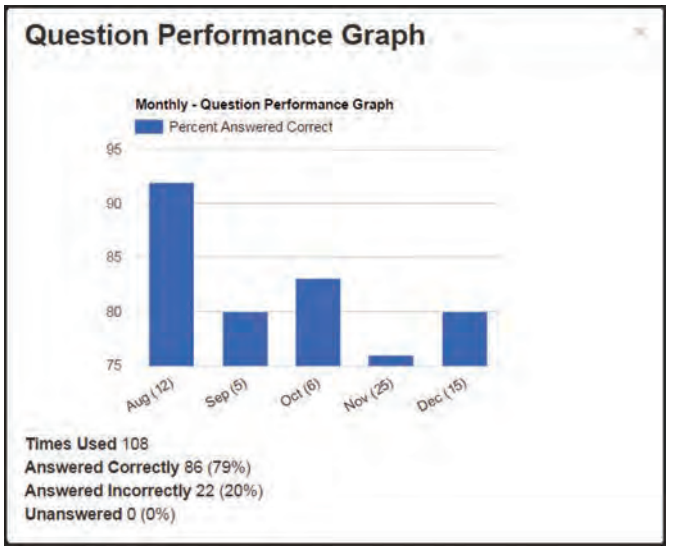
Continuous Improvement (CI) is the process of continually analyzing the performance of some aspect of operations, and then applying changes intended to improve that performance. It is a critical component in maintaining the health of any operation and can be applied to almost any activity. This is the third and final installment in a series of articles intended to introduce CI, and to give some practical tips for using CI in any maritime organization to improve training effectiveness and efficiency. Implementing a modest CI process for in-house training is neither expensive nor difficult, and even a small program can produce a tremendous ROI in safety, efficiency, trainer engagement and trainee satisfaction.

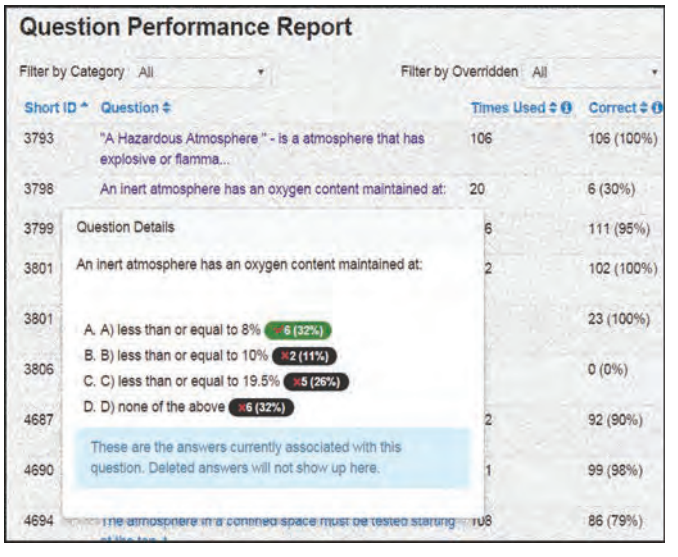
The first and second articles in this series, published in the January (http://digitalmagazines.marinelink.com/nwm/MaritimeReporter/201601) and February (http://digitalmagazines.marinelink.com/nwm/MaritimeReporter/201602) editions of *Maritime Reporter and Engineering News* respectively, introduced continuous improvement and some key performance indicators (KPIs) applicable in maritime training. To get the most out of this article, it would be useful to review those posts before progressing with this one.

In this article, I complete this series by talking about specific key performance indicators which are likely to be available if (or once) a learning management system (LMS) is employed in the delivery and management of job and familiarization training. These KPIs provide deep insight into learning activities and performance, and can be used as part of the foundation upon which continuous improvement is implemented.

### Key Performance Indicators

The focus of the second and this third article is Key Performance Indicators. Key Performance Indicators (KPIs) are the foundation of any CI process. KPIs are measurements used to evaluate effectiveness and efficiency. This is critical - unless we have a way of measuring whether changes made in the name of CI have created an improvement in outcomes (effectiveness and efficiency), there is no way of telling whether we are moving closer to, or further away from, our goal. KPIs provide that information by measuring the success of every change made.




### LMS-Enabled KPIs Overview

As with many data-driven systems (and KPIs are just that - data), technology is our friend here. Computer-based learning management systems (or LMSs) generate a wealth of KPIs that track learning and assessment effectiveness. These are metrics which cannot otherwise be practically obtained. In fact, metrics are one of the greatest strengths and benefits of using an LMS and that is one of the reasons that most large training organizations use an LMS. Because the use of LMSs is now rapidly expanding in the maritime industry, it is time to begin thinking about how an LMS can improve the process of continuous improvement in operational training.

As a reminder, KPIs should minimally satisfy the following requirements:

- They must be aligned with corporate goals.
- They should react reasonably quickly to changes made in training.
- They must track something the organization has some control over. Otherwise, although they may be interesting to track, they are not helpful in the process of tuning training outcomes.

In order to understand how an LMS can generate the KPIs we are interested in here, it is important to have a basic understanding of what an LMS is. Here is a short, edited definition from Wikipedia:

A learning management system (LMS) is a software application for the delivery, management, tracking, and reporting of training and assessments. A robust LMS should be able to do the following:

- Assemble and deliver standardized training content rapidly
- Consolidate training initiatives on a scalable web-based platform
- Personalize content and enable knowledge reuse
- Centralize and automate training administration

Note the emphasis in the definition on "management, tracking and reporting". It is the "reporting" aspects we are most concerned about here.

### The KPIs

Let's take a look at some examples of "LMS-enabled KPIs" and discuss how they can be used in a process of continuous improvement.

### Individual Exam Question Metrics

LMSs can be used to deliver exams, and while doing so, are able to record various kinds of metrics. The exam metrics often found to be the most compelling are per-question statistics.

One form of per-question statistics is a report on the distribution of answer choices for each question in the system. This is outstanding information to have because it highlights hidden weaknesses in training which are unlikely to otherwise be apparent. For example, it may be the case that in general, trainees are passing exams with flying colors. However, despite their overall performance, they may routinely be incorrectly answering a small set of safety critical questions. If not for the metrics generated by an LMS, this would be a very difficult fault to uncover on an organization-wide basis, yet may represent a real risk to safety or operational efficiency. An LMS will alert the organization to these issues.

Another per-question metric is a report on the distribution of answers for each exam question possibly highlighting an incorrect, though commonly chosen response. This metric can help an organization identify common misunderstandings and be very helpful in updating the learning materials to correct the issue.

In either case, this metric is very useful at bringing to the surface any hidden training issues, facilitating their correction before they result in a loss.

### Learning Content Access Metrics

One of the most informative and useful LMS metrics is a learning page access log. This metric shows every learning page in the system and indicates, on av-

erage, how long learners are spending on that page (referred to as "dwell" time). Trends in dwell time can be tracked to determine whether training time expectations are valid, and to alert organizations to changes which could be caused by candidate differences or changes in the training materials.

More importantly, dwell time can be used to identify pages which are outliers. For example, our experience has shown that dwell times for most learning pages fall into a range of about 30 seconds to one minute, but there are a small number of pages with very short dwell times, and another small group with very long dwell times. In either case, the LMS has exposed these outliers, alerting the organization to the potential training issue. A quick visit to that page will usually make it immediately apparent whether there is a problem, and if so, how it can be resolved. These metrics provide a window of insight into how trainees use the learning materials; an insight which would not otherwise be available. This is a great example of how technology can be our friend when analyzing training activities for the purpose of continuous improvement.

## Overall Exam Performance Metrics

Another metric that is easily generated by most LMSs is that of overall exam performance. This is a metric which can be maintained without an LMS, but an LMS does the work automatically and usually presents tidy and flexible reporting options. Typically, for each exam in the system, an LMS will report on the average score that trainees have been achieving on that exam. This simple metric allows an organization to "keep their fingers on the pulse" of assessment performance. It is a useful audit metric that can be tracked over time to watch for increases or decreases. Such variations must be examined carefully since they could be due to a number of factors including changes in the level of knowledge of incoming candidates, changes in the exams themselves, changes in trainer preparation and performance, changes in training curriculum, and so on. All of these are important and may require attention. Regardless of the cause, they provide insight which should be tracked. Numbers which are (or are trending to be) too high or too low in relation to organizational goals indicate a problem with training or assessment and must be dealt with.

## Self-test Metrics

Most learning management systems include self-evaluation (or self-tests) as one of their features. Self-tests are typically automatically graded, but no grade is recorded and the trainee is not evaluated on the basis of any self-tests they take. Instead, they are used as a formative tool by the trainee to determine whether they possess the knowledge required to progress to the next learning module or exam.

Because self-tests are used for a different purpose than summative assessments ("final" exams which test competency), metrics about self-tests tell us something very different than the metrics discussed above. Summative assessment metrics tell us whether the trainee eventually learned the material. Self-test metrics, on the other hand, tell us how quickly the trainees learned the material.

The reason for this is due to the typical usage patterns of self-tests. Trainees typically first review the learning materials, and then when they believe they know it reasonably well, they move on to the self test to validate their belief. If all goes well, they move on to the next module (or the summative test if they are finished). If, instead, the self-test yields a low score, they return to the learning materials and then, later, re-attempt the self test. This latter pattern will create a lower average score on the self-tests.

A learning management system will provide far deeper insight into the efficiency and effectiveness of training programs than we could ever hope for without the use of an LMS. In some cases, these metrics can highlight significant shortcomings in training which can lead to safety or operational problems. This is one of the benefits of an LMS which has made their use very common outside the maritime industry, and which is now greatly accelerating their use within the maritime industry.


## The Author

Murray Goldberg is CEO of Marine Learning Systems (www.MarineLS.com). An eLearning researcher and developer, his software has been used by 14 million people worldwide.

# Structural Stress Analysis
## Tested vs. Predicted

FRITZ WALDORF

Use of strain gauges provides correlation for numerical Finite Element Analysis, and helps to identify real world stresses not always predicted with ideal analysis models. The following case study documents the work performed on the foundation for an A-Frame structure on the aft end of a supply vessel.

The connection of the support arm of the A-Frame structure to the hinge structure at the base of the Frame had experienced a number of weld cracks over a relatively short operational lifetime. A Finite Element Analysis (FEA) was commissioned to evaluate the structure, and determine if the design was adequate for the intended operational service. The results of the initial FEA indicated relatively low levels of stress in the connection of the support arms to the hinge structure, and were not indicative of the types of cracks that had been observed in the structure.

To provide further insight into the stresses in the A-Frame, a series of strain gauges were installed on the upper and lower flanges of the support arms. On each arm, strain gauges were located along the inboard and outboard edges of each flange to capture potential bending effects in both directions. The strain measurements were recorded as the A-Frame swung through a 90 degree

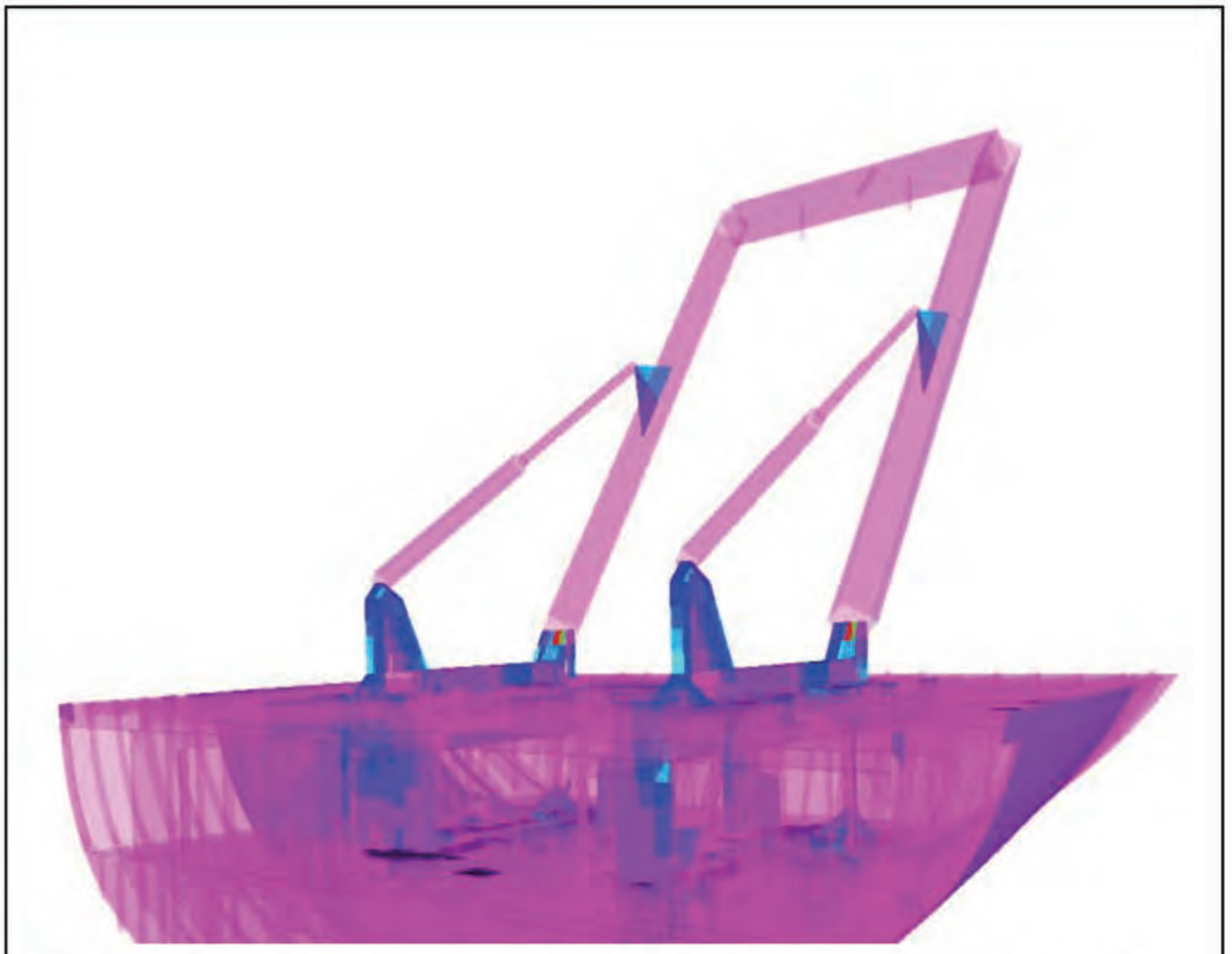


**Figure 1 – A-Frame Initial FEA Stress Results**

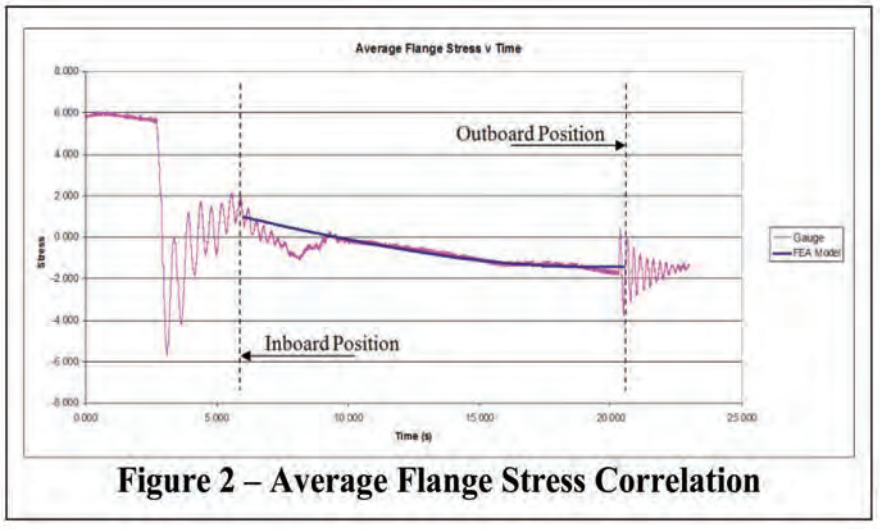



**Figure 2 – Average Flange Stress Correlation**

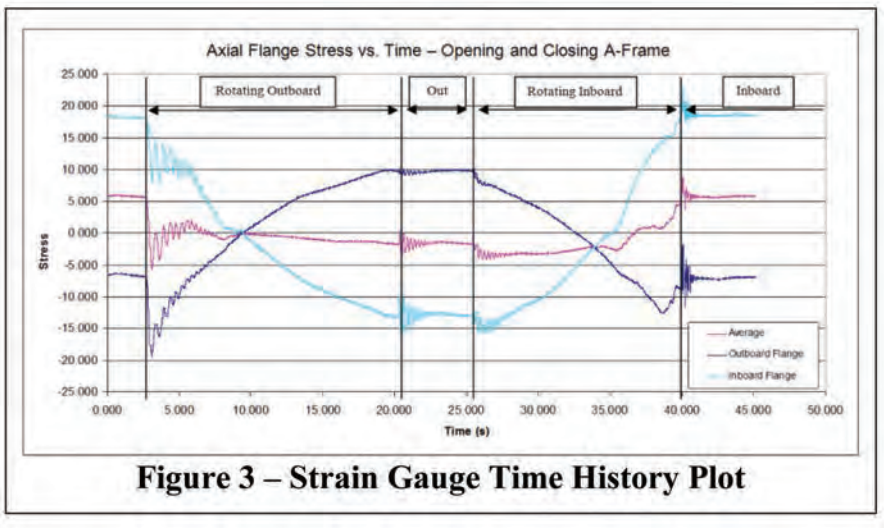



**Figure 3 – Strain Gauge Time History Plot**

arch from the inboard position, to the outboard position, and back.

The initial stress correlation showed excellent agreement between the FEA predicted stress and the average stress results for both the upper and lower flanges. (Stress averaged between the inboard and outboard gauge locations). The good correlation of the average stress results of both the upper and lower flanges indicated that the FEA model was a good representation of the overall stiffness, the fore and aft bending, and the overall stress present in the structure during the operation of the A-Frame. However, a comparison of the inboard and outboard stain gauges results identified a significant discrepancy between the FEA and real world stress results. A plot of the stress time histories from the inboard, outboard, and average strain gauges is shown in Figure 3.

As shown in Figure 3, there is a significant difference in the inboard and outboard strain gauge results, with the two results inversely proportional to one another, indicating that the stress results are likely the results of a transverse bending in the structure. The initial FEA model results showed fairly uniform stress results across the width of the upper and lower flanges, and did not correlate well with the results of the strain gauges.

The initial FEA model was based upon ideal geometry, and included perfect alignment of the structure and the axis of rotation of the hinges supporting the port and starboard support arms. In the real structure, construction tolerances and distortion from the welding during fabrication had introduced imperfections within the structure, and the axis of rotation for the port and starboard hinges were no longer aligned. As a result, the port and starboard A-Frame support arms were rotating in non-parallel planes, but the cross bar connecting the tips of the support arms ensures the tips of the support arms maintained a constant distance from one another, and resulted in large horizontal bending loads when the A-Frame was rotated inboard and outboard.

To correlate with the strain gauge results, imperfections were introduced into an updated FEA model with various levels of misalignment between the two hinges. The models were kinematically solved to investigate the effect of hinge alignment on horizontal bending within the structure, and a FEA model was developed that provided good correlation with the observed stress results in way of the gauge locations. Once the model was tuned to match the known stress results in way of the gauge locations, the FEA model could then be used to evaluate the effect of the horizontal bending loads on the stresses throughout the structure, including in way of the connections to the hinge structure where cracking had been previously observed. The results of the misalignment study were then used to determine appropriate alignment tolerances to avoid overstressing the local A-Frame, hinge, and supporting structures details.

## The Author

Fritz Waldorf is Director of Sales and Marketing for Viking Systems International, which assists shipyards and ship designers with the efficient implementation of advanced analysis tools in the floating vessel design process.

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# METHANOL

## Methanol's Case as a Marine Fuel


GREG DOLAN

The global shipping industry is facing increasingly stringent emissions requirements. As of January 1, 2016, newbuild ships sailing in certain Emission Control Areas (ECAs) known as NOx Emission Control Areas (NCEAs), which currently comprise the North American and Caribbean Sea ECAs, are required to meet stringent 'Tier III' NOx emission standards. These Tier III standards require around 70% lower NOx emissions than the current Tier II standards and can't be met simply by taking the sulfur out of fuel oil.

2016's implementation of Tier III NOx emission standards join 2015's requirement that ships entering within 200 miles of US, Canadian, Caribbean and northern European waters began to face a 0.1% fuel-sulfur limit. National and regional environmental agencies in these areas had established Sulfur Emission Control Areas (SECAs) under pollution rules adopted by the International Maritime Organization (IMO). While shifting to low-sulfur marine gasoil (MGO) provided a viable, albeit expensive, compliance strategy with 2015's sulfur regulations, it will not help to meet the new Tier III NOx reduction regulations.

Potential solutions for the Tier III limits include Selective Catalytic Reduction (SCR) systems and Exhaust Gas Recirculation Systems (EGR), but these technologies are complicated, costly, and largely unproven.

For the existing fleet of some 100,000 commercial vessels plying the world's oceans, and the 2,000 new keels laid each year, the option of adding dual-fuel capability for diesel-LNG (liquefied natural gas) or diesel-methanol is increasingly seen as the smart course. While there are already some 50-60 ships using LNG as a bunker fuel, interest in the use of methanol fuel, as a considerably less expensive alternative to LNG, is quickly gaining speed.

First, let's look at the global efforts to demonstrate methanol as a marine engine fuel:

- From 2010 to 2014, two European programs – EffShip (Efficient Shipping with Low Emissions) and SPIRETH (Alcohol (Spirits) and Ethers as Marine Fuel) – identified methanol as an alternative fuel that could reduce emissions and improve the environmental performance of marine transport. The technology development work from these programs contributed to the IMO's draft IGF code (International Code of Safety for Ships using Gases or Low-Flashpoint Fuels) which governs the safe handling of LNG and methanol fuels on-board ships.
- In December 2013, Methanex Corporation, the world's largest methanol producer and distributor, announced an agreement with Mitsui OSK Lines (MOL) to build seven new 50,000 dead weight ton ships with MAN Diesel & Turbo's ME-LGI flex fuel engines running on methanol, fuel oil, marine diesel oil, or gas oil. The ships are being built for delivery next year by Japan's Minaminippon Shipbuilding Co., and South Korea's Hyundai Mipo Dockyards Ltd. The ships have been chartered by Canada's Waterfront Shipping Company, a subsidiary of Methanex.
- In January 2015, Lloyd's Register announced plans to design a whole new generation of cruise ships and RoPax ferries powered by methanol ushering in a low-emission, fuel-efficient revolution in today's marine fleet. Partnering in the project are German shipyard Meyer Werft, German shipbuilder Flensburger-Schiffbau-Gesellschaft, and German methanol distributor HELM AG. Funded by the German government, designs for the new methanol ships will be developed over the next three years.
- In March 2015, the Swedish ferry operator Stena Line, relaunched the Stena Germanica featuring the world's first dual-fuel methanol propulsion system. The 240-meter long, 1,500 passenger ropax ferry features four Wärtsilä engines, with one of the engines converted to methanol operation while in dry dock in Poland's Remontowa shipyard in January 2015. Having been satisfied with initial tests, the other three engines will now be converted one by one while the vessel is in service. Running on methanol, SOx emissions are expected to be cut by 99%, NOx by 60%, particulates by 95%, and CO2 by 25%. Funding of €11.2 million for the work was provided under the European Union's Trans-European Transport Networks (TEN-T) program.

A new report released by FCBI Energy in December 2015, and commissioned by the Methanol Institute (MI), details the many advantages of methanol. The report, Methanol as a Marine Fuel, contains a number of key findings and can be downloaded HERE.

- Methanol is plentiful, available globally and could be 100% renewable - There are more than 70 million tons of methanol being produced annually, and depending on the feedstock used in its production, it can be 100% renewable as well.
- Current bunkering infrastructure needs only minor modifications to handle methanol – Methanol is very similar to current marine fuels such as heavy fuel oil (HFO) as it is also a liquid. Existing storage, distribution and bunkering infrastructure can handle methanol


with only minor modifications necessary due to methanol being a low-flashpoint fuel.

- Infrastructure costs are modest compared to alternative solutions – Installation costs of a small methanol bunkering unit have been estimated at around € 400,000, and a bunker vessel can be converted for approximately € 1.5 million. In contrast, an LNG terminal costs approximately € 50 million, and an LNG bunker barge € 30 million.
- Conversion costs will drop dramatically as experience mounts – The main reference point on conversion costs comes from conversion of the Stena Germanica. Being the first of its kind, the Stena Germanica **(pictured left)** retrofit entailed much design work on new technical solutions, safety assessments and adaptation of rules and regulations. It has been estimated that a second retrofit will cost only 30% to 40% of the Stena Germanica conversion.
- Current engines have performed well on methanol and upcoming technologies will further improve this performance – Thus far, methanol ships have been powered by diesel concept engines modified to run on both methanol and marine diesel. Converted methanol engines have performed as well as, or better than, diesel engines in both field and lab tests. Methanol-optimized engines currently in development are expected to perform even better than the current converted engines.
- Shipping and chemical industries have a long history and ample experience in handling methanol safely – Methanol has been shipped globally, and handled and used in a variety of applications for more than 100 years. From a health and safety perspective, the chemical and shipping industries have developed tested procedures to handle methanol safely. These have been codified in the Methanol Safe Handling and Safe Berthing Bulletin and Checklists available on MI's website HERE.
- Methanol is biodegradable – From an environmental point of view, methanol performs well. Methanol dissolves rapidly in water and is biodegraded rapidly. In practice, this means that the environmental effects of a large spill would be much lower than from an equivalent oil spill.

As the lifecycle economics, and other benefits of using methanol compared with other emission compliance options becomes more evident, we expect to see the tide rising on the use of methanol as a marine engine fuel.

## The Author

Greg Dolan serves as CEO of the Methanol Institute (MI), the global methanol industry trade association.

# SEAHAWK SERVICES

## A New Name with a Long History in Fuel Testing

*In economic times good or bad, oil prices high or low, ships at sea depend on the purchase and burning of quality fuel to enhance and extend the life of their ships. Last month we visited with* ***Wajdi Abdmessih****, Founder & Owner of Seahawk Services, a new name (but a long history) in the fuel testing and inspection business.*

BY GREG TRAUTHWEIN

**Please provide a brief background on your company.**

Seahawk Services is a fuel testing and inspection operation based in New Jersey. It provides global submitted fuel and lube oil sample analysis as well as bunker quantity surveys in the U.S. and Latin America. The company currently has one fully equipped laboratory in West Deptford, N.J., capable of testing fuel samples to the full ISO 8217:2012 quality standard. It is also equipped with advanced diagnostics instruments such as Fourier Transform Infrared Spectroscopy (FTIR) and Gas Chromatography-Mass Spectrometry (GC-MS).

**What was the impetus to found the company in June 2014?**

As a laboratory chemist working in the marine industry for many years, I have found that many companies give little attention when it comes to investment in the marine fuel testing laboratory division compared to, for example, gasoline, diesel and chemical testing. Therefore I decided to establish a state-of-the-art laboratory equipped with all the necessary high level of equipment to create an environment where testing and research can work together to protect and to better serve our clients.

**As you know, there are many fuel testing & inspection companies and services in the marine sector. What differentiates Seahawk Services?**

I have more than 25 years' experience in the laboratory and inspection sectors, and my extensive knowledge of fuel chemistry and vessel operation allows me to serve both the fuel user and the supplier on fuel quality and quantity issues.

Most marine laboratories are focused on one side along – which is usually the fuel user. As such, they are not aware of the fuel blending and optimization operations that suppliers regularly undertake. Furthermore, they usually have limited experience when it comes to fuel overall, with most of them just running ISO 8217 tests and comparing the results against the specification in what I would call a production line approach. Many marine fuel testing laboratories also have a lack of experience when it comes to fuel handling, and they may depend heavily on a set of standard comments that have been triggered by a computer and which have been based on certain analysis numbers. In many cases the results don't take into consideration the vessel equipment configuration, vessel age and other important vessel condition/operation capabilities.

**Give us you view on the global maritime bunker markets, with particular emphasis regarding quality issues in recent years.**

We have seen an increase in problematic fuel, specifically an increase in the average level of cat fines in the fuel over the last year, and we expected this trend to continue with the introduction of global sulfur regulation. The bunker market will experience a large shift from residual fuels to distillate fuel in the next few years. While the use of distillate may seem to be less problematic, the new ISO 8217 revised specification (currently being circulated for comment) may be expected to accept a biofuel mix in distillate fuel which could result in more quality issues.

**The marine industry as you know is under tremendous legislative pressure to reduce emissions, with fuel quality (and proof thereof) heading the list. Put in perspective the challenges for the shipowners.**

Shipowners are faced with major decisions that they need to take in order to comply with regulation and stay in business. They have to decide how to comply with the new emission regulation and what type of vessel configuration/fuel/other will achieve that goal.

Will it be distillate, LNG conversion, the use of residual fuel with a scrubber, or a switch to dual fuel – or maybe other sort of renewable energy or combination? Each choice will come with a large price tag and the decision will mainly depend on the area in which a vessel operates and the stability of future fuel price.

Will it be **Distillate**, **LNG Conversion**, the use of residual fuel with a **Scrubber**, or a switch to **Dual Fuel** – or maybe other sort of **Renewable** energy or combination? *Each choice will come with a large price tag* and the decision will mainly depend on the area in which a vessel operates and the stability of future fuel price.

**How do outside factors such as oil prices and shipping volumes impact your business?**

The price of oil will not affect our business since vessels will still need to know the quality of the fuel they are consuming and they also need to comply with regulations. However, the slowing world economy will affect our business since fewer vessel will operate which means less bunkering and fewer samples and bunker surveys.

**What were the goals for your company from the outset?**

Introducing a successful state-of-the-art laboratory and inspection service where quality and customer service can work in harmony without compromising quality or integrity. Our goal is helping C/E to optimize the use of the fuel and to take preventative action so as to avoid problems before they happen. We have introduced a chemist-based laboratory and not a production lab - every sample is handled individually by a chemist.

**What factors will drive the whole fuel testing and quality business fastest & furthest?**

Fuel testing must not be limited to specification or compliance checks but must be extended to protect the user and to optimize the use of the fuel. We are introducing the lab of the future, working with our clients for better fuel optimization, to protect their investment and maximize the use of the energy they purchased.

## Seahawk Services

Seahawk Services is a fuel testing and inspection agency, established by Wajdi Abdmessih in June 2014. Based in West Deptford, NJ, it features a fully-equipped testing laboratory capable of testing fuel to ISO 8217:2012 requirements. The lab is also equipped with advance diagnostics instruments such as Fourier transform infrared spectroscopy (FTIR) and GC-MS (Gas Chromatography-Mass Spectrometry). It provides a range of bunker services, including bunker quantity surveys, fuel oil analysis, pre-bunker analysis, purifier efficiency monitoring, ship fuel sampling audits, ship 'remains on board' (ROB) audit, lube oil analysis, sampling equipment, failure analysis studies and claim support. Abdmessih has more than 25 years of experience in marine fuel testing, developing internal testing methods and working with various organizations, providing data for sulfur monitoring worldwide.

# MARINE BIOFUELS

## Biofuels could be 5-10% of the marine fuel mix by 2030

DIRK KRONEMEIJER

In the wake of COP 21 and in advance of any subsequent IMO ruling on the environment, it may seem to many that the shipping industry is in limbo when it comes to improving its emissions footprint. On the contrary, ship owners and operators are increasingly looking for ways to ensure that both existing fleets and new builds maximize their business potential, while at the same time keeping up with industry regulation and initiatives to combat climate change.

First, there is a tightening range of environmentally conscious legislation coming in to force – including the impending roll out of Emissions Control Areas in China. This adds to existing control areas in North America and the Baltic Sea, meaning that the global scope of this kind of legislation will only continue to expand in the next five years and beyond.

In addition, new IMO NOx Tier III requirements will take effect in North American and U.S. Caribbean ECAs from January 1, 2016 for vessels with a keel-laying date on or after January 1, 2016 and an engine output of ≥130kW. And then there is also the European Commission's Monitoring, Reporting and Verification (MRV) rules to consider: in force from July 1, 2015, this legislation dictates that operators of ships exceeding 5000 GT must monitor and report their carbon emissions on all voyages to, from and between EU ports from 2018.

Given these legislative developments, there has never been a better time for ship owners and operators to stand back and re-examine business decisions so as to not fall foul of the new laws.

In the case of reducing emissions, there are already a few potential solutions on the market – installing scrubbers, which requires significant investment, for example, or transitioning a vessel to use LNG as a fuel, which not only requires investment, but also has a long way to go before the global infrastructure is capable of effectively supporting vessels worldwide.

There is a viable alternative, however, steadily emerging onto the market, with every indication that it is about to shake up the marine fuel mix in a big way. It is predicted that biofuels will make up 5-10% of the global marine fuel mix by 2030 – meaning that biofuels will represent a crucial role in creating a low-emission future for shipping.

Sustainable marine biofuels replace fossil fuels and significantly reduce both local emissions such as SOx and particulate matter (PM), but most significantly, they can enable significant reductions in levels of CO2 of 80-90%. It is this emissions reduction that is one of the main draws for ship owners and operators – not only because of the environmental benefits – but because growing numbers of ports across the world are incentivising greener shipping.

Some major global ports are now offering incentives for vessels that exceed environmental targets. For example the Environmental Ship Index (ESI), adopted by nearly 40 ports worldwide, evaluates NOx and SOx emissions and rewards vessels by offering a reduction in port dues. In certain ports this has also been extended to include particulates, a group of pollutants that includes carbon monoxide (CO), carbon dioxide and black carbon solids (soot).

Shipping is the last of the major transport modes to turn its eye to biofuels as way of becoming less emission-intensive. As was the case in the jet biofuel market, the first volumes are likely to geographically concentrate on where the incentives are. The same "usage hotspots" are therefore anticipated for shipping, in, for example, Western Europe, the Nordics, west coast North America, followed by Australia, Asia and so on.

The benefits of biofuels don't stop there, however; their ability to be used as a 'drop in' fuel (put simply, to blend with traditional fossil fuels) is critical, as it ensures that current logistical and operational systems can remain in place and every party can stay in a 'business-as-usual' mode.

This in turn ensures that sustainable biofuel requires no investment in infrastructure; all that is required is a standard fuel tank and ex-pipe facility at berth or a standard bunker barge.

The lack of initial outlay to make a vessel ready to use biofuels is compelling. Installing scrubbers or making a vessel LNG-ready costs both time and money – costs that operators can scarcely afford to incur given the current market conditions, especially when low oil prices have now elongated payback projections. Any time spent in port is time not spent at sea – and this is notwithstanding any losses in capacity that may come from refitting a new system, permanently diminishing the profit margin of operating the vessel on every future journey. Furthermore, biofuels are a clean, high performance fuel that produces less sludge waste than fossil fuels, which ultimately means that their usage requires less engine maintenance than ship operators will be accustomed to.

Given all of these reasons, the adoption of biofuels is now an emerging strategy – one that is particularly reinforced by their drop-in nature and instant, quantifiable benefits in terms of a reduced emissions profile. Every indication is that, over the next few years, the sustainable marine biofuels market will quickly evolve to cement them as a core component in achieving a more sustainable, low-emission future for shipping.

### The Author

CEO Dirk Kronemeijer founded the GoodNRG Group after pioneering the market of bio aviation fuels with SkyNRG - the global market leader in sustainable aviation fuel. GoodFuels Marine is part of the GoodNRG Group. It is the first company focused on creating the market for sustainable marine fuels and supports the prediction that biofuels will form 5-10% of the total global marine fuel mix by 2030.

## Parker Kittiwake Procal Aids ECA Compliance


Procal 1200M data gathering system and control unit, designed for maritime use by marine engineers. In addition to collecting and processing data from Parker Kittiwake Procal's marine emissions analyzers, the Procal 12000M is capable of sending and receiving data from devices which monitor exhaust gas scrubbing systems. This enables the collation and accurate reporting of data from various parameters, including SO2, CO2, NOx, PH, sea water temperature, turbidity, polyaromatic hydrocarbon equivalents, and wash water flow rate.

The analyzers communicate via a serial data link to the Procal 1200M, which can be located up to 1200m from the exhaust mounted CEMS, and data from up to 16 channels per exhaust gas scrubbing systems can be presented on an individual front panel. Sealed to IP65 standards and specifically designed to be located in harsh marine environments, the Procal 1200M control unit has the ability to generate detailed and accurate reports, aiding operators in meeting the stringent reporting requirements of today's environmental regulations. With three levels of password protection, the unit is also compliant with the security requirements of MARPOL Annex VI. Spot sampling is becoming increasingly common in the Baltic and North Sea ECAs, and from January 1, 2016 the European Union requires member states to carry out sulfur tests on the marine fuel being used onboard many of the ships calling at their ports. Where mariners are unable to rapidly and effectively demonstrate compliance, even compliant vessels could incur delays.

**www.procal.com**

## DNV GL, VPS Launch Fuel Analytics Solution

**Gerard Rohaan, CEO of VPS (Right) and Dr. Torsten Büssow, DNV GL's Head of Fleet Performance Management sign the agreement.**

Veritas Petroleum Services (VPS) and DNV GL announced the launch of a new Fuel Analytics solution. As part of DNV GL's ECO Insight fleet performance management portal, the tool will enable a systematic assessment of the impact of fuel quality on vessel performance. "We have been the largest fuel testing services provider since our inception in 1981," said Gerard Rohaan, CEO of VPS. "And as a result we have the world's largest fuel sampling database – more than two million tested samples. By extracting valuable information from this extensive database with state-of-the-art analytical tools, we help our customers get the best value from their bunker purchases through fast, accurate performance monitoring and decision making."

The fuel analytics solution is a tool shipping companies can use to answer key questions, including:

- What impact does my bunkered fuel quality have on my vessel's performance?
- What bunker quality have I received compared to a world fleet average of similar vessels in the same time period?
- Where do I find good quality bunker locations and suppliers?

Fuel quality is calculated in terms of four major benchmarks: technical quality (meeting the specifications of ISO standard 8217), financial quality (energy, water content), statutory compliance as well as reporting quality (deviation from the bunker delivery note). By providing aggregated and comparable benchmarks, ship operators can easily assess ports and suppliers globally on a common scale.

**http://performance.dnvgl.com**

# Maritime Simulation Trends

BY KATHY A. SMITH

Simulation training continues to grow in its varied applications to help train officers and crews in their vital roles. Simulator technology is also advancing in response to growing demand for more customized and complicated training scenarios that mimic real-life situations.

## ARI Simulation

ARI Simulation headquartered in New Delhi, India, designs and builds simulators with a high degree of real-world experience. According to the company's mission, its aim is to provide a training environment that's the next best thing to being there. "Our simulation systems are extremely flexible," says Mr. Shravan Rewari, CEO. "Standalone simulators are an ideal medium for individual skill development and reinforcement. Simulation solutions, however, come into their own when integrated simulators work together in a unified mission exercise."

ARI is in the unique position of being a leading simulation equipment manufacturer and also a major provider of simulated-based training. The company specializes in customized simulation programs for vessel bridge operations, crane operations, dynamic positioning, machinery operations and many others. In fact, ARI has over 1,000 simulator installations worldwide. In addition, ARI experts have conducted Train-the-Trainer courses on behalf of the IMO for many organizations.

In the last seven years, the company has upgraded its modeling infrastructure by infusing new talent and technology. As Rewari points out, soon to be gone are the days of a one-size-fits-all simulation solution. Buyers are demanding en-

BCIT's marine campus has seven bridge simulators. The bridges can all be interconnected as necessary for particular training exercises. Transport Canada also sets the curriculum for deck officers. BCIT runs Simulated Electronic Navigation (SEN) courses on a regular basis – training officers on how to understand and interpret radar, navigate safely and execute a passage correctly from point A to point B.

CREDIT: BCIT



"MPT (has) a dynamic and on-going upgrade process that identifies key areas of improvement and takes steps to integrate those enhancements. This is done on a six-month cycle wherein computers, graphics, cards, hardware interfaces, software, etc., are all evaluated and upgraded. Improvements and additions to ship models and geographical areas are also addressed," said Capt. Ted Morley.

CREDIT: Maritime Professional Training

vironments that meet their own specific niche requirements.

"It's more a case of my ship, my terminal, my cargo, my engine, my equipment," he says. "ARI has put a lot of focus on areas that will allow for creating high-quality, rapid and cost-effective custom environments."

ARI simulators are DNV-GL certified to the highest Class A standards, and use Windows-based technologies and a GPU-based visualization engine. In order to future-proof simulator solutions, ARI also uses common off-the-shelf equipment with the latest platforms commercially available to ensure the user is not dependent on any proprietary platforms or technologies which could cause problems in the upgrade process. High-accuracy, high-performance mathematical models relate across every process that is simulated, giving as close to real a feel as possible.

Flexibility is important in customization. For instance, for naval customers, when combining bridge simulation with machinery control room simulation, Combat Information Centre, Combat Management System, weaponry systems and other simulation play-

ers, complex scenarios can be created and practiced efficiently. "We have also created systems where specific simulator setups can be rapidly reconfigured to represent different operating environments, for example, a bridge simulator representing a class of Corvettes can be reconfigured to represent another class of vessels," explains Rewari. Hundreds of other simulations can be run for all manner of marine and non-marine operations such as offshore vessel work, port crane container handling and navigation safety procedures.

In addition to full mission simulators, ARI also provides table top simulators that can work in multi-functional classroom in a variety of station setups that include individual mode, group modes, team modes and multi-team modes. These can also be linked to full mission simulators.

Rewari sees the drivers for the future in simulation as realism and user involvement. "We are aggressively pursuing areas of virtual reality using VR headsets, gesture recognition systems and a host of other similar areas where we believe the user will have a much higher sense of immersiveness and presence."

## MSRC

Pilot training is the main focus of Quebec, Canada-based Maritime Simulation and Resource Center (MSRC), a division of the Corporation of Lower St. Lawrence Pilots. And while there are no formal simulation training requirements for marine pilots, MSRC continues to see growing demand for their specialized courses. In fact, the Center, which has just celebrated its 10th anniversary, creates only customized training for each group of pilots, their unique waterways challenges and the ships they work on. "We are privately owned and we are also very specialized in that we don't provide training as required by the STCW Convention for Masters and Officers," said Director Paul Racicot. MSRC courses are created by pilots for pilots. The Centre sees recurring customers consisting of 100 percent of Canada's 415 pilots, and groups representing 11 percent of the 1,300 American Pilots.

When a particular pilot group requests training, Racicot's team goes to work developing a database of purpose-built training scenarios that group will use for ongoing training. Flexibility is important in order to adapt to changing needs within pilotage groups and for different pilot organizations.

"We have the in-house capacity of developing exercises areas and ship models," says Racicot. "I can ask my 3D developer to build the Houston Ship Channel and ask my ship modeler to develop specific ship models. It means this particular pilot group will have specific training with exercises adapted to their own operational reality of that waterway."

In another example, with the collaboration of Halifax pilots, MSRC developed specific scenarios, ship models and relevant escort operation techniques for them to work with post-Panamax container vessels before the ships began calling at that Port. "When that was completed, the pilots and tug masters from Halifax scheduled several training sessions in our facilities," says Racicot.

MSRC has four fully equipped Kongsberg navigation bridges (each with two radars, two ECDIS, pilot plugs, conventional propulsion and Z-drive propulsion, etc.). During training exercises, instead of pilots having to share the same navigation bridge with three or four colleagues, this configuration allows for each pilot to have their own bridge and 100 percent of the training time.

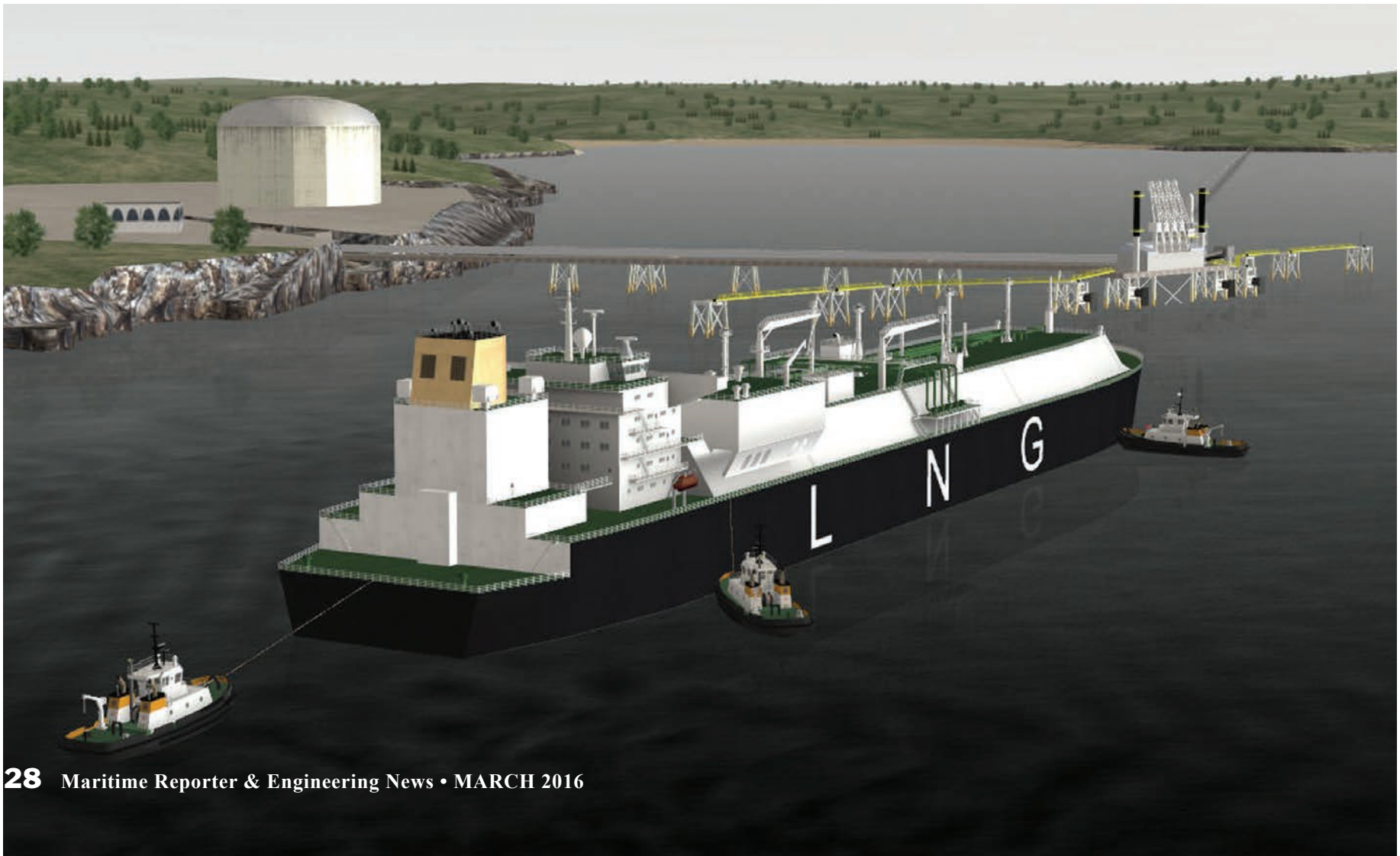
In addition to pilot simulation training, MSRC specializes in project development. It has completed more than 40 operational feasibility studies, 50 percent for LNG terminals and 70 percent of all studies involved four interactive bridges using Z-Drive tugs.

Developing unique solutions to complex pilot training problems can be a challenge but Racicot is keenly aware of the importance of simulation experiences. "The margin of error tolerated by the pilots is nil," he says. "We need to give them the best we can to enhance their competency and knowledge."

## BCIT

Approximately 1,300 mariners pass through British Columbia Institute of

"We (Maritime Simulation and Resource Center) have the in-house capacity of developing exercises areas and ship models. I can ask my 3D developer to build the Houston Ship Channel and ask my ship modeler to develop specific ship models. It means this particular pilot group will have specific training with exercises adapted to their own operational reality of that waterway."




CREDIT: Maritime Simulation and Resource Center

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CREDIT: ARI Simulation

ARI specializes in customized simulation programs for vessel bridge operations, crane operations, dynamic positioning, machinery operations and many others. In fact, ARI has over 1,000 simulator installations worldwide.

Technology's (BCIT) Marine Campus every year and nearly 370 of them use Kongsberg bridge and engine room simulators. Bridge simulator 'Ownships' can emulate the hydrodynamics of a variety of vessels from tugs to bulk carriers, and propulsion plant simulators model most classes of engines found on commercial vessels from large tankers and containerships to ferries and high-performance craft.

In a typical engine room simulation, trainees are required to start the engine and make sure associated systems are working properly. "Then an instructor could inject a fault into the scenario like a valve not sealing properly or a sensor that may set off a false alarm and the student would have to troubleshoot their way through these problems," says Captain Philip McCarter, Associate Dean, Marine Campus, BCIT School of Transportation.

The curriculum for marine engineering officers is set by Transport Canada. Trainee assessments are carried out by the simulators. This feature is built into training programs so that the subjectivity



**NOTICE OF SANCTION AND EFFECTIVE DATE OF AMENDING SCHEME OF ARRANGEMENT**

Claim Nos. 5812 and 5813 of 2014

**IN THE HIGH COURT OF JUSTICE (IN ENGLAND AND WALES)**
**CHANCERY DIVISION**
**COMPANIES COURT**

**IN THE MATTERS OF**

**OIC RUN-OFF LIMITED**

(formerly Ralli Brothers Insurance Company Limited and The Orion Insurance Company plc)

– and –

**THE LONDON AND OVERSEAS INSURANCE COMPANY LIMITED**

(formerly Hull Underwriters' Association Limited and The London and Overseas Insurance Company plc)

(both subject to a scheme of arrangement)

– and –

**IN THE MATTER OF THE COMPANIES ACT 2006**

NOTICE IS HEREBY GIVEN that, by an order dated 29 October 2015 made in the above matters (the "**Order**"), the High Court of Justice of England and Wales (the "**Court**") has sanctioned an amending scheme of arrangement proposed to be made between the above companies (the "**Companies**") and their respective Scheme Creditors pursuant to Part 26 of the Companies Act 2006 (the "**Amending Scheme**"), which was voted on and approved by Scheme Creditors during six meetings held on 11 December 2014. Unless otherwise defined in this notice, all capitalised terms used in this notice have the same meaning as given to them in the Amending Scheme.

On 11 January 2016, the United States Bankruptcy Court issued an order under Chapter 15 of the United States Bankruptcy Code (the "**US Bankruptcy Code**") granting recognition to and enforcing the Amending Scheme under the US Bankruptcy Code from 11 January 2016 (the "**US Order**").

Following the issuance of the US Order, a copy of the Order sanctioning the Amending Scheme was delivered to the Registrar of Companies in England and Wales for registration on 14 January 2016. The Amending Scheme became effective for the Companies on that date. All Scheme Creditors are therefore now bound by the provisions of the Amending Scheme.

Claim Forms may be submitted to the Companies either via the Website at www.oicrun-offltd.com or, upon request by the Scheme Creditor, by completing and returning a hard copy of the Claim Form by post. The Website contains important information and guidelines explaining the process for the submission of Claim Forms.

Scheme Creditors are required to provide full details of their claim(s) against the Companies, including any Notified Outstanding Liabilities and IBNR Liabilities, together with all Supporting Information, by completing and submitting a Claim Form, either electronically or (on request by the Scheme Creditor) by post, so as to be received by the Companies **by no later than midnight (English time) on 12 September 2016** (the "**Bar Date**").

The requirement to submit a Claim Form before the Bar Date applies to all Scheme Creditors other than NNOFIC, Opt Out Qualifying ILU Policyholders, Protected Policyholders, Potentially Protected Policyholders, No Notice Individual Creditors and those Qualifying ILU Policyholders who may, in certain very limited circumstances, bring a claim against the Companies after the Bar Date under the terms of the Amending Scheme.

Any Scheme Creditor to whom the Bar Date applies and who does not return a Claim Form so as to be received by the Companies before the Bar Date, and who has not elected to have its voting and proxy form or any other form that it has submitted (as the case may be) treated as its Claim Form, will be deemed to have accepted the details of its claims (net of any Security Interest and Offset Amount) set out in the Claim Form made available to the Scheme Creditor by the Companies on the Website. Scheme Creditors who have additional Scheme Liabilities (including any Notified Outstanding Liabilities and/or IBNR Liabilities): (i) which are not shown on their Claim Form; or (ii) who do not have a Claim Form, and who, in each case, do not submit details of their claims on their Claim Form before the Bar Date, will receive no payment in respect of those additional claims under the Amending Scheme.

The Companies will make available on the Website a Claim Form for each Scheme Creditor whom the Companies believe has or may have a claim against either or both of the Companies. The Claim Form will include, to the extent known by the Companies details of:

a. certain policies held by that Scheme Creditor;
b. the Scheme Creditor's Established Liabilities; and
c. the Scheme Creditor's Agreed Liabilities.

Each Scheme Creditor will be provided with an individual Website login ID and password, which will enable that Scheme Creditor to access the secure area of the Website containing their Claim Form as prepared by the Companies. Alternatively, Scheme Creditors may request a hard copy version of the Claim Form by post from the Run-off Company.

Any Qualifying ILU Policyholder who wishes (in respect of all Qualifying ILU Policies held by that Qualifying ILU Policyholder) to opt out of the crystallisation and payment provisions of the Amending Scheme must submit an Opt Out Form, either electronically or (upon request by the Qualifying ILU Policyholder) by post, so as to be received by the Companies by no later than the Bar Date.

Any Scheme Creditor which has any questions concerning this notice or the action that it is required to take, or which requires assistance in completing its Claim Form, should contact the Run-off Company using the contact details set out below. Any person who is, or who considers itself to be a Scheme Creditor, and who has not received by post a copy of this notice, an Opt Out Form, a Postal Service Request or a schedule with its individual Website login ID and password, should also contact the Run-off Company using the contact details set out below.

Copies of the Amending Scheme documents can be downloaded from the Website at www.oicrun-offltd.com. Alternatively, hard copies can be obtained, free of charge, by sending a request to the Run-off Company using the contact details below. Further information may be obtained from the Website or upon request from the Run-off Company.

The contact details for the Run-off Company are as follows:

By post: Armour Risk Management Limited, 4th Floor, 20 Old Broad Street, London, EC2N 1DP, United Kingdom
By email: Oicclosurehelpdesk@armourrisk.com
By phone: +44 (0) 20 7382 2020
By fax: +44 (0) 20 7382 2001

Dated 15 February 2016

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Solicitors to the Scheme Administrators

of the assessor is removed. For instance, if a student should have turned a particular valve and didn't, the computer would record that. "We also use CCTV cameras to see how they perform, so we're able to record the events to be used during a de-briefing," says Capt. McCarter. "The software can also play the event back to them. But in the end, when there's an examination, a Transport Canada official is present to observe."

BCIT's marine campus has seven bridge simulators. The bridges can all be interconnected as necessary for particular training exercises. Transport Canada also sets the curriculum for deck officers. BCIT runs Simulated Electronic Navigation (SEN) courses on a regular basis – training officers on how to understand and interpret radar, navigate safely and execute a passage correctly from point A to point B.

For example, in a SEN course, a requirement could be that no ship will come within one nautical mile of your vessel. If a vessel comes closer than that, a trainee will have to do the scenario again. Many SEN scenarios can be run in a variety of environmental conditions from daytime with excellent visibility to foggy, restricted visibility and night-time passages. Depending on what level a mariner is at, each will have different challenging exercises to carry out.

One of the bridge simulators simulates a tug with a 360o-degree capability. "More and more simulation centers are going this route," says Capt. McCarter. "This one can interact with the other bridges, too. For instance, we can run sessions whereby multiple tugs can be docking a larger ship. So with that capability, you can demonstrate how important communication amongst the pilot, the ship's Master, tug Masters and people on the dock is, for example, at the container terminals here in Vancouver Harbor." BCIT also has ECDIS, GMDSS and liquid cargo simulators.

## MPT

The S.M.A.R.T. Campus at Fort Lauderdale, Florida's Maritime Professional Training (MPT) features bridge simulators, engine control room simulators, liquid cargo simulators, as well as partial task simulators such as six DP stations, 12 ECDIS stations, 16 radar/arpa stations and four all-weather stations. The main simulator product used is Transas. "We also use real-world equipment including Marine Technology DP, Furuno and Sperry ARPA units, and Raytheon that the Transas software drives," explains Captain Ted Morley, Chief Operations Officer.

MPT's S.M.A.R.T. campus was developed to be a totally integrated simulation center with the ability for all of the simulators to be involved in the same scenario or operated independently. The three main simulator bridges are designed to emulate the layouts found on modern passenger ships, commercial vessels and offshore/towing vessels. The consoles and equipment have been placed in locations that are identical to or close to how the bridges are laid out in real life.

The instructors and operators can adjust all manner of difficulties. The system is dynamic with respect to weather conditions, sea state, visibility, steering, mechanical failures, fire and flooding, ice accretion and traffic interface. Overall behaviour and utilization of resources is key in assessing students.

"Technology is constantly improving," says Capt. Morley. "MPT is very proud to have a dynamic and on-going upgrade process that identifies key areas of improvement and takes steps to integrate those enhancements. This is done on a six-month cycle wherein computers, graphics, cards, hardware interfaces, software, etc., are all evaluated and upgraded. Improvements and additions to ship models and geographical areas are also addressed. The goal is to make the training environment as realistic as possible to maximize the training value."

MPT trains more than 12,000 mariners annually, and is currently expanding its campus and simulation department. The total square footage is approximately 61,000 square feet. Enhancements are being made to all components of the simulation department, including adding DP capability to the full mission bridges and new visual projection to all navigation bridges.

"Simulation is a fantastic tool and while it will never replace real-world experience, it does provide a measure of competence and task familiarity that is hard to duplicate," says Capt. Morley. "We like to say the only thing you bruise is your ego. The ability to test the limits of a vessel or operator in varying weather conditions is only really possible in a simulation."

Capt. Morley sees virtual reality and global integration – using multiple simulation centers around the world connected via the Internet to allow ship owners and operators to train with pilots or tug operators in far-ranging ports without having to bring them together in the same facility – as the two main areas that will require the next generation of simulation technology.

# Bouchard
## Invests in Safety

BY GREG TRAUTHWEIN

(L to R):
At the Bouchard Transportation Company, Inc., Tug & Barge Simulation Center at SUNY Maritime are Cadet Bryan Hinton, Morton S. Bouchard III, Brendan J. Bouchard, Cadet Kelly Paseka and Cadet Kameron Knight.

Morton S. Bouchard III (right) watches as the SUNY Maritime cadets run the simulator through its paces.

Promoted to president of Bouchard Transportation Company, Inc., in 1996 at the age of 32, Morton S. Bouchard III – the president and CEO of Bouchard Transportation Company, Inc. and his family's fourth generation to manage the company – is justifiably proud of his tenure which has seen Bouchard Transportation become the largest privately owned ocean-going petroleum barge company in the United States, with operations on the East and Gulf coasts of the United States and in the Caribbean. But earlier this year during a ceremony at The State University of New York Maritime College, a ceremony to confer upon him an honorary degree of doctor of science, it was never more clear that Bouchard is even more proud of his companies leadership in building and maintaining a safety culture that has few peers in the maritime sector. At the heart of his commitment is the Bouchard Transportation Company, Inc., Tug & Barge Simulation Center located at SUNY Maritime in Fort Schuyler, a state-of-the-art facility which opened in October 2014 and serves as a state-of-the-art training platform for both students and professional mariners alike.

### Build it and They will Come ...

SUNY Maritime's cutting edge Bouchard Tug & Barge Simulator Center helped to fill an enormous training hole in the New York area, as the only other available simulator in the area had long since been moved to the Houston. Bouchard's investment and a willing partner in SUNY Maritime changed all that in the autumn of 2014 with the opening of the new simulation center.

"The contribution is to, first and foremost educate the cadets that go to school here (SUNY Maritime), to give them a good foundation when they graduate to come and be employed in an industry that is booming and lacking qualified employees right now," said Bouchard when the center was opened. "We partnered with SUNY Maritime to build a first-class simulator on campus that would not only benefit cadets, but would benefit our employees. We're going to do our training here with our captains and mates," (which today number more than 600).

The Bouchard Transportation Company, Inc. Tug and Barge Simulation Center is the latest in Kongsberg Polaris Bridge simulation technology, using an industry-inspired bridge console arrangement, with the latest hydrodynamic ship models and exercise areas. The Center offers full mission bridge simulators, instruction stations, and a de-briefing area, where instructors can discuss topics including navigation, seamanship and bridge resource management skills required in the operation of tugs and barges. Attention is given to the complexities of operating tugs and barges, ranging in size from 3,000 to 12,000 horsepower, which carry all types of commodities.

But as with any technology, the shelf-life can be short. With this in mind Bouchard's investment in the center was not envisioned as 'one and done.' "(We thought) we'll build the simulator, we'll do all of our training here … but more importantly as the next generation of wheelhouse technology comes out (we'll keep up)," said Bouchard. "The world continues to evolve with new technology, and we as a company have made a

commitment to invest in it (new technology) every year. We budget for it every year and we will upgrade it every year with more charts and modern equipment. Training and Safety is central to all that we do."

Bouchard summed up his company's stance on the importance of training and safety succinctly: "Training and education is 200% more today. You cannot be profitable in this industry unless you are safe; you cannot be safe unless you train. But that's not only in the simulator, it's every day on these vessels. The captains in our company are held to the highest standards to be safe, and that is the only way that you can be profitable."

Mort Bouchard's commitment to safety, training and future mariners was clearly on display earlier this year on the day he was conferred his honorary degree at SUNY Maritime, as he closely watched three SUNY Maritime Cadets – Bryan Hinton, Kelly Paseka, and Kameron Knight, each one a recipient of the Morton S. Bouchard Jr. scholarship, named in honor of Mort Bouchard's father – run the "Danielle Bouchard" through her paces in a realistic simulation scenario set in the Port of New York.

## Continuous Investment ...

Modern simulator technology has dramatically impacted the means and efficiency to train modern mariners, but as is the case with any new technology, regular investments in updates is required to maintain a specific facility's technological edge.

At the time of the simulator's initial installation, Eric Johansson, SUNY Maritime's Vice Chairman, Professional Education & Training Department, said, "The Bouchard investment with Maritime College is a testament to Bouchard's generosity true commitment to safety and Maritime Colleges commitment to the towing industry. The Kongsberg Tug Barge Simulator is specifically built to serve the towing industry benefiting mariners from cadet to captain."

This commitment exceeded simply writing a check.

Bouchard was closely invoved with Kongberg in providing operating parameters and information regarding its tugs (the simulator has models for 4,000, 6,000 and 10,000 hp tugs) and their associated barges. According to Johansson, after the system was set up, Bouchard brought in its captains to run the simulated vessels through their paces, and return to Kongsberg with comments and suggestions so that the final simulation models would be as close as possible to real-world conditions.

But the investment didn't stop after the simulation center opened, as Bouchard has pledged annual investment in the facility to ensure that is continually updated and improved. To that end, last month a pair of Class D desktop simulators were installed, simulators that interact directly with the full bridge mission simulator to practice docking and undocking with assist (tractor or conventional) tugs, for example. In addition, the Class D models can be configured as ATBs, so that it can simulate three ATBs running simultaneously.

"Mr. Bouchard was clear from the outset that he would continue to invest and develop this facility," Johansson concluded.

# Station Keeping in Ice

BY ANDREW SAFER

While substantial amounts of petroleum reserves exist in the Arctic—30% of the undiscovered gas and 13% of the undiscovered oil, according to the U.S. Geological Survey's 2009 estimates—there are hurdles that need to be cleared before oil and gas companies can efficiently operate there. A high priority is to be able to accurately predict the forces that nearby ice floes would exert on a vessel's hull upon impact, and have the ability to react to this information in a timely manner (see sidebar). A Dynamic Positioning (DP) system outfitted to operate in managed ice (following icebreaking) would satisfy this requirement. It needs to (1) be equipped with predictive capability, (2) be able to determine the counterforce that will be required to offset the force of ice collision, (3) "know" the limitations of the vessel's engine power and propulsion system, (4) recognize when ice loads will exceed these limits and provide a signal to the DP Operator, and (5) when the force of impact of ice loads is within the vessel's limits, automate the response from the thrusters and propulsion system required to maintain station. Such a DP system would be particularly valuable for a drillship when carrying out operations. When the system notifies the DP Operator that the vessel will be unable to maintain its position due to the magnitude of the ice loads, the operator would then ensure that the drill string and risers are pulled, there would be a controlled, safe disconnect from the seafloor, and the vessel would be moved. Since DP systems were designed to operate in open water, significant technology developments and modifications are required to enable operations in ice environments. Model testing and simulation—both in the development of an ice model and the visualization of mathematically based scenarios—are playing key roles in an applied research project underway in St. John's, Newfoundland and Labrador.

The Center for Marine Simulation (CMS) at the Fisheries and Marine In-

**Captain Chris Hearn**, Director, Center for Marine Simulation and **Maria Halfyard**, Manager, Applied Research and Industrial Projects in the Offshore Operations Simulator which is outfitted with a DP system (controller is on the left).

(Photo: National Research Council of Canada)

stitute of Memorial University in St. John's, in partnership with the Government of Canada's National Research Council Ocean, Coastal and River Engineering (NRC OCRE) also in St. John's, and Kongsberg Maritime Simulation Ltd., are conducting a five-year research project to address these issues. The funding totals $8.6 million ($C), including $1.8 million in in-kind contributions. The funders include Petroleum Research Newfoundland & Labrador, the Government of Canada through the Atlantic Canada Opportunities Agency, Research & Development Corporation of Newfoundland and Labrador, and Kongsberg Maritime.

"If you can extend the weather window in the Arctic by one month, that would be huge," says Maria Halfyard, CMS' Manager of Applied Research and Industrial Projects, and Project Manager. "They're spending millions of dollars a day in time up there." Referring to recent restrictions on drilling in the Canadian Arctic post-Macondo, she adds that oil companies don't have enough time to drill two wells in one season. "If our technology allows them to do this, that would be significant for them." Since the kick start of this project in May 2014, Halfyard has spoken to half a dozen oil companies, all of whom have confirmed the high priority of developing DP capability in ice-infested waters.

One of the major challenges on the CMS side of the project is addressing the complexity of simulating ice. "Ice simulation is still in its infancy," says Halfyard. "Our aim is to develop the best ice simulation out there. We want it to look as realistic as possible, including fracture, colour, and floes responding to and bouncing off each other, and breaking."

The approach of the CMS project includes testing a fully instrumented model drillship in an ice tank at NRC OCRE, and sending the ice-ice and ice-ship interaction data to the numerical researchers and software engineers who are building an ice model, who then send scenarios to CMS where visualizations are created, and simulations are run on-screen. Kongsberg Maritime will then assess the fidelity of the ice model and DP response and determine what modifications their DP system requires for integration.

At NRC OCRE, which boasts one of the world's longest ice tanks (90 metres by 12 metres), a team of ice and software engineers are working on model testing and building a numerical ice model. Ice engineers have conducted tests with a DP-equipped model drill ship (1:40 scale) in the ice tank, which holds 76 metres of ice. Managed first-year ice up to two metres in thickness was specified. The testing began with the ice field designer coding each piece of ice to represent its geometry, toughness, type, and thickness. The tests provided ice-ice and ice-ship interaction data, collected as the drillship proceeded across the tank. This information was passed to the ice modelers / software engineers who are analyzing the data and developing formulas (algorithms) to represent the measured forces. Based on this data, they are currently building the numerical ice model.

The physical model used for testing is self-contained, providing its own power to the thruster and data acquisition systems onboard. An optical six-degree-of-

## Station-Keeping in Ice

After consulting with subject matter experts from oil and gas companies and other organizations/ institutions with Arctic expertise, the Center for Arctic Resource Development (CARD) in St. John's completed its Arctic Development Roadmap in 2012.

The purpose of the Roadmap was "to identify, organize and prioritize key research and development issues that need to be addressed to fill gaps in the knowledge, technology, methodology and training associated with offshore Arctic oil and gas development."

The oil and gas companies that were consulted for the CARD Roadmap included Exxon Mobil, Suncor, Husky Energy, Statoil, Chevron, Imperial Oil, Shell, and Conoco Phillips. Among the needs that were identified as high priority was station-keeping in ice using either mooring or dynamic positioning. The limiting case used for design was station-keeping during emergency response, which pointed to the need for "improved ice load models (and full-scale data) for floating platforms to guide the design of station-keeping systems."

## A Rude Awakening

"When I first went to the Arctic in the early '90s, the statistics said there was a very small chance that there would be a vast ice floe," recalls David Millan, who was working for NORDCO of St. John's as the Engineering Project Lead. His mission was to collect and analyze data on a brand new digital radar system on board a 1,000-foot long icebreaking cargo ship (now "MV Arctic"). He climbed aboard in Antwerp and was heading for Nanisivik on Baffin Island. While travelling at 6 knots, the ship came to an abrupt halt. It had hit a massive ice floe. "It practically threw people off their feet," Millan recalls. "We waited three days for the Canadian Coast Guard's Sir John A. MacDonald to break us free. On the same trip heading south to North Sydney, the Arctic encountered 17-meter seas close to the ice edge." One of the hulls cracked on the next voyage, which Millan figures was probably due to the impact and massive seas. Ever since, Millan has been aware of the need for superior ice detection capability and technology solutions that can make Arctic voyages safer.

freedom system is used to track the position and orientation of the model. NRC OCRE's in-house DP system is used to maintain station, and record forces and moments. A camera is mounted over the bow with the purpose of observing ice-ice and ice-hull interaction. There are three azimuthing podded propellers fore, and three aft. Since a wireless network is connected to the model, there is no need for a tether.

The ice produced in the tank—equivalent to first-year ice—was cut from a sheet into ¼-metre floes. Over the ensuing days, as a result of the impacts, variations in size and thickness developed, reports David Millan, OCRE System Engineer and NRC Project Manager, at which point the tank more closely resembled a real-world managed ice field. The ice thickness ranged from 15 millimetres to 32 millimetres to 50 millimetres. Millan's team conducted almost 40 days of testing, finishing up in March 2015. They used 17 full-tank ice sheets, and made 372 model test runs (three runs per length of the tank), which yielded terabytes of data.

Software engineers reformat the data to provide ice type and ice field characteristics, which is then fed into one of three algorithms that focus on collisions, loading, and the motion of the ice. "The boat is moving through the ice," explains Millan. "According to how it's pressured by the ice, there's a response—a pushing back by the thrusters." Successive calculations produce realistic ice-loading information, based on data collected from the real-world tests.

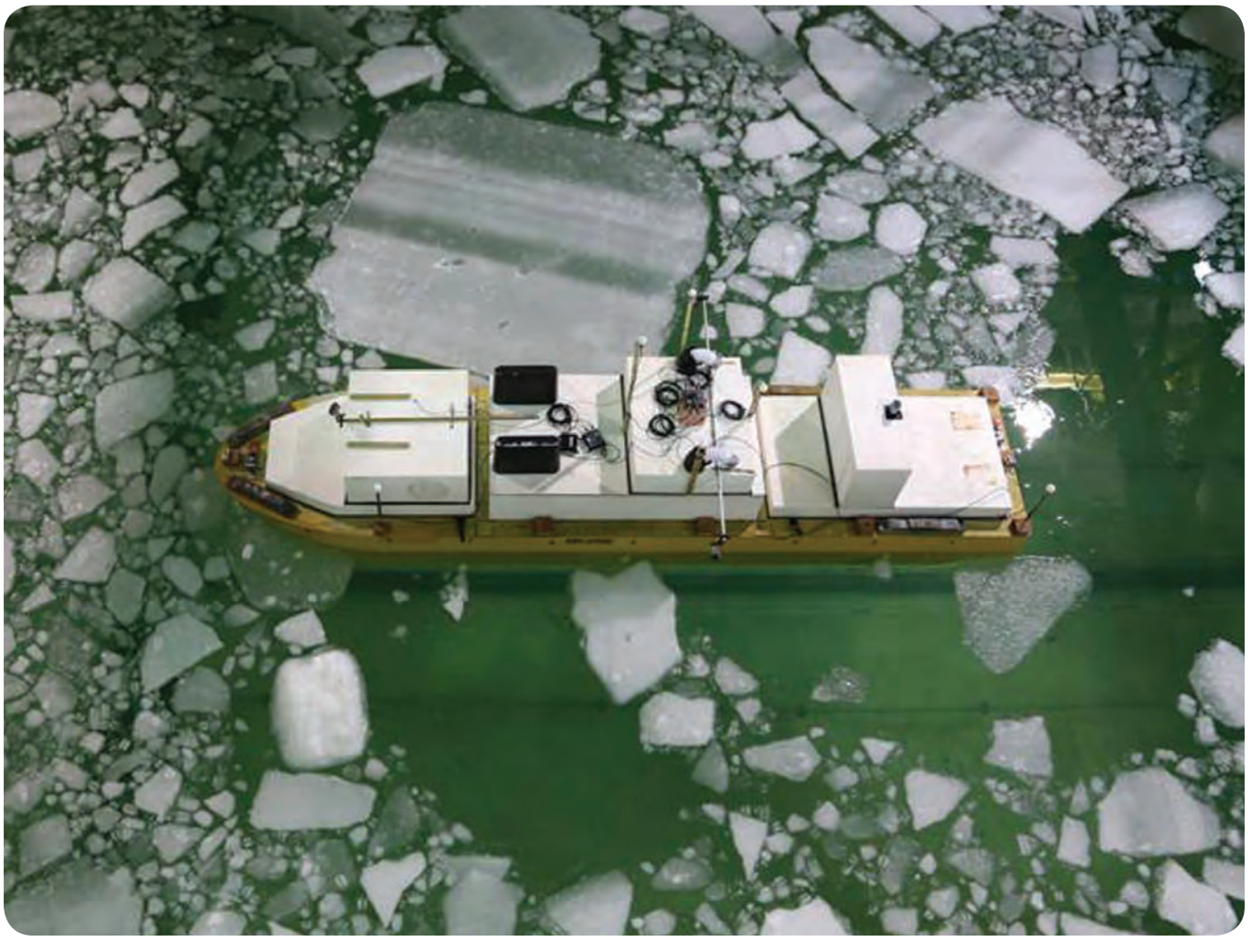
The plan is for the OCRE team to send this data to the CMS team, who will represent the scientific information visually. Each piece of ice is specified according to type, shape (number of vertices), thickness, and location. The information transferred to CMS will include ice field, ship, wave, and wind scenarios, and force interaction components. The embedded complexity of shapes and sophisticated rendering methods used by CMS will result in a very high fidelity look and feel to the simulation.

To create the visualization, the appropriate visual representation will be wrapped around the ice geometry. The CMS team will then display the 3D scientifically-based real-time visualizations on three 55-inch screens, arranged side-by-side with an angle between them representing a 150-degree horizontal view. A fourth screen will enable walking around different areas of the vessel and changing one's point of view. (This is the screen set-up that CMS instructors currently use for DP training.). The numerical ice model will then be tested on NRC OCRE's DP system. Once positive results are obtained regarding how the vessel responds in an ice field, that will validate that the integration of the numerical ice model and DP system is working well. The next step will then be to integrate this into a commercial DP Control System, which is where Kongsberg Maritime comes in.

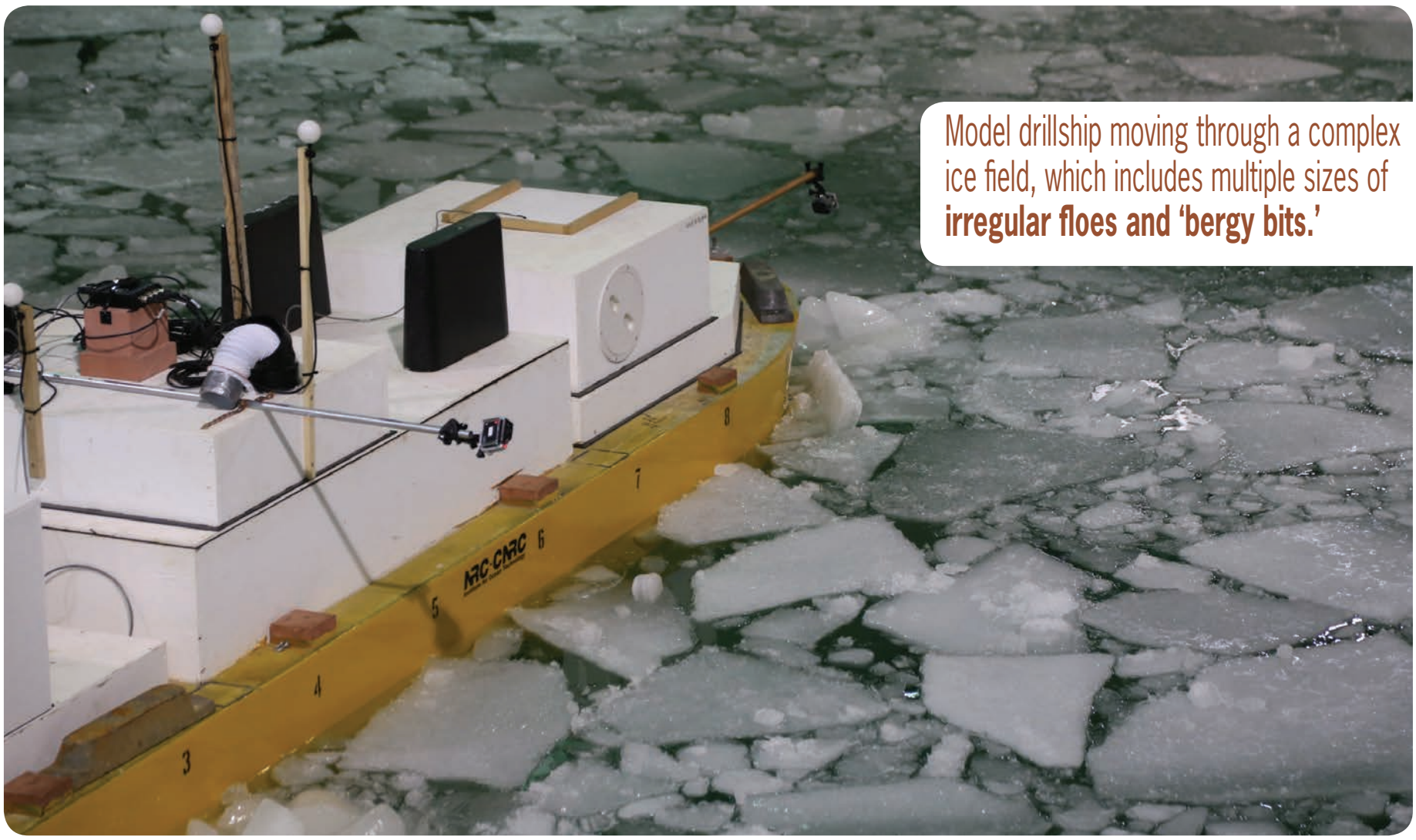
By the end of the project, "we hope to have a prototype," says Halfyard. "There are people who are skeptical because ice is so unpredictable. They're saying, 'Can you really build a numerical ice model that is realistic for the type of ice conditions that we get? I keep telling them, 'Just think outside the box.' Let's push past what we know, and create something innovative. We can be the group that develops this new technology."

Evolving the prototype into a commercially available product will extend well beyond the life of the project, says Halfyard. The objective of this project is to develop a proof of concept that can be commercialized by a DP manufacturer. "It will likely take years to bring to market, as significant full-scale testing would need to occur," Halfyard observes. "But then again, innovation takes time and patience."

**Model moving through complex ice field.** A model scale 100-m floe is next to the vessel.



(Photo: National Research Council of Canada)




Model drillship moving through a complex ice field, which includes multiple sizes of **irregular floes and 'bergy bits.'**

(Photo: Memorial University of Newfoundland)

# Dry Dock Training & Education

BY JOE STIGLICH

Drydocking and undocking of ships and vessels is a small but specialized part of the shipbuilding and repair industry. There is little written about drydocking of vessels. Engineering and Naval Architecture books only include limited information on the drydocking of vessels. There are no universal dry dock standards. As a result, organizations often design, build, maintain and operate their dry dock facilities with little sound engineering guidance. To bridge the gap of lack of information, DM Consulting conducts a Basic Dry Dock Training Course, hosts the Dry Dock Conference, and consults with organizations requiring drydocking or undocking assistance.

The process of drydocking involves lifting, lowering and balancing an extremely heavy weight, while landing and supporting of a vessel out of the water. It must be maintained it that position throughout the period of work, and then safely returned to its normal floating position.

There are four major types of dry docks: basin/graving, railway/slipway, floating, and vertical lift/ship lifts. Each major type of dry dock has several types or versions. Additionally, travel lifts, cranes, or air bags are other methods of drydocking vessels.

The Captain or Master is the person normally responsible for the safety of the ship. However, the Dock Master assumes this responsibility when the ship enters a dry dock. Therefore, the Dock Master must have the ability to orchestrate a safe dry dock operation. Dock Masters train crews, establish procedures, maintain dry dock equipment, and execute dry dock operations. Dock Masters should be developed through formal training, on the job observations, and participating in actual drydocking operations.

In preparation of a drydocking, the Dock Master should be able to carry out calculations pertaining to ship's weight, weight distribution and stability. These calculations are computed while respecting the limitations of the ship and the dry dock. Additionally, many drydocking situations are unique. Some dry docks have transfer capabilities which allow


(Photo: Greg Trauthwein)

movement of the vessel off of the dry dock platform to a repair area on land. Floating dry docks are vessels that require proper blasting and flooding to operate. Each dry dock requires special operating procedures and each operation requires special consideration due to the variety of shapes and weights of ships. Most ships that are scheduled for drydocking will have a Docking Plan reflecting the hull form and any unusual hull anomalies that must be taken into consideration. The applica tion of general principals and concepts taught in DM Consulting's course will allow the Dock Master to decide if a ship can be safely drydocked based on the ship's shape, size, and weight.

Drydocking a vessel is both an art and a science. There are many approaches to the drydocking of vessels and ships, some are very conservative and safe while others are more risky. The course puts emphasis on a safe drydocking approach. These safety precautions result in extra costs, while other organizations are driven by efficiency and cost. Both approaches to drydocking are discussed in the course to provide a complete understanding of possible drydocking methods.

DM Consulting instructors have a combined 100+ years of experience in the industry and U.S. Navy drydocking qualifications. Leveraging hands-on experience in both the government and private sector, good engineering principles and common sense, DM Consulting developed the technically sound Basic Dry Dock Training Course, accredited by SNAME (Society of Naval Architects and Marine Engineers) and RINA (Royal Institution of Naval Architects). The course addresses the deck plate level of knowledge required by the dry dock operators. This includes the mathematical calculations required to carry out operations in accordance with established engineering practices.

The course covers the basic principles of drydocking, progresses through safety concerns, and all drydocking phases: preparation, drydocking, lay period, and undocking. There is dedicated time to share experiences and a discussion of accidents and incidents. Course surveys have shown both experienced and inexperienced dry dock personnel have benefited from attending the training. The educational background of the course attendees varies greatly from minimal formal education to graduate degrees in Naval Architecture and Engineering. DM Consulting provides a dynamic learning environment with classroom lectures, hands on projects, and practical application exercises. There are also opportunities for attendees to take part in discussions where they can gain knowledge and share experiences.

This training course cannot, of itself, produce a fully qualified Dock Master. An intensive effort on the part of the student and hands-on training outside the classroom will better prepare the individual in achieving this goal. The course provides the academic background to enable the prospective Dock Master to understand and fully assimilate knowledge to be gained in a period of additional practical training on his/hers assigned dry dock prior to final certification and qualification of as a Dock Master.

Dry docks and the drydocking process are a significant part of the shipbuilding and repair industry. The benefits of completing this course are not limited to Dock Masters. Other knowledgeable drydocking personnel are required to assist the Dock Master in the drydocking process. Completion of this course will assist Docking Officers, dry dock crew personnel, engineers, naval architects, port engineers, marine surveyors, project/program managers, ship operators/owners, and others involved in drydocking vessels in execution of their duties.

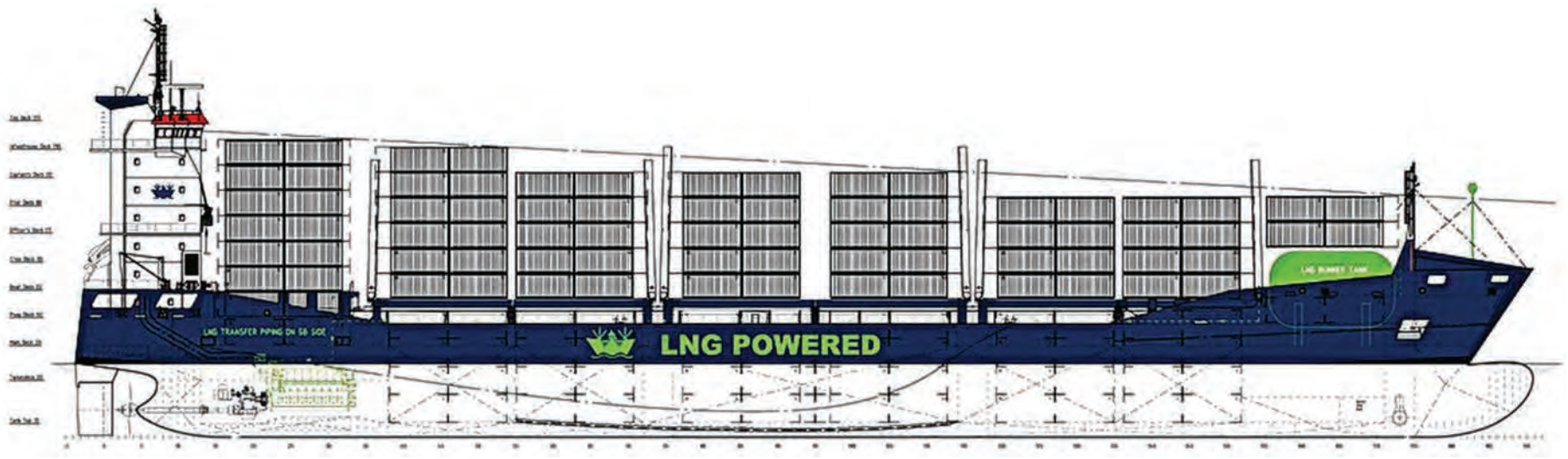
Beyond the Basic Dry Dock Training Course, the Dry Dock Conference provides additional training and exposure for personnel in the drydocking industry. Conference presentations given by various experts in the dry dock field will cover unusual, unique and problem dry dockings, launchings, and heavy lifts. Additionally, new facilities and ideas for the industry are introduced. The Dry Dock Conference is held every two years and the next conference is scheduled for 2017.

**www.drydocktraining.com**

# Green Shipping

## Challenges and Solutions from an Owner's POV

BY DIPL.-ING. PETER POSPIECH




(Image: Wessels GmbH)

**The graph of the Wes Amelie shows the LNG-tank location on the forecastle.**

International trade relies on transportation by sea, as about 85 percent of the freight volumes are shipped globally by vessels. But while maritime is widely regarded as the most environmentally benign of any transport system, maritime transport can cause a diverse environmental burden: It includes, beside the potential for damages and leaks, the inflow of waste water and, in particular, the emissions of air pollutants. Furthermore the improper cleaning of oil sludge, as well as the transfer of organisms into foreign ecosystems within ballast water.

The reduction of the environmental burden and the improvement of the environmental protection can be called in overview "Green Shipping." Central to these goals is the reduction of the greenhouse gas emissions (water vapor, methane gas, carbon dioxide, CFC and nitrous oxide). About 2.5 percent of the worldwide greenhouse gas emissions results by the sea transport. Tighter limit values have been introduced in certain areas to reduce the emissions. It is well known that since 2015 the sulfur content in fuel has been limited by 0.1 percent in the European emission controlled areas (ECA's). The existing fleet of ships must be retrofitted to conform with these thresholds. To do so vessels can be retrofitted with exhaust gas treatment systems or use low-emission fuels instead of using fuel with high sulfur content. Shipping experts expect a further increase of transports by sea as well as more air pollutants caused by vessels. So far the International Conventions as well as the on the EU-level agreed reduction of the greenhouse gases are not lasting enough.

### The River Ems-Axis-Region

The Ems-Axis-Region (Leer-Papenburg-Haren) is the second largest shipping location of Germany. Here, the shipping companies demonstrate an extraordinary high economic dynamic. With a number of 43-strong multi-purpose cargo fleet is the Wessels Reederei GmbH, located in Haren at the Ems, one of the biggest German fleet owner of coaster. We had the opportunity to talk to Gerd Wessels, CEO of the Wessels Group, about "Green Shipping":

**Mr Wessels, sustainability in your organization has a very big importance. What do you understand by "Green Shipping"?**

Green Shipping for us is to take all measures to protect the environment in shipping. We are focussing on the reduction of pollutant emissions of the used drive technologies and fuels. It is furthermore important to limit the illegal disposal of oil sludge and the reduction


(Image: PPM News Service Pospiech)

**Gerd Wessels, the 45 year old CEO of the Wessels Reederei GmbH, was elected in 2013 as Chairman of the Environmental Committee of the Technical Advisory Board of DNV GL. In this role he has championed a number of pioneering developments, such as the "Environmental Passport – Operation."**

# Gerd Wessels

Gerd Wessels (born 1971) studied shipbuilding and marine engineering at the Bremen University of Applied Sciences after graduating from high school and apprenticeship. He gained valuable experience while studying as a classification surveyor at Germanischer Lloyd, a company with which he still works closely today as the chairman of the GL Environmental Committee. After two years in a position of responsibility in the family business, Gerd Wessels took over the management of the Wessels group from his father on December 31, 2004 at the age of 33. As his father anticipated, he brought fresh ideas to the company by increasing its efficiency, which successfully led to new areas of business. Gerd Wessels has focused primarily on new construction and the rejuvenation of the fleet as well as the expansion of the business into Asia. For him, the term "responsibility" includes protecting the environment in addition to securing the future of the company. The highest priority for this father of two is therefore the sustainability of his actions.

of waste disposal on sea as well as the discharge of wastewater. The reduction of emission values and the development of new, as well as the use of alternative drive solutions play a major role for us. In this regard we are continuously searching for new possibilities.

**With which measures do you counter the most important environmental impacts?**

We have produced continuously during recent years a series of innovations, which ensures sustainability in the shipping sector. One good example is the SkySails-Technology which we (adopted) in 2007 as the worldwide first shipping company supported and promoted – that was an important milestone of Green Shipping.

Additional cooperation in research projects to increase wind supported ship propulsion, e.g. during the starting phase with Mariko ( the Maritime Kompetenzzentrum in Leer) with the topic of innovative Wind Hybrid Coaster followed since that time. The improvement of the ship propulsion with the consequent and optimal power exploitation is consistently in our focus.

Meanwhile we have equipped 11 vessels of the type Rhein-M with Schneekluth-ducts, with this we safe 200 to 400 liter heavy fuel per day per ship (the mounting of the Schneekluth WED & spoilers effects a hitchless and linear water stream to the propeller). Further retrofits with this special fuel saving ducts will be done in the next future.

Our avtivities so far reach from establishing propulsion increasing measures to software launch and energy efficiency increase as well as the development of alternative propulsion systems.

Our latest and newest project for more environmental protection in shipping is the retrofit of our container vessel Wes Amelie (1,036 TEU) for the use with natural gas; this will be the first worldwide retrofit of a container vessel from heavy fuel to natural gas. In cooperation with MAN D&T, and Marine Gas Engineering (TGE), we checked all aspects during the last two years of a possible retrofit of the drive line of our 1,000 TEU-container vessels from heavy fuel to natural gas. We also checked the installation possibilities of scrubber systems. At the end we decided not to use the scrubber, instead the natural gas. Scrubbers have a significantly poorer environmental balance compared to natural gas – and they extend the use of heavy fuel. Furthermore, in regards to scrubber, the use of open-loop and closed-loop systems in different national shipping areas is not clear. Therefore, from our point of view, the future course shall

be alternative fuels like natural gas.

But to finance such a retrofit for the use of natural gas is the most important challenge. It is much more expensive and complex than the installation of a scrubber system. In addition to ones own equity, external financial support is necessary – at least with the first retrofits.

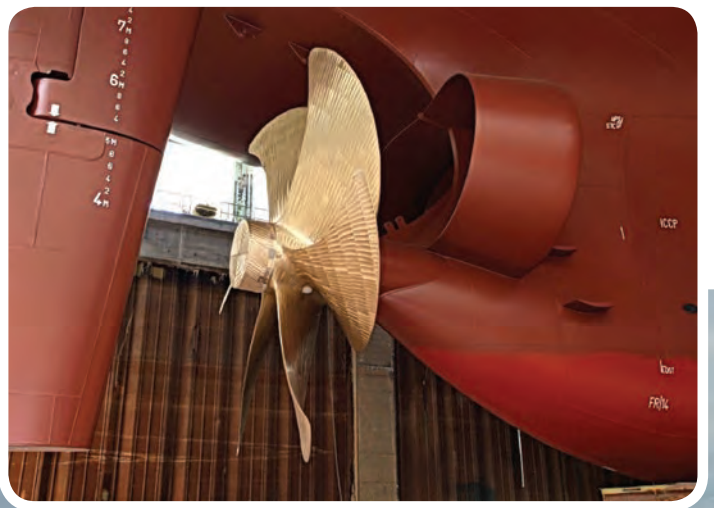
**If I understand you correct Wes Amelie will not be the only vessels which you are going to convert?**

Right. We paid a lot of attention to achieve a high multiplier effect, in other words: possible follow-up projects can benefit from this first conversion. Because of this we choosed our Wes Amelie which is a 1,000 TEU feeder vessels. This young vessel has been built in large series. They are mostly navigating in the European feeder traffic, and 16 identical sister ships are available for such a natural gas conversion. All these vessels feature the same main engine type from MAN which have been converted succesfully in numerous landside gensets towards the use of natural gas. Thus, valuable practical experience and know-how could be gained in advance for our following conversion. I am convinced that vessels from other shipping companies can benefit from the experiences we will have. Future conversion will be profitable with the possible increase of quantity. In general, further gas conversion projects may substantially reduce the budget. A financial support could be obsolete under these parameters in the long-term.

**The existing LNG-infrastructure, also in highly frequented ports, is insufficient for supplying seagoing vessels. In your opinion, what must be done to reduce this situation?**

The expansion of natural gas for the shipping industry suffers from a – this can be seen also in other areas – known phenomenon: the so called "chicken-and-egg-problem." In other words: without an actual demand there will be not a robust LNG-infrastructure and vice versa. The financial incentives for both sides are too small and the entrepreneurial risks are too high to become active. Particularly at the tight state of the market, and the insufficient LNG-infrastructure, no one of the owner is prepared to take the full investment risk. Our actual gas project is therefore intended to create important impulses for the formation of a strong LNG- demand structure. We are convinced: the gradual modification of vessels, which are already in service will stimulate the demand for natural gas and also the urgently necessary extension of the LNG-infrastructure.

**Right: "Meanwhile we have equipped eleven vessels of the type Rhein-M with Schneekluth-ducts. With this we safe 200 to 400 liter heavy fuel per day per ship," said Gerd Wessels.(the mounting of the Schneekluth WED & spoilers effects a hitchless and linear water stream to the propeller).**



**Below: The retrofit of Wes Amelie (1,036 TEU) for the use with natural gas, will be the worldwide first conversion of a container vessel from heavy fuel to natural gas.**


(Images: Wessels GmbH)

# PBES to begin Norwegian production early 2016

By Grant Brown, Vice President Marketing,
Plan B Energy Storage

*"We've learned that doing things right from the beginning will save a lot of money and headaches later on as our company scales up production with the right infrastructure in place."*

**– Brent Perry, CEO, PBES**

Plan B Energy Storage (PBES) will begin manufacturing batteries in Trondheim, Norway early in 2016 to better meet demand from Northern European markets.

PBES, known for its team of highly qualified and experienced engineers, has developed what they call Safe Energy Storage: the ability to fully contain thermal events in a battery that would simply destroy other systems. This patent pending system has been vetted and validated by leaders in commercial marine propulsion systems and begins production in Trondheim early in 2016.

"PBES is well poised for manufacturing and deployment in Europe," commented PBES chief executive officer Brent Perry."We've learned that doing things right from the beginning will save a lot of money and headaches later on as our company scales up production with the right infrastructure in place."

"Engineering our battery's unique thermal stability and safety was very challenging for our team. Laying down the manufacturing with the right people is also hard. Being able to manufacture and service the product efficiently is the next challenge, and we've executed on all three in a short period of time."

PBES nabbed industry veteran Erik Ianssen, former CEO of Selfa Arctic AS, to spearhead the company's industrial marine markets in Norway. A boat builder known for his innovations, such as the fully electric fishing vessel Elmax 1099, Ianssen has a reputation for best-in-class quality products and has extensive knowledge of the local marine business.

"The opening of the Norwegian office of PBES could not have come at a better time," said Ianssen. "As the market for energy storage in Europe rapidly grows, it makes sense to have local production, distribution and service. The proximity to the market will enhance the level and speed of service we are able to provide. With the PBES energy storage system, we will continue to help players in the marine industry become sustainable, both environmentally and economically."

In addition to Ianssen, the rest of the business development staff at PBES is also world class. Internally referred to as the solutions team, they consist of other industry experts from a variety of backgrounds, all focussed on finding the right energy storage solution for their customer's specific application. The mantra of providing solutions for their customers extends to all areas of the company. Everything from engineering a best in class product, to providing best in class supportis looked at from the perspective of service to the customer. PBES is poised to dominate the Northern European energy storage industry. "We've done it before," said Perry, "we are doing it again, only this time we are even more focussed on the needs of our partners and customers."

Perry, who recently spoke at the COP21 United Nations Climate Change Conference, is a lithium battery safety and technology expert. His efforts in bringing battery technology to the commercial marine sector have lead to the creation of the electric marine industry. He has been directly involved in virtually all of the most significant hybrid and electric marine systems on the water today and has been called the Elon Musk of the marine industry.


Leading lamp: Norway's first battery powered ferry, the Ampere, marks a year of crossings.

Photo: handout Norled/Lars Jacob Engelsen of Norled)

# ZERO

# Norway's Battery Charges

BY WILLIAM STOICHEVSKI

**What do a global climate conference, two Canadian energy storage companies and 12 Norwegian ferry tenders have in common? They might change shipping.**

Lashed to the European Union (the EU), Norway is on a battery-charged "clean fleets" drive which coincides with new EU emissions rules that preempt International Maritime Organization (IMO) consensus on how to pollute less. The best marine battery minds are now in Norway, and it's all in-line with IMO states agreeing in Paris this past December to set national emissions goals.

If the Norwegians have their way, ship owners and operators could soon have another way to pollute less and cut fuels costs. Norway is incubating the world's marine energy-storage expertise and keeping them interested with a number of incentives: cash and access to its powerful fleets and famous yards. Oslo is betting its "battery forum" will tip the scales away from other marine green-tech.

The first stately move toward battery dominance is applying 2.3 billion kroner of a 67 billion kroner "climate fund" and 500 million of its nitrogen-oxide (NOx tax) fund in support of near-shore, zero-emissions shipping technology — starting with ferry tenders. In 2015, ferry operator NORLED AS steamed its "fully electrified" 120-car ferry on shore charges of cheap, plentiful Norwegian hydropower, and now landing stages that recharge provide the template for port plug-ins across Europe. Ports are at the heart of Europe's clean-cities campaign.

## Battery Forum

Still Europe's No. 1 petroleum supplier, Norway could now become a world energy-storage giant — its pipelines to Europe augmented by battery production lines. It's the goal now being realized by the Who's Who of battery power recently assembled here.

Foremost are the Canadian engineers behind heavyweight PBES. They join a burgeoning Norway-focused battery forum that includes compatriot company Corvus Energy, a business founded by the founders of PBES. The Canadians' arrival means "the pieces are now in place." Others include ZEM, an outfit very near class standard bearer DNV GL. Propulsion and shore-charge experts ABB and Cavotec round out the heavyweights working here on solutions for ferries, offshore vessels, work boats and fishing vessels.

"There's a lot of great products out

# Mounting risks of BWTS non-compliance for shipowners

**By Tom Perlich, President and Founder of Ecochlor**

The IMO recently announced that the combined fleet tonnage of the ratifying countries is still not sufficient to reach the 35% necessary to ratify the Ballast Water Management Convention (BWMC). Panama, whose fleet has sufficient tonnage to reach the threshold, announced in early January that they were confident their parliament would ratify before the IMO's Marine Environment Protection Committee meeting in April. If this occurs, the BWMC would enter into force 12 months after Panama's ratification.

Currently, 32 manufacturers have submitted a "Letter of Intent" to perform USCG Type Approval testing. To date, only three have completed testing and submitted an application to the USCG; all of which use ultraviolet (UV) technology. In late 2015, the USCG's Marine Safety Center informed those manufacturers that their testing method, Most Probable Number (MPN), is not equivalent to the method outlined in the ETV Protocol and would not be accepted for Type Approval at this time.

This ruling has led shipowners to more closely examine BWT systems that are undergoing testing for USCG Type Approval. Additionally, the rigorous testing protocols required by the U.S. have shipowners questioning the objectivity of the IMO G8 Type Approval.

For vessels operating in U.S. waters, both the EPA Vessel General Permit (VGP) and USCG regulations are already in effect. With no USCG Type Approved system yet on the market, the operation of a BWTS that has received USCG Alternate Management System (AMS) acceptance can be used until a BWTS is Type Approved. Any vessel operating USCG AMS accepted systems in U.S. waters will also have to comply with the EPA Vessel General Permit (VGP), which initially requires semi-annual testing of ballast water discharge.

With IMO ratification on the horizon, and U.S. regulatory requirements already in effect, there are mounting risks of non-compliance.

**Challenges for the BWTS manufacturer**

Many shipowners have delayed the purchase of BWTS. The closer to ratification they wait, the more difficulty the owners will have with planning and negotiating a cost-effective, timely solution for their fleet. The question that shipowners keep asking manufacturers is, "How are you going to keep up with the demand?"

Ecochlor has actively and aggressively pursued Classification and Type Approvals, with the expectation to finish land-based and shipboard USCG Type Approval testing in Q1 of 2016 and plans to submit the application upon receipt of the report from the Independent Laboratory.

Ecochlor has been standardizing manufacturing and production to increase the current build capability from 180 annually to meet the escalation in need for the future. Additionally, the installation process is flexible; it can be performed with a riding crew, eliminating the need for a scheduled dry dock.

In January 2016, Ecochlor signed an agreement with Drew Marine to provide logistics support for the resupply of BWTS precursor chemicals at select ports worldwide, as well as offer technical support to ships fitted with the Ecochlor technology.

The Ecochlor team is also working closely with engineering firms that are familiar with their BWTS and currectly have relationships with shipyards worldwide.

**What shipowners can do to prepare**

With more than 50,000 vessels that will soon require a BWTS there are many steps that a shipowner can do now to prepare.


*"Shipowners should investigate well in advance the feasibility of retrofit installation of BWMS on board their vessels with evaluation of the results of 3D laser scanning. There are multiple advantages with relatively small capital investment involved. Evaluation of installation effort and costs, clarification of installation difficulties and initial discussion with Classification Societies regarding installation approval are only some of them,"* said Andreas Kokkotos, Co-founder of Argo Navis Marine Consulting & Engineering.

John P Dooley, President of Choice Ballast Solutions advised, *"The biggest risk factor for compliance is the project timeline. Time delays for execution of the overall project often impact the available time for proper integration engineering, detailed fabrication drawings and class approvals. Proper planning of the engineering effort is essential for a successful installation of a BWTS either at dry dock or at sea."*

there, but they're being put into the wrong applications," says PBES Global's vice-president of marketing, Grant Brown. Skyping us from a Starbucks in B.C., Canada, Brown confirms PBES is nearing battery production in Norway.

With cash dispersals from stately incubator entity, Enova, companies will be paid to do battery R&D in Norway, helped by contributions from charterers, operators, yards and the Norwegian government, with its NOx and climate funds.

Under that umbrella, PBES is building its production operation here under the business leadership of a Norwegian CEO known for launching dozens of fishing vessels, including a battery-only trawler.

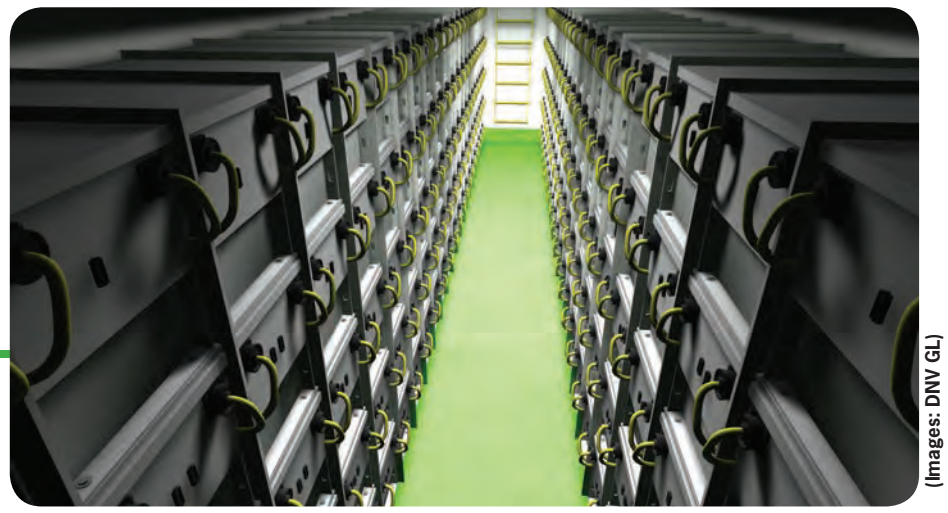
"We're working with the top five integrators, the big players with thousands of employees with whom we've developed relations over years," says Brown. "They're validating what we're doing by coming to Vancouver to observe fire and performance testing, and they're seeing we've come up with excellent criteria (for testing)."

Lithium batteries are prone to overheating. If rated to 4.7 volts, each cell may not go beyond that. At 5.4 V, shorts on the inside can reach thermal runaway "which is unstoppable in a standard lithium battery."

"One cell goes and the adjacent cells do it too. On a boat, it's a very bad place for this to happen," says Brown. PBES has commercialized its "thermal runaway" suppression system for lithium ion batteries of kilowatt and megawatt capacities. The company now has three trademark battery safety systems they say are "the template for energy storage the next twenty years."

As we wrote these lines, four parked Norwegian electric buses were being heavily damaged by fire attributed to overnight charging. In Sweden, a violent explosion forced authorities to stop some battery R&D. Discharged hydrogen gas building up in confined spaces is also a worry. In the PBES battery, cooling systems are in place and thermal energy is "pulled out" to render the battery "like a brick".

In a joint statement by the Norwegian



**Power banks**
**Battery cells aboard a conceptualized electric vessel.**

(Images: DNV GL)


**Recharge**
**Artist's impression of port battery charging operation.**

(Images: DNV GL)

Fisheries and Finance ministries, an extra 100 million kroner was earmarked for the type of "user-guided innovation arenas" PBES and others have become a part of here.

There is also 134 million kroner available for green-tech pilots. It all, 330 million kroner and from 12 to 120 ferry crossings are the carrot. Extra opportunity exists in the 40 electric vessels DNV GL says are ordered worldwide. Nevertheless, Cavotec, Corvus Energy, Schneider Electric and DNV GL recently opened the first charging station for offshore service vessels in Bergen, despite Europe ferries, for now, being "a huge opportunity", as landing stages and "zero-emissions" ports become part of the coming national emissions math as taught by EU politicians and Paris climate plenipotentiaries.

## Rules and Dates

Subsidies for Norwegian battery power, allowed by the EU, will help Norway's ships and yards compete by helping world fleets comply with emissions rules. In Paris, Norway and the EU promised 30 percent fewer emissions by 2030, a joint platform attributed to much of the Norwegian fleet being flagged in the EU and to Norway — an EU outsider paying the Continent for market access — doing the EU's bidding.

The EU on 1 July 2015 began monitoring, reporting and verification (MRV) of the carbon dioxide produced by ships entering its waters. For ships over 5,000 t, per-voyage MRV starts in January 2018. It's a preempting of IMO efforts to find its own pollution-control mechanism: emissions cuts; a fuel levy or EU-style emissions trading. By August 2017, owners and operators must submit an emissions monitoring plan to EU port authorities, for use in January 2018, when ship owners will also have to report their energy efficiency design index, or EEDI (fuel use divided by cargo size). By 2020, EEDI Phase 2 (20 percent "greener" vessels) will coincide with a 0.5 percent sulfur cap on emissions for European waters. By 2025, some ship owners will face EEDI Phase 3 (30 percent cleaner) and a possible global 0.5-percent sulfur cap.

As of now, the IMO's Tier III NOx rules force all new-builds hoping to trade in the United States to have exhaust-gas or catalytic scrubbers onboard, and now half of all IMO rulemaking of the past decade is climate related. When regulation by 2020 begins feeling like strangulation, battery retrofits could become the way to go, and the World Energy Council forecasts a 70-percent drop in energy storage costs by 2030.

## Green Ferries

A new EU recycling directive (no beaching) and a Norwegian government deposit (of 2 million kroner to scuttle ships over 30) seem to compel fleet renewal. Scrapping ships, Oslo says, will spare us 200,000 t of CO2 and 4,000 t of NOx per year.

For now, Norled AS — operator of the Ampere, Norway's first battery-powered ferry — is celebrating a year of charging cells from shore. All has gone shock-free. "In the introductory phase, there were a number of adjustments that had to be made, but (during operations) we have had very good regularity on the crossing. The (10t Corvus battery) technology works," says Norled deputy director, Lars Jacob Engelsen.

# Waste Away

As commercial vessels are increasingly pressed to clean up their ops, solid and liquid waste management onboard has never been as important. **Andrew Korney** of Terragon Environmental Technologies shares his perspectives on evolutions of the market,

BY GREG TRAUTHWEIN

Terragon is a Canadian company whose mission is to develop and commercialize products to enable the zero-waste discharge vessel, which it aims to accomplish through a number of proprietary systems, including:

- **MAGS:** The Micro Auto Gasification System (MAGS) transforms shipboard garbage and oil sludges into useful energy for use by the vessel;
- **WETT:** The Wastewater Electrochemical Treatment Technology (WETT) cleans grey, black, and oily wastewater for reuse or discharge.
- **STEP:** The System for Total Environmental Protection (STEP) is the implementation of both MAGS and WETT, and is Terragon's concept for the zero-waste discharge vessel – all waste streams are used to produce energy or clean water for reuse.

The innovative technology from Terragon has steadily matured over the past few year and according to Korney the last 12 months have been particularly eventful. "We've continued to make excellent headway in all of the market sectors we are focused on, however, we've had a particular growth within the commercial marine sector," he said. "In 2015, we installed two MAGS MV7 systems; one with Maersk Supply Service, and the other with Matson. Towards the end of the year, we finalized the design for our latest model of MAGS – the V8 and MV8 – and have contracted to supply these new models with– Maersk Line Limited, Crystal Cruises, and Lindblad Expeditions.

While shipowners have traditionally been reticent to install 'new' technology onboard commercial vessels, a long list of new regulations regarding emissions from vessels at sea have forced many traditionalist to explore new lines of thought.

"One of our biggest challenges was fighting the mentality of 'We've always done it this way'," said Korney. "Changing a mind-set or trying to introduce a technology in a place where no problem is perceived to be, can be tough. However, as the industry looks to the future in terms of owning and operating more efficient and environmentally friendly vessels, has helped us greatly. The idea of future compliance, keeps folks listening and thinking."

"All human operations generate waste, whether it is on a ship or on land; however ships cannot simply dispose of garbage at sea, and must follow the regulations laid out in MARPOL Annex V," said Korney. "MAGS will not only reduce the waste volume by more than 95%, it will generate useful energy from this waste that can be integrated onboard the vessel, increasing overall efficiency."

In addition to its efficiency enhancing capabilities onboard the ship, it could also eliminate the potential headaches involved with land-side disposal, namely the cost and the logistical problems encountered when land-side reception facilities are inadequate.

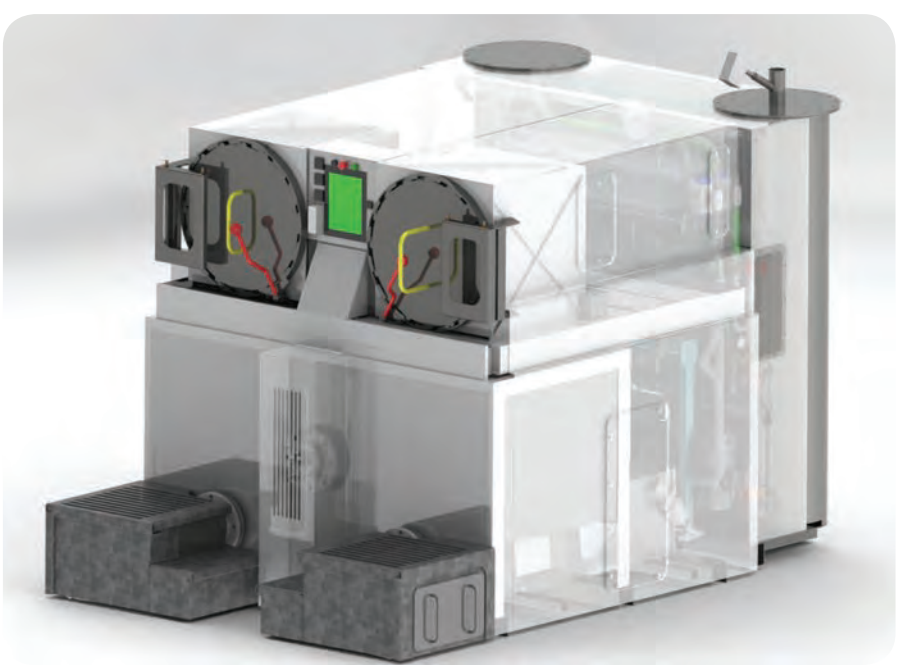
"Aside from a more complete solution for waste management, provided by MAGS, it also has exceptionally clean emissions" added Korney. "The Marine Environmental Protection Committee (MEPC) has directed the Pollution, Prevention, and Response Group 3 to develop a proper category, and regulation for technologies like MAGS, that have better environmental performance, efficiency, and pose less fire and safety risks."

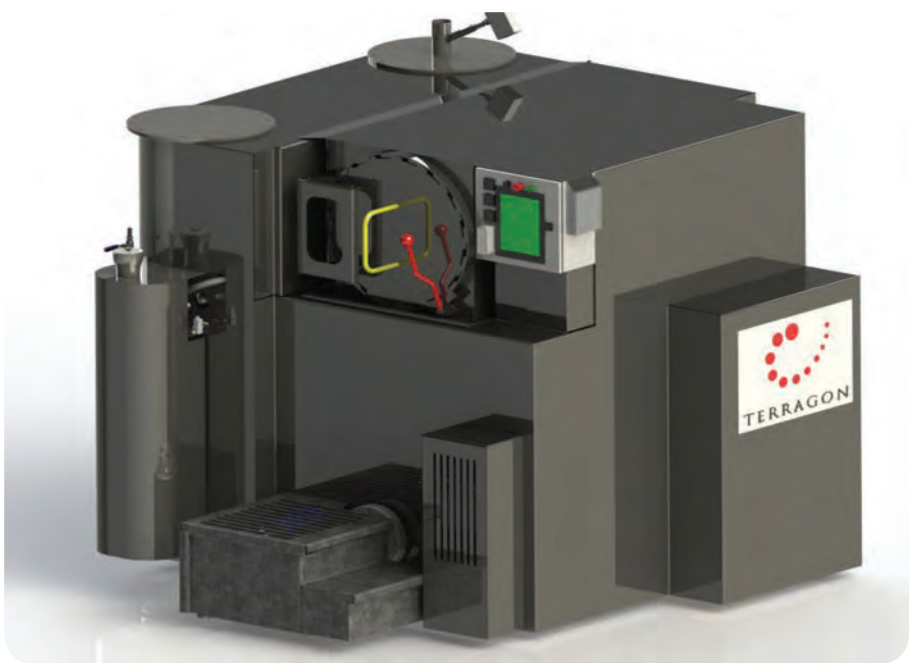
But as nearly any other new player in the maritime market could attest, one of the biggest challenges apart from proving technology is working the technology into the mainstream for owners, builders and designers. "One of our biggest challenges has been introducing the technology to shipyards for the inclusion of MAGS, as an option, into vessel designs," said Korney. "We've been lucky that many ship-owners have included us on their Maker's Lists, so we are given the opportunity to bid. But, as existing designs do not include our technologies, in some cases the shipyards demand a very high design-change fee from the shipowner, which hurts the overall ROI. It comes down to a split-incentive: some shipyards want to be build the lowest cost vessel, regardless if the equipment installed gives the best operational benefits to the owner and/or operator; a similar situation can exist between shipowners and charterers. We need to find ways to share the incentives and benefits that will enable each interested party to reap rewards on the initial investment of technologies, as well as once in operation.

## The Path Ahead

While the maritime industry is a tumultuous market for even the most seasoned players, Korney and the Terragon crew see plenty of opportunity given the ongoing demand for cleaner shipboard

**"Towards the end of the year, we finalized the design for our latest model of MAGS – the V8 and MV8 – and have contracted to supply these new models with– Maersk Line Limited, Crystal Cruises, and Lindblad Expeditions," said Andrew Korney**





operations.

"We continue to install more systems globally, our challenge lies in expanding our operations to meet this growth," said Korney. To that end, Terragon continues to find, make and build relationship globally with capable companies that are geared to help it grow sales, manufacturing and servicing. "The marine industry doesn't stop at 5 p.m. or weekends, we will ensure our customers can reach us at any time of the day or night, anywhere, for whatever they may need."

He said MAGS has been operating onboard commercial and Naval ships since 2010. "With the Navy ship, we've seen a drastic reduction in not only the cost of shore disposal of garbage, but also a reduction in time the crew spends handling and managing waste," said Korney.

"The same goes for commercial vessels, although they have smaller number of crew onboard. There is also less of a need to separate waste, as MAGS can accept any mixed bag of organic, combustible waste; where some other technologies have trouble with high water content, plastics and so on."

While the maritime world is diverse and scattered, Korney said there are some unifying themes among early adopters of the Terragon solution, including:

- First and foremost, the need to reduce waste management costs is a priority – including shore disposal costs.
- To lower the environmental impact of the vessel –less greenhouse gas emissions, reduction of reliance on fossil fuels, and to some degree reduced fire and safety hazards.
- A yearn to become familiar with emerging technologies, which they feel will help them stay ahead of the pack on the regulation front.

"To try and categorize this into a market niche only represents a small piece to the story – but generally we could deduce that smaller cruise and exploration vessels, and/or ships trading in sensitive environmental areas of the world are highly interested," said Korney. "That said, we still have many others from the industry wanting to learn more and demonstrate the technology within their fleet – offshore, accommodation rigs, deep sea and more."

**Andrew Korney of Terragon Environmental Technologies.**

# Japan Coast Guard

In step with Sea Japan 2016, *Maritime Reporter & Engineering News* had the opportunity to interview **VADM Satoshi NAKAJIMA**, Vice Commandant for Operations, Japan Coast Guard.

BY GREG TRAUTHWEIN

## Please discuss the history of the Japan Coast Guard.

Immediately after the end of World War II, maritime security and the safety of ship operations were both deteriorated significantly in waters around Japan. Crime became widespread, while marine navigational aids and other establishments were destroyed. Many sea mines, which threatened ship operations, were planted. To deal with these situations, there was an urgent need for Japan to enhance its coast guard capabilities.

To address these challenges, the government of Japan was considering establishing a consolidated coast guard system. Not by reinforcing existing organizations, Tokyo rather insisted that it set up a single organization authorized to have centralized control over the management and operation of vessels and other facilities, and to comprehensively and wholly supervise all administrative affairs having to do with ensuring the safety of ship navigations and maintaining public order at sea.

In February 1946, United States Coast Guard (USCG) Capt. Frank Meals came to Japan, providing advice and recommendations similar to what the government of Japan was claiming in those days. As a consequence, the JCG, which was called the Maritime Safety Agency at that time, was established on May 1, 1948.

On May 12, 1948, Mr. Takeo Okubo, first Commandant of the Maritime Safety Agency, flew the agency's official flag on the rooftop floor of the official building. Today, the JCG commemorates its foundation on May 12 every year.

## What are the primary missions of the Japan Coast Guard?

It is the JCG's mission to ensure maritime safety and security.

To fulfill this mission, the JCG is performing a wide variety of duties on the stage of vast oceans. While enhancing our partnerships and cooperation with relevant domestic authorities and overseas organizations, we strive to ensure security; organize rescue operations; conserve the natural environment; deal with natural disasters; conduct marine surveys; gather, manage and provide information and ensure safety for ship traffic; among others.

## What are important tasks for the JCG in 2016?

First, the JCG will develop a strategic maritime security system.

We will soundly promote the development of a strategic maritime security system to be able to make every possible effort to guard waters around the Senkaku Islands and crack down on fishing boats from other countries and regions in those waters, and to deal seamlessly with various suspicious activities, behaviors and other occurrences in Japan's territorial waters, including that surrounding our remote islands and the waters of the farthest reaches of Japan.

Second, the JCG will help maintain public order at sea as stipulated under the rule of law.

To share the importance of maintaining public order at sea with other Asian economies, help them enhance their coast guard capabilities and reinforce our cooperative relations with them, we will enrich our newly launched Maritime Safety and Security Policy Program (a master's course) and improve other aspects of our education and research infrastructure. We will also organize workshops on maritime security, hoping that we will become an international base from which human resources will be cultivated for the field of Asia's maritime security.

Our third important task is to defend Japan's maritime interests and ensure safety at sea.

To secure Japan's maritime interests and ensure safety at sea, we will continue to promote our extensive and detailed maritime surveys. We will also enrich a system and take other actions to be able to analyze and process

Japan

necessary information and take other necessary steps under centralized management of information obtained from the maritime surveys.

Our fourth important task is to build a consolidated maritime traffic control mechanism and undertake disaster-prevention measures to protect Aids to Navigation.

We will consolidate the Tokyo Wan Vessel Traffic Service Center and the traffic control offices of each port and build a mechanism to take over and perform their tasks altogether in order to give warnings and other notifications and provide information such as evacuated areas to vessels immediately and accurately in case tsunamis and other major disasters occur in Tokyo Bay, which is congested with vessel traffic.

We will also undertake measures to protect Aids to Navigation from disasters, which is necessary for safety navigation of vessels, in order to ensure the safety of seaborne transport routes in the event of disasters.

In 2016, Japan will host the annual G7 Summit Meeting. The waters near the venue of the Ise-Shima Summit are complicated, having many small and large islands, bays and shallows, where fishery and other businesses, such as pearl cultivation, are active. We believe that it is necessary to take all possible actions to perform maritime security duties, while obtaining understanding and consent from local residents and cooperating tightly with relevant organizations.

## Please discuss the size and scale of the JCG shipbuilding plan today?

Under construction, as of February 1, 2016, are 20 vessels, including nine large, six medium and three small patrol vessels as well as two patrol boats.

The vessels are being built at the Shimonoseki Shipyard and Machinery Works of Mitsubishi Heavy Industries, Ltd.; the Tamano Works of Mitsui Engineering and Shipbuilding Co., Ltd.; the Yokohama Shipyard (the Isogo Works) of Japan Marine United Corporation and other shipyards.

## What is the key to being more proficient with the human assets under your command?

I feel that officers and other employees at the JCG are all highly capable. However, there is a limit to what individuals can do. As such, it is important to deal with things in an organized way and cooperate organically.

I think that it is important to this end for them to have awareness of various issues, think for themselves and express opinions.

**(Continued on page 58)**

## VADM Satoshi NAKAJIMA

***Vice Commandant for Operations***
***Japan Coast Guard***

**Date of Birth:** May 1956

**Education:** Graduated from Japan Coast Guard Academy in March 1979

**Assignment History:**

April 2015: Vice Commandant for Operations (Current Assignment)
April 2014: Director General of Guard and Rescue Department, Japan Coast Guard Headquarters
April 2013: Commander of 11th Regional Coast Guard Headquarters
April 2012: Commander of 4th Regional Coast Guard Headquarters
April 2011: Director of Administration Division, Guard and Rescue Department, Japan Coast Guard Headquarters
April 2008: Director of Security Intelligence Division, Guard and Rescue Department, Japan Coast Guard Headquarters
April 2007: Director of Info-Communications Planning Division, Administration Department, Japan Coast Guard Headquarters
April 2006: Director of Guard and Rescue Department, 8th Regional Coast Guard Headquarters

# Sea Japan 2016 JAPAN PAVILION

Supported by THE NIPPON FOUNDATION

The Japan Ship Machinery and Equipment Association (JSMEA) will take part in this year's Sea Japan, the 12th edition of Japan's leading marine industry event. With financial support from The Nippon Foundation and the Ministry of Land, Infrastructure, Transport and Tourism (MLIT), JSMEA will showcase its member companies' products and services at the Japan pavilion as part of the Japanese maritime cluster.

The Japan pavilion will occupy a space of some 3,000 square meters at the center of the exhibition. In the thematic zone of the pavilion, members of the Japanese maritime cluster will showcase Japan's cutting-edge technologies and developments to the world. Exhibits will include the Kaiko 7000II, an unmanned underwater probe capable of reaching depths of 7,000 meters; an underwater robot called "Hobarin," which is an autonomous underwater vehicle that can hover in place underwater much like a helicopter; and models of offshore floating drilling facilities.

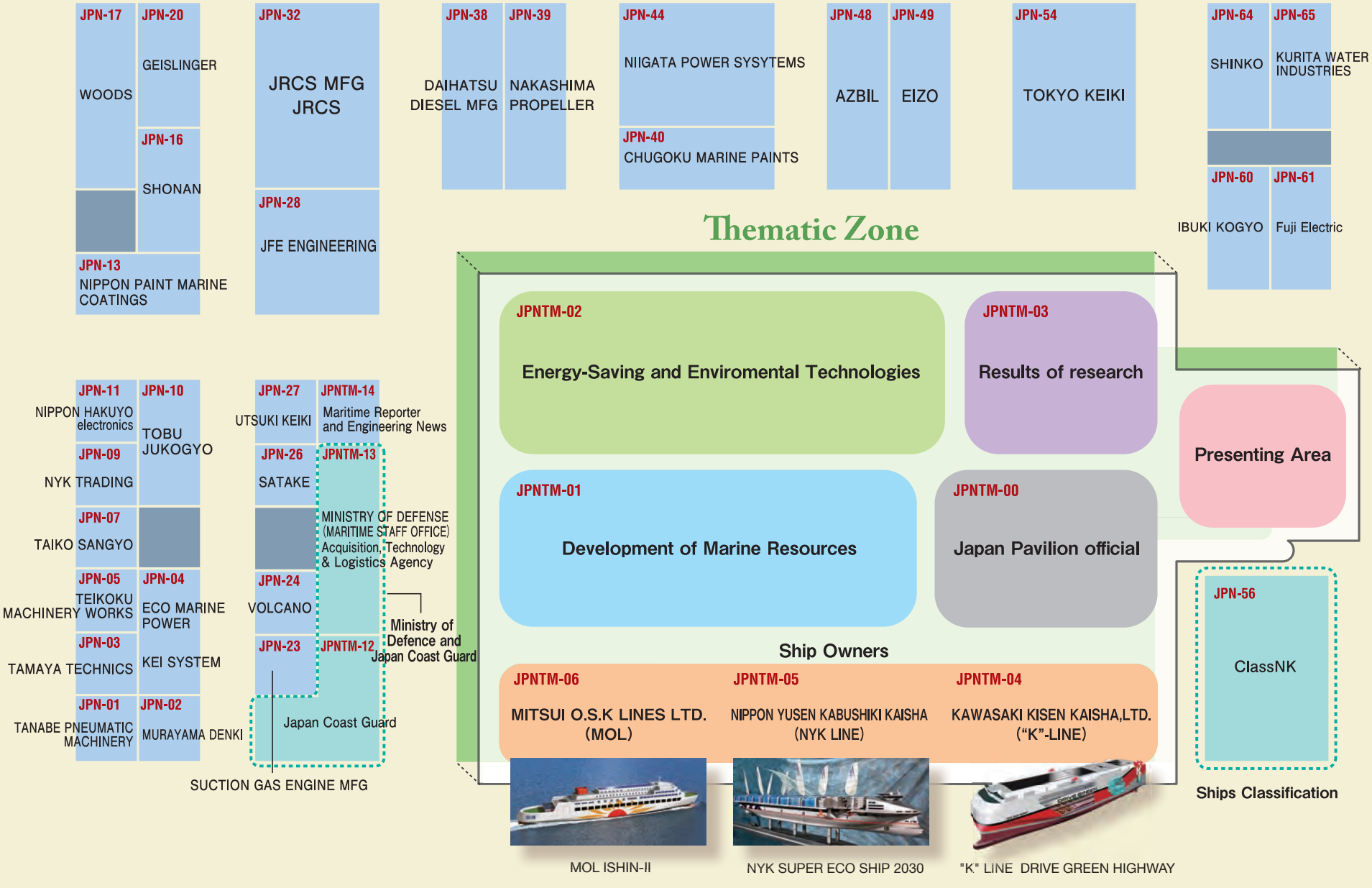
In addition, there will be exhibits showing Japan's technologies for exploiting marine resources and for saving energy and protecting the natural environment. Also to be unveiled will be the results of industry-academia-government joint research projects, whose participants include universities and colleges as well as research institutes.

To help visitors better appreciate the unique characteristics and significance of various ships, the Ministry of Defense (MOD), the Japan Coast Guard (JCG) and leading shipping companies will display ship models and other materials.

A program of conferences and seminars will be held, with key figures from Japan and other nations giving presentations. They will focus on, among other subjects, MLIT's efforts on environmental protection in the field of maritime affairs; the marine policies promoted by Norway, which is an advanced nation in terms of maritime affairs as well as joint actions taken by the public and private sectors; and the approaches of the maritime sectors of Japan and Germany on big data and the Internet of Things (IoT).

JSMEA strongly hopes that visitors to Sea Japan 2016 will take the time to visit the Japan pavilion to learn more about the strength of Japan's maritime cluster and its production of state-of-the-art technologies.

## *Japan Pavilion Layout*



## I. The thematic zone will include the following areas of interest:

(1) Vessels of Japanese shipping companies in which latest technologies have been adopted;
(2) Exploitation of marine sources;
(3) Technologies for saving energy;
(4) Technologies for protecting the natural environment and saving energy;
(5) Results of research (e.g., industry-academia-government joint research projects); and
(6) Exhibition of ships

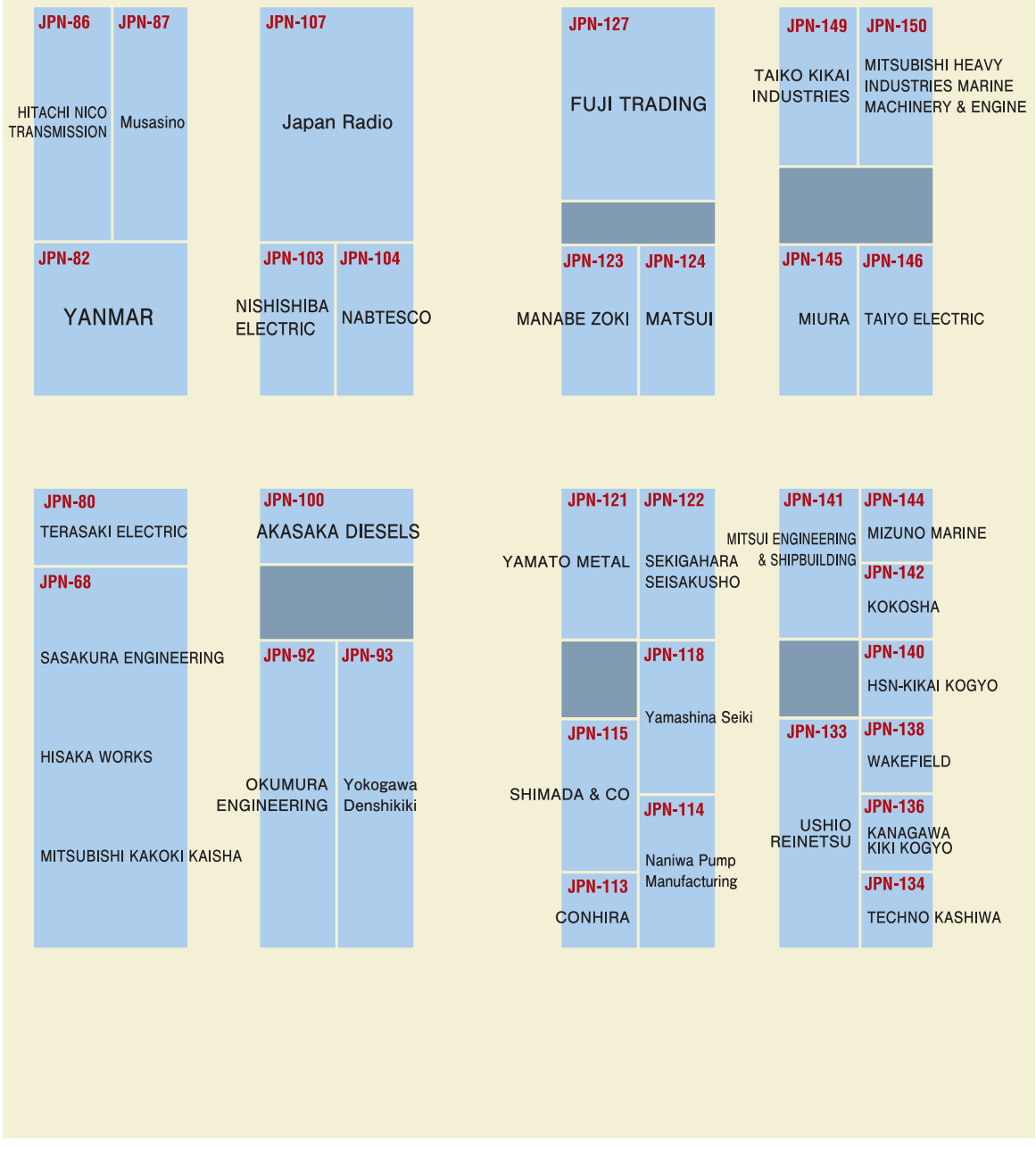
## II. Members of the Japanese maritime cluster

Ministry of Land, Infrastructure, Transport and Tourism (MLIT); Ministry of Defense (MOD); Japan Coast Guard (JCG); National Maritime Research Institute (NMRI); Japan Railway Construction, Transport and Technology Agency (JRTT); Japan Ship Technology Research Association (JSTRA); Nippon Kaiji Kyokai (ClassNK); Shipbuilding Research Centre of Japan (SRC); Nippon Yusen Kaisha (NYK); Mitsui O.S.K. Lines, Ltd. (MOL); Kawasaki Kisen Kaisha, Ltd. (“K” Line); The University of Tokyo; Tokyo University of Marine Science and Technology; Yokohama National University; The Shipbuilders’ Association of Japan (SAJ); The Cooperative Association of Japan Shipbuilders (CAJS); Japan Ship Machinery and Equipment Association (JSMEA); shipbuilding companies; ship machinery and equipment manufacturers and others

## III. Seminar schedules (see the next page)

Wednesday, April 13
Friday, April 15

Sea Japan 2014




## THE THEMATIC ZONE EXHIBITORS

| Stand No. | Theme | Company Name |
|---|---|---|
| JPNTM-00 | Japanese policy of maritime affairs | Ministry of Land, Infrastructure, Transport and Tourism (MLIT) |
| JPNTM-05 | Ship Owners | Nippon Yusen Kabushiki Kaisha (NYK LINE) |
| JPNTM-06 | | Mitsui O.S.K. Lines, Ltd. (MOL) |
| JPNTM-04 | | Kawasaki Kisen Kaisha, Ltd. ("K" LINE) |
| JPNTM-02 | Energy-Saving and Enviromental Technologies | AKASAKA DIESELS LIMITED |
| | | Alfa Laval |
| | | ASAHI SHIPPING CO., LTD. |
| | | CHUGOKU MARINE PAINTS,LTD. |
| | | DAIHATSU DIESEL MFG. CO., LTD. |
| | | Diesel United,Ltd. |
| | | FUJI ELECTRIC CO., LTD. |
| | | HITACHI NICO TRANSMISSION CO., LTD. |
| | | Japan Marine United Corporation |
| | | Kawasaki Heavy Industries, Ltd. |
| | | Maritime Innovation Japan Corporation |
| | | MITSUBISHI KAKOKI KAISHA, LTD. |
| | | Mitsui Engineering & Shipbuilding Co., Ltd. |
| | | Mitsui O.S.K. Lines, Ltd. (MOL) |
| | | NABTESCO |
| | | NAKASHIMA PROPELLER CO.,LTD. |
| | | NANIWA PUMP MFG. CO., LTD. |
| | | NGK INSULATORS LTD. |
| | | NIIGATA POWER SYSYTEMS CO., LTD. |
| | | NIPPON PAINT MARINE COATINGS CO., LTD. |
| | | Panasonic Environmental System Engineering Co.,Ltd |
| | | SATAKE CORPORATION |
| | | Shipbuilding Research Centre of Japan (SRC) |
| | | TAIKO SANGYO CO., LTD. |
| | | TAIYO ELECTRIC CO., LTD. |
| | | The Hanshin Diesel Works, Ltd. |
| | | YANMAR CO.,LTD. |
| JPNTM-01 | Development of Marine Resources | CHUGOKU MARINE PAINTS,LTD. |
| | | Inter Energy Co., Ltd. |
| | | Japan Marine United Corporation |
| | | Japan Radio Co., Ltd. |
| | | Kawasaki Heavy Industries, Ltd. |
| | | National Maritime Research Institute (NMRI) |
| | | NIHON MARUKO Co.,LTD. |
| | | NIPPON PAINT MARINE COATINGS CO., LTD. |
| | | Sasakura Engineering Co.,Ltd. |
| | | SHINKO IND. LTD. |
| | | Shipbuilding Research Centre of Japan (SRC) |
| | | Uzushio Electric Co., Ltd. |
| | Development of Marine Resources (Supporters) | Japan Oil, Gas and Metals National Corporation (JOGMEC) |
| | | Japan Agency for Marine-Earth Science and Technology (JAMSTEC) |
| | | INPEX CORPORATION (INPEX) |
| | | Japan Drilling Co.,Ltd. (JDC) |
| JPNTM-03 | Results of research | The University of Tokyo |
| | | Yokohama National University (YNU) |
| | | Tokyo University of Marine Science and Technology (Wind Challenger Project) |
| | | Japan Railway Construction, Transport and Technology Agency (JRTT) |
| | | Japan Ship Technology Research Association (JSTRA) |
| | | Marine Eingine Service Association of Japan (MESA) |
| | | AKASAKA DIESELS LIMITED |
| | | Kamome Propeller Co., Ltd. |
| | | KITA ENGINEERING |
| | | SMART SHIP APPLICATION PLATFORM PROJECT (SSAP PROJECT) |
| JPNTM-13 | Ministry of Defence and Japan Coast Guard | MINISTRY OF DEFENSE (MARITIME STAFF OFFICE) |
| | | Acquisition, Technology & Logistics Agency (ATLA) |
| | | Japan Coast Guard (JCG) |
| JPN-56 | Ships Classification | Nippon Kaiji Kyokai (ClassNK) |
| JPNTM-00 | Associations | The Shipbuilders’ Association of Japan (SAJ) |
| | | The Cooperative Association of Japan Shipbuilders (CAJS) |
| | | Japan Ship Machinery and Equipment Association (JSMEA) |

# International Maritime Seminar

## Challenges for Maritime Innovation ~Green Technologies and IoT~

Date: April 13 (Wed), 2016 Time: 9:30~12:30
Place: Tokyo Big Site
Host: Ministry of Land, Infrastructure, Transport and Tourism

| | | |
|---|---|---|
| 9:30 ⇩ 12:30 |  | [Key Note Speech]<br>**Norwegian Ministry of Trade, Industry and Fisheries**<br>Speaker:<br>Ms.Dilek Ayhan, State Secretary of Norwegian Ministry of Trade, Industry and Fisheries |
| |  | [Presentation 1]<br>**Ministry of Land, Infrastructure, Transport and Tourism**<br>“Green Frontier in Maritime Industry”<br>Speaker:<br>Hiroaki Sakashita, Director-General, Maritime Bureau, |
| |  | [Presentation 2]<br>**Norwegian Ministry of Trade, Industry and Fisheries**<br>“Blue Growth for a Green Future”<br>Speaker:<br>Ms Birgit Løyland, Director General of Maritime Department, |
| |  | [Presentation 3]<br>**Class NK**<br>“Maritime Big Data Solution by ClassNK”<br>Speaker:<br>Mr.Yasushi Nakamura, Exective Vice President, Representative Director |
| |  | [Presentation 4]<br>**Monohakobi Technology Institute (MTI)**<br>“Utilizing Big Data and the Internet of Things in Shipping”<br>Speaker:<br>Mr.Taizo Yoshida, Managing Director |
| |  | [Presentation 5]<br>**BIBA - Bremen Institute for Production and Logistics**<br>“Industry 4.0 in the Maritime Sector - Potentials and Challenges”<br>Speaker:<br>Dipl.-Inform. Mr. Karl Hribernik, Head of Department Intelligent ICT for Co-operative Production |
| |  | [Presentation 6]<br>**NCE Maritime CleanTech (Norway)**<br>“Developing clean maritime solutions by cluster cooperation”<br>Speaker:<br>Ms. Hege Økland, Chief Executive Officer |

# Ships and Marine Technology Seminar

Date: April 15 (Fri), 2016 10:30~15:30
Place: Tokyo Big Site
Host: Nippon Kaiji Kyokai (ClassNK)
Ministry of Land, Infrastructure, Transport and TourismMinistry of Land, Infrastructure, Transport and Tourism (MLIT)
Japan Ship Machinery and Equipment Association (JSMEA)

| Time | Seminar |
|---|---|
| 10:30-10:40 | Opening Remark ClassNK |
| 10:40-11:10  | Visualization of friction resistance by 3D hull roughness analysis<br>Mr. Koji Yokota, Assistant Manager, Anti-Fouling Technical Division,<br>Technical & Production Headquarter, Chugoku Marine Paints, Ltd. |
| 11:20-11:50  | Development of 2-stroke Low-Pressure Dual-Fuel Engine<br>Mr. Kouji Moriyama, Director, General Manager, Design and Engineering Department, Diesel United, Ltd. |
| 12:00-12:30  | Development of Ship Energy-saving System by Simultaneous Control of the Shaft Speed and the Blade Angle of CP Propeller<br>Mr. Junichi Suzuki, Manager, CPP Design Group, Engineering Dept., Kamome Propeller Co., Ltd. |
| 13:00-13:30  | Retrofitting BWMS with ClassNK-PEERLESS<br>Mr. Isamu Teranishi, President, Sanwa Dock Co., Ltd. |
| 13:40-14:10  | Safe and Environment Friendly Hull Structures with Newly Developed Highly<br>Ductile Steel and Collision Analysis<br>Mr. Kenji Kamita, Hull Design Group Leader, Imabari Shipbuilding Co., Ltd. |
| 14:20-14:50  | Study on Carbon Composite Marine Propeller<br>Dr. Toshio Yamatogi, General Manager, Composite Business Department,<br>Nakashima Propeller Co., Ltd. |
| 15:00-15:30  | Activities of Smart Ship Application Platform (SSAP) Project<br>Dr. Hideyuki Ando<br>Senior General Manager, Maritime Technology Division, MTI Co., Ltd. |


← Sea Japan 2014 International Maritime Seminar

Ships and Marine Technology Seminar →

KOBELCO

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ASAHI SHIPPING CO., LTD.

The Best Partner of
Energy, Water and Environment
MIURA

# Binary cycle power generation system for ships passes tests, Receives approval from ClassNK Installation on actual ship in May 2016

Kobe Steel, Ltd., ASAHI SHIPPING CO., LTD. and MIURA CO., LTD. began joint development of a binary cycle power generation system for ships in April 2014. Land-based testing of the binary cycle power generation system has recently been completed, and the system has received approval from Japan's ship classification society Nippon Kaiji Kyokai (also known as ClassNK), a general incorporated foundation ("ippan zaidan hojin").

ASAHI SHIPPING, an industrial carrier for Kobe Steel, has commissioned TSUNEISHI SHIPBUILDING Co., Ltd. to undertake mounting work of the binary cycle power generation system on the MV ASAHI MARU, a large coal carrier owned by ASAHI SHIPPING that serves Kobe Steel, in May 2016. The system will undergo performance assessments on the ship. After completing development in fiscal 2016, ending March 2017, Kobe Steel aims to commercialize the binary cycle power generation system.

In order for the binary cycle power generation system to be introduced as "environmental equipment" evaluated by ClassNK under its Environmental Guideline, ASAHI SHIPPING and the other companies are contributing to revision work of the Environmental Guideline—using the knowledge cultivated in the development of this system—to create a new classification, "waste heat power generation," which is being promoted by ClassNK.

The binary cycle power generation system uses the heat emitted from the ship's engine, which has largely gone unutilized in the past, as the heat source to generate approximately 100 kW (sending end output). The electricity will serve as auxiliary power and contribute to the efficient utilization of energy and reduction of CO2 emissions. As originally anticipated, land-based testing confirmed that it would be possible to reduce fuel consumption and CO2 emissions by 2.6 to 2.9 percent per year.

In this project, Kobe Steel developed the new binary cycle power generation system for ships, while MIURA developed an evaporator to recover the heat source. The binary cycle power generation system will be constructed on the MV ASAHI MARU, a large coal carrier owned by ASAHI SHIPPING that serves Kobe Steel. TSUNEISHI SHIPBUILDING will be responsible for overall engineering.

The power generation system is noted for two original features:

1. As the binary cycle power generation system is applicable for main engines in the 5,000-kW class and higher, which are used by most vessels, the system can be used in a wide variety of ships.
2. The main engines in ships undergo large load fluctuations. The binary cycle power generation system can generate electricity under a wide range of conditions, from high loads (about 70-90%) to low loads (about 50%).

This project has been adopted as a joint research theme by Japan's Ministry of Land, Infrastructure, Transport and Tourism and ClassNK.

Note

With environmental problems in the shipping industry drawing increasing attention, ClassNK has been promoting the identification of ships that have introduced environmental technology using evaluation criteria compiled in its Environmental Guideline, as a way to evaluate technology that has achieved a reduction in the environmental load. As the binary cycle power generation system for ships and other so-called products for waste heat power generation are in a new field, ClassNK is pushing forward with revision work on the Environmental Guideline to create a new classification that recognizes the advantages in environmental terms of the new binary cycle power generation system.


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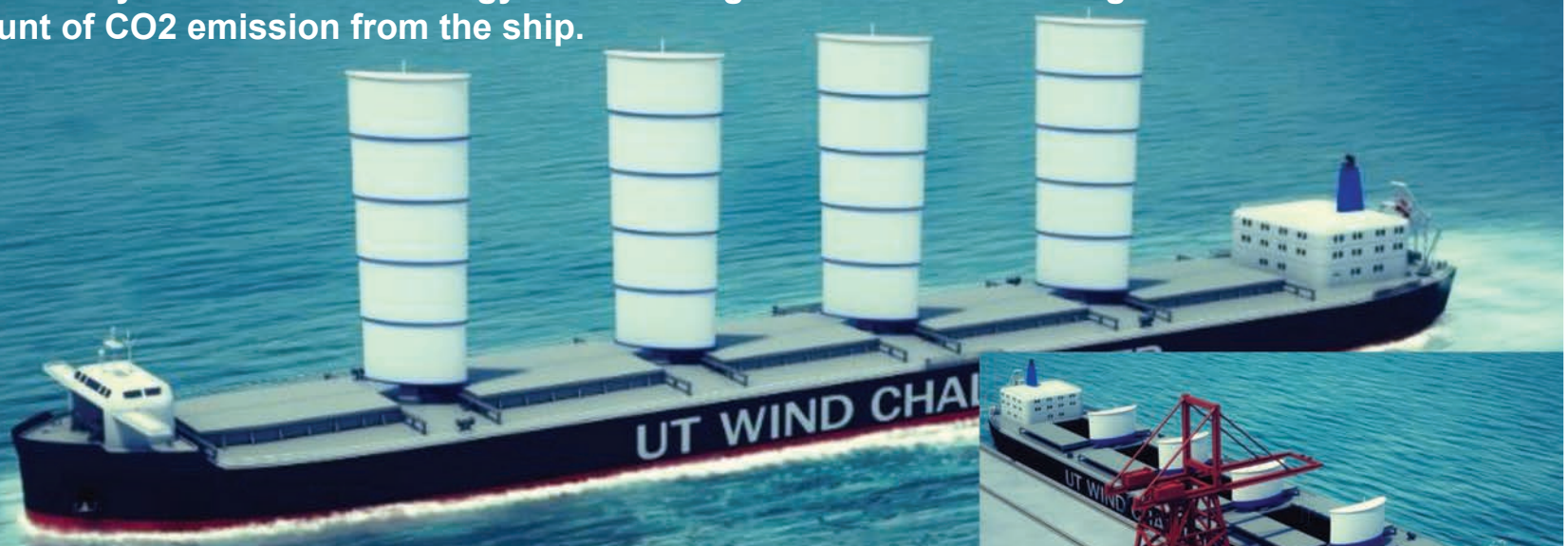
MIURA CO., LTD.
Corporate Communications Department
Tel: 089-979-7019 Fax: 089-979-7126
Email: burandokikakushitsu@miuraz.co.jp

# Wind Challenger Project

## From Fossil Energy to Wind Energy

**WCP (Wind Challenger Project) has been developing the rigid sail system which can successfully catch the wind energy and realizing the reduction of a huge amount of CO2 emission from the ship.**





*Sail Reefing at berthing*

**Wind Challenger Office: Room 341, 3rd Engineering Bldg.,**
**7-3-1 Hongo, Bunkyo-ku Tokyo, 113-8656, Japan**
**URL: http://wind.k.u-tokyo.ac.jp/**

# Who is VOLCANO Co., Ltd. ?

## Marine Equipment Business

### Supporting "Sea Transport in the 21st Century" with High Reliability and Long Years' Experience

Since 1928, the year the Company was founded, VOLCANO has had an installed base of more than 15,000 units, making it one of the leading suppliers of marine use products. These products cover a full range of marine boiler burners, including LNG carrier main boilers as well as various types of auxiliary boilers, fuel treatment homogenizers, bilge concentrators and shipboard incinerators.
The Company's Marine Use Products Lineup have played an important role in powering, heating as well as in preventing marine pollution from ship waste in every aspect of the seagoing operation. The Company has put a lot of energy into the development of Next Generation Combustion Systems, which will accommodate heightened combustion performance required by marine boilers, and will help in the prevention of air pollution from ship boiler emission, which is a crucial topic to be addressed in the sea transport field.
The Company's after-sales service network covers 14 countries around the world in order to provide better support for safety operations of sea transport fleets.

**Newly-building**

Burner for boiler
Shipboard Incinerator
Bilge treatment

Environmental Solution

**After-sales-service**

Parts
Technical inquiry
Re-issuing of drawings
Dispatching of engineers

**Modification**

MGO modification

Gas modification

Environmental Solution

## Auxiliary boiler burner

For LNG fuel ship
**Oil/Gas combination burners for auxiliary boilers**
TYPE **SFUGX**
**"Vignis"**

### Overview

This burner was designed and developed for the auxiliary boilers on LNG fuel ships and supports both oil and gas. We developed this burner based on our experience with SFFG II burners used for the main boilers on LNG carriers. Not only can this burner be configured for single-fuel combustion in both oil and gas applications, but it can also be used for mixed combustion to help save energy and reduce the impact on the environment. This high performance burner adapts well and can support any future changes in fuel types.

### Specification

Evaporation rate: For 4.0 to 10.0 t/h
Oil combustion capacity: 330 to 835 kg/h
Gas combustion capacity: 370 to 935 Nm3/h
Turndown ratio: 10:1
Combustion configuration: Oil / Gas mixed combustion, single-fuel gas combustion, single-fuel oil combustion
Spray method: Gas / Diffusive mixing, Oil / Vapor spraying
Control method: Proportional control
Compatible fuel: LNG, HFO, MGO and MDO
Fuel viscosity: Supports 700 cSt

## Bilge concentrator

Engine room bilge processing system
**Bilge concentrator "Bilcon X"**
TYPE **IREV**

### Overview

This system concentrates the bilge water efficiently using humidification and evaporation (low temperature humidification). It significantly reduces the unloading costs and hassles related to bilge water processing, making it a labor saving system. In addition, the humidification and evaporation method uses a completely closed system and does not discharge any processed bilge water from the vessel, also helping reduce the vessel' s impact on the environment.

### Specification

Processing capacity: 1,000 to 3,000 kg/day
Heat source: Water temperature: 80°C Vapor (0.49 MPa sat °C) Heat-transfer oil (140°C)

## Main boiler burner

For LNG carrier
**Oil/Gas combination burners for main boilers**
TYPE **SFFG II**

### Overview

This burner was designed and developed for the main boiler on LNG carriers and is currently being used by many LNG carriers. The boil-off gas from the LNG tank can be used as fuel, and it can also be combined with oil fuel for mixed combustion. The operation efficiency has been improved. This burner can also be configured as a single-fuel gas burner to reduce the impact on the environment and is ideal for complying with the tightening of regulations (for NOx and SOx, etc.) in the future. This burner offers excellent load-following performance, high load combustion, energy savings and a reduced environmental impact. Currently, its application is not just limited to LNG carriers but is also extending into other offshore fields, such as FPSO and FSRU.

### Specification

Evaporation rate: For 6.0 to 70.0 t/h
Oil combustion capacity: 550 to 6,300 kg/h
Gas combustion capacity: 450 to 5,300 Nm3/h
Turndown ratio: Oil 15:1 Gas 7:1
Combustion configuration: Oil / Gas mixed combustion, Single-fuel gas combustion, Single-fuel oil Combustion
Spray method: Gas / Diffusive mixing, Oil / Vapor spraying
Control method: Proportional control
Compatible fuel: LNG, HFO, MDO, MGO and crude oil
Fuel viscosity: Supports 700 cSt


**Contact VOLCANO**
- on Products, Parts and After-sales service -

Combustion Engineering Division
VOLCANO Co.,Ltd.

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(Continued from page 51)

*At a Glance*

## Japan Coast Guard

The JCG has its Headquarters in Tokyo and performs coast guard operations, dividing Japan into 11 regions. Each of the 11 regions is governed by a Regional Coast Guard Headquarters. Under the Regional Coast Guard Headquarters, there are Coast Guard Offices, Coast Guard Air Stations, Coast Guard Stations, Traffic Advisory Service Centers, Air Stations, Hydrographic Observatories and other units.

**Number of ships in the JCG: 455**

- Patrol ships: 128
- Patrol boats: 238
- Special guard and rescue boats: 63
- Hydrographic survey vessels: 13
- Lighthouse service boats: 10
- Training vessels: 3

**Number of JCG personnel: 13,422**

### Looking at your responsibilities, do you have one that stands out?

The JCG is much like a jack-of-all-trade at sea, as we are in charge of sea-related administration in general. It is necessary to deal precisely with the needs of the general public. To this end, we need to fulfill our potential synergistically. I believe that it is important to make the Guard & Rescue, Maritime Traffic and Hydrographic & Oceanographic departments work hand in hand organically with support from the Administration and Equipment & Technology departments.

### What are the greatest challenges faced today by the JCG?

Organizing a maritime security system seamlessly across the nation, which will also cover the waters around the Senkaku Islands, is one.

Around the Senkaku Islands, official vessels from China have repeatedly intruded into Japanese territorial waters. They also continue to hold demonstrations by sailing around in contiguous zones. In addition, it is intensifying oceanographic research activities with dedicated vessels without obtaining consent from Japan. As these examples show, the East China Sea is still in a difficult situation. Determined to defend Japan's territory and territorial waters by all means, however, all JCG officers continue to keep their missions in accordance with the law calmly and firmly to keep the situation from becoming worse.

We are scheduled to complete a fleet dedicated for guarding the sea around the Senkaku Islands by the end of fiscal 2015 (April 2015-March 2016), consisting of 10 large (1,000-ton) patrol vessels and two patrol vessels with helicopters, which will be equivalent to a fleet of 14 large patrol vessels. (Note: By adopting a multiple-crew system, the JCG will secure operation rates for 12 vessels with the 10.)

We will enlarge the fleet of patrol vessels with enhanced crackdown capabilities to handle overseas fishing boats. We will also launch the Tanegashima coast guard station and the Miyakojima Coast Guard Office, which will be upgraded from a coast guard station, and enlarge the Ogawasawa stations.

### Twenty years from now, what is the JCG fleet going to look like?

The JCG will improve the formation of the coast guard duties that will be able to deal with problems faster and more accurately by replacing existing patrol vessels systematically with those with greater specifications.

## Historically whare are the greatest successes of the JCG?

As I said earlier, the JCG was influenced by the USCG when it was set up. While the USCG maintains military capabilities, however, we have none. It may have been attributed to situations in those days, but I feel today that there is significant value in that the JCG is just a law-enforcement agency.

Today in Asia, the effectiveness of maritime law enforcement is acknowledged as the third most powerful instrument to resolve disputes, following diplomacy and military actions. Prime Minister Shinzo Abe insists on maintaining and developing "open and stable seas" not by exercising power, but by keeping order in accordance with fundamental rules, such as securing the freedom of aviation and navigation, ensuring safety for them and respecting the rule of law, including peaceful dispute settlements based on international law. It is very meaningful for the JCG, a law-enforcement body, to contribute to his idea.

The JCG, which was established as a law-enforcement agency in Japan ahead of other countries and regions in Asia, has since 1969 been providing technical cooperation to help them strengthen their maritime-law enforcement capabilities and for other purposes. In 2015, we launched the Maritime Safety and Security Policy Program, which is a Master's program in the field of maritime security and the first such course in the world. With the program, we have also been offering academic support so that coast guard officers in other Asian nations can study international law and other subjects. As a law-enforcement entity, we contribute to maintaining and fostering public order at sea in Asia. I feel that we are valuable in this sense as well.

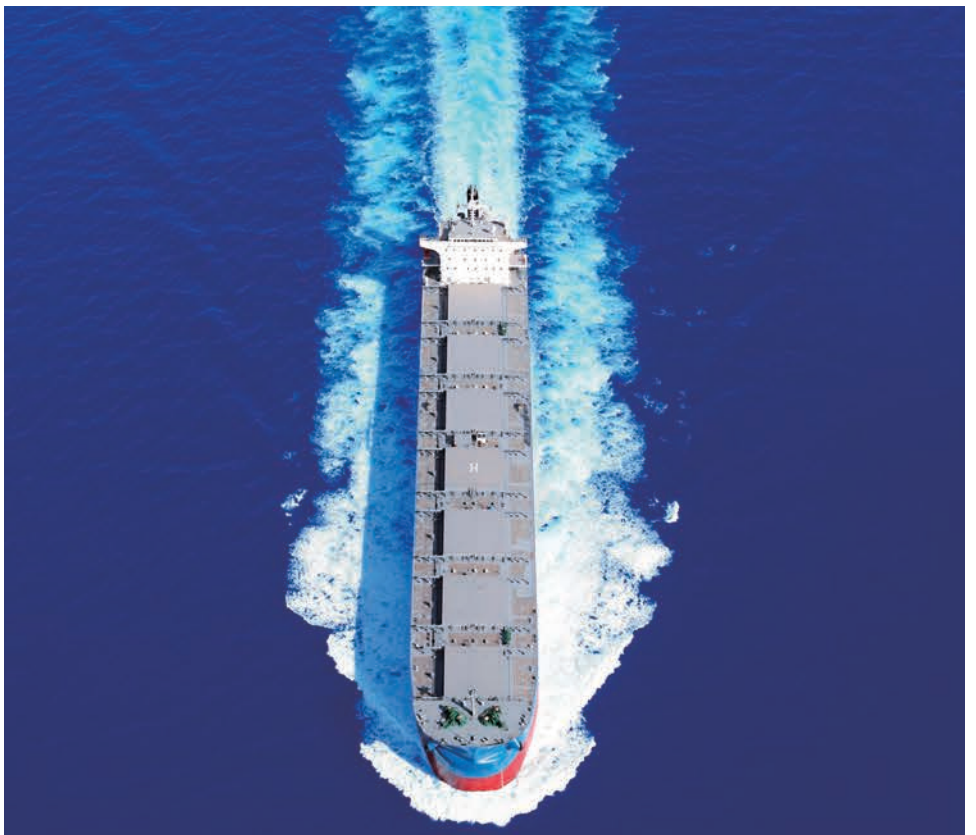
## Looking at your career, is there a most influential or defining moment?

It is difficult to pick up one because I have experienced a wide variety of assignments since I joined the JCG. However, the most impressive duty performed recently was when I was allowed to give support to Emperor Akihito's and Empress Michiko's visit to Palau and the Philippines to console the souls of those who had died in World War II and pray for peace.

## Looking at the JCG of 1996 and the JCG of today, how is it most the same? How is it most different?

Ensuring safety and security at sea, which is the JCG's mission, has always been the backbone of our activities. At the same time, our stance of fulfilling duties side by side with local citizens has also remained unchanged. In contrast, circumstances surrounding the JCG have changed drastically over the last 20 years. As such, we need to deal firmly with such changes.






**MOBILE**
SpecTec AMOS Mobile

# Software Solutions

*Software solutions are a pivotal driver in maritime operations, particularly with the advent of "Big Data" and the evolving focus on the use and movement of data from ship to shore to ship. Last month we caught up with executives at several leading maritime software developers for their insights on 'What's Next.'*

BY GREG TRAUTHWEIN


**The "Roundtable" Participants**
**Hendrik Bruhns**, President, Herbert-ABS Software Solutions
**Jan Erik Haarvei**, CEO, Tero Marine
**Stephen Schwarz**, VP and COO, ABS Nautical Systems
**Giampiero Soncini**, CEO, SpecTec


**The evolution of the software side of the marine business has evolved steadily in the past 20 years, from a large group of disparate, smaller companies to fewer, larger, more comprehensive solution providers. When you look at this evolution, what do you consider to be the 2 or 3 main drivers?**

**Soncini** First of all, it is 30 years and not 20. SpecTec is now 31 years old, and there were some companies even before us. Second, the market is still very fragmented. Every second week, somebody wakes up in the morning and decides to waste time, money and expertise by reinventing the wheel and trying to create a new software which, of course, is much better than anything else and which, of course, has a 99% chances of failing. I am not sure why this happens, but I think the main reason is that people do not perform a real analysis of the shipping market. I have heard many times that "there are 80,000 ships which are our target" which is simply a false assumptions, because no one in our industry can realistically target all the ships in the world. If we are lucky and have lots of money to spend, and a robust infrastructure, we can possibly target 28,000 ships. Of these, half would have a competing system, and the remaining half is scattered over 30 countries. This is why IT in shipping remains a small niche market, dedicated to good masochistic professionals who love to work twice as hard for half the money, compared to doing the same job in another industry.

**Schwarz** Evolution of marine technology is being driven by the changing nature of technology as well as the focus on regulatory reporting and performance management, which both drive a need for comprehensive data management. The increasing pace of technology change can be seen in the rapid increase in cloud and mobile solutions, changing the way companies deploy software and the ways in which users interact with software in their daily lives. In addition, increasing interest in big data decision

support solutions is driving a focus on unifying business data on to fewer integrated platforms so that the data can be effectively leveraged. Managing business data in a comprehensive way has never been more important. Further, regulatory changes and a focus on performance efficiencies are driving a focus on accurate data collection, aggregation and analysis. Comprehensive, end-to-end solutions will increasingly define the future of the marine software space.

**Haarvei** 20 years ago most maritime software providers focused on a specific part of a maritime operation, which often was ship-specific. When we developed TM Master V1, it was an onboard solution for Planned Maintenance. About 15-20 years ago the market started to request solutions that considered the whole fleet, and not only ship-specific operations. The software companies that managed to make this transition survived.

**Bruhns** There are a number of drivers for evolution of the software side of the marine business. The amount of information that needs to be managed has increased significantly, presenting an increased burden to the operators that need to be managed efficiently. The burden comes from increased regulations, reporting requirements and requirements for documentation.

Economic pressures increase the need for more comprehensive software solutions to optimize operations towards an increased efficiency. Software is key to help drive efficiency and safety advancements. This is the case in regards to logistics, especially in the container sector, as well as ship design, all aspects of operations and ship safety management. There are many contributing factors to energy efficiency, as well as ship safety, multi objective optimization of operations can be achieved through the utilization of the right software solutions.

**Looking at the coming 20 years, what trends do you see evolving today that will effectively shape your business, shape the use of software solution products onboard commercial ships for a coming generation?**

**Schwarz** The increasing number of regulations coming into effect now and into the future as well as sustained innovation in technologies available to collect, manage and analyze data will continue to drive the future of marine software. Owners and operators will increasingly look for ways to automate the reporting of regulatory and operational data leading to greater crew efficiency and opportunities for more shoreside intervention and control.

Classification will become more data-driven, relying on performance data collected and analyzed by sophisticated software systems. The trend towards condition-driven classification that requires data and underlying applications to interpret the data will align the interests of ship owners and classification societies.

**Haarvei** Ship owners and ship managers are often late in implementing new software technology. This allows us, as maritime software providers, to glance over at the trends in land-based B2B solutions. It is obvious that there

> Regulations continue to drive the adoption of software as a route to facilitate and consistently demonstrate compliance. For example, the Subchapter M regulation coming into effect in the U.S. will have a dramatic impact on the inland market, encouraging the use of technology to drive change, efficiency and compliance.

# *Stephen Schwarz,* ABS Nautical Systems

ABS Nautical Systems NS Enterprise


will be a shift towards handheld devices, and looking at Microsoft Win10 and Office 2016, we can see how tablets are becoming fully integrated into corporate business processes. Full-fledged cloud based solutions are also becoming a reality with Office 365, MS Sites and MS One Drive. Smaller maritime software providers have often based their user interfaces on the innovations done by Microsoft or other global software developers. We believe that this trend will continue in the foreseeable future.

**Bruhns** Things being worked on today that will shape the use of software solution products onboard commercial ships for a coming generation are the increased availability of ship internet connectivity, big data and the possibility of monitoring and optimizing operations from shore. Software solutions will make the possibility autonomous ships and drones much more likely. Minimization of data entry. Improved logistics. i.e. for containers. More integration of software streamlining the data input and allowing for multiple usages. More holistic approach optimization routines such as connecting the trim optimization with optimal machinery component utilization.

**Soncini** The maritime sector will move towards an increasingly automated reality with autonomous and unmanned vessels, in which remote and automated technologies will monitor and control functions both on and off board. In other words: there will be no staff on board ships to perform maintenance and order spares: engine data will be transmitted via telemetry to offices ashore, where it will be analyzed against trends and threshold. Technical managers will monitor exceptions and activate actions in the first ports. In case you have never heard of such things, it is commonly used on a transport industry called "Aviation."

**Maritime Markets are notoriously cyclical, and notoriously conservative in their acceptance of new solutions. Briefly discuss how attitudes have/are changing among ship owners and ship operators toward modern software solutions.**

**Schwarz** We are seeing a much younger workforce transitioning in the marine industry. A younger workforce demands more from information technology. They are used to the digital world and are not afraid of technology. They prefer to automate wherever possible and expect to have access to information at their fingertips, driving robust demand for mobile and big data solutions. Regulations continue to drive the adoption of software as a route to facilitate and consistently demonstrate compliance. For example, the Subchapter M regulation coming into effect in the US will have a dramatic impact on the inland market, encouraging the use of technology to drive change, efficiency and compliance. The downturn in the economy is also driving owners and operators to improve efficiency. Even with the low cost of fuel, companies continue to look for ways to lower operating costs and extend the life of their assets.

**Haarvei** The attitude amongst ship operators towards modern software solutions rely on many aspects. For example the adoption of modern B2B software differs from country to country. The Scandinavian operators are often "first movers." In addition we can see that many companies now have senior managers and crew that have used software and computers since they were young and in many different aspects of their daily life. Hence, there is a natural shift towards fully extracting the benefits of a well-designed software solution and not only installing it for complying with regulations.

**Bruhns** Ship operators are overloaded and need software solutions to simplify. The increased demands on the crew make software solutions a necessity to manage daily tasks as efficiently as possible. It has also become an economic necessity to optimize operations to stay ahead of or keep up with competitors. Minimization of data entry. Improved logistics. i.e. for containers. More integration of software streamlining the data input and allowing for

> "Aahhhh, the power of Marketing….. BIG DATA! So, before this word was invented we were dealing with what, Small Data? No Data? Data has been invented now? The reality is that people need some sort of new messianic word to do the same things that other, more intelligent people had been doing for a long time."

# *Giampiero Soncini,* SpecTec

multiple usages. More holistic approach optimization routines such as connecting the trim optimization with optimal machinery component utilization.

**Soncini** The shipping industry has always been stubbornly reluctant towards IT. After 30 years since AMOS came to life, Information Technology solutions are still not considered as strategic Fleet Management solutions; many companies do not use any kind of corporate high level ERP solutions, which is amazing; or if they decide to invest in IT, they expect to do it with minor effort. This opens the door to enormous wastes due to disinterest, inefficiency, neglect, pilferage, plain thefts. If shipowners could stop a minute and understand how much money they waste because they neglect their costs, instead on always concentrating on how to make more money (especially in a depressed market), they will understand why some shipping companies fail while others still make money even in a depressed market.

**BIG DATA: Many of our discussions today center on "BIG DATA" and its transformative effects on the marine industry. When I say "BIG DATA", what does it mean to you, and what does it mean to the development and positioning of your product suite in this market?**

**Soncini** Aahhhh, the power of Marketing….. Big Data! So, before this word was invented we were dealing with what, Small Data? No Data? Data has been invented now? The reality is that people need some sort of new messianic

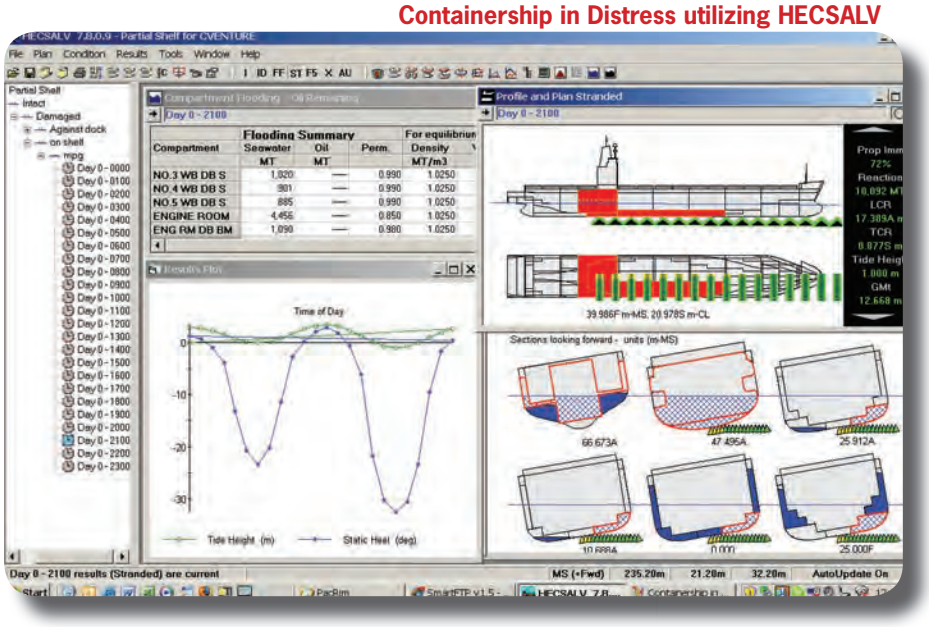
> There are a number of drivers for evolution of the software side of the marine business. The amount of information that needs to be managed has increased significantly, presenting an increased burden to the operators that need to be managed efficiently. The burden comes from increased regulations, reporting requirements and requirements for documentation.

# *Hendrik Bruhns* , Herbert-ABS Software Solutions

word to do the same things that other, more intelligent people had been doing for a long time. SpecTec started dealing with BIG DATA since its creation, 1985. We started to build great databases then, inserting in AMOS all the maintenance instructions, all the technical data, all the spares, so that staff on board could make use of AMOS in the best possible way. AMOS became the center of all technical activities of a Fleet. AMOS has always had the tools to manage and analyzes "Big Data." But a lot of people thought that spending $30,000 for a $100 million vessel, to have the right data in AMOS, was far too much. After all competition was selling "skeleton Databases" for only $2000! So why spend $30,000 or $40,000? There is no right software without right data, actually I keep saying to all my customers that software should be free of charge but data should be mega expensive, because you manage a vessel with data, not with software. Anyway, let us applaud to this word: Big, Medium or Small, it doesn't matter: Data is the right word. But once you have the right Data, you don't only need the right software to analyze it, you need people to understand it. And this, is the most difficult part.

**Schwarz** To NS, "Big Data" means managing many points of time series data and using techniques to correlate the data leading to understanding parameters that effect vessel performance and operations. One of the biggest opportunities for big data is in the area of vessel and fleet performance. NS, along with the ABS Operational and Environmental Performance (OEP) group, are leaders in providing tools to manage and collect the data required to take decisions that make Vessels more competitive - covering all aspects of efficiency and performance.

Containership in Distress utilizing HECSALV




**Haarvei** Our strategic approach to Big Data and Business Intelligence is that we allow TM Master V2 to be integrated, through data interfaces, with any other solution in the market. It is up to our clients to decide how they want to use the large amounts of critical data gathered in TM Master V2. We have many tools for extracting and analysing this data, but more importantly, we have tailored tools for cleaning the data and ensuring that the end report is based on correct inputs.

**Bruhns** More and more data is being made available through monitoring equipment and reporting capabilities. As data continues to rapidly grow, so do expectations on how to analyze it faster. Multi-objective optimization of load planning, voyages, the loading and unloading operations for increased efficiency have become the norm. Software solutions need to interface with other system to allow for multiple usage of available data and to minimize data input.

**The Environment: Similarly, many of our discussions center on environmental matters, more specifically how a deluge of new regulations is dictating what ships can and cannot emit into the environment. How has the push to 'clean up' shipping materially impacted your business?**

**Schwarz** Environmental issues are driving the need to develop better compliance software solutions that enable owners and operators to demonstrate compliance more effectively. NS works closely with ABS to ensure that the software supports the most current regulations. This has a direct impact on the user experience. We are constantly working to improve our user interfaces and are implementing a number of tools to better facilitate the activities that support compliance. Our goal is to take the pain away from compliance for our customers. We are developing a number of specific compliance solutions targeted by market segment to do this. We rolled out a Subchapter M solution in late 2015 and will be rolling out a number of blue water compliance applications in 2016 and 2017, including MRV and IHM.

**Bruhns** There is generally a need for software solutions to consider the regulations and environmental needs when planning any operations. Ships are designed and loaded to minimize the environmental footprint.

**Every business has its challenges. What do you consider to be your company's biggest challenge to being efficient and profitable in this sector, short**

> Ship owners and ship managers are often late in implementing new software technology. This allows us, as maritime software providers, to glance over at the trends in land-based B2B solutions. It is obvious that there will be a shift towards handheld devices, and looking at Microsoft Win10 and Office 2016, we can see how tablets are becoming fully integrated into corporate business processes.

# *Jan Erik Haarvei* , TERO Marine

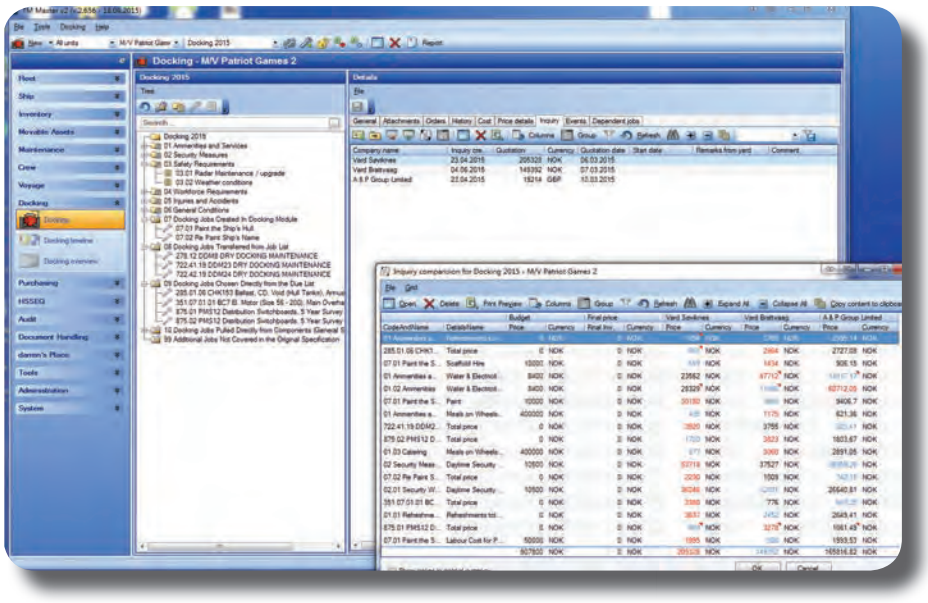
**term and long term?**

**Soncini** 2015 has been SpecTec best year ever in terms of profitability and revenues. It was a nice way to celebrate our 30th Anniversary. Our biggest challenge is finding, training, and motivating young staff with the passion, we have always had. It gets more and more difficult to write specialized software, more and more difficult to install it and service it. Thus, it is not easy to recruit the right staff. This is our biggest challenge: great staff.

**Schwarz** Our biggest challenge is ensuring that our product development cycle reflects the regulatory pace of change while also staying focused on operational efficiency and improved performance. All of this needs to be delivered in a tool that delivers an exceptional user experience and is quickly adopted by both crew and office staff. Further, making sure our clients get the most out of the software is another challenge. Our Professional Services organization developed the "Implement for Success" methodology to help our clients achieve optimal success with the software. Our future roadmap reflects the substantial commitment and investment from ABS in technology in support of compliance, safety and class.

**Bruhns** The biggest challenges are the pace of software development, integration with other software solutions and the international coordination of the company with growing offices

**Docking inquiries**




worldwide. We have also grown rapidly in the last years providing its own set of challenges. Applying more traditional technologies to new platforms such as phones and tablets and maximizing the utilization potential of newer platforms is also very interesting.

**Have you introduced or do you plan to introduce any new technology/solutions in this sector? If yes, please explain the product and its significance to the maritime community in detail.**

**Haarvei** Tero Marine is constantly enhancing TM Master, both due to customer demands and to the development of the maritime industry in general. We have recently added several modules and features to our software suite, including Inspections, Incidents & Observations and Document Management. I would also like to point out the release of our new Docking module, which we think will change how ship operators plan and execute docking operations. This is a module that has been developed in close cooperation with five shipping companies, and the first reports from them indicate that it strongly improves this part of their operations – also from a business perspective.

**Schwarz** We recently launched NS Core, a streamlined version of our flagship NS Enterprise product designed specifically for the workboat and inland market. NS Core brings the power of the Enterprise solution to smaller operators. We are launching a Vessel Performance tool in March. The tool was developed in collaboration with the Operational and Environmental Performance group at ABS and delivers a next-generation vessel performance capability, benchmarking hull and propeller performance against design parameters, and integrating main engine performance into a comprehensive operational and environmental performance solution. The NS Vessel Performance tool is the only one of its kind to include main engine with hull and propeller KPIs for a comprehensive approach to performance management. With regulations and the economy putting a greater focus on efficient vessel management and operations, ship owners and managers have identified improved vessel performance as a key differentiator in an increasingly competitive environment. We are rolling out our mobile solutions as well with new features being announced throughout the year.

**Soncini** AMOS is in a continuous evolution pattern. But we have to keep in mind that whatever we do, it needs to adapt to the existing reality of well over 6,000 ships and 1,000 oil rigs (onshore and offshore). Once, we wanted to be the first with everything. Now, we are happy to try to be the best. So yes, we do have a large number of new products, from AMOS Mobile, to a complete Crewing Module, not to speak about something, which will see the light soon (I don't want to say much more). But as Alessandro Manzoni wrote (The betrothed, 1827): "Adelante, Pedro, con juicio" ("Go, Pedro, with prudence").

## NOAA Study finds a $7B U.S.

# Ocean Enterprise

*In mid-February 2016 NOAA officially released its report which aims to give shape and size to the U.S. Ocean Enterprise, a collective entity estimated to be in excess of $7 billion annually. MR spoke with **Zdenka Willis**, Director, U.S. Integrated Ocean Observing System (IOOS), for her take on this initial survey and her perspective of its impact.*

BY GREG TRAUTHWEIN

"The study didn't yield any show-stoppers, but it is great that we now know that private-sector ocean enterprise work brings in **$7 billion annually, about the same as the NFL."**

**Zdenka Willis**, Director, U.S. Integrated Ocean Observing System (IOOS), NOAA

Studying the world's oceans is an intensive and broad business, but trying to come to grips with its overall "value" is somewhat elusive. To help put some 'meat on the bone,' NOAA recently released its first 'Ocean Enterprise,' study.

"Our objective is to determine the breadth and value of the U.S. ocean observation enterprise to the U.S. economy," said Zdenka Willis, Director, U.S. Integrated Ocean Observing System (IOOS), NOAA. "We used the term 'ocean enterprise' as a direct reference to 'weather enterprise,' which has been in use for over a decade and brought a great deal of interest and attention to firms and organizations working to improve atmospheric measurement, observing, and forecasting. Ultimately, we would like to see this study bring the same gravitas and recognition to the ocean enterprise."

"This study demonstrates that for profit and nonprofit business activity in the ocean enterprise is thriving. Not only does the ocean enterprise generate $7 billion in the U.S. every year, but also more than 85% of these firms have been in business over 5 years and expect to maintain their size or grow in the near future," said Willis.

While the survey was comprehensive, it "does not consider return on investment of observing systems as applied to end user benefits, nor does it investigate the full supply chain," said Willis. "While that information is very important, it was outside the scope of this study."

The biggest challenge was getting respondents to provide full financial information, as about one third of the main financial questions were not answered by all respondents.

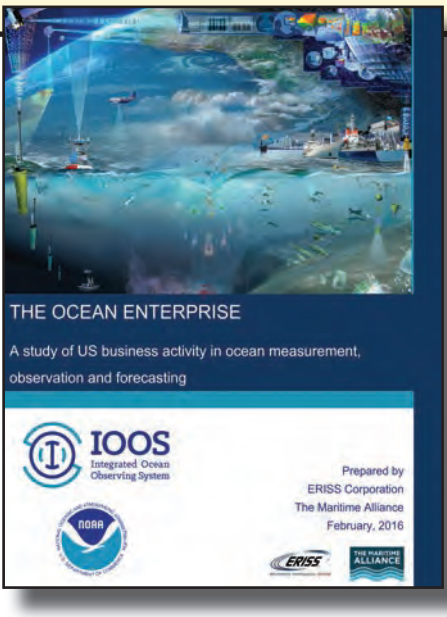
"However, we were able to acquire publicly available revenue data about most companies who did not respond," said Willis. "The chief question people bypassed was a figure for total annual revenue."

### The Path Ahead

Perhaps the highest value in any study of this scope is repeating it regularly, affording the organization to build a baseline comparison of evolving trends.

"If this survey is repeated, the best advantage we could have is for the participating companies to see the value in providing accurate information," said Willis. "This study highlights their work, and the key figure is to show revenue and jobs. The more we can refine those numbers, the more important this study will be over time, and the more likely it is to continue."

Willis said that as a descriptive study, this is valuable to NOAA informationally. IOOS and NOOA can now see the extent and value of private sector ocean enterprise in the blue economy, and with that information are better able to find ways to engage with it and forge stronger, mutually beneficial partnerships. "It extends beyond NOAA to the Department of Commerce, not only in providing them with valuable domestic industry data, but also by including figures for export data generated by the study."




## The $7B Ocean Enterprise

*A Study of U.S. Business Activity in Ocean Measurement, Observation and Forecasting*

This study, prepared by ERISS Corporation and The Maritime Alliance, sought to lend insight on the size, shape and impact of the collective 'ocean enterprise' in the United States. The full report is a fascinating read, packed with data and statistics that will be of use to any company serving the subsea market. Some highlights:

**$7B**

$7B: This is the estimated annual revenue generated by the U.S. Ocean Enterprise.

### A Diverse Market

The top four market niches served by respondents, starting with the largest, include: Environmental Monitoring; Academic Research; Oil & Gas; and Ports and Harbors.

**$1.4B**

$1.4B: This is the estimated annual exports generated by the U.S. Ocean Enterprise.

### Strong Regional Hubs

While the Ocean Enterprise touches many states, there is a predictable pattern of major hubs: the Northeast U.S.; Southern Florida; the Houston area; Southern California and the Pacific Northwest.

**54%**

54%: The percentage of respondents that expect their Ocean Enterprise business to grow in the coming year.

# Arctic Shipping Routes May Open by 2080

Commercial summer shipping across the North Pole may be possible by the end of the century, with the first potential crossings feasible for ice-strengthened ships around 2040. According a study by scientists at the National Oceanography Center (NOC), Arctic shipping could potentially account for as much as 10 percent of all cargo transported between Europe and the Pacific. It will help supply communities and industries along the coasts of Siberia and Canada. A simulation using NOC ocean models suggests that approximately 40 percent of Arctic summer sea-ice cover will consist of broken-up ice by the 2040s. This will allow certain classes of ice-strengthened ships to move directly through the high Arctic, saving time and fuel relative to travelling up the Siberian coast.

Although fuel savings could have economic and environmental benefits, soot from ships could also accelerate ice melting by reducing the reflective qualities of the sea-ice. There is also concern that any oil spills might take longer to dissipate in the Arctic due to the lack of bacteria to break it up and lower ocean temperatures.

This research, published in the Marine Policy, will ultimately feed into the COPERNICUS forecasting system – which aims to predict and forecast ocean behavior in a way that helps industry in Europe. The study was conducted as part of the EU FP7 funded project "Ships and Waves Reaching Polar Regions (SWARP)", which aims to use oceanographic research to help European industries. In addition, it also received National Capability funding from the Natural Environmental Research Council.

National Oceanography Centre
NATURAL ENVIRONMENT RESEARCH COUNCIL

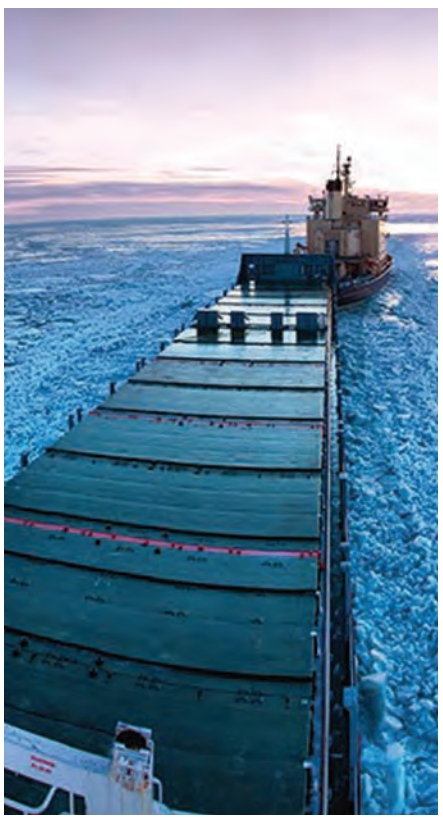


Photo: NOC

# Shipping in 2016

## Navigating the Market

IZABELA LISTOWKA

Weak global trade and an oversupply in fleets have constrained outlooks for the shipping industry. Izabela Listowska, Director at Standard & Poor's, highlights the implications as companies struggle in current conditions

The global shipping industry faces a number of large challenges in 2016. For a start, slower than expected Chinese economic growth is having a knock-on effect on international trade, which will have a major impact on the industry's prospects for the year ahead.

Exacerbating this weak demand is an unsustainable oversupply in global fleet numbers. Shipping companies will have to rein in orders of new vessels to balance the books, which will likely create a drop in employment.

Combined with eroding liquidity and the risk of a rebound in oil prices, shipping companies will need to look to cost-cutting measures across the board to maintain financial stability over the coming year.

### An Uncertain Outlook for International Trade

Of course, a healthy shipping industry depends on sustained international trade. Yet the economic growth underpinning such trade has been weak in recent years: from 2012-2015, annual global trade growth was at 3.2%, its lowest recorded growth outside of recession. This poses a risk to the financial stability of shipping companies – and, in turn, to their workforce. Specifically, China is experiencing a significant slowdown in economic growth – with growth in 2015 slower than it has been for 25 years. As the country is the top global importer of iron ore and among the largest consumers of coal, the dry bulk sector – which transports raw materials by sea – has particularly suffered as a result. Current time charter rates (the cost per day of hiring a ship) for the dry bulk industry are at a three-decade low. These have plummeted from a high of US$185,000 per day in 2008 to US$5,000 today, below the break-even operating cost.

Meanwhile, container shipping – carrying all non-bulk goods and cargo – has been hit with sluggish growth in developed markets. The flow of exports from Asia to Europe and intra-Asian trade have decelerated.

Low economic growth in developing countries is also contributing to the overall drop in demand – Brazil, for instance, is in recession, and its year-on-year imports of goods and commodities fell by the greatest amount since 1977 this January.

### Accounting for Capacity

Weak global trade only heightens the recognised supply-demand imbalance in the shipping industry, which already suffers from a significant oversupply of ships. Indeed, overcapacity is running at around 30%.

The shipping industry has traditionally suffered from poor supply discipline, driven by an urge to gain market share in a highly competitive industry. So if vessel prices remain relatively low, container companies may be tempted to order new, larger ships.

From S&P's perspective, debt-funded ordering of new ships would only serve to worsen the persistent over-supply problem and may even contribute to negative ratings actions in the future.

Shipping companies will therefore have to look critically at their capacity for expansion. Indeed, since the end of


| *All values in USD Millions | 2016 | 2015 | % CHANGE | BULKER | CONTAINER | LNG | LPG | SMALL DRY | TANKER |
|---|---|---|---|---|---|---|---|---|---|
| GREECE | $95,287 | $105,605 | -11% | $21,142 | $11,469 | $13,406 | $4,724 | $246 | $44,299 |
| JAPAN | $80,816 | $89,745 | -11% | $24,713 | $12,662 | $15,457 | $5,060 | $2,664 | $20,259 |
| CHINA | $67,493 | $70,771 | -5% | $17,647 | $22,424 | $2,975 | $2,811 | $3,232 | $18,403 |
| GERMANY | $43,639 | $49,703 | -14% | $4,922 | $26,013 | $659 | $1,863 | $4,584 | $5,599 |
| SINGAPORE | $36,940 | $38,254 | -4% | $6,008 | $6,302 | $503 | $5,388 | $1,021 | $17,717 |
| USA | $32,145 | $34,479 | -7% | $3,848 | $5,442 | $2,097 | $106 | $315 | $20,338 |
| NORWAY | $28,325 | $33,202 | -17% | $3,312 | $1,733 | $4,391 | $4,254 | $496 | $14,138 |
| S. KOREA | $23,431 | $25,205 | -8% | $5,031 | $3,871 | $3,172 | $1,779 | $648 | $8,929 |
| DENMARK | $22,965 | $18,866 | 18% | $1,011 | $12,517 | $907 | $1,577 | $546 | $6,407 |
| UK | $18,574 | $22,029 | -19% | $1,587 | $4,460 | $5,174 | $2,241 | $491 | $4,621 |

last year, Maersk Line, has committed to cutting down their portfolio – postponing investments in new ships, and beginning a process of laying off about 4000 employees. In a move to supply-demand equilibrium, it is likely that others will follow the downsizing trend in 2016.

Naturally, reduced orders for ships can have a knock-on negative impact for employment prospects in the shipbuilding sector, too. Facing stagnant demand, South Korea's shipyards, face around 10,000 layoffs in the next two to three years.

## The Risks of a Potential Rebound in Oil Prices

What's more, a rebound in oil prices could tip the scales further. Keen to build up stocks of inexpensive oil, many companies have recently employed large tankers for floating storage. This has removed some of the extra vessel supply from the market and driven up time charter rates for very large crude tankers from $28,000 to $48,000 per day, helping to keep the sector buoyant in current conditions.

Higher oil prices would reverse this process by putting ships back into supply. Meanwhile, the low operating costs enjoyed by container and dry bulk fleets thanks to reduced fuel prices would come to an end. And given the pressures of weak trade demand, they may not have the financial buffers in place to compensate for any sharp potential rise in fuel costs.

## Braving Stormy Conditions

In view of these potential risks, maintaining financial discipline will be key to navigating difficult conditions in the shipping industry in 2016. First and foremost, maintaining liquidity is vital. Sources of funding to the sector – from banks loans, secured bonds and, to a lesser extent, private equity – could well become increasingly scarce and expensive if prospects for trade diminish.

Considering such funding constraints, companies will have to pursue greater cost-efficiency. While large-scale M&A activity is unlikely in the various shipping industries, container liners might well look to a degree of consolidation to find savings. A case in point is German company Hapag-Lloyd AG's merger with Chilean container line Compania Sud Americana de Vapores, which brought savings of around $300 million, but had to cut 23 ships and the staff from its fleet.

Encouragingly, all but one of the shipping companies rated by Standard & Poor's currently have adequate liquidity to see them through the year. Yet with negative outlooks forecast for a quarter of the portfolio, doubts remain. One in particular being that with lower capital expenditures expected across 2016 as a result of tighter purse strings, there may be a potentially negative impact on the industry's ability to sustain employment.

2016 may well be a tough journey for the shipping industry. But so long as companies stay aware of the risks and respond accordingly, they should stay afloat.


## The Author

Izabela Listowska, based in the Frankfurt office, is a Director in Standard & Poor's Corporate & Government Ratings Division.

# Seaspan Venture Repower: Like for Like

WORDS & IMAGES BY ALAN HAIG-BROWN

"We don't usually remove the heads at mid-life on the Cummins engines," Randy Beckler, Shore Engineer for Seaspan Marine, explained in reference to the 2003 launched Seaspan Venture's third like-for-like repower.

The repower was completed in the first week of February 2016. The Seaspan Venture, like her sister, Seaspan Tempest, had a pair of Cummins KTA38 M0 engines when new builds. These engines were changed out at over 40,000 hours. In 2016, the second set of engines had around 42,000 hours. "We do what we call a top end job on them at 15,000 hours," Beckler said, "We just change the injectors, refurbish the after cooling and address any water leaks, but we don't change the heads. We do the same overhaul again at 30,000 hours."

The decision was made to install the third set of KTA38 M0 engines, delivering 850 HP each at 1,800 RPM, in the Seaspan Venture at 42,000 hours, as the tug was due for its quadrennial inspection by Transport Canada. This involves pulling the tug out of the water for tail shaft and sea valve inspections. "We try to do everything at once when we have the boat out," Beckler said, "we could have probably run the engines for another year but this was a good time to make the change."

These two boats have been very popular with their crews. The hulls were built to order in China, shipped to Canada by barge, and finished up at Seaspan's Vancouver Shipyard. There was a lot of input from operators in the functional design. At the time they were a new generation of tug with a fine, longer, double-chined hull. The 64- by 23-foot hull has a molded depth held to 10.4-feet to facilitate working some of the shallower areas of the lower Fraser River while providing good water flow to the propellers. This fine hull form, combined with a smooth "slipper" stern reduced the wake wash and lessened the need for the tug to make a "slow-bell" past riverside moorings.

The boats tow the big boxy wood chip scows, so they were designed so that the aft bulwarks are the same height as the deck of a loaded chip barge while the bow matches the height of an empty barge. This improves the safety of crews getting on and off both empty and loaded barges. Bulwarks are set two feet back from the hull side to further ease the safety of crew moving between barge and boat.

After nearly 14 years of daily use on the Fraser River the two tugs have proven the effectiveness of the design. And now, with a new set of engines and other upgrades, the Seaspan Venture is ready to go back to barge towing for another 40,000 plus hours.

# Italian Navy Renewal

The steel cutting ceremony of the LSS logistic support unit's bow section was held at Fincantieri's shipyard in Castellammare di Stabia. Construction works officially started on the first unit, as provided in the renewal plan of the Italian Navy's fleet, which has been commissioned to Fincantieri.

The section is 94 x 24 meters x 16.3 m, weighing about 4,100 tons. In the coming months it will be launched and transported by sea to the shipyard in Muggiano (La Spezia), where it will be assembled to set up the entire unit with the stern section, whose steel cutting ceremony took place on February 9 in the shipyard of Riva Trigoso (Sestri Levante, Genoa). The delivery of the LSS is scheduled in 2019.

The LSS is a vessel that provides logistics support to the fleet, endowed with hospital and healthcare capabilities thanks to the presence of a fully equipped hospital, complete with operating rooms, radiology and analysis rooms, a dentist's office and hospital rooms capable of hosting up to 12 seriously injured patients. The ship is capable of combining capacity to transport and transfer to other transport vessels used for liquids (diesel fuel, jet fuel, fresh water) and solids (emergency spare parts, food and ammunitions) and to perform at sea repairs and maintenance work for other vessels. The defense systems are limited to the capacity of command and control in tactical scenarios, communications and dissuasive, nonlethal defense systems. The vessel is also capable of embarking more complex defense systems and becoming an intelligence and electronic war platform.

**www.fincantieri.com**

### Vessel Main Particulars

| | |
|---|---|
| Length | 165m |
| Speed | 20 knots |
| Capacity | 200 people |
| Replenishment stations | 4 abeam, 1 astern |

- Capacity to provide electricity to land with 2500 kw of power
- Possibility of embarking up to eight residential and healthcare modules
- Capacity to perform rescues at sea, through recovery and seabed operations (the ship is equipped with an 30 tons offshore stabilized crane stabilized)
- Base for rescue operations through helicopters and special vessels.

Fincantieri

N-KOM

# N-KOM Delivers Newbuild Liftboat

Nakilat-Keppel Offshore & Marine (N-KOM) reports that it has delivered its first liftboat unit, Al Safliya, to Qatari rig operator Gulf Drilling International (GDI).

Al Safliya is the first liftboat to be wholly constructed in Qatar at the Erhama Bin Jaber Al Jalahma shipyard The self-propelled and elevating unit has been customized for operations in the Middle East and North Africa (MENA) region in water depths of up to 65m. Al Safliya liftboat is equipped with four tubular legs, a unique 200 ton leg encircling crane and a 50 tonne pedestal crane, a large open deck space of around 800 sq. m., a helideck, and accommodation capacity for 130 persons. It can undertake a wide range of services such as well servicing, commissioning, maintenance and decommissioning of offshore platforms. The liftboat also allows for a specially designed gangway bridge to be used for emergency and other safety purposes.

## ME-GI Engines for World's Largest Ethane Carriers


(Image: Hartmann)

**Eco Star 85K Very Large Ethane Carrier with its overall length of 231.60 m; maximum breadth of 36.60 m; maximum deadweight of 50,000 mt; and scantling draught of 12.30 m.**

JHW ordered five 85,000 cu. m. Very Large Ethane Carriers (VLECs) for a JACCAR/Hartmann Reederei joint venture, called UEC (United Ethane Carriers); each vessel will be powered by a single MAN B&W 6G60ME-GI main engine. Dalian Shipbuilding Industry Offshore Co. Ltd. (DSIC) will construct the vessels in China, while Hyundai Heavy Industries (HHI) will build the engines in Korea. Delivery of the first carrier is scheduled for the middle of 2017. Captain Ulrich Adami, Fleet Manager of Hartmann Schiffahrts GmbH & Co. KG, said, "The ME-GI engine appealed to us for several reasons, not least its environmental credentials with negligible slip of gas fuel, and its robust, stable combustion properties – even in heavy seas. We also viewed its high fuel efficiency and its flexibility of being able to run on HFO or ethane as pluses when it came to selecting main engines for our newbuildings."

The engines will meet Tier III emission requirements with the aid of MAN Diesel & Turbo's EGR (Exhaust Gas Recirculation) technique. They will feature an injection pressure of 400 bar and form the main part of a propulsion system that also features a MAN Diesel & Turbo Alpha controllable pitch propeller.

The ME-GI engines will drive VBS1810 propellers, which are the largest Mk 5 models (diameter 7.6 m) ordered from MAN Diesel & Turbo's propeller portfolio to date. To maximize efficiency, the propeller plant employs propeller blades of Kappel design, as well as a fairing cone/rudder bulb system. MAN Diesel & Turbo is also providing each vessel's shaft-alternator system. Upon construction, the vessels will be the largest ethane carriers ever constructed. MAN Diesel & Turbo also reports that it currently has eight ethane engines on order.

The newbuild ethane carriers form the basis for United Ethane Carriers, a new ethane venture that the Hartmann Group is developing with Jaccar Holdings of Luxemburg for which long-term charters have already been secured.

The vessels will also feature another world-first in the form of their innovative 'Star-Trilobe' tanks that consist of three cylinders combined into one. Due to better utilization of the space in the cargo holds, this results in higher efficiency and allows an increase in cargo capacity of nearly 30 percent over similarly-sized vessels with conventional tanks, reducing shipping costs through greater economies of scale.

MAN Diesel & Turbo said it sees significant opportunities arising for gas-fueled tonnage as fuel prices rise and modern exhaust-emission limits tighten. Indeed, research indicates that the ME-GI engine delivers significant reductions in CO2, NOx and SOx emissions. Furthermore, the ME-GI engine has no methane slip.

**www.mandieselturbo.com**

# New Patrol Vessels for the Philippines

Incat Crowther has secured a contract to design a 50m multi-mission monohull patrol vessel for the Philippine Government. Two identical vessels of this type will be built in Manilla by Josefa Slipways.

The primary role of the vessels is to combat illegal fishing for the Philippine government. With the local fishing industry losing billions of dollars to illegal fishing, these assets will enhance law enforcement's capability to patrol and protect territorial waters. The multi-mission nature of the vessels also affords the flexibility to lead in disaster relief and/or rescue operations, as well as to serve as a platform for research.

The Department of Agriculture (DA) with its operating agency, Bureau of Fisheries and Aquatic Resources (BFAR) will operate the vessels.


Incat Crowther

Notable features of the steel vessel are a spacious aft working deck to accommodate both a rescue craft launched from a deck crane as well as 9m RHIB deployed from a specially designed well with a transom door. Ahead of the aft working deck, the main cabin houses a spacious galley with adjoining freezer and cold rooms, a medical clinic with adjacent lab, a large mess hall for the crew, and a private mess hall for officers. A large conference room accommodating 36 personnel is at the front of the main cabin.

Below deck are the engine, control and equipment rooms as well as full accommodations for 42 personnel.

Accommodations for officers and engineers are on the mid deck. Forward in the mid deck is a conference room with a capacity of 14 personnel.

The large pilothouse gives an unobstructed view forward and plenty of desk area for electronics and charts. It also has sleeping quarters for two pilots.

The vessels will be powered by two Mitsubishi S16R2-T2MPTK engines, coupled with a Masson MM W18000 gearboxes and fixed pitch propellers. Two Yanmar 6HAL2-WHT generators will service the vessel's electrical needs with an additional emergency generator.

**www.incatcrowther.com**

# Bouchard's Newest ATB Christened in New Orleans

Bouchard Transportation Co. celebrated the naming of the M/V Donna J. Bouchard and the B. No. 272 at the christening ceremony held on Thursday, February 18 in New Orleans. The ceremony began with remarks from Bouchard Transportation Co., Inc. President/CEO, Morton S. Bouchard III, followed by VT Halter Marine and ExxonMobil/SeaRiver Maritime. Vessel sponsor Joan Lesniewski, wife of Robert Lesniewski of ExxonMobil/SeaRiver Maritime, performed the breaking of the champagne bottles.

The barge, B. No. 272, was launched at VT Halter's Pascagoula Operations in Pascagoula, Miss., on November 20, 2015. The tug, Donna J. Bouchard, was launched at VT Halter's Moss Point Marine facility in Escatawpa, Miss., on September 15, 2015, and is named after the sister of Morton S. Bouchard III. Constructed independently of each other, and now paired, the M/V Donna J. Bouchard and B. No. 272 are now classified alongside the Kim. M Bouchard and B. No. 270 as the largest vessels to date in Bouchard's ongoing fleet expansion program.

These are the second of two Articulated Tug Barge (ATB) units constructed by VT Halter Marine, Inc., a company of Vision Technologies Systems, Inc.

The B. No. 272 measures 628 x 91 x 47 ft., has a 255,000-barrel capacity, and is ABS and USCG certified for Jones Act service.

Photo: Bouchard Transportation Co.

The Donna J. Bouchard is a 10,000 hp twin screw ATB tug and is classed by ABS as +A1 Towing Vessel, Dual Mode ATB, USCG Subchapter M, and is equipped with an Intercon Coupler System.

Paired with Barge B. No. 272, the unit will be used to transport petroleum products for Bouchard Transportation.

"Celebrating the christening of the M/V Donna J. Bouchard and B No. 272 signifies another major milestone in developing a modern, fuel-efficient, well-specified, reliable, and most importantly, safe fleet, capable of supporting the exacting requirements of the offshore industry around the world," said Morton S. Bouchard III.

## Fishing Vessel Conversion

A 170 x 40-ft. fishing vessel, now named Defender, recently underwent a significant conversion to become the first fish pumping vessel in the Global Seas and Patti Marine Enterprises Inc. fleet. Selected to provide engineering services including structural and mechanical work for the conversion was Jensen Maritime, Crowley Maritime Corp.'s Seattle-based naval architecture and marine engineering company. Because the vessel was being converted from fishing work on the East Coast (herring and mackerel) to West Coast fishing (pollock), a new fish pumping system was installed on the stern and a new full forward, sheltered fish distribution room was constructed for protection during the fish sorting process. Both changes make the vessel better suited for the operations and weather of her new Alaska fishing assignment, Jensen said. Structural work included a stern extension, bulbous bow with refurbishing of the thruster, whale back bow cover for the refurbished anchor windlass, an anti-roll tank, aft decks and bulwarks. Mechanical work included rebuilding the main engines and generators, installation of new propellers, nozzles and Deflector Rudder system. And, electrical systems and wiring received substantial upgrades and reworks by the shipyard along with sandblasting, water blasting, deep cleaning and recoating.


(Image: Jensen Maritime)

### Mega move of 22.5-m-long structure

# World's Largest Underwater Restaurant Ships Off

The acrylic and steel structure for the world's biggest underwater restaurant is on its way to the Maldives, courtesy of GAC's project logistics. The restaurant, complete with its 13-meter-high stairwell, is heading for the new resort Hurawalhi, where it will offer guests an underwater dining experience with panoramic views of surrounding marine life, including re-planted corals, when it opens in August 2016. Food will be prepared on land, then transported to the 24 guests waiting in the dining area further below sea level than any other underwater restaurant in the world. It took 12 months of detailed planning based on GAC's CAD-assisted lifting and lashing calculations to prepare the structure's voyage. The first stage involved transporting the 410-metric-ton load 8 km by road quickly, safely and without incident from the construction company's yard at New Plymouth in New Zealand to Port Taranaki.

Photo: GAC

The restaurant was lifted onto a 200-wheel trailer with the help of four trucks – two pulling, one pushing and a fourth on standby for backup. The road trip to the port started at 11 p.m., due to local traffic regulations for heavy loads, and 12 hours later, it was lifted onto Jumbo Maritime's vessel, the Fairlane, after just half an hour of preparatory procedures and two hours ahead of schedule. Next came the lashings, welding, securing and protection of the load.

The entire operation was planned and overseen by Captain Per Thörnblom, GAC's Group Project Logistics Manager.


## New Autonomous Control System

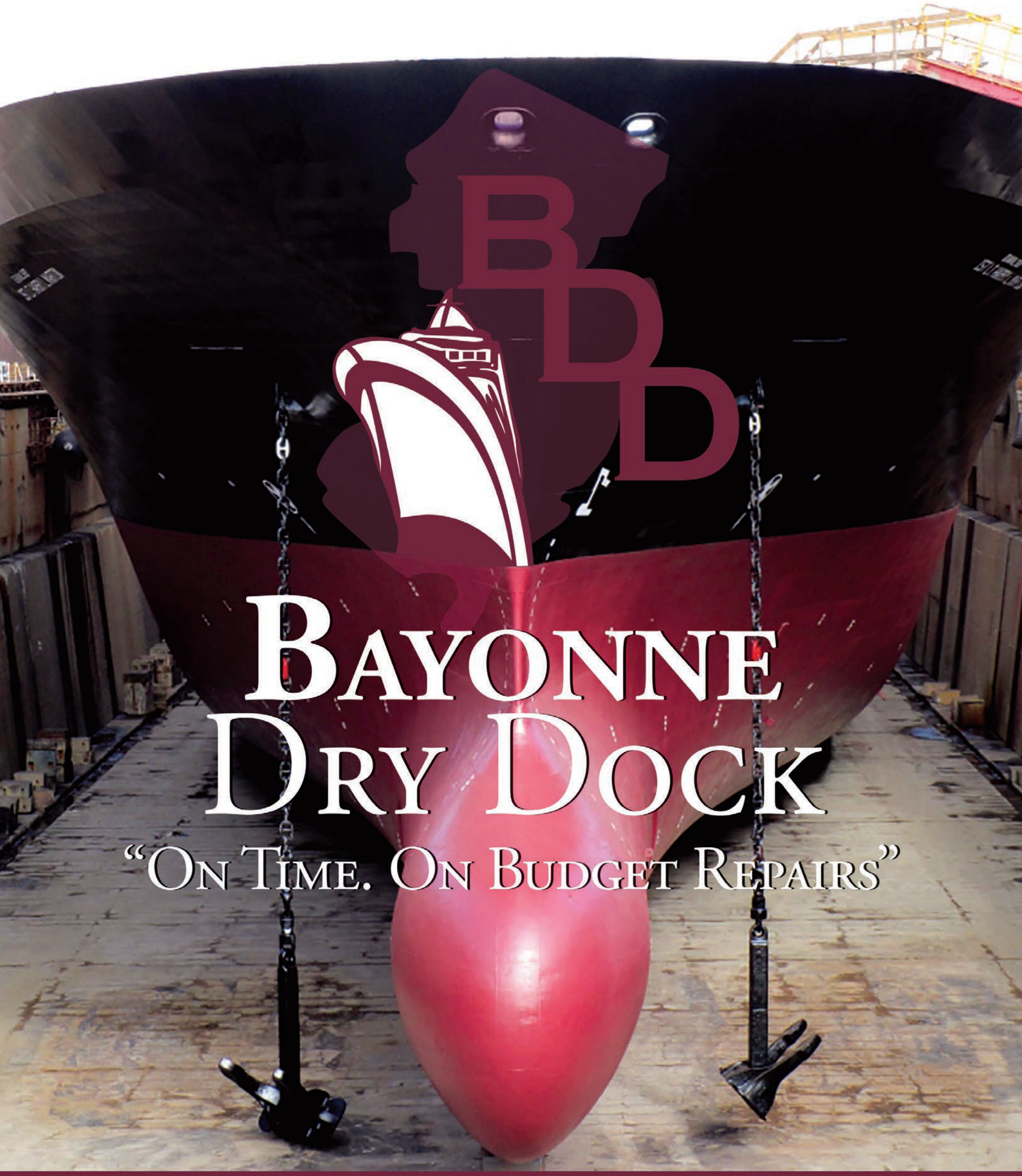
Sea Machines Robotics of Cambridge, Mass. announced the release of its Autonomous Control System (ACS), an advanced vessel control system which converts manually piloted hulls to self-piloted Unmanned Surface Vessels (USVs). It is designed to be integrated into company-developed Sea Machine USVs or other commercial production hulls. The ACS allows for seamless transition between unmanned and manned operations and can be integrated into most OEM vessels, including workboats, pleasure craft, launches, fishing vessels, survey boats, tugs and more.

Sea Machines ACS is currently being offered for vessels up to 50 ft. in length but can be enhanced for larger craft operations. The system works with various propulsion and steering configurations including electric, gas/diesel, diesel-electric, inboard, sterndrive and water jet.

The system incorporates water resistant (IP67) enclosures, with active liquid cooling, and industrial grade (-40° C to +85° C) components and PLC's to allow for operations in harsh marine environments. Communication capabilities include Marine Broadband Radio and Hardened Wifi for Line of Site, high data rate applications, and VSAT and Iridium antennas for Over the Horizon and back up capabilities.

**www.sea-machines.com**


Images: Sea Machines Robotics



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# JetAnchor Positioning System for Smaller Boats

## **Target:** Pilot boats, Fireboats, SAR, Patrol, Survey, DSV and small Offshore Crewboats

HamiltonJet launched its vessel positioning system called JETanchor, which has been developed and tested over the past 18 months. Developed from the blueARROW controls platform, JETanchor is the newest addition to the HamiltonJet controls' product range. Aimed predominantly at Pilot boats, Fireboats, SAR, Patrol, Survey, DSV and small Offshore Crewboats, the system is designed to provide a cost-effective "dynamic-positioning-type" system for smaller vessels.

One stand out feature is a new anchoring system using GPS location.

It is essentially a virtual anchor mode, which allows the vessel to weathervane off a fixed GPS point under prevailing wind and sea conditions. As a result the operator enjoys a hands-free vessel positioning with comfortable vessel motion and at low engine rpm minimizing fuel usage. Another smart design feature is a station keeping mode, which allows the vessel to automatically hold a GPS position and heading more accurately than can be done manually, allowing the operator to be hands-free for other helm operations.

In addition the JETanchor system is set-up with an autotune routine, which automatically tunes the control system to specific vessels dynamics and makes it easy to install.

The JETanchor positioning system will provide commercial operators with valuable, tangible benefits resulting in a significant reduction in operator workload and crew fatigue especially on standby, a potential reduction in operational crew numbers, an improvement in fuel consumption and accurate positioning for survey work, ROV deployments, and standby-modes.

**www.hamiltonjet.co**

JETanchor

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# “Green” Inland Midstream Refuel Barge Delivered

John W. Stone Oil Distributor, LLC took delivery of its first “green” inland midstream refueling barge from Tres Palacios Marine in Palacios, Texas. The 160 x 54-ft. double hull barge is the latest addition to the fleet of equipment Stone Oil uses to support its customer base as well as its various terminal operations. Stone Oil discussed ways to improve the existing midstream fuel barge design with its marine personnel as well as its shore based maintenance staff. This was coupled with requests from customers to provide a means to deliver various grades of fuel, lubricants, water and other related products and services.

What is unique and “green” about this vessel, S-49, is its ability to deliver and remove products that will be crucial for existing and new build vessels to meet the ever increasingly stringent emission standards. It will reportedly be the first vessel in the U.S. capable of delivering Selective Catalytic Reactor fluid in bulk and receive effluent from scrubber equipped vessels.

“Though not prevalent at this time, after detailed discussions with equipment manufacturers and customers, both domestically and internationally, we made the decision to design and build this barge,” said Tony Odak, VP at Stone Oil. “After thorough design review by the USCG and various vetting agencies, Stone Oil will have a barge that not only meets current emissions standards, but has capability and redundancy to meet future energy efficiency requirements.

This is not the only barge Tres Palacios Marine has built for Stone Oil. The two companies formed an alliance back in 2010 building refueling barges. “In 2010, we had just completed improvements to our yard to allow for the construction of 300 ft. barges,” said Jo Anne Estopinal, President, Tres Palacios Marine. “Stone Oil came to us with request to build a series of 140-150-ft. vessels, smaller than we had ever built. Each vessel required minor changes and tweaking in order to meet Stone Oil’s strict standards.”

Tres Palacios Marine, established in 2006, is the second barge construction yard currently owned by the Fiegel family of Galveston, Texas. The other yard, West Gulf Marine, was established in 1998 and, dating back to 1966, the Fiegel family shared in the ship building experience with Harry Fiegel, the father of this family, at Galveston Shipbuilding Company.



## BioCorr Receives EU Trademark

Cortec Corporation said that its biobased and biodegradable rust preventative, BioCorr, received registered trademark approval from EU's Office of Harmonization. BioCorr is a water-based, ready-to-use formulation intended for preservation of metals in storage and during transportation. This innovative solution is formulated with renewable raw materials and contains 64% biobased content. It provides multi-metal corrosion protection by combining film-forming additives with Vapor phase Corrosion Inhibitors (VpCIs).

This ready-to-use formulation can provide protection for up to two years of indoor storage or during shipments. Water-based BioCorr leaves a dry film on the surface of the metal that is virtually undetectable. This feature helps to create a clean workplace and prevent material waste. BioCorr does not contain any chlorinated compounds, chromates or nitrites.

**www.cortecvci.com**

## Marine Solar Power Product Range

Eco Marine Power (EMP) finalized its range of marine solar power solutions and related products. The solutions include Aquarius Marine Solar Power and Aquarius MAS + Solar in addition to standalone products such as class-approved marine batteries and marine solar panel frame kits. These products and solutions are suitable for use on ships, offshore platforms and coastal applications.

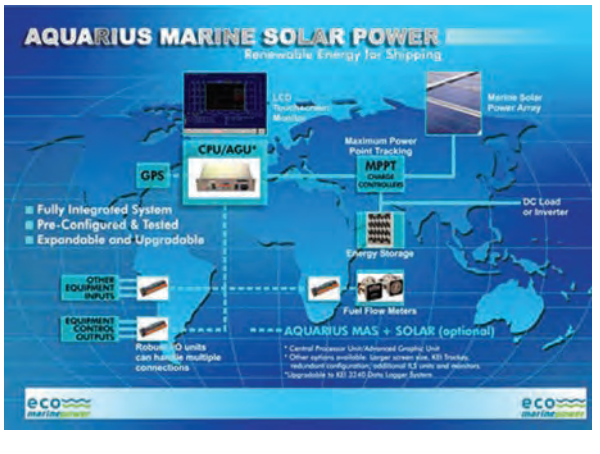
A marine solar power solution from EMP is an integrated class-accepted system that may include a marine computer, battery chargers, batteries, marine-grade solar panels plus interfaces to other equipment and sensors. Each solution can be designed and scaled to suit a wide variety of ships including passenger ferries, cruise ships, tankers, bulk ore carriers and offshore support vessels. Aquarius Marine Solar Power is basically a stand-alone solar power system which is not integrated with other shipboard systems but provides a DC output which can be connected to a DC load or via an inverter to an AC load.

Aquarius MAS + Solar includes all the elements of the Aquarius Marine Solar Power solution plus additional hardware and interfaces to fuel flow meters, GPS and other equipment on a ship. This allows the system to record fuel consumption, calculate emissions and monitor main engine revolutions, generator output and a range of other equipment. It can also be expanded to include KEI 3240 Data Logger functions. An Aquarius Marine Solar Power or Aquarius MAS + Solar package is suitable for new-building projects and can also be retrofitted to existing vessels.

In cooperation with strategic and technical partners, Eco Marine Power also offers a range of marine solar power products and services for ships and marine use including:

- Flexible marine grade solar panels designed for use on ships and other vessels.
- Solar Panel & Frame for Ship Use
- Marine Solar Panel and Frame

**Eco Marine Power along with KEI System, The Furukawa Battery Company and Teramoto Iron Works will exhibit the complete range of marine solar power solutions and products at Sea Japan 2016 in Tokyo in April.**




## MAGS

Terragon's Micro Auto Gasification System (MAGS) is a simple and compact appliance for the conversion of shipboard garbage and sludge oils into energy. MAGS uses Terragon's patented Auto Gasification process to break down waste, and reduce its volume by over 95%. The system produces its own fuel, outputs approximately 110 kW of thermal energy while using only 22 kW, and has extremely clean emissions, meeting the most stringent regulations worldwide. MAGS has the operational, environmental, and most importantly, economical benefits ship-owners and operators demand in today's challenging market conditions. Reduce your costs from shore disposal and traditional shipboard incinerators.

**www.terragon.net**

# Kidde Fire Systems Introduces New Monitors

Kidde Fire Systems launched a new control head monitor (CHM) for electric actuators and solenoid monitors for directional valves. The new CHM is fully compliant with the National Fire Protection Association (NFPA) 2001-2012 Standard on Clean Agent Fire Extinguishing Systems and is designed for simple installation on existing Kidde systems. Kidde Fire Systems is a part of UTC Climate, Controls & Security, a unit of United Technologies Corp. Electric actuators are commonly used as activating devices for the release of a fire suppression agent in the event of a fire and the NFPA requires these devices to be in place and ready to activate. If they are not in place, the CHM will send a signal to the control panel warning of system impairment. In addition to seamless installation on new Kidde fire suppression systems, existing Kidde systems can easily be retrofitted for use with the new CHM. There is no need to switch out the existing electric actuator on discharge control heads and the CHM comes standard with an explosion-proof rating. With many clean agent systems already installed, Kidde Fire Systems' channel partners have a significant opportunity to help safeguard current and previous customer's installations. Kidde Fire Systems has taken the same approach with the directional valves for chemical clean agents and inert gas systems. The directional valves are now sold with a supervisory monitor system directly mounted to the valve.

Existing Kidde Fire Systems clean agent and inert gas systems can also be retrofitted to work with the new supervisory monitor system. The directional valve solenoid monitor for chemical clean agents is available in an explosion-proof model.

The Kidde CHM for electric actuators and directional valve solenoid monitors have Underwriters Laboratory listing and Factory Mutual approval and are now available for shipment.

**www.kiddefiresystems.com**

## Water Cannon Pressure Washer

Leakages of lubricating oil, exhaust gases and fuel oil pose a threat for a fire aboard a ship. Take care when inspecting the ship generator room, in particular, any high-pressure fuel pipes. Oil leaking from these pipes can drip directly onto hot parts, which can quickly ignite. For the ultimate in electric powered high pressure washing products this industrial indoor-safe water blaster is both portable and built for around the clock applications. The 15M71 boasts 20 hp, 460 volt 3 phase heavy duty motor with Auto Start/stop feature that powers a TSP Series General Triplex Plunger Pump - 4.5GPM - 6000PSI using the long lasting Poly Chain Drive system.

**www.watercannon.com**

## Optimarin on America's Finest

Optimarin landed its first contract in the fishing segment as it was contracted to supply its Optimarin Ballast System (OBS) for the Skipsteknisk-designed America's Finest. Seattle-based Fisherman's Finest will own and operate the 80-m stern trawler, which is being built at Dakota Creek Industries. America's Finest, a ST-116XL design, has been hailed as Skipsteknisk's most environmentally friendly vessel. It combines a DNV GL classed +1A1 Ice 1B hull, reducing resistance in both ice and the open water, with the ability to tow, process and freeze its white- and ground fish catch at sea.

**www.optimarin.com**

## FURUNO at Sea Japan

Furuno supports safe and efficient voyages with its navigation and communication equipment. This year at SEA JAPAN, Furuno will show its ECDIS FMD-3x00 and radar FAR-3000 with MFD capability. The ECDIS and radar will be presented with the new 27-inch wide monitors MU-270W. It will also show its new products: The 15-inch IMO radar FAR-15x8 and the AIS FA-170. It will also introduce its latest radar technologies, including ice detection radar, FICE-100, which is suitable for use onboard vessels operating the Northern Sea routes. Another introduction will be a wave detection radar, supporting fuel-saving voyage optimization.

Furuno representatives will also provide latest information on Inmarsat Global Xpress, taking into account the best proposal for your vessels. FURUNO will be exhibiting the following equipment at Sea Japan:

- ECDIS, FMD-3300 with MU-270W
- Radar, FAR-3000 with MU-270W

The ECDIS, FMD-3300, and radar, FAR-3000, will be displayed as a FURUNO bridge system with the latest multi-function-display software installed.

- Radar, FAR-15x8 with MU-150HD
- Ice radar, FICE-100
- AIS, FA-170
- Satellite speed log, GS-100
- Navigational echo sounder, FE-800
- Satellite Communication Services.

**Find FURUNO at Sea Japan stand no. C-42**

## LNG as Marine Fuel

Qatar and Royal Dutch Shell agreed to develop liquefied natural gas (LNG) as a marine fuel for use by A.P. Moller-Maersk. Qatargas, the world's largest LNG producer, said the three companies signed a MOU which sees Qatargas 4, a joint venture between Qatar Petroleum and Shell, producing the fuel for use by Maersk Line. While the push for LNG has recently been stunted with the precipitous drop in global oil pricing, making the conversion to LNG from traditional heavy fuels less cost-effective, long-term prospects for LNG in the maritime market is good because it more easily meets current and proposed emission rules. DNV GL recently found that 63 LNG-fueled vessels were already operating globally with another 76 LNG-fueled ships being built. Maersk has approximately 600 ships operating, including some of the biggest in the world.

**www.qatargas.com**

## LNG Bunkering in Jacksonville

Earlier this year TOTE Maritime Puerto Rico successfully loaded LNG bunkers aboard the world's first LNG powered containership, MV Isla Bella. Approximately 100,000 LNG gallons transported by 12 TOTE-owned LNG ISO containers were loaded on schedule. The bunkering was conducted under US Coast Guard oversight while Isla Bella was also undergoing cargo operations. The LNG was transferred from the ISO tank containers using a specially developed transfer skid developed by TOTE's partner Applied Cryogenics Technologies (ACT) of Houston, Texas. The transfer skid is designed to allow four ISO tanks to be transferred to Isla Bella at once, dramatically reducing transfer time.

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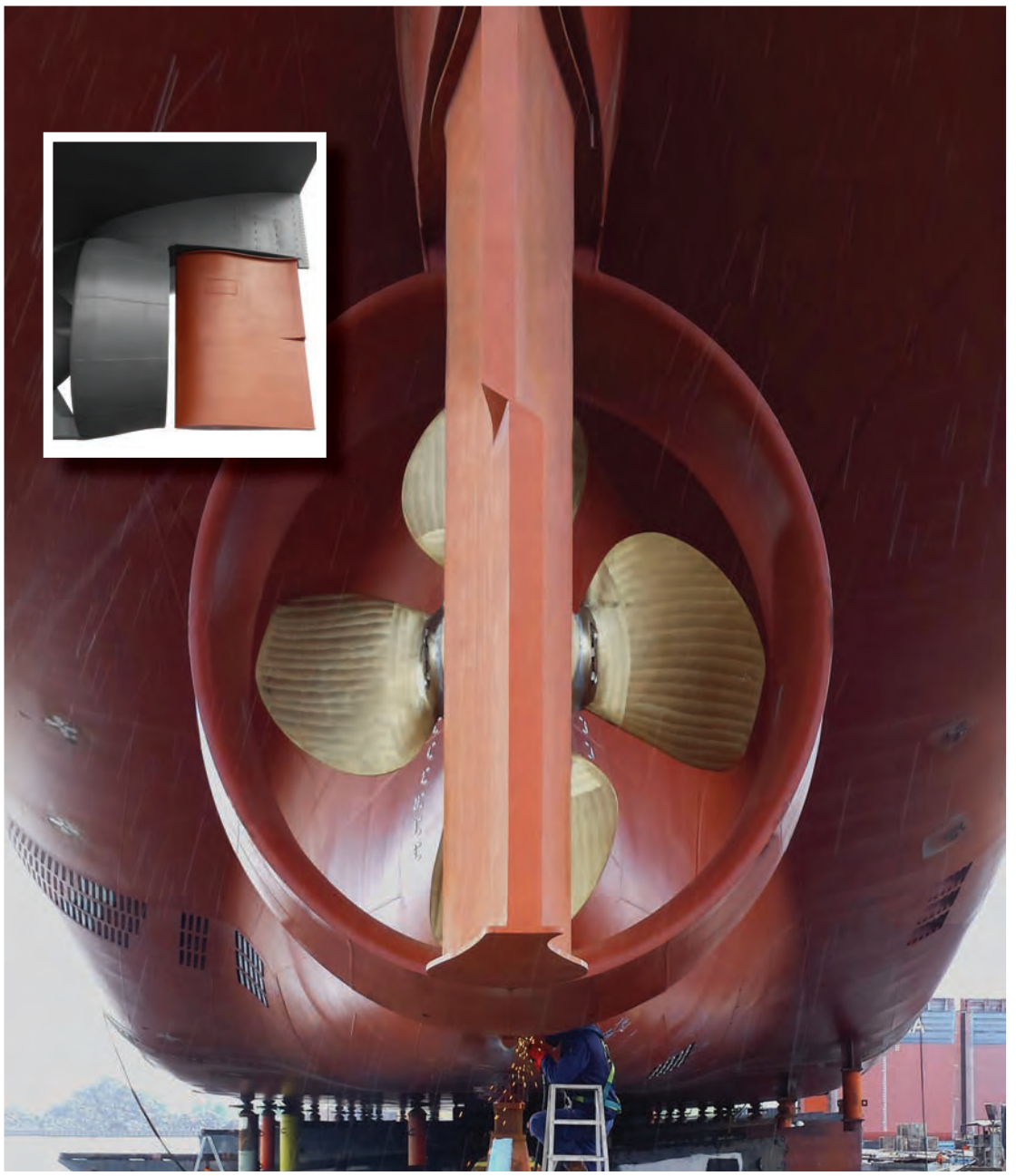
# Optimized Schilling Twisted Trailing Edge Rudder



The improvement of energy efficiency in the global shipping industry is one of the sustainable goals of the Becker Marine Systems company. To that end, the company is presenting a new rudder profile, the optimised Schilling Twisted Trailing Edge (Schilling TT) Rudder. Two years following the successful development of the new Becker Schilling TT Rudder the outcome has been positive: "Our Twisted Trailing Edge modification of the familiar Schilling Rudder has become firmly established on the market," said Walther Bauer, Director of Sales & Projects at Becker Marine Systems. "Becker's engineers were successful in meeting customer demand for a well-considered solution for propulsion along with improved manoeuvrability in one rudder. We are getting consistently positive feedback about the improved performance of the rudder thanks to its asymmetric trailing edge," said Bauer.

Development of the rudder began a few years ago and the product is now encountering increased demand, driven largely by environmental regulations in the shipping industry.

The rudder is suitable a number of applications, including tankers, general cargo carriers and research vessels, to name a few. These ships usually have to travel long distances to their area of operations and once there are dependent on increased maneuverability. At the beginning of the year, Becker Marine Systems recorded incoming orders for 10 Twisted Trailing Edge Rudders for general cargo carriers with a carrying capacity of 3,300 and 8,500 dwt. "We combine the rudder with our specially optimized rudder bulbs in order to further lower energy consumption," said Bauer about the product innovation, which has lower servicing and maintenance costs due to the simple design of its rudder blade.



# Indonesian Navy Orders MAN Engine for Training Ship

(Image: MAN Diesel & Turbo)

MAN Diesel & Turbo received an order for a MAN 6L21/31 engine to power a newbuild cadet training sailing ship for the Defense Ministry of the Republic of Indonesia. The engine will be used to power the 110-m Kri Bima Suci and up to 200 persons on board when not propelled by sail power. The ship is currently under construction at the Freire Shipyard in Vigo, Spain.

Lex Nijsen, Head of Four-Stroke Marine, MAN Diesel & Turbo, said, "We're very happy to have won this unusual order, unusual in the sense that orders anywhere in the world for the building of such a large sailing vessel of 100 meters and over are few and far between."

He continued, "In this particular case, we enjoy a long and fruitful relationship with the Indonesian Navy, which already uses MAN engine types in its fleet, and – in this respect – an MAN engine was the natural choice for such a fine vessel. I also feel that fulfilling the demands for such an unusual application bears testament to the strength of our medium-speed program."

MAN Diesel & Turbo has prior experience with sailing ship orders and has previously re-engined the 113-m Esmeralda, a four-mast barquentine, for the Chilean Navy. Similarly, in 2006, the company re-engined the 104-m Fregata Libertad for the Argentinean Navy.

Such tall ships often have a dual purpose where, besides training new recruits, they are often used in courtesy visits to other countries as, by nature, their presence can be viewed as more diplomatic than that of a modern, naval vessel.

The company noted it has had many dealings with the Indonesian Navy in the past and recently signed a contract for the delivery of MAN 20V28/33D STC engines for two frigates due to enter service in 2017. These engines represent a generation change within the Indonesian fleet that has been powered for many years by MAN Diesel & Turbo 28/33D and Pielstick-branded engines.

As with the 20V28/33D STC engines, the new 6L21/31 engine will also be built by MAN Diesel & Turbo.

**mandieselturbo.com**

(Image: MAN Diesel & Turbo)

**Photos:**

**Left:**
**Graphical representations of the Kri Bima Suci.**

**Below Left:**
**File photo of the MAN 6L21/31 engine**

# Wärtsilä Design Deepwater DSV

(Image: Wärtsilä)

**The new deepwater DSV for Shanghai Salvage Bureau (SSB) is designed by Wärtsilä.**

Wärtsilä has signed a contract with Shanghai Bestway Marine Engineering Design Co Ltd to design a new type of deepwater dive support vessel (DSV). The ship is to be built for China state-owned Shanghai Salvage Bureau (SSB), a professional salvage company in China. The contract with Wärtsilä was signed in January. The Wärtsilä design features a combination of capabilities, including deepwater (6,000 meters) salvage operations, deepwater pipe laying and construction work, and saturation (SAT) diving operations for 24 divers using two diving bells. SAT diving is a technique that allows divers to reduce the risk of decompression sickness when working at great depths for extended periods of time. All the design features are based on a single platform operating with DP3. When built, this will be the world's first SAT diving support vessel with Multi-Lay and ultra deep water construction capabilities, Wärtsilä said.

Wärtsilä's contract with SSB covers initial and basic design of the ship, meaning that class and flag authority related drawings for the purpose of finalizing the necessary approvals and certifications, will be supplied. Wärtsilä will also provide the basic references for future, more detailed engineering requirements for building the vessel.

**www.wärtsilä.com**



# Cummins Marine Tier 3 Product Line

Cummins launched a new Onan marine U.S. EPA Tier 3-certified generator, the 55-kW MDDCM. "The expansion of our EPA Tier 3 marine product lineup to 55 kW with the MDDCM provides our customers a higher power option in a more environmentally-friendly product than previously available from Cummins Onan," said Brian Barnes, Marketing Leader, Onan Marine. The MDDCM joins the company's Tier 3-certified marine product line, which includes engines from 6.7 to 50 liters and generators from 17 to 55 kW. Cummins Tier 3-certified engines 19 liters and below and Onan marine generators also meet future U.S. emissions requirements, and will be available for the foreseeable future. The 55-kW Onan marine generator was engineered for lower emissions and some of the best sound and vibration mitigation in the industry. All Onan marine generators, including the MDDCM, feature advanced sound shields for lower sound and an optimized mounting system for reduced vibration. Plus, all are available with a Cummins Onan digital display for user-friendly diagnostics, including extensive engine and alternator information, self-diagnostic features and text display.

**https://marine.cummins.com**

(Image: Cummins)

# Schottel Delivers for Coastal Transportation




The latest addition to the Coastal Transportation fleet, MV Coastal Standard, was built at Dakota Creek Industries Shipyard in Anacortes, Wash. with a design developed to maximize cargo carrying capacity while minimizing construction and operating costs, according to the shipbuilder. With help from its Schottel Propulsion system, the vessel also scores high marks in safety, maneuverability and operability. The vessel's owner, Seattle-based Coastal Transportation, owns and operates a fleet of cargo vessels sailing from Seattle to ports throughout Western Alaska and the Aleutian Islands, delivering cargo such as construction equipment, fishing supplies, household goods and refrigerated perishables. In Dutch Harbor (Alaska), Coastal Transportation maintains efficient dock and cold storage facilities. Here, cargo moves quickly across the dock into one of Coastal Transportation's vessels, to be transported to Seattle. From Coastal's Seattle terminal cargo can be distributed to other destinations in Seattle, North America, or around the world via truck or rail connections. For these services, fast and reliable vessels are needed with excellent maneuvering properties for various Alaskan and Aleutian ports.

Schottel said its propulsion system is an important part of the concept; the Schottel Controllable Pitch Propeller type SCP 77/4-XG (2.300 kW) provides a high free running speed and excellent maneuverability and operability, with no need for a reversing gear – contrary to conventional shaft line solutions. The pitch of the propeller blades can be adjusted for maneuvering and to adapt to changing operating conditions. The SCP is supported by two Schottel Pump Jets SPJ 85 RD (360 kW each). The two SPJs are fully capable azimuth thrusters, enclosed completely in the vessel's hull. They are maneuvering aids and, at the same time, redundant take-home devices.

The 2,200-DWT freighter vessel is 242 feet long, with nine single cabins for crew and one cabin with four crew berths for extra crew or guests.

**www.schottel.de**


ABS

Dr. Tikka


DNV GL

Svensen


Evergreen Line

Taiwan President Ma Ying-jeou (right) honored Evergreen Group founder Dr. Chang Yung-Fa, accepted by his eldest son, Chang Kuo-hua (left).


Kongsberg

Haugsdal


WQIS

Mongello

## Tikka to Lead ABS Global Marine

ABS centralized its global Marine strategic planning, client development, and product and service offerings to deliver enhanced classification services and joint technical projects. Effective Feb. 15, 2016, Dr. Kirsi Tikka is promoted to the new role of Executive Vice President – Global Marine. She will continue to be based in London.

As the Global Marine lead, Tikka will align ABS strategic planning, client development, and product and service offerings with the industry's technical needs and requirements. Dedicated market sector leaders will focus on container ships, tankers and bulk carriers, and an executive team is positioned to deliver practical energy efficiency, environmental performance, and global gas solutions. Prior to her appointment, Tikka served as the Division President for Europe and Africa and as Vice President and Chief Engineer.

## Svensen Retires from DNV GL

Tor E. Svensen, Group Executive Vice President at DNV GL, has decided to retire effective from August 1, 2016. Svensen is a ubiquitous figure in maritime circles, and he will continue to work in the maritime industry and will, amongst other things, take up a role as professor at the University of Strathclyde in Glasgow, focusing on education and research related to safety at sea. Svensen's career at DNV GL spanned more than 20 years and saw him lead the Maritime Business for more than a decade. Svensen graduated from the University of Newcastle upon Tyne in 1978 with a degree in Naval Architecture and Shipbuilding, subsequently receiving a Ph.D. from the same university in 1983.

## Taiwan President Honors Evergreen Founder

Taiwan President Ma Ying-jeou honored Evergreen Group founder Dr. Chang Yung-Fa with a posthumous commendation in recognition of his contributions to international transportation and social welfare during the memorial service.

Dr. Chang established Evergreen Marine Corporation in 1968. The global container carrier's service network facilitated exports from East Asia and especially for Taiwan, an island that relies on foreign trade for economic development. The shipping line's unprecedented success in launching Asia - Europe service opened the door to the booming European market for exporters in Taiwan and many parts of Asia.

Dr. Chang formed EVA Air in 1989. The airline's innovative service has attracted international passengers and driven the growth of Taiwan's travel industry. Now a Star Alliance member, the airline has won numerous awards for service excellence and flight safety from aviation and travel organizations. Its consistent recognition has helped promote Taiwan's image in the global community. Evergreen Group has also diversified into aircraft maintenance, engine overhaul and manufacturing of aircraft parts, playing an important role in building Taiwan's burgeoning aviation supply chain. With its business expansion, Evergreen Group has established overseas affiliates across a global network of more than 110 countries.

## Haugsdal to Take Over as Kongsberg Maritime Head

Egil Haugsdal has been selected to take over as President of Kongsberg Maritime. Haugsdal holds extensive leadership experience from Kongsberg, currently leading Kongsberg Oil & Gas Technologies, with previous experience as Executive Vice President of Business Development and as President of Kongsberg Protech Systems. Haugsdal will assume his new position after a short period of overlap with current president Geir Håøy, who will assume the position of CEO of Kongsberg in June 2016.

## WQIS Hires Mongello as COO, SVP

WQIS, underwriter of pollution liability insurance for marine vessels, has created the new position of Chief Operating Officer and has selected Justin A. Mongello to fill the role, as well as that of Senior Vice President.

Mongello holds a Bachelor of Science in Marine Transportation from State University of New York Maritime College and brings to the role almost 20 years as a team leader in underwriting with firms such as Zurich North America, Swiss Reinsurance Corp and Liberty International Underwriters.

## Edison Chouest Opening Mississippi Shipyard

Edison Chouest Offshore locating shipbuilding operations, TopShip, LLC, in Gulfport, Miss. Edison Chouest Offshore's new Gulfport operations, TopShip, LLC, will be located at the Port of Gulfport's new inland port on Seaway Road. The company will be operating at the former Huntington Ingalls Composite Facility, which was acquired by the Port in March 2015.

## Scherer Named Director of Seattle Maritime Academy

Sarah Scherer has joined Seattle Maritime Academy as its new director, aiming to improve the student experience, connect with industry partners and raise the academy's profile. Scherer took the helm of Seattle Maritime Academy as its new director this month after a well-rounded career in the maritime industry.

## Andy Lawrence Joins T&T Salvage

Andy Lawrence has signed on to bring his background and experience to T&T Salvage's global response team. Lawrence graduated with a Bachelor of Science in Mechanical Engineering from the U.S. Coast Guard Academy in 2004, and later obtained a Master of Science in Mechanical Engineering from Penn State University. Picking up sea time along the way, Lawrence sailed aboard the USCG Cutter Mackinaw, then worked as a Naval Architect with the USCG Marine Safety Center performing stability-strength analysis, and part of the elite Salvage Engineering Response Team (SERT). Deciding to take his talents to the civilian world, Lawrence then joined Seattle-based Global Diving and Salvage, not only as a Naval Architect/Engineer but honing new skills as Salvage Master and Project Manager in a variety of salvage, diving and wreck removal operations.

## PVA Elects 2016 Leadership

During the PVA Annual Convention at MariTrends 2016 held January 23-26 in Crystal City, Va., members of the Passenger Vessel Association (PVA) elected Margo Marks, President and General Manager of Beaver Island Boat Company, Beaver Island, Mich. as PVA President for 2016.

The company, under its present ownership, operates two subchapter K vessels which transport passengers/vehicles and freight on a ferry route that is 32 miles long and that takes approximately two hours. She graduated from the Great Lakes Maritime Academy in 1983 and holds a First Class Pilot (Great Lakes) and Mates Great Lakes/Inland Water license of any gross tons and a 100 ton Masters license. She also graduated from Ferris State University where she earned her BA in Business Administration in 1984.

## Kemp Joins PMSA as Vice President

The Pacific Merchant Shipping Association (PMSA) announced the hire of Carl Kemp as a Vice President based in the organization's Long Beach office. Kemp brings more than 20 years of experience in government and public affairs. Most recently, he served as Senior Advisor for Legislative and Public Affairs at the Federal Maritime Commission, where he reported directly to Chairman Mario Cordero. Previously, he had his own government affairs practice and PMSA was among his clients. He also created the Office of Government Affairs and Communication in the City of Long Beach, and went on to create the Office of Government Affairs at the Port of Long Beach.

MARITIME REPORTER AND ENGINEERING NEWS

# EDITORIAL CALENDAR

| | | BONUS DISTRIBUTION |
|---|---|---|
| **JANUARY**<br>Ad Close: Dec. 21 | **Ship Repair & Conversion Edition**<br>Market: Passenger Vessel Operation Optimization<br>Technical: Marine Salvage & Recovery<br>Product: Maritime Propulsion: Gears, Thrusters, Waterjets & Propellers<br>Country Reports: Spain & Portugal | **PVA Maritrends**<br>Jan. 22-26 Washington DC |
| **FEBRUARY**<br>Ad Close: Jan. 21 | **Cruise Ship Technology Edition**<br>Market: U.S. Navy Technology<br>Technical: BIG DATA: Satellite, Data, Tracking & Communications<br>Product: Marine Coatings & Corrosion Control<br>Country Report: Italy | **Cruise Shipping Miami** March 14-17, Miami, FL<br>**Asia Pacific Maritime** March 16-18, Singapore<br>**ASNE DAY** March 2-3, Arlington, VA<br>**NACE Corrosion** March 6-10. Vancouver<br>**PSOCE 2016 Florida** March 17-19, Tampa, FL |
| **MARCH**<br>Ad Close: Feb. 22 | **Green Marine Technology**<br>Market: Training & Education: Maritime Simulation Centers & Technology<br>Technical: Workboat Fleet Maintenance & Repair<br>Product: Green Marine Fuels & Lubricants and Emission Technologies<br>Country Report: Japan | **CMA Shipping**<br>Mar 21 -23 Stamford, CT<br>**Workboat Maintenance**<br>April 12-14, New Orleans, LA<br>**Sea Japan** April 13-15, Tokyo |
| **APRIL**<br>Ad Close: Mar. 21 | **The Offshore Annual**<br>Market: Port & Ship: Loading and Unloading Technology & Equipment<br>Technical: Satellite Communication<br>Product: Deck Machinery, Winches and Ropes<br>Region Reports: Scandinavia: Denmark, Finland, Norway & Sweden | **OTC** May 2-5, Houston, TX<br>**Inland Marine Expo** May 10-12, St. Louis<br>**Portsecure 2016** May 18-20, Toronto |
| **MAY**<br>Ad Close: Apr. 21 | **The Marine Propulsion Edition**<br>Market: RIB & Patrol Boat Report<br>Technical: Workboat Design & Construction<br>Product: Marine Electronics: Navigation Radar & ECDIS<br>Country Reports: Greece & Turkey<br>Special Report: U.S. Coast Guard Annual | **Posidonia** June 6-10, Athens<br>**Sea-Air-Space** May 16-18, National Harbor, MD<br>**SeaWork** June14-16 Southampton, UK<br>**CIMAC CONGRESS** June 6-10. Helsinki |
| **JUNE**<br>Ad Close: May. 20 | **Annual World Yearbook**<br>Market: Maritime Simulation & Training Centers<br>Technical: Dredging Vessel Technology<br>Product: Pumps, Valves, Pipes & Insulation<br>Country Reports: U.K. & Ireland | **Marine Money Week**<br>June 21-23,<br>New York, NY |
| **JULY**<br>Ad Close: Jun. 21 | **Marine Communications Edition**<br>Market: Tugboat, Towboat & Barge<br>Technical: Oil Spill Response & Recovery<br>Product: Marine Electronics Equipment & Supplier Guide<br>Country Report: Singapore | JULY SPECIAL CONTENT<br>ELECTRONIC EDITION<br>www.whitepapers.marinelink.com |
| **AUGUST**<br>Ad Close: Jul. 21 | **The Shipyard Edition**<br>Market: Offshore Deepwater: Structures and Systems<br>Technical: Heavy Lifting Solutions: Maritime Cranes, Winches, Windlasses & Capstan<br>Product: Ballast Water Technologies<br>Country Report: The German Maritime Cluster | **SMM HAMBURG**<br>September 6-9,<br>Hamburg, Germany |
| **SEPTEMBER**<br>Ad Close: Aug. 22 | **Maritime & Ship Security**<br>Market: Caring for the Mariner: Onboard Amenities<br>Technical: Maritime Propulsion: The Hybrid Drive Solution<br>Product: Clean Water Technologies<br>Region Report: U.S. West Coast Maritime | **Shipping Insight**<br>October, Stamford, CT |
| **OCTOBER**<br>Ad Close: Sep. 21 | **Marine Design Annual**<br>Market: Ship Classification Societies<br>Technical: Marine Firefighting, Safety & Salvage<br>Product: CAD/CAM<br>Country Report: The Netherlands | **SNAME**<br>November 2-4, Bellevue, WA<br>**Arctic Technology Conference**<br>October 24-26, St. John's |
| **NOVEMBER**<br>Ad Close: Oct. 21 | **Workboat Edition**<br>Market: The 'LNG-as-Fuel' Revolution<br>Technical: Deck Machinery, Winches & Ropes<br>Product: Marine Coatings<br>Special Report: Gulf of Mexico Builder and Supplier Guidebook | NOV. SPECIAL CONTENT<br>ELECTRONIC EDITION<br>www.whitepapers.marinelink.com<br>**Workboat Show**<br>Nov. 30-Dec. 2, New Orleans, LA |
| **DECEMBER**<br>Ad Close: Nov. 23 | **Great Ships of 2016**<br>Market Report: The Autonomous Ship: Command & Control<br>Technical: Shipyard Automation: Welding & Cutting Equipment<br>Product: Marine Engine Guide<br>Country Reports: China & Korea | **Surface Navy Association 2017**<br>Crystal City, VA |


Edison Chouest Offshore

Chouest


Seattle Maritime Academy

Scherer


T&T Salvage

Lawrence


PVA

Marks


PMSA

Kemp


Crowley

Garcia

### Two Win Crowley Scholarships

Crowley Maritime Corporation awarded $2,500 Thomas B. Crowley Sr. Memorial Scholarships to University of North Florida (UNF) students Camilo Garcia and Danijel Hadziavdic at a scholarship luncheon.

### Ecochlor Selects Drew Marine

Ecochlor signed an agreement with Drew Marine to assist them in providing logistics support for the resupply of its BWTS precursor chemicals at select ports and harbors. In addition, Drew Marine will provide chemical storage at designated ports, delivery of the precursor chemicals, and technical support to ships fitted with the Ecochlor BWTS.

### Furuno Establishes China Subsidiary

Furuno Electric Co., Ltd., announced that its new subsidiary in Hong Kong has been established and has commenced business operation on February 1, 2016. The new subsidiary, Furuno China, Co., Limited is Furuno's wholly-owned subsidiary company incorporated in Hong Kong.

### Norsafe Safety Packages for Seafarers

Norsafe provides STCW and Norwegian Oil and Gas (NOROG) compliant training courses for seafarers, reportedly making it the only lifeboat manufacturer that offers production, servicing and certified training in the operation and maintenance of lifeboats and lifeboat crew. Norsafe has two modern training academies one in Rosendal, Norway and the other in Athens providing STCW and Norwegian Oil and Gas (NOROG) compliant courses. Norsafe offers life- saving equipment of the highest standard, worldwide servicing and now with the addition of STCW certified training, we can confidently state we're a complete safety supplier," said Michael Røssland, Vice President, Norsafe Academy. "With Port State Control Inspections consistently finding a 10% deficiency rate in life saving equipment maintenance and training, it is important that ship owners and ship management companies focus on this area as it could quite literally be a matter of life or death," he continued.

### Sanmar Celebrates 40 Years

Tugboat builder and operator Sanmar Denizcilik is celebrating its 40th Anniversary this year. More than 150 tugboats are presently in operation on international seas, the company says. It was in the year 1976 that Orhan Gürün, today's company chairman, together with his friend, the late Gökçen Seven, incorporated Sanmar Denizcilik. Now celebrating its 40th Anniversary, Sanmar has developed into a force on two fronts, firstly as a tugboat operator and secondly as a tugboat builder with two modern custom built shipyards producing vessels for six continents.

Being one of Turkey's oldest tugboat companies in the private sector has challenged Sanmar, resulting in a powerful fleet with an average age of less than two years. With up-to-date equipment and well-trained and experienced crew, Sanmar provides a variety of services in various ports and terminals around the coastline of Turkey and Bulgaria.

### Caterpillar Names Dealer for Cuba

Caterpillar Inc. has named privately owned Puerto Rico-based company Rimco as the official Cat dealer for Cuba. Rimco, a longtime Cat partner, currently serves as the company's dealer for Puerto Rico and the Eastern Caribbean.

The move comes in anticipation of the U.S. lifting its embargo on trade with Cuba. Upon easing of trade restrictions, customers in Cuba will be able to purchase Cat products through Rimco in accordance with U.S. and Cuba regulations. While steps remain until relations are fully normalized, including lifting the embargo, Rimco and Caterpillar will continue preparations to best serve the Cuban marketplace with construction and mining equipment, power systems, marine and industrial engines.

## BV Classes Mega Asphalt Carrier

Classification society Bureau Veritas is classing the 37,000 dwt asphalt carrier Asphalt Splendor, recently delivered to U.S.-based Sargeant Marine. The vessel was built at Avic Dingheng, China and is one of a series of two designed by Chinese design institute SDARI in cooperation with Sargeant. The hot asphalt can be carried liquid at temperatures up to 170 degrees C in 16 independent tanks with a total capacity of 35,666 cu m. Dan Sargeant, President, Sargeant Marine, said, "It is imperative to stay ahead of the game, thinking innovatively when it comes to economics, as well as operations. We are looking forward to the second of these new vessels, also BV classed, which give us a distinct advantage in the marketplace, as there is truly nothing like this out there."

**Key dimensions:**
DWT 37,000 metric tons
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Depth 16.8 m
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Propulsion plant: 1 x Wartsila 5RT-flex 6.400 kW at 99 rpm

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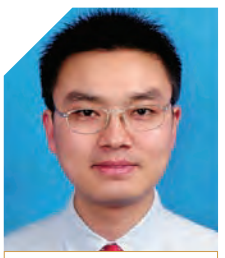

**Gan Shaowei**
National LNG Project Leader, LNG leading Expert & Director Company, China Classification Society, China

**Joachim Skorge**
Regional Head & Managing Director, DNB Bank ASA, Singapore

**Jason Waldie**
Associate Director, Douglas Westwood, Singapore

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This directory section is an editorial feature published in every issue for the convenience of the readers of MARITIME REPORTER. A quick-reference readers' guide, it includes the names and addresses of the world's leading manufacturers and suppliers of all types of marine machinery, equipment, supplies and services. A listing is provided, at no cost for one year in all issues, only to companies with continuing advertising programs in this publication, whether an advertisement appears in every issue or not. Because it is an editorial service, unpaid and not part of the advertisers contract, MR assumes no responsibility for errors. If you are interested in having your company listed in this Buyer's Directory Section, contact Mark O'Malley at momalley@marinelink.com

### ANCHORS & CHAINS

Anchor Marine & Supply, INC., 6545 Lindbergh Houston, Texas 77087 , tel:(713) 644-1183, fax:(713) 644-1185, david@anchormarinehouston.com

### ANTI-CONDENSATION COATINGS

Mascoat Products, 4310 Campbell Rd., Houston, TX , USA , tel:(713) 465-0304, fax:(713) 465-0302, wconner@mascoat.com

### APPROVED U.S. COAST GUARD MARINE SANITATION DEVICES

Environmental Marine, Inc., 711 Colyer Rd., Bronson, KY , USA , tel:(606) 561-4697, bobkenison@aol.com

### AUTOMATIC IDENTIFICATION SYSTEM

Saab AB (publ) TransponderTech, SE-589 41 Linkoping , tel:46 13 180000, fax:46 13 182377, Info.transpondertech@saabgroup.com

### BALLAST MONITORING

KING-GAGE Systems / King Engineering (tank level & draft monitoring), 8019 Ohio River Blvd, Newell, WV , USA , tel:855-367-2494, marine@king-gage.com, www.king-gage.com

### COATINGS/ CORROSION CONTROL/ PAINT

Hempel A/S, Lundtoftegårdsvej 91 2800 Kgs. Lyngby , tel:45 4593 3800, fax:45 4588 5518, marine@hempel.com , www.hempel.com

Tri-State Coating and Machine Co. Inc., 5610 McComas Road, PO Box 296, Salt Rock, WV V4W 3S8, USA , tel:1-800-477-4460, fax:304-736-7773, brichmond@tscminc.com

### COMMUNICATIONS

David Clark Company (Wireless Headset Communication Systems), 360 Franklin Street, Worcester, MA 77060, USA , tel:(800) 298-6235 , www.davidclarkcompany.com/marine

### CORDAGE

Helkama Bica Oy, Lakimiehenkatu 4, KAARINA FI-20780, Finland , tel:+358-2-410 8700, sales@helkamabica.fi , www.helkamabica.com

### COUPLINGS

Centa Corporation, 2570 Beverly Drive #128, Aurora, IL 48331, USA , tel:(630) 236-3500, fax:(630) 236-3565, bobl@centacorp.com

### CRANE - HOIST - DERRICK - WHIRLEYS

Essex Rental Corp., 1601 NE. Columbia Blvd. Portland ,OR 97211

Lifting Gear Hire, 9925 Industrial Drive Bridgeview, IL 60455

### DRILLS

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Evonik Resource Efficiency GmbH, Active Oxygens, Rodenbacher Chaussee 4, D-63457 Hanau, Germany, , tel:+49 6181-59 5326, fax:+49 6181-59 75326, juergen.meier@evonik.com , www.evonik.com/peraclean-ocean

### FILTERS/FILTER SYSTEMS

UT 99 AG Oil Mist Separators, Schaubenstrasse 5 CH-8450 Andelfingen , Switzerland , tel:+41 52 397 11 99, fax:+41 52 397 11 90, info@ut99.ch , www.ut99.ch/en

### GROUNDING & EARTHING BRUSHES

Sohre Turbomachinery, Inc., 128 Main Street, Monson, MA , USA , tel:413-267-0590, fax:413-267-0592, tsohre@sohreturbo.com contact: Tom Sohre, www.sohreturbo.com

### HOISTS

Kleeco, 10110 S. M43 HIGHWAY Delton, MI 49046

### INSURANCE SERVICES

WQIS (Marine Pollution Insurance Policies), 60 Broad Street, 33rd Floor, New York, NY , USA , tel:1-800-736-5750, fax:(212) 292-8716 , www.wqis.com

### INTERIOR DESIGN

Metalcolour Sweden AB, Box 510, SE-372 25 Ronneby, Sweden , tel:+46 457 781 00, fax:+46 457 666 75, info@metalcolour.com , www.metalcolour.com

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### LIFT EQUIPMENT

Kleeco, 10110 S. M43 HIGHWAY Delton, MI 49046

Lifting Gear Hire, 9925 Industrial Drive Bridgeview, IL 60455

### LIGHTING SYSTEMS/ EQUIPMENT

Larson Electronics LLC, 11035 Jeanell Drive Kemp, TX 75143 , tel:(903) 498-3363, cred@larsonelectronics.com

### MARINE AND PROTECTIVE COATINGS

Sherwin Williams, 101 W. Prospect Avenue, Cleveland, OH, 44115 , USA , tel:800.524.5979, klarmstrong@sherwin.com , sherwin-williams.com/protective

### MARINE TRANSPORTATION

Central Boat Rentals, Inc., P.O. Box 2545, Morgan City, LA , USA , tel:985-384-8200, fax:985-384-8455, earl@centralboat.com or gary@centralboat.com

### MECHANICALLY ATTACHED FITTINGS (MAFS)

Viega, 100 N. Broadway 6th Floor, Wichita, KS , USA , tel:904-315-3899, fax:888-782-6188, paul.switzer@viega.us contact: Paul Switzer, www.viega.us

### MILITARY PATROL CRAFT MANUFACTURERS

Brunswick Commercial & Government Products, 420 Megan Z Avenue, Edgwater, FL 80204, USA , tel:(386) 423-2900, kelsey.nemeth@whaler.com , www.brunswickcgp.com

### NAVAL ARCHITECTS, MARINE ENGINEERS

Bristol Harbor Group, Inc., 99 Poppasquash Road Unit H, Bristol, RI , USA , tel:(401) 253-4318, fax:(401) 253-2329, kribeiro@bristolharborgroup.com

Brunswick Commercial & Government Products, 420 Megan Z Avenue, Edgwater, FL 80204, USA , tel:(386) 423-2900, kelsey.nemeth@whaler.com

JMS Naval Architects, 34 Water Street, Mystic, CT 22203, USA , tel:(860) 536-0009 EXT 16, fax:(860) 536-9117, RickF@JMSnet.com contact: Rick Fernandes, www.jmsnet.com

The Shearer Group, Inc., 99 Poppasquash Road, Unit H, Bristol, RI , USA , tel:(401) 253-4318, fax:(401) 253-2329, kribeiro@bristolharborgroup.com

### NITROGEN GENERATORS

Air Product AS, Vige Havnevei 78, 4633 Kristiansand, Norway, P.O.Box 4103 Kongsgaard, 4689 Kristiansand, Norway , tel:+47 38 03 99 00, norway@airproducts.com , www.airproducts.no

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Rustibus, 2901 WEST SAM HOUSTON PKWY, NORTH SUITE E-325, HOUSTON, TX , tel:832-203-7170, fax:832-203-7171, houston@rustibus.com , www.rustibus.com

### SENSORS

R.M. YOUNG COMPANY, 2801 Aero Park Drive, Traverse City, MI , USA , tel:(231) 946-3980, fax:(231) 946-4772, met.sales@youngusa.com

### SHIP REPAIR

Malin International, 320 77th street, Pier 40/41 Galveston, TX 77554

### SOUND DAMPING INSULATION COATINGS

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### STEEL, PIPE, ALUMINUM & ALLOY SURPLUS - PURCHASING

Texas Iron & Metal, 865 Lockwood Drive, Houston, TX 36652, USA , tel:713-672-7595, fax:713-672-0653, maxr@texasironandmetal.com contact: Max Reichenthal, www.texasironandmetal.com

### STEEL, PIPE, ALUMINUM & ALLOYS

Texas Iron & Metal, 865 Lockwood Drive, Houston, TX 36652, USA , tel:713-672-7595, fax:713-672-0653, maxr@texasironandmetal.com contact: Max Reichenthal, www.texasironandmetal.com

### VACUUM TOILET SYSTEM

Jets Vacuum AS, Myravegen 1 6060 Hareid , tel:47 700 39 100, fax:47 700 39 101, post@jets.no , www.jetsgroup.com

### VALVES

Wager Company Inc., 570 MONTROYAL RD Rural Hall, NC 27045

### WASTE WATER TREATMENT

Scienco/FAST – Marine Sanitation, Water Treatment, 12977 Maurer Industrial Dr., Sunset Hills, MO 33309, USA , tel:1-314-756-9300, solutions@sciencofast.com , www.sciencofast.com

Terragon Environmental Technologies Inc, 651 Bridge St Montréal, Québec Canada H3K 2C8 , tel:514-938-3772, fax:514-938-0721, andrew.korney@terragon.net

### WATER JET SYSTEMS

Marine Jet Power Inc., 6740 Commerce Court Drive Blacklick, OH 43004-9200, USA, Columbus , tel:(614) 759-9000 , www.marinejetpower.com

### WELDING AND CUTTING EQUIPMENT

Profile Cutting Systems USA, Boulder Creek, CA 95006 , tel:(831) 338-8251, john@pcsusa.pro, www.pcsmachines.com

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**Email:** hr@nycl.com
**New York, New York, United States of America**

**Skills:**
New York Cruise Lines, based at Pier 83 on the Hudson River, is one of the premier operators of waterborne dining and event facilities in New York through the iconic Circle Line Sightseeing Cruises, as well as World Yacht. Whether you are exploring New York for the first time or rediscovering your hometown, a Circle Line cruise is a relaxing and fun way to see the world's most famous skyline. World Yacht offers unique and memorable special events and private yacht charters, as well as dinner and brunch cruises on our fleet of four beautiful yachts. We are currently seeking a full-time Marine Mechanic Assistant who will oversee scheduling, coordinating, and performing vessel repair & maintenance. You still also be responsible for purchasing of parts and repair services and supplies; ensuring all vessels are in compliance with all regulatory agencies; accurately filing records of all maintenance performed using company program; assisting in troubleshooting and repairing vessel machinery; maintaining and securing work tools; effectively using purchase orders and reviewing invoices; and performing emergency repairs on vessels as required.

**Description:**
• 5 years of increasingly responsible engineering experience in the maritime industry
• Experience maintaining Dinner and Sightseeing vessels
• Ability to repair marine equipment on site under adverse conditions
• Ability to understand and execute complex oral and written instructions and work independently
• Must be able to read, speak, write, type, and understand English in person and over the telephone
• Valid State driver's license
• Use of Computer (Word and Excel), Copier and Fax Machine
We offer a competitive salary and a comprehensive benefits package including medical, dental, short and long term disability, life insurance support, tuition reimbursement and a matching 401(k) plan. If you are interested in joining our team, please submit your resume as a WORD document along with your salary history/requirements to: hr@nycl.com or fax to 212-630-8827. Salary history/requirements must be stated in order to be considered for the position. EOE

## Vessel Engineer

Catalina Channel Express
Full Time
**Category:** Engineer / Naval Architect
**Job Location:** Berth 95 San Pedro, CA, 90731 United States
Contact HR Director
**Email:** hrmail@catalinaexpress.com
400 Oceangate, Suite 300 `Long Beach, CA, 90802 United States

**Qualifications:**
• Experience in maintaining diesel engines; knowledge of hydraulic systems, electrical HVA systems a plus
• Ability to repair marine equipment on site under adverse conditions at times
• Ability to interact with others using courtesy, tact, and good judgment
• Maintain the confidentiality of all sensitive communications
• Ability to understand and execute complex oral and written instructions
• Ability to work independently with minimal or no guidance
• Ability to interact professionally with all departments
• Must have a valid drivers license

**Description:**
Our engineering team is a group of individuals who take pride in ensuring our vessels are not only the safest but also provide a quality experience for our passengers. We are looking for individuals to join our team of Vessel Engineers who are willing to put the dedication and attention to detail into their work. Vessel Engineers perform routine maintenance on our fleet as directed by the Port Engineer as well as perform inspections of vessels for repair and maintenance standards and procedures working with other company engineers as needed.

**Job Conditions and Environment:**
This job requires the ability to travel between our ports as well as receive emergency repair calls after hours. Weekend work is required. The work may occur under adverse weather conditions. Travel may be involved on certain projects. It also requires the ability to fit into tight fitting spaces for repair work.
We offer competitive benefit and compensation packages. We are and Equal Opportunity Employer and a Drug Free Workplace. Pre-employment drug testing is required.

## Summer Sea Term 2016

**Maritime College**
**Salary:** $ DOE , Full Time , Company Employee

**Category:** Corporate / Senior Management

**Job Location:** Apply online Bronx, NY, 10465 USA
Contact
**Email:** none@given.com
**Work Phone :** 888-888-8888
**Apply Online Bronx, NY, 10465 USA**

**Description:**
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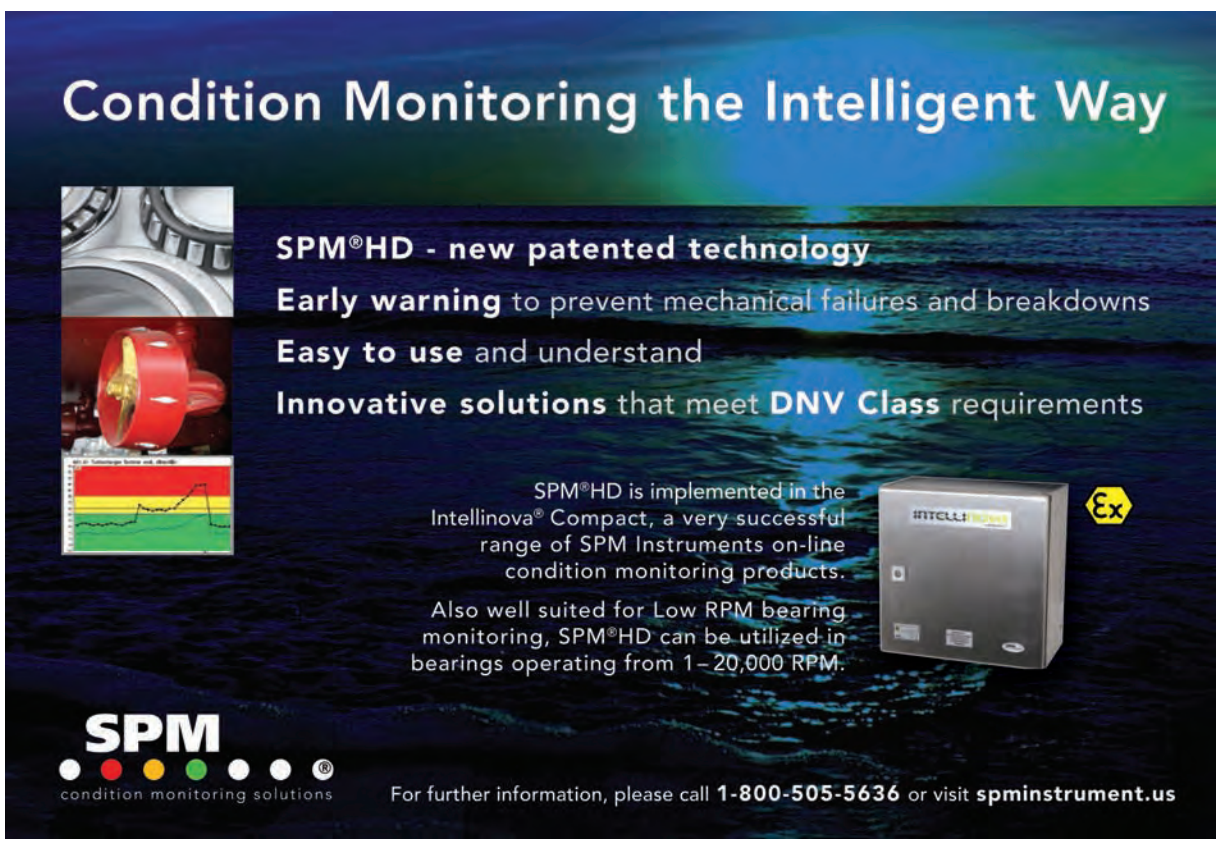

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