Swedish Shipping Gazette

SMM 2018 Edition

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Green Shipping

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Swedish Shipping Gazette

Published by:
Svensk Sjöfarts Tidnings Förlag AB, a subsidiary of the Swedish Shipowners' Association (Föreningen Svensk Sjöfart).

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Printed by: Risbergs Information & Media, Uddevalla
Cover photo: Joachim Sjöström

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Green thinking

SWEDISH shipowners prefer to utilize green technology in their newbuilding projects, supporting climate-smart transport solutions at sea. A key component is usually close cooperation with long term charterers.


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THE SWEDISH SHIPYARD

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Swedish forerunners

SWEDISH SHIPOWNERS have by tradition been early adopters. It is 200 years since commercial traffic with steamboats was introduced in Sweden. Some 100 years later, in 1912, Johnson Line took delivery of the cargo motor vessel Suecia, which is regarded the second ocean going diesel-powered merchant vessel in the world.

Another example is the Swedish shipowner Wallenius, a pioneer within the field of operations with car carriers and roro-vessels as we know them today.

I HAVE OFTEN HEARD the statement that shipowners are conservative when it comes to introducing new technology. Respectfully, I disagree – especially when talking about Swedish owners.

I think that it is never about opposing innovation. But is there a single corporate board that would approve investments in new, unproven technology in any field? A newbuilding is a huge investment. Regardless of it being a small family owned tanker or a giant cruise vessel, there is not much latitude for experiments when the ship needs to be making money from day one. No commercially operating owner has the possibility to build a testbed for new and exciting shipboard technology just for fun.

New technology is introduced step by step on vessels and often they are baby steps. Therefore I think it is fantastic to follow the industry when something really revolutionary is going on, such as introducing new fuels like LNG, LBG and methanol, not to mention battery power and hydrogene fuel cells.

The change does not happen overnight, but that does not mean that it would not come at all.

OF ALL NEWBUILDINGS on order for Swedish shipowners a remarkable large share are utilizing green tech designed for climate-smart shipments. I think that this is characteristic for Sweden's shipowners. The shipping industry needs forerunners to prove that new technology really works.

But the responsibility for impelementing new technology in shipping has to be shared by all stakeholders. The authorities must encourage such initiatives and be proud of their entrepreneurs. Unfortunately this is not always the case. Nevertheless shipowners invest in green tech as never before.

I really do think that shipping is one of the least conservative industries in the world.

BUT IT IS NOT JUST ABOUT tecnology and hardware. Although the Swedish merchant feet is rather small, Sweden is a great nation when we talk about quality shipping. Swedish shipowners are also well-liked employers – not only among those who live in Sweden. I have for example been told by many Filipino seafarers – both officers and crew – that it is like winning the lottery to be employed by a Swedish owner.

Why? Usually the answer is "because they treat us with respect". And it is about give and take. Happy employees are loyal and motivated. Such employees are perhaps the most important asset of a company.

Gothenburg, 22 August 2018
Pär-Henrik Sjöström, editor

Swedish ship-owners think green

A REMARKABLE SHARE of the newbuildings for Swedish shipowners include a lot of climate-smart and energy efficient technology. Green investments are nurtured by the whole Swedish society.

PÄR-HENRIK SJÖSTRÖM

SIRIUS SHIPPING

Sirius Shipping's project Evolution includes two vessels for delivery in 2018 and 2019.

When a Swedish shipowner launches a newbuilding project the aim is to build an efficient vessel which is also climate-smart.

It is not a coincidence that 45 per cent of the seagoing merchant vessels on order for Swedish owners are designed to be powered by LNG or methanol. If vessels prepared for conversion to alternative fuels are included, the share rises to 77 per cent. And the remaining ones are not bad either. By their innovative design and implementing the latest technology, they has to be considered as "green" ships too.

For example Sirius Shipping is introducing its LNG ready "Evolution" series of IMO II chemical and product tankers with a tank capacity of 9700 cbm. Both the MAN B&W main engine and the auxiliary engines will fulfil IMO's Tier III emission standard with a NOx level below 2 g/kWh due to exhaust gas cleaning - HPSCR for the main engine and a Catamiser for the auxiliary engines.

Family owned

Fredrik Larsson Senior Policy Advisor, Safety & Environment at the Swedish Shipowners' Association, thinks that there are several factors contributing to the fact that Swedish shipowners are in the front row regarding investments in green technology.

"One reason is that they are often family owned companies. They have a long term perspective and a well established relationship with environmentally conscious customers. At the same time, we see a change in the whole society - including as well individual persons and households as companies, politicians and the public sector. In order to continue to operate competitive shipping they have to meet this trend."

He stresses that this is not unique for Sweden, but in Sweden the wheels have really been set in motion.

"There are many bumps in the road and it is not easy to take the lead, but the driving force is that the whole society starts demanding sustainability in all fields."

Higher costs

The costs are considerably higher when building a for example LNG powered vessel compared to a vessel with conventional diesel machinery. Fredrik Larsson admits that there may emerge a certain competitive disadvantage.

"However the customers are beginning to demandi climate-smart manufacturing and transportation. In the long run you are forced to adopt if you want to expand or even survive as a company."

Still he thinks that the environmental legislation both nationally and internationally is quite adequate today.

"Of course it could be more stringent but the investments have to be in line with what is realistic and economically viable. The legislation is sharp enough, the goals are high enough to strive for. Swedish shipowners usually go much further than what is demanded for just compliance."

Wish there were more

Fredrik Larsson says that several large Swedish transport buyers have special demands and therefore are willing to pay a little bit extra for a climate-smart shipment.

"Of course we wish that there would be even more of them because this is a key factor in the development of climate-smart new vessels. For example

Terntank's investments in a series of LNG powered product tankers was enabled by a cooperation with the oil companies Preem, Neot and Esso Norway."

The downside is that the shipments will be more expensive for such companies.

"We wish that also more international transport buyers start setting higher requirements, both regarding environment and climate, but also regarding social conditions on board."

"I don't think the goal is too ambitious"

Fredrik Larsson, Senior Policy Advisor Safety & Environment, Swedish Shipowners' Association

Ambitious goals

Sweden has declared a vision to achieve net zero greenhouse gas emissions by 2045. IMO has agreed to halve the greenhouse gas emissions from shipping by 2050.

"I am optimistic and our vision within Swedish shipping is to reach zero emissions by 2050. For the moment I am quite convinced that we are well on track to achieve this, but it will get harder further on", Fredrik Larsson says.

In his opinion it is obvious that this will require new logistics chains as well as new energy carriers.

He does not think that the technology itself will be a major problem.

"Technology is already existing and is getting more advanced all the time. The foremost problems are economic, legal and political. It is for example not economically profitable to produce bio gas. Also the charter parties has many outdated features. A vessel may be running at full speed to its destination just to be forced to drop anchor as the quay is occupied. The political problem is the inability to solve the economic and legal problems", he says, and concludes:

"We have a long and difficult road ahead but I don't think that the goal is too ambitious considering the fact that investments have already been made in battery technology, sun and wind energy, gas and especially bio gas. And we still have 32 years of time to reach our goal."

Pär-Henrik Sjöström

NAOS

Combining business, expertise and skills

SMTF (Swedish Maritime Technology Forum) is a business orientated network, operating in close cooperation with its members.

The main task of SMTF (Swedish Maritime Technology Forum) is to support the development of marine subcontractors to shipping and the leisure boat industry, both with regard to their business needs and the technical challenges they face. Currently, SMTF comprises around 100 member companies.

"We are a business orientated network that operates in close cooperation with our members. Through our activities and projects we serve a focal point for issues of relevance to the industry," says Process Manager Eva Errestad, one of six employees in the organization.

GreenPilot

SMTF hosts business and networking activities and works with technical development projects where member companies are involved. One such project is called GreenPilot, where one of the Swedish Maritime Administration's pilot vessels has been converted to run on methanol. Participating in the project are SMTF member companies ScandiNAOS and SSPA.

"With GreenPilot we have successfully paved the way both in technical and regulatory terms for methanol-driven propulsion in the smaller engine segment. This is a good example of an innovation-driven project that benefits our member companies, both through new business and new expertise, while also profiling Sweden internationally in green propulsion, says Eva Errestad.

Celeste

Another project is the Celeste program, which was launched this spring. The purpose of the program is to develop new technology and to combine existing technology in new ways.

"The overall goal is to develop next-generation zero-emission vessels for the coastal segment. The way we work is that we split the ship's overall systems into different blocks. For example, the driveline is one block, the hull is another while the navigation system is a third. The combined knowledge will provide us with the right expertise to create an optimized future vessel profile, explains Andreas Bach, senior project manager at SMTF.

Open innovation platform

At the moment, SMTF is developing an open innovation platform for the maritime industry. The platform, called SARGASSO, aims to help companies use a demand-driven concept to develop specific ideas or services that they aim to turn into market-ready solutions.

"The company contacts us with a


SMTF

Eva Errestad.

business or project idea they wish to develop together with partners with complementary skills or expertise. In the next step, we communicate the business opportunity to companies and organizations in the member network to match the opportunity with suitable partners," says Eva Errestad.

Member companies are given the opportunity to respond to the request first and then the proposal is forwarded to SMTF's entire network of contacts which also includes companies from other industries and clusters.

"There is definitely an upside in finding solutions and partners also outside of the maritime cluster. It is an excellent opportunity to present the maritime field of business and the buzz of innovations that it is currently generating. At the same time as we gain knowledge and contacts from other industries," says Eva Errestad.

"SARGASSO will be a very efficient tool for staying ahead of the competition. We have already received some proposals and the platform will go live during October. Even the Celeste program will be incorporated as a part of the Sargasso platform so that we can exploit and utilize all available market and technological knowhow."

Good reputation

Eva Errestad emphasizes that Sweden has a very good reputation in shipping and marine engineering internationally, not least in the area of energy efficiency and optimization. But today, a number of challenges are faced with, not least, the provision of skilled workers with the right competencies, an issue shared with several other industries in Sweden.

"Most of the work and products produced are exported, which of course is positive but it means the industry has a low profile in its home market. Therefore, an important part of our mission is to make the companies and their work visible so they find the right people with the right skills which will enable them to grow."

Part of RISE

SMTF became a part of RISE, Research Institutes of Sweden, a year ago. Now the office in the south of Sweden has moved to Lund and the main office to Gothenburg.

"By becoming part of RISE, we can further expand our network and gain better access to research expertise and facilities, especially for test beds and lab environments. RISE is a large organization with over 2000 employees and has offices all over the country," Eva Errestad explains.

Participating in fairs

Another part of the mission of SMTF is to participate in fairs, such as SMM in Hamburg. At trade fairs, the organization is responsible for the Swedish National Pavilion where companies showcase their marine technological innovations.

"We are a national organization, but we work internationally through the trade shows. With the Swedish pavilion, we strengthen the Swedish brand in the industry. SMM is important because it is the biggest fair this part of the world and famous for generating good business," Eva Errestad says and continues:

"This year we will have nine exhibitors in the pavilion, which is 160 square meters in size. The pressure on SMM was high this year and we had to turn down four companies. New for this year is a collaboration with Business Sweden's Italian office, which has helped us connect the Italian shipyard Fincantieri with some of our member companies. Next exhibition coming up will be Norshipping in June in Oslo next year, we have good business opportunities coming up there too."

"Our mission is to make companies and their work visible"

Eva Errestad, Process Manager, SMTF


SMTF

Andreas Bach.

“We should be proud of what has been achieved”

There is a clear political willingness to increase the economic growth within the Baltic Sea Region. Shipping is one of the very back bones enabling the global trade and to a very large extent the same goes for the increased prosperity in the Baltic Sea Region. Today, more than 1500 ships are present in the region at any given time and we can thus foresee an increased number of vessels in a near future.

Some papers even indicate that in 2030 the number of vessels in the Baltic Sea will be more than doubled. Obviously, this is something that we from the shipping industry support. The shipping sector must, according to politicians, take a larger share of the increasing freight volumes if we should be able to develop the sustainable society.

AT THE VERY SAME TIME, we note several of political measures to protect the Baltic Sea. Looking back, we have the decisions via IMO to declare the Baltic Sea to be both a special area and a Particularly Sensitive Sea Area (PSSA). HELCOM have special requirements for ships in the Baltic Sea and some countries have, in addition, national regulations. All of them with the ambition and purpose to minimize or in some cases, even totally reduce the negative impact from shipping both in the water and into the air.

Shipping is a global industry and the introduction of regional, national and local regulations are indeed problematic. It becomes even more problematic, and in some cases even impossible, when these regulations are to be implemented within a short time frame and on the existing fleet. Not seldom, we from the industry participate in the debate and the rule making process arguing for global, instead of regional, regulations. There should be no doubt that the shipping industry is working hard to reduce negative consequences of shipping. The vision is that shipping should not affect the environment at all and that there should not be any accidents.

DURING THIS SUMMER, we have had two groundings by general cargo ships in the Baltic Sea and both occurred in Swedish water (... one of them literally on the Swedish coast). Even though we are awaiting the results from the official investigation reports, one thing that these two accidents have in common is alcohol. One of the groundings caused an oil spill from the fuel tanks to the surrounding archipelago.

Thanks to immediate and effective actions from, in parallel with very good cooperation between, different authorities and voluntary work from the general public, the damages from the oil spill could be minimized. We are, of course, very sorry for the oil spill and the consequences to nature, animals and people. One conclusion that can be drawn from this, as well as many other cases, is that an accident no matter the reason, has negative effects for the entire shipping sector.

SINCE THE EARLY 1990s, the number of illegal oil spills and amount of oil detected in the Baltic Sea have decreased by more than 90 per cent! However, there is still work to be done to reach the vision, but together with the authorities, via HELCOM, cargo owners and the ports we should be proud of what has been achieved so far.

However, one thing we can’t be proud of is when alcohol or drugs cause accidents and oil spill. And these accidents do occur. We as an industry should be ashamed. Reducing or fully abolish the use of alcohol and drugs is a huge task, for any part of the society, but it is obviously a work that needs to be done. Part of the shipping industry has shown it is possible to change culture, for example the tank sector.

IN A NEAR FUTURE, the number of ships in the Baltic Sea will be doubled and we want passengers and cargo owners to be and feel safe when using shipping. Within the industry we want to avoid the number of regional rules. However, a very basic homework we need to do is to increase the safety work with respect of alcohol and drugs. Likewise, the tanker sector and their Vetting regime, perhaps it would be wise of us to include the customers in this work?

RIKARD ENGSTRÖM, CEO
CARL CARLSSON, SENIOR POLICY ADVISOR
SAFETY, SECURITY AND TECHNOLOGY
SWEDISH SHIPOWNERS’ ASSOCIATION

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PÅR-HENRIK SJÖSTRÖM

Viking Grace has a rotor sail installed.

How green is green-tech shipping?

Green-tech is a fickle term and with today's PR-sassy environmental movements it is not always as straightforward as it might seem.

In shipping-terms green-tech includes vessel operation, ports authorities, yards and sub-contractors who bear the burden of creating a sustainable maritime industry. But is this reasonable? And is it profitable? Let's take a look.

Without a doubt, it is the operation and employment of a vessel that creates its largest environmental footprint. The Clean Shipping Index claims to be: "... an independent and holistic labelling system of [a] vessel's environmental performance; a practical tool for differentiating port- and fairway fees or choosing more sustainable shipping alternatives".

Organizations like this do have a huge influence on best-practice shipping operations today through their lobbying programs. Another example is WPSP - the World Ports Sustainability Program - which says that: "... Ports are nodal points in global supply chains [and] are embedded in local and regional communities. As a result, ports must respond to worldwide, regional and local challenges."

Is enviro the new black?

The results of these kinds of initiatives has had an impact. Just look at the number of jobs within the maritime industry that are unambiguously related to environmental issues. Marine biologists, costal-zone certified marine scientists, environmental specialists, marine conservation internships and marine program manager positions are all out there just waiting for budding applicants.

On the up-side, this does create a Blue Economy approach to shipping. On the down-side, most of these jobs are advertised by maritime authorities and research bodies meaning that ship operators are lagging in their environmental obligations. Or are they?

Royal Caribbean Cruise Line took a leading role in 2008 when the company introduced an eco-adapted management system. As the first US operator to have a dedicated Environmental Officer onboard every ship who is responsible for prevention processes and the overall adherence to set goals as part of the company's Save the Waves program, it was a first. Environmental Officer tasks also extend to shoreside duties and they report to the company's Vice President of Environmental Stewardship.

Reduce, reuse and recycle are key to this process. Pollution prevention (meaning that nothing is thrown overboard), surpassing current regulation requirements and a program of continuous improvement where innovation is encouraged and rewarded has been put in place.

The Baltic Sea

All the Baltic passenger shipping companies know that they have the eyes of the environmentalists upon them regarding newbuildings and the operation of older

tonnage. The Baltic is classified as an inland sea – basically it's a lake with a hole at the southern-most end and must be treated with respect.

The Viking Grace proved that this was possible as will her, as yet, unnamed sister vessel. In a cooperation with the Port of Turku, the Ports of Stockholm and the Port of Mariehamn the company was provided with EU funding from CEF as part of the NextGen Link project.

"This means that we will once again transform our services between Turku, Mariehamn and Stockholm using an LNG powered vessel", says Johanna Boijer-Svahnström, Head of Corporate Communications.

Both vessels use/will use rotary wind-power to additionally reduce their carbon footprints. Lloyd's Register approved, the new additions meet the organization's Guidance Notes for Flettner Rotor Approval. The rotor was developed by Finnish company – Norsepower Oy Ltd – and calculations show that it can cut fuel consumption and reduce emissions by up to 900 tons CO_2 annually. Currently no figures for fuel consumption reduction available.

"We have an ongoing program to monitor results, but so far it seems to be a valuable part of our efforts to reduce emissions", says Johanna Boijer-Svahnström.

Infrastructure improvements in port will also be introduced. In all € 12.7 million of external funding has been secured for the project.

Low emissions – better ROI

At Tallink, energy efficiency is high on their list of priorities.

"We understand that protecting the environment in which we sail is vital for our operations", says Hans Friberg, VP of Safety, Environment and Ship Management at the Tallink Group. "All of our ships have catalyzer systems and we use low sulphur fuel. We have also set targets which ensure that the latest technology reduces CO_2 and NOx emissions. We have also upgraded our environmental management system (the previous certificate was ISO 14001) to ISO 14001:2015 certified by Lloyds Register".

And with Megastar, their recently introduced LNG powered fast ferry, this has significantly reduced emissions on the Tallinn/Helsinki run. The addition of second LNG powered newbuilding will further improve this says Friberg, whilst adding to long-term ROI.

Even Gotlandsbolaget has invested in LNG ropax vessels for its Destination Gotland subsidiary with the first dual-purchase agreement in LNG passenger shipping history. Chinese yard, Guangzhou Shipyard International was the builder of choice, however, delays have been an ongoing problem. The company's first LNG vessel, M/S Visborg was planned for delivery to its home port of Visby at the end of 2017. This didn't happen as sea trials were delayed until January 2018 due to technical issues. Destination Gotland now says that delivery will not take place until late July of this year (time of writing). If there will be a knock-on effect for its sister vessel, the M/S Thjelvar, is still an open question even though she was launched in July 2017.

Agendas

Birka Line has defined specific programs to address the green issue. M/S Birka Stockholm is said to be one of the most eco-classified, fossil fuel powered cruise ferries in the Baltic Sea today with Clean Design and Comfort Class status. (Clean Design = environmental solutions built into the vessel at the yard where it was built; Comfort Class = defining noise and vibration levels).

"Protecting the environment is vital for our operations"

Hans Friberg, VP Safety, Environment and Ship Management, Tallink Group

But their claim-to-green goes beyond what the pundits normally look at. Food waste has been reduced which in turn has cut the volume of provisions loaded and their associated costs, recycling of waste and energy recovery programs have been implemented while deposition waste (such as broken crockery, glasses and even toilets) has dipped below the national average.

Other measures include new propellers to reduce fuel consumption (by 12 per cent), bi-monthly hull cleaning to reduce water resistance, eco-cruising and its fleet of coaches are EUO 5/6 clas-

TALLINK

Megastar.

Battery power will be tested at Stena Jutlandica.

STENA LINE

sified which means that they use at least 80 per cent non-fossil fuel. As around 75 per cent of the company's passengers arrive to the terminal by coach, this means significant on-land environmental improvements.

In Poland

Further down the Baltic, Polferries operates five vessels between Gdańsk-Nynäshamn, Świnoujście-Ystad, Świnoujście - Copenhagen and Świnoujście - Ronne (summer service only).

The Polish Baltic Shipping Co. (operating under the name of Polferries) recently announced that it will add a second vessel on its Gdańsk-Nynäshamn run. The MF Nova Star will join MF Wawel increasing the number of departures to 6 per week. Although technically speaking she is an 11-year-old vessel, her actual operating time at sea is less than four years so she is in decent shape. Although not necessarily an enviro-classed vessel, Polferries insists that it adheres to IMO standards regarding green operation with their new vessel being a further case in point regarding the operator's green credentials.

Their newbuilding is currently under construction at the Szczecin yard (part of the PGZ, Polish Armaments Group). Work on the ship began in 2017.

Polish Prime Minister (previously Minister of Development and Finances), Mateusz Morawiecki explains the importance of the project.

"It is estimated that Polish shipowners will require some 10 new ferries within the coming five years if we are to remain a competitive maritime nation. By building specialized, high value and efficient vessels as part of our Strategy for Responsible Development we can build upon the legacy of Polish shipyards and support shipowners in the Baltic ferry market".

As Polferries first LNG vessel, she will be fitted with a hybrid system. Bunkering will be carried out at the Świnoujście LNG terminal and the Port of Ystad.

Piotr Redmerski, President of the Polish Baltic Shipping Co. is certain that the investment will open a new chapter in Polferries' history.

"For us this is a significant moment. Our new ferry will strengthen our fleet so that we can compete in the international market. The vessel is slated for launch in 2019 with handover to us in 2020".

Stena creates the 1 MWh club

Stena Line together with The Callenberg Technology Group has created the first 1 MWh vessel concept. Stena Jutlandica will be converted in a way that no commercial ferry of its size has ever undergone.

The ship was built by Van der Gissen de Noord, in the Netherlands in 1998. She can carry 550 cars and 1,500 passengers and operates between Gothenburg and Frederikshavn.

Even though the company has set its sights high, it will be a gradual introduction of new technology that leads the way. In phase one the vessel will use electric power sources for docking. CEO of Stena Line, Niclas Mårtensson explains.

"We will test battery power in port first and then increase the scope of its use during the following years. Our aim is that this ship and others in our fleet will be electrically powered on short-haul routes using electric power alone".

Stena is no stranger to innovative environmental investments as Mårtensson can attest to.

"In 2015 we installed a methanol fuel system onboard Stena Germanica and through that realized that environmental fuel solutions are not only practical, but also financially viable".

But is today's battery technology capable of making large-scale electric services a reality?

"With regard to size, weight and efficiency, the batteries currently on the market mean that there is an opportunity to take this concept into the future. Remember that batteries have become far more efficient and cheaper, but as a pragmatic company we have decided to take things one step at a time".

Three phases

Electrification of Stena Jutlandica encompasses three very distinct phases; first battery power to the vessel's bow thrusters, then the introduction of battery power that will drive the ship for 10 nautical miles. The hard part will be the final phase - battery power that can provide 50 nautical miles of operation in a program that stretches until 2030.

In all, the project will cost the company somewhere in the region of SEK 25 million where 50 per cent is funded by various EU sustainability/transport funds and by The Swedish Transportation Administration's Development Fund.

The proposed technology is a plug-in hybrid kind where the batteries are charged while the ship is in port through a land-based connection. The vessel can even be charged at sea using gensets.

Automated charging conundrums

Scandlines' two HH Ferries - M/S Aurora af Helsingborg and M/S Tycho Brahe which operate between Helsingborg, Sweden and Helsingør, Denmark are set to be the first twin-service ferries in the world operated using electrical power. Tycho Brahe was converted back in 2017 and Aurora af Helsingborg should begin electric services this summer. The main power source is water-cooled lithium ion batteries with a capacity of 4.16 MWh. But it's not been all plain sailing.

The reason is not the onboard installation itself (supplied by ABB), but rather the automated systems designed to charge them. This was based on the assumption that as soon as a vessel docks, an automatic charging point would be connected using an industrial robot. In theory the idea seems sound, but it proved far harder to realize than expected.

With charging voltages of around 10,5 kV, automation is a good idea as crews need not handle high-voltage connections manually.

Problems arose early when the automated system proved to be over-sensitive to the vessel's movement in the water and ship-to-shore charging failed to work as expected.

According to Tycho Brahe's skipper, Jörgen Damgaard it's not a constant problem, but rather one which comes with choppy weather.

"Some days we have no problems, others it is a challenge but as the vessel is designed with a hybrid power solution, we still maintain our schedules".

ABB has worked with both hardware and software upgrades to solve the issue.

The way forward – easy or challenging?

The shipping industry is very circumspect. Investments are huge while new-tech has often proved to have its downfalls.

Some companies have no environmental policies in place - or at least they might do, but fail to make them public. Others have far-reaching processes that have encompassed their entire operations while also contributing to bottom-line figures.

So where does responsibility lay?

As the CEO of Stockholm's Repair Yard said: "The key to our future growth is our quality of understanding for the needs of today's operators. With their environmental approach to shipping, our business must take them in the direction they want to go."

Let's just say that the future is bright, but that collectively speaking, environmental shipping has to be a joint effort.

Daniel Cooper

Thun Greenwich at Falkvarv.

ERIK THUN GROUP

Blocal and Glocal yards – it's a tough market

FALKVARV, GOTENIUS, SWEDE SHIP AND DOCKSTAVARVET – four Swedish repair yards, each with its own unique history and field of competence.

Blocal is an adjective which defines an enterprise with local and Baltic/North Sea activities. Glocal means that a business is active in its home market and around the world. Basically, they are buzzwords with significant meaning in the shipping industry of today.

In Sweden there are a number of very active repair yards that rely on orders from overseas customers to keep their bank-balances in the black. Four of these - Falkvarv, Gotenius, Swede Ship and Dockstavarvet are all synonymous with Swedish shipbuilding and repairs and as longstanding contributors to the shipping community, each has its own unique history and fields of competence.

Cutting costs

But shipping today is more than just weight and balance, design and interiors, newbuildings and upgrades. It's also about cutting operational costs and reducing the environmental impact of customer operations while maintaining profitability and securing yard-worker jobs.

Falkvarv's USP is that it is offers high-quality service with short lead times and that it specializes in the repair and upgrade of North Sea tonnage. Located in the south-western Swedish town of Falkenberg it holds a strategic position between the Strait of Öresund and Gothenburg.

With 50 employees it is not a major yard in Blocal/Glocal terms, but according to CEO, Jan-Olof Carlsson this does not detract from its value to shipowners in the region, but rather enhances it.

"Customers can contact any member

of staff regarding specific issues meaning that they get to speak with someone with the knowledge they need to solve their problems."

Falkvarv works closely with a network of sub-contractors and specialist partners and can undertake almost any kind of shipyard project in its class.

"We can carry out new installations and engine repairs as well as blasting, painting and surface treatment, electrical installations, service and outfitting", says Carlsson.

One area that the yard sees as a source of future expansion is its mobile-services division.

"This means that we can provide on-the-spot problem resolution 24 hours a day."

Falkvarv has been active since 1946 and has two floating dry-docks. The largest has a maximum capacity for ships up to 150 meters long and 22 meters on the beam while its crane is capable of lifting 7 500 tons. The company's second dock is 120 x 19 meters in size with a crane capacity of 4 500 tons.

Ups and downs

It has to be said that Falkvarv has faced a number of trials and tribulations over the years. It has increased its staff base and grown its turnover - quite an achievement when you consider that it was all done in the face of impending closure.

In 2012, when the Falkenberg town planners proposed a major revamp of its water-side land holdings, the yard's future was in doubt. According to the brief: "...attractive housing will encourage more educated and competent people to move into the area bringing growth businesses [as a result]". Consultancy firm, WSP was brought in to look at what could be done with the land which Falkvarv occupies.

As is common in this type of urban development, WSP took the side of the program-owner rather than taking existing business needs into consideration. Quite simply, they proposed the same idea that has threatened the future of the shipping industry around Sweden and abroad for the past 15 years - more water-adjacent housing at the cost of maritime activities. Seen from a political perspective this is strong medicine indeed. Even though Falkenberg has a slower growth-rate than its neighboring districts of Varberg and Halmstad, WSP's conclusion was that: "[highly educated and creative people living near the sea] will fulfil a vision for the area with a main strategy of letting housing development lead the way."

As has been proved time and time again - within shipping and at airports around the world - this is not viable as those who come after (irrespective of education) often displace those who have been there for far longer and provided revenue to the local community.

The last yard in Gothenburg

How do you fight political ambition, an agenda-fueled media and families with impressive disposable income when you are operating the only remaining shipyard in Gothenburg? You stick to your principals.

Götaverken Cityvarvet went defunct in 2015 with the loss of 124 jobs and an historic era was laid to rest. That left just one significant yard in the area - Gotenius.

Located on Ringön, a part of Hisingen which is the fifth-largest island in Sweden covering an area of 199 km2, it is Strategically placed between the River Göta, the River Nordre and Kattegat making it the ideal home for a shipyard. Founded by the father of current owner, Mats Gotenius - Vilhelm Gotenius - it is a forward-thinking business.

"Shipyards are all about three things - quality, delivery and profit", says Mats Gotenius. "We have a healthy order-book, so our docks are occupied. What I am appalled about is the fact that when Cityvarvet was closed, Gothenburg was counted out as a shipyard city by the media".

Even if Gotenius is smaller than Cityvarvet, it is certainly an asset for ship operators in the region.

"They get to speak with someone with the knowledge they need"

Jan-Olof Carlsson, CEO, Falkvarv

"The largest port in the Nordics needs repair capacity and the resources to take care of all kinds of shipboard problems. How can the Port of Gothenburg maintain its tugs, the Swedish Transport Administration its car ferries and the city keep its commuter services running if there is no local yard? If we add to this the fact that larger floating docks are now a priority among customers, we need a longer and wider dock. In my book that means growth and nothing less".

Mats Gotenius was forced to lobby for a higher free sail height for the new Hisingsbron (a replacement for the old swing bridge built in 1939).

"With its planned free sail height of 28 meters it would create problems for us". His efforts paid off and it is now designed to open 32 meters.

The yard's land lease has been extended to 2045, however new condominiums are planned on plots around the site and even if city planners have promised that the land adjacent to Ringön will "... maintain its character" they fail to cite shipping as a reason.

"They seem to prefer art studios, galleries and rehearsal halls as a future for the area. There is no way that graffiti painters, artists and musicians are going to be the answer to the city's self-imposed problems. 3 000 people come to work here every day. It's better to look at what you have rather than dreaming of what you might have", he says.

Versatility

Swedeship has a long tradition of shipbuilding. The yard was founded 120 years

"Customer requirements steer our processes"

Anders Hellman, CEO, Dockstavarvet

PÄR-HENRIK SJÖSTRÖM

Dockstavarvet, located near Umeå, was founded in 1905.

ago, but more significantly it has supplied the Swedish Coast Guard and Navy with newbuildings as far back as 1937. Aluminum was the metal of choice in the 1950's and composites became an integral part of ship construction there in 1979.

The Swedeship Group comprises three shipyards each with its own specialty. Swedeship Marine, Swedeship Composite and Swedeship Yacht Service.

The Swedeship yard in Djupvik concentrates on aluminum and steel ship production, the yard in Hunnebostrand focuses on composite materials while Yacht Service in Gothenburg is a dedicated service and repair yard.

When you drive to the yard in Djupvik you can't really see it as it is hidden behind a hill. However, seen in terms of shipbuilding design, quality and revenue it is highly visible on the shipbuilding radar. Some 60 employees work here keeping the local economy of Tjörn alive.

"Our customers have a range of specific needs. We use tried and trusted hullforms which are the platforms we then build our type derivates on. We build boats for Norwegian and Swedish SAR operations, the coast guard and the Swedish Navy", says CEO, Bo Axelsson.

Founded in 1894, it is once again a legacy yard in Swedish shipping with its main focus on building fast and operationally flexible vessels.

"We have also built road ferries, work boats and specialist boats for the offshore wind-farm industry", explains Axelsson. "Currently we have orders from the Swedish and Norwegian SARs and are just beginning a life-time extension for Patrol Boat 80.

But it's not only long-established technology that the company is focusing on.

"Construction of our first 100 per cent electrically powered vessel has just begun which will join three existing vessels of the same class (diesel powered) in Norwegian ferry service."

So, what is it like running Swedeship in today's competitive climate?

"It is both demanding and rewarding", says Bo Axelsson. "Keeping a full orderbook is always a challenge, but we have steadfast owners who are with us for the long-term. On average we complete between four and six newbuildings a year, but it takes a lot of knowhow and determination to satisfy customer requirements."

The company also maintains and overhauls between fifty and sixty vessels each year.

Apart from hull construction, the yard also offers outfitting, carpentry, coatings, bespoke hardware and piping solutions.

"We have a strong customer base in countries outside Sweden which provides a broader market orderbook potential. And we have found that costs are not always the deciding factor when these customers order newbuildings, something which is more significant for our Swedish customers."

Bo Axelsson joined the Swedeship in 2008 after a lengthy career in the car industry. Maybe that is why he looks to construction efficiency as a way to secure income.

Further up the coast

Dockstavarvet is a long-time manufacturer of aluminum boats for commercial and military use in the Nordics and international arenas.

Founded by Nils Sundin in 1905 it is a third-generation company. Their first aluminum workboat was built in 1969 and their first aluminum pilot boat was delivered in 1975.

In more recent times Dockstavarvet has developed design concepts and built highspeed patrol boats for military and non-military applications. Located in the middle of Sweden on the east coast it has direct water access to the Baltic Sea.

Dockstavarvet has not only been active in its shipbuilding activities. Management decided in 2007 to expand through acquisition when it purchased 55 per cent of Muskövarvet, the former Naval repair yard located on Muskö in the Stockholm archipelago incorporating it as part of parent company, Aludesign i Docksta AB which also (at the time) owned the now defunct Rindö Marine.

Design optimization

"Newbuilding costs have increased considerably over time so with almost 15 years' experience in serial production of

patrol vessels we now customize existing, tried and tested hullforms for specific needs", says CEO Anders Hellman.

"No matter if they are military or non-military newbuildings we use well-proven designs to which both Dockstavarvet and our customers have contributed".

Dockstavarvet can build a new vessel every month (production-line methods used) and employs a meticulous logistics chain and has a close cooperation with local and regional subcontractors, and suppliers.

"Customer requirements steer our processes. Depending on the type of vessel ordered and its employment we can cover most needs."

"Usually the hull is built on-site and in certain cases the wheelhouse, specific deck sections, hatches, casings and other elements are provided by nearby, third-part suppliers", says Hellman.

If the company has been contracted to provide a one-off vessel, then building time averages around 12 months.

"All systems are tested together with the customer before delivery while documentation and spare parts logistics, operator maintenance training and service requirements are compiled."

Growth attracts interest

Just before Christmas, 2017 SAAB bought out Dockstavarvet. It was not unexpected as the deal also included Muskövarvet – this as part of the Swedish defense conglomerate's plans to strengthen its naval capacity presence.

"Dockstavarvet has delivered more than 200 units to date on three continents" says Gunnar Wieslander, Senior Vice President and Head of Business Area Kockums (itself a SAAB company under which Dockstavarvet and Muskövarvet have now been incorporated).

"Muskövarvet is a full-service repair yard and primarily works for the Swedish Navy's amphibious forces. With this acquisition, we have strengthened our product portfolio within surface vessels while growing capacity for support and maintenance at the Muskö naval base. It will also secure exports for Dockstavarvet's other products and services thus broadening its customer base."

Are things looking up?

Swedish shipbuilding is still viable in today's Blocal/Glocal markets even though no large-scale vessels for merchant or passenger operation are constructed here anymore. It seems that the name of the game is specialization, efficiency and flexibility, seeking new business outside traditional markets and sheer determination to keep long established businesses thriving in a market of ever changing dynamics.

So, are things looking up? It seems that they are. Only time will tell how this market develops, but there is a great deal of knowledge and experience around to make it happen.

Daniel Cooper

DELTAMARIN

Langh Tech delivers hybrid scrubbers and EGR water treatment systems to a series of 2150 TEU container vessels on order at Guangzhou Wenchong Shipyard.

2020 is getting closer

There are already some 1300 vessels with scrubbers installed or on order and the number is rapidly increasing.

A recent survey among members of Exhaust Gas Cleaning Systems Association (EGCSA) shows that scrubber uptake is rapidly accelerating with the number of ships with exhaust gas cleaning systems installed or on order standing at 983 as of 31 May 2018.

Several major shipping companies have opted for scrubbers. EGCSA informs that for example one of the 'big' container companies has confirmed it will use scrubbing as part of its 2020 compliance portfolio and there are rumours that others will do likewise.

Larger engines

Until relatively recently the largest scrubber installations has been for engine powers in the region of 25 to 30MW. The latest data from ECGSA reveals that this has been well and truly exceeded by a retrofitted hybrid system for a 72MW container ship engine. Large capacity scrubbers are not confined to retrofits as the maximum size new building installation is a hybrid system for a 65MW engine.

Further it is informed that nearly 60 per cent of all retrofits and new building installation works take place in Asian yards. The share of the Asian yards is close to 85 per cent of newbuilding installs.

EGCSA informs that during the next five years shipowners are likely to spend more than USD 20 Billion on exhaust gas cleaning systems.

Yard capacity not an issue

Although there has been a surge in demand, EGCSA believes that shipyard capacity is not an issue going forward. However, according to the association, other constraints such as the availability of laser scanning specialists and experienced installation teams mean that it may not be possible to pick and choose an installation slot nor coincide a scrubber installation with an already scheduled drydock in the near future.

The majority of EGCSA members are still taking orders with several now taking options through to 2023 to enable shipowners to secure a position on the installation timetable.

> ***"Scrubber feels like a safe choise"***
>
> **Laura Langh-Lagerlöf, Commercial Director, Langh Tech**

Bulk carriers taking over

EGCSA informs that a number of roro and ferry operators led the way and successfully chose scrubbers as a means of compliance back in 2015, in readiness for the switch to 0.1 per cent sulphur fuel within ECA. The cruise industry came next.

Now with 2020 looming, bulk carriers have taken over at the top of the ship types adopting exhaust gas cleaning, with container ships and tankers following. In each of these sectors retrofit open loop installations predominate.

The EGCSA-survey also shows that 37 per cent of the ships with scrubber installations are newbuildings already delivered or on order.

Open loop preferred

The survey also shows that 63 per cent or 988 of the 1561 individual scrubber towers installed or on order by the end of May are for open loop scrubbing.

EGCSA states that open loop scrubbing is preferred as it is the simplest system, favoured by ship crews: Although many early adopters in the North Sea and Baltic fitted hybrid systems, they are operated for the majority of time in open loop.

While closed loop and hybrid systems are available for enclosed bodies of water with little water exchange or where discharges are restricted by local regulation, ECGSA suggests the alterna-

JULIA SJÖSTRÖM

Laura Langh-Lagerlöf of Langh Tech in the engine room of the cruise vessel Norwegian Bliss. The company's delivery included a hybrid inline scrubber system.

tive of switching to low sulphur fuel for the port stay where open loop operation is not possible. The cost impact is likely to be limited as over 90 per cent of fuel consumption is during full away at sea, which is where the financial benefits really accrue.

Deliveries until 2022

Statistics from DNV GL show an even higher number of scrubber-equipped vessels. According to figures from the beginning of August 2018 there are 1290 ships with confirmed scrubber projects. Of these 1207 will be commissioned by the end of 2019.

Distributed by type of vessels bulk carriers count for 31 per cent, oil and chemical tankers for 26 per cent, container vessels for 15 per cent, cruise vessels for 11 per cent and roro-vessels for 7 per cent.

According to DNV GL the four largest suppliers Wärtsilä, Alfa Laval, Ecospray and Yara Marine have a total market share of 70 per cent, followed by Clean Marine, Panasia and Langh Tech with a total market share of 12 per cent. The rest of the market is shared by Bilfinger, CROE, Feen Marine, SAACKE, DuPont, Pacific Green Technologies, VDL AEC Maritime and PureTeQ.

Largest order

Laura Langh-Lagerlöf, Commercial Director at the Finnish scrubber manufacturer Langh Tech Oy Ab, confirms that there has been a dramatic increase in the request for tenders for scrubber installations. The company also recently closed its largest deal so far and will deliver scrubber systems for the Danish shipping company Dampskibsselskabet Norden A/S. Langh Tech will retrofit four MR tankers and eight bulk carriers in the Norden- fleet with scrubbers of open loop-type.

"We are glad that Norden chose us for this very interesting project, and we are looking forward to start working on it. There has been a huge increase in demand for scrubber systems lately and in addition to Norden's order we have dozens of new scrubber systems in the pipeline. At the same time, we are increasing our capacity which allows us to keep offering systems with delivery before 2020", Laura Langh-Lagerlöf says.

Safe choice

Laura Langh-Lagerlöf thinks that one reason for the major interest in scrubber installations is that it is considered a safe choice.

"In a newbuilding project there is a jungle of different options. Scrubber feels like a safe choice because it is likely that the price of heavy fuel oil will remain at a relatively low level compared to other marine fuels."

According to her, received requests for scrubber installations on newbuildings show that the majority of shipping companies want at least that their ship will be ready for a later installation of a scrubber plant.

"If they chose to install a scrubber, the most demanded option is the hybrid-ready open loop. Then the plant is ready for later upgrading to closed loop."

Laura Langh-Lagerlöf thinks that the interest in systems designed for open loop only gradually will decline.

"Most shipping companies expect that the environmental requirements will be more and more stringent and want to ensure that they are able to operate the scrubber plant also in the future."

Unique water treatment

Langh Tech also offer their advanced water treatment units for closed loop systems as a stand alone product on the market. There are several hybrid scrubber installations, where the scrubber unit of the system has been delivered by another manufacturer and the water treatment plant by Langh Tech.

Laura Langh-Lagerlöf points out that Langh Tech's water treatment plant can be operated with zero emissions.

"It works well in areas with zero discharge is demanded, for example in the Kiel Canal. The purified water is so clean that it may be recycled in the process for some time as we do not use any chemicals in our membrane filtration."

An additional advantage of scrubber is, according to Laura Langh-Lagerlöf, that it also removes particles in the exhaust gases.

"For the time being a scrubber removes between 70 and 80 percent of the particles. We are currently focusing heavily on developing our system to further reduce the particles."

Pär-Henrik Sjöström

PÄR-HENRIK SJÖSTRÖM

STOCKHOLM REPAIR YARD

In the heart of the city

The capital of Sweden has a repair yard with centuries of traditions just a stone's throw from the city centre.

If you hear someone say that Stockholm has little history of shipyard greatness, dismiss that as fake news.

If, on the other hand they say that time has caught up with the industry here, then they are right.

723 yards

The Regal Ship Wasa was launched from Skeppsholmens varv - Skeppsholmen's Ship Yard - in August 1627. At the time there were no fewer than 723 shipbuilding and repair yards, large and small, active within the municipality reaching far out into the archipelago. Skeppsholmen as a shipyard no longer exists apart from a few remnants of its former glory.

Those who are familiar with Wasa's fate know that she sank on her maiden voyage, but disagree as to why. Irrespective of this, the reality is that Swedish shipbuilding was thriving in Stockholm back then and contributed to the growth of commercial shipping of all kinds in the region. One yard that has withstood the test of time is Stockholm Repair Yard. Located on the island of Beckholmen, it is still to this day an important center for repairs and modifications.

Old becomes new

Beckholmen was originally called Biskopsholmen - The Bishops Islet. At the time it was a place where wooden-hulled sailing vessels could get a new lease of life and a coat of much needed tar. In 1633, tar was boiled here and applied to hulls according to the orders of the owners. At the time, the island belonged to the Swedish Crown, but in 1647 Queen Kristina handed it over to the City of Stockholm (a dubious contract it was later to be discovered). The year after, the production of tar ended and storage buildings for tar sorting were raised instead as tar was now imported from the Baltic states.

In 1717, brothers Abraham and Carlos Grill together with Johan Petersen acquired site and turned it into what was to become the largest shipyard in the city. Despite the fire of 1723 that decimated their business, it was to be resurrected and with that it became Varvsön - The Shipyard Island.

Newbuildings and repairs were the need of the day and in 1849 two dry docks were created - one 75 meters long and the other 48 meters with construction of both overseen by Swedish lock-builder, Nils Ericson. Enclosed, drydocks were now available in the heart of Stockholm's capital.

The site was eventually re-purchased by the City of Stockholm in 1918 and then immediately sold on to the Swedish Navy who commissioned the building of an even larger dock than the two previous ones. This was to be 152 meters long and 24 meters wide. Today it is 197 meters long.

Now operating under the name of Stockholm Repair Yard, in recent years its home on Beckholmen has undergone a major make-over.

Environmentally updated

The yard and its surroundings have been reconstructed and decontaminated as part of a program that begun in the Spring of 2011. According to Claes Insulander, the initiator of the project, Beckholmen needed a through update.

"During the past seven years the island and its surrounding area has been excavated, sediment decontaminated, and 200 000 tons of earth replaced", he says.

Commercially, Stockholm Repair Yard is thriving and seen in terms of revenue, has taken a major step into the black since 2013. Earnings peaked during 2017

"We aim to grow our business"

Staffan Röberg, CEO, Stockholm Repair Yard

STOCKHOLM REPAIR YARD

(last figures available) with profit margins topping 5.6 per cent.

Majority-owned by Rederi AB Gotland - the operators of Destination Gotland and subsidiaries including Gotland Tankers AB and Nya Skärgårdsbolaget - the company holds a controlling stake in the facility amounting to 62.5 per cent.

Stockholm Repair Yard maintains and repairs around 100 ships a year ranging from pax-carriers, specialist vessels, cargo, tank, roro, barges and workboats. They can also send staff to other ports and yards in the region should the need arise. Even the Swedish state has contracts here including those for Coast Guard tonnage, municipal car ferries, Navy ships and icebreakers.

Refits

According to Sales Manager, Torvald Hvistendahl, there is a consistently high demand for the company's services.

"We recently re-fitted commuter ferry Djurgården 8 making it more accessible for people boarding with bicycles, wheelchairs and prams. The old, narrow entrances have been enlarged, obstacles that stood in the way of passengers when boarding and disembarking have been removed while gangways have been upgraded. We have also installed a new engine supplied by Scania that has significantly reduced NOx emissions, cut particle contamination and brought down noise levels", he says.

A heat exchanger that is coupled to the main engine recovers waste heat which has done away with the old oil-fired heating system in winter.

"This is all part of a program ordered by SL/SLL (the local authority tasked to administer commuter traffic in the city) and this Autumn/Winter Djurgården 9, 10 and 11 will be upgraded in the same way."

Hvistendahl sees, however, that there are is a certain problem that must to be solved.

"We need to recruit additional, experienced staff if we are to keep up with our current rate of expansion."

A market of knowledge

May competition be tough, Stockholm Repair Yard as an edge says CEO, Staffan Röberg.

"We have focused on the more advanced kinds of work that today's market requires. These include environmental and ship safety projects which both demand a special kind of knowhow".

Modifications and preventative measures are at the top of ship-owners' wish lists as new regulations and environmental constraints dictate future ship operation.

"Our strength lies in the fact that we can provide high-quality work and short lead times while at the same time our strategic position is vital to customers. This has made us an employer of choice".

Röberg is convinced that the yard's perseverance in broadening its customer base has paid off.

"The key to our future growth is our understanding of the needs of today's operators. With their environmental approach to shipping, our business must take them in the direction they want to go."

The yard's Annual Report speaks for itself as does its reputation.

"We have proved that we are an essential part of the shipping industry in and around Stockholm and aim to grow our business based on that", he says.

Daniel Cooper

PÅR-HENRIK SJÖSTRÖM

Tanker for climate-smart shipments

Fure Vinga is the first in a series of six LNG powered product and chemical tankers from Avic Dingheng Shipbuilding Ltd. in China.

In November 2015, Furetank Rederi AB, Rederi AB Älvtank and Thun Tankers BV announced that they had ordered a total of four LNG powered product and chemical tankers from Avic Dingheng Shipbuilding Ltd. in China.

Furetank had contracted two ships while the other two companies ordered one ship apiece. Just over a year later in October 2016, Furetank and Älvtank expanded the series with each adding an additional vessel to the contract.

All three companies have a cooperation agreement as part of the Gothia Tanker Alliance while commercial management of the vessels is administered by Furetank Chartering.

Two delivered

The first ship in the series, Fure Vinga, was delivered to Furetank on April 4 this year while its sister vessel was handed over to Älvtank on July 25 and christened Ramanda. After that, Thun Venern will be delivered to Thun Tankers at the end of September and Fure Valö will be commissioned to Furetank in late November. In January 2019, Fure Ven will be delivered and the series will end with Ramelia handed off to Älvtank in June of next year.

The vessels' design was developed by Furetank in cooperation with FKAB.

FURE VINGA	
Builder	Avic Dingheng, China
Class	Bureau Veritas
Length	149.9 m
Beam	22.8 m
Draught	9.3 m
Dwt	17 999
GT	12 770
NT	5 838
Cargo capacity (98 %)	19 812 m^3

These newbuildings represent a further development of the previous ship series that Furetank and Älvtank built in China between 2004 and 2006 and have been tailored to meet the specific requirements of the intensive and demanding routes they will operate on in northern Europe with short trips and frequent port stops.

High block coefficient

Fure Vinga can carry 1500 cubic meters more cargo than its predecessors and has a slightly shallower draft than the company's older ships. She is also five meters longer and one meter wider.

"The new vessels have a relatively high block coefficient while at the same time, when running at 12 knots, fuel consumption has decreased from about 17 tons of diesel to 8.5 tons of LNG per day. We have managed to achieve an EEDI value of 4.69 (Ramanda). This means that compared with the target for ships

built after 2025 (which is 7.76) we can fulfil IMO requirements for a 50 percent reduction of CO_2 by 2050", says Lars Höglund, Managing Director of Furetank Rederi AB.

The vessels' have so called MälarMax dimensions, enabling trading to Lake Mälaren through the new Södertälje channel.

Systematic approach

Lars Höglund explains that the company has taken a systematic, inclusive approach to address the issue of energy efficiency.

"It's all about energy savings", he says. "From the lights on board that are all LEDs to recycling and heat recovery. In this way we use energy where we need it."

Initially, the company conducted an in-depth study of the vessels' energy consumption and mapped where there was a potential for savings. Firstly, the ship's employment was analyzed over a one-year period.

"We looked at the amount of time the ships were at sea and how much time they spent unloading. The next step was to examine energy consumption during these various processes. We discovered that it is during the crossing and when we are in port unloading that we use 95 percent of the energy produced onboard in one year."

Lars Höglund explains that this data was crucial to the final design of the engines and gensets on board.

"By using LNG, even when we unload, we can generate 95 percent of our energy needs with the most environmentally friendly fuel available."

Bunkered with LBG

The newbuildings can also use liquid biogas (LBG) as a fuel. In addition to the environmental benefits that LNG provides compared to conventional bunker, LBG is a renewable power source. Fure Vinga was the first Swedish flagged vessel to bunker LBG. Skangas was the supplier of choice and the ship was fueled by a road tanker at the Port of Gothenburg.

"We decided to use LBG because we wanted to show how shipping can, under the right conditions, improve its environmental footprint. We who build LNG-powered ships are sometimes criticized when we switch to what people claim is merely a new fossil fuel. But that's not true. It is not LNG we are looking to use, but rather methane. If we can get methane in a clean way as possible, that's where we want to go. Currently, the availability of LBG is an issue that must be addressed", says Lars Höglund.

Tier III

Fure Vinga meets IMO's strictest emissions classification regarding Tier III requirements. For the main engines, these constraints are met using either LNG or LBG as a fuel while the gensets have catalytic exhaust gas cleaning as standard. The entire driveline was supplied by Wärtsilä with the main engine being a dual-fuel medium-speed Wärtsilä 9L34DF that develops a maximum of 4 500 kW. Shaft speed can vary between 625 and 750 revolutions per minute.

Gas powered electricity

Using the main engine and the shaft generator to produce electrical power during unloading required a few special solutions which called for some ingenious engineering. Based on a system where the main engine operates in a special Harbor Mode, this has proved to be a viable path to take.

In normal mode, the main engine's maximum speed is 750 revolutions per minute and it develops 4 500 kW. This amount of power is sufficient to meet the requirements of ice class 1A operations due to the nozzle propeller increasing its efficiency by about 25 percent at low speed. In addition, the nozzle reduces the underwater noise that is normally caused by the propeller.

The normal power of the main engine would, however, be too great to drive the shaft generator in port. The main engine, therefore, has a second operational setting, Harbor Mode, where the speed is reduced from 750 to 625 revolutions per minute while the maximum power output is reduced to 2600 kW.

"It is all about energy savings"

Lars Höglund,
Managing Director Furetank Rederi AB

"At this setting, we can use the main engine to power the generator in port giving us a 30 to 40 percent workload when we are moored and unloading. We are probably the first company in the world to use this solution", says Lars Höglund.

The inert gas generator also uses LNG as a fuel, but it can also be operated on gas oil. Thanks to the dual-fuel IG generator, the pressure in the LNG bunker tanks can all the time be controlled.

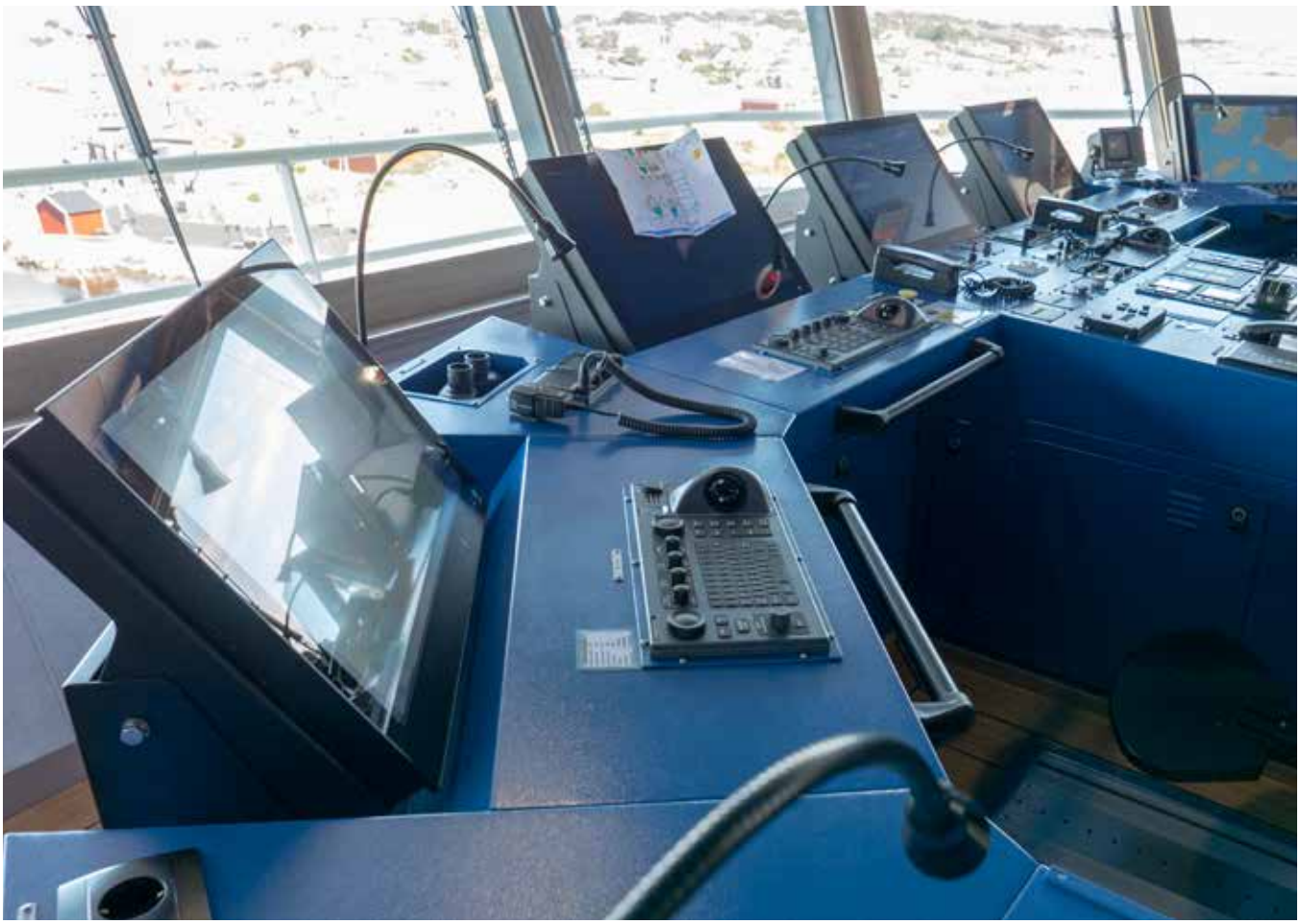
Maximum redundancy

In addition to the shaft generator, Fure Vinga has two Wärtsilä Auxpac gensets for its power supply. The smaller of these is the 688W4L20 and it is used to generate the remaining 5 percent of the total energy requirement of the vessel (on a yearly basis). The larger of the two units is a 1600W9L20D and has been installed to provide maximum system redundancy.

In the case of a possible loss of power from the main engine, the larger genset can produce electric power for propulsion. The 1800 kW shaft generator also acts as an electric propeller motor. With it, the ship in a fully loaded state, can cruise at a speed of almost 9 knots. All the vessels in the series have therefore received the Bureau Veritas class designation AVM-APS which stands for Availability of Machinery covered by Additional Class Notation AVM (AVM-APS) or Assisted Propulsion which, among other things, has a defined speed requirement.

The auxiliary engines have been equipped with Selective Catalytic Reduction (SCR).

The Wärtsilä Energopac propeller and rudder system includes a high-efficiency



PÄR-HENRIK SJÖSTRÖM

Becker rudder with twisted lead flap and integrated propeller bulb. Wärtsilä's delivery also includes reduction gear and shaft generator.

To minimize the risk of electrical power interference and loss, a large UPS has been installed.

"We have installed batteries as back-up providing more than 30 minutes of operation, but this was also done to eliminate the need to run extra auxiliaries to ensure sufficient generation of electric power", explains Lars Höglund.

Steam boilers are heated by the main and auxiliary engines' exhaust gases. Heat is also recovered from the cooling water for heating of LNG vaporizers, accommodation and stores as well as freshwater production. Ballast water treatment is done using Alfa Laval's Pure Ballast system which is approved by both the IMO and USCG.

Six pairs of tanks

The cargo space uses the same proven concept as the Fure Nord class. It consists of six tank pairs with a total volume of 20 306 cubic meters. One of these is a dedicated slop tank, but normally handled cargo residue is taken care of via two deck-drain tanks of 50 cubic meters each.

With a 98 percent fill rate, their overall cargo capacity is 19 900 cubic meters. Each tank is equipped with an electric Wärtsilä Svanehøj deepwell cargo pump with a capacity of 300 cubic meters per hour. The electric pumps have their engines placed inside a pipe tunnel which means that noise levels are significantly reduced equating to about half of that emitted by similar vessels during unloading. The ship has 25 fixed tank cleaning machines and one portable unit, all supplied by Scanjet. The tanks have been internally treated with the phenolpox based coating system PPG Phenguard 930/935/940 and were hot cured at the yard.

A happy crew

Considerable thought has been given to creating a pleasant and safe working and onboard environment for the crew. In addition to the ship's comfortable cabins, galleys and recreational facilities, it also has its own gym and a sauna. On board there are cabins for 19 people.

To ensure a good work environment year-round in all weather conditions, the forecastle deck has been completely enclosed. The equipment on deck is situated in a pipe tunnel.

The ergonomically designed bridge has been equipped with Furuno's integrated navigation system.

Pär-Henrik Sjöström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JOACHIM SÖSTRÖM

Sharing mental models

Bridge Resource Management is founded on sharing mental models. What does this mean when navigating and manoeuvring in confined waters?

Is the level of information exchanged on the bridge detailed enough to enable unambiguous and timely challenge and response?

Accidents in confined waters are often the result of intentions and actions not challenged in due time, despite all formal Bridge Resource Management tools being applied. So, what is missing?

A new concept to plan critical navigational elements is required for navigation and manoeuvring in confined waters.

The idea is that defining critical navigational elements (i.e. cross track distance, speed, rate of turn, drift angle etc.) in terms of an interval of values - rather than single values - may remove the ambiguity to challenge who is conning the vessel.

Critical navigational elements need to be controllable and observable through monitoring by the bridge team, and are determined by:

• An interval of planned values that represent the normality of operations. If everything goes according to plan, none of the planned values would have been exceeded.

• No go area/values that cannot be exceeded (i.e. non-navigable waters, breakwaters, speeds beyond or below which it is impossible to control the vessel). If the no go value is exceeded, then the ship is either aground, has had an allision or collision.

• The reserve that is the difference between planned values/areas and no go values/areas. It represents the safety margin available for a specific critical element. The reserve can be used intentionally, in order to reasonably adapt to unplanned situations (i.e. traffic, changes in environmental conditions etc.) or not intentionally because of conning errors.

In order to clarify this concept, let us consider an example where the reserve is used intentionally. Indeed, the reserve can and should be used as soon as the person conning believes it is reasonable to do so. This could happen to avoid impeding the passage of a ship constrained by her draft.

In the figure above the ship A is leaving the planned corridor as a result of an alteration of course to starboard.

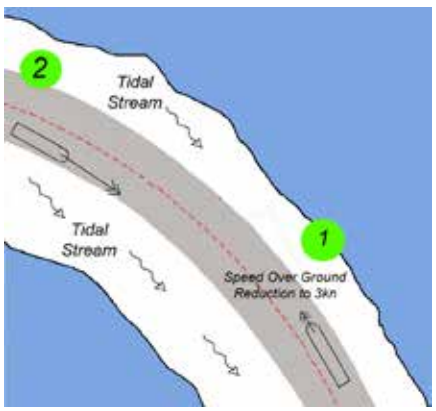
The person conning is making the bridge team aware of his/her intention to use the reserve by using the thinking aloud technique. Such technique is based on verbalising the intention (of the person conning), the motivation behind an action before its execution and its expected outcome. In this way the elements are given for either confirmation or for a challenge made by other team members.

With reference to ship A, an example of thinking aloud could be:

Plan: I intend to alter course to starboard.

Reason: To avoid impeding the passage of ship B which is constrained by her draft.

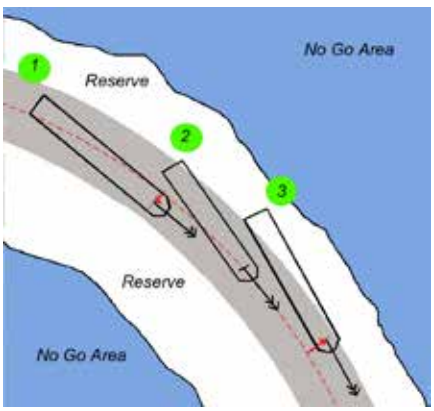
Outcome: I will navigate outside the planned corridor with a Cross Track Distance not more than 200 m right of the track.



Another example of reasonable use of the reserve is the necessity to slow down the speed over ground when approaching another vessel at a difficult bend in a tidal river (figure above). Vessel 1 with the tidal stream against her may need to slow down to 3 knots until vessel 2 has passed clear. If the reduction of speed over ground is outside the interval of planned values - say between 5 to 6 knots - such reduction would certainly be considered a reasonable use of the reserve.

This example shows that reserves are not only of a spatial nature. Also the drift angle can be defined by an interval of planned (normal) values and by an extreme value, which - once exceeded - causes unacceptable swept path in a narrow channel. In other words, all drift angle values outside the normal interval and still within the extreme ones, make up a safety margin to use only under abnormal or emergency conditions.

This planning methodology aims to remove the ambiguity to challenge the team member conning the vessel. At the same time it is allowing the necessary flexibility any shiphandler needs to manoeuvre without being constrained by unrealistically strict parameters.



When the ship is in position 1 in the figure above, the Cross Track Distance (measured from the conning position) is right of track and the entire ship is within the Planned Corridor, without using the reserve. When the ship in position 2, the Cross Track Distance is zero (conning position on track), but the stern is on the edge of the planned corridor. When the ship is in position 3, the Cross Track Distance is only slightly left of track but the ship's port quarter is well within the reserve, with not so much space left before crossing the safety contour and entering the No Go Area with the stern.

In principle, critical elements planned according to this concept, can be used as baseline not only for thinking aloud, but also for challenge and response.

Before turning, the person conning would expressed his/her intentions as follows:

Plan: I intend to turn keeping the conning position right of track.

Reason: Because I want to keep the port quarter within the planned corridor.

Outcome: The Cross Track Distance will be between 0 and 40 m right of track.

Now let us assume that the ship is drifting into position 2 due to an unexpected current and the person conning is not promptly acting on it. As soon as it is apparent that the Cross Track Distance will move left of track, any other team member should intervene by probing: "What is your intention?" and/or alerting: "The Cross Track Distance is now zero and the port quarter is going outside the corridor".

However, if probing and alerting does not satisfy the team member who has concerns, then the challenge needs to be expressed using words which raise attention such as "I suggest" or "I recommend". The following expression would constitute an outcome based challenge:

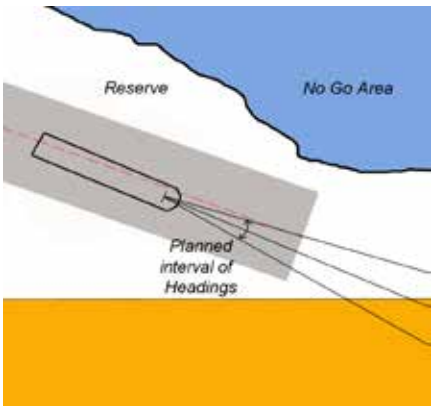
"I recommend to bring the conning position right of track as initially planned".

Need to focus

It is important to understand that the challenge needs to focus on the outcome rather than on the specific action to control the ship. This is in order to avoid that the person conning is psychologically anchored to specific instructions given by the person challenging, especially if he/she has more authority to do so within the team. In this case if the challenge included specific instructions it could lead to a situation where the person with the conn waits for the next one. This could mean a 'de facto' but not formal taking over of the conn.

Moreover, to avoid distractions and keep the level of communication essential on the bridge - especially during critical navigational phases, any challenge should be timely and triggered by the intended/potential use of the reserve. This is particularly useful during manoeuvres to berth/unberth the ship. For example, a critical element during an approach to a berth could be the ship's heading. An interval between two headings - rather than a single heading value - would define the inter-

val of reasonable angles of approach to the berth.



An example of this situation is shown in the figure above.

If the heading is outside the interval of planned values, suggesting to adjust the ship's heading may be more convenient than suggesting how to specifically achieve the end result. If the outcome based challenge is carried out in due time, it may be possible to let the shiphandler give orders as independently as possible.

In conclusion, the concept presented in this article aims to share detailed mental models and achieve essential, timely, and unambiguous challenges and responses between bridge team members. By no means is the concept meant to constrain shiphandling within fixed limits. On the contrary, the interval of planned values (rather than single values) as well as any reasonable use of the reserve allows the necessary flexibility and discretion to handle a vessel in confined waters.

For this concept to work effectively though, critical navigational elements should be planned, agreed and shared in due time before navigating in confined waters. The analysis of real world data from ships sensors, as well as high fidelity simulators are essential tools to define the critical elements of a challenging manoeuvre to such a level of detail. However, it is also important to keep the number of critical elements as low as possible. Applying the concept of the interval of values to all possible navigational elements in confined waters may defeat the overall aim of the concept itself, which is the prevention of accidents caused by intentions and/or actions not challenged in due time, or not challenged at all.

In conclusion, the concept addresses the concerns raised by safety investigators around the world. A recent accident report of the Canadian Transport Safety Board maintained that "the absence of a detailed, mutually agreed-upon passage plan deprives bridge team members of the means to effectively monitor a vessel's progress, compromising the principles of Bridge Resource Management".

Antonio Di Lieto, Hans Hederström, Peter Listrup, Ravi Nijjer

This article was previously published in Seaways, The Nautical Institute magazine

PÅR-HENRIK SJÖSTRÖM

Fossil free by 2021

Börjessons aims to become a completely fossil free ship operator by 2021.

"We aim to convert our ships to fossil free operation by 2021", says Henrik Börjesson, CEO of Börjessons, a passenger shipping company based on the island of Styrsö, in Gothenburg's archipelago.

The company operates two vessels - Lyrön and Fjordskär - which primarily provide passenger transport and local cruise services for companies in Gothenburg and western Sweden. In addition, Börjessons also conducts water quality monitoring programs along the Swedish west coast for various marine conservation organizations in Bohuslän and Halland using their research vessel Sensor.

Part of Fossil-free Sweden

The company has been an active member of the Swedish government's environmental initiative, Fossilfritt Sverige, (Fossil Free Sweden) which aims to ensure that the country will be one of the world's first fossil free welfare nations.

"We are an active member of the program and have therefore set a goal to remodel our entire operation so as to be fossil fuel independent by 2021", says Henrik Börjesson.

And they have already come a long way in achieving their aims.

First fossil free charter boat

On land, the company's various facilities only use fossil free electricity and their vehicles are powered by biodiesel. But the biggest change is at sea where the larger of their two passenger vessels, Lyrön, runs entirely on biodiesel, or HVO100 as it is properly called.

"Lyrön is Sweden's first 100 percent fossil free, biodiesel powered charter boat. The vessel also consumes less fuel than other ships of comparable design and size."

According to Henrik Börjesson, thus far the conversion has proved to be advantageous for the company.

"Our engines, which have been supplied by Scania, are environmentally certified and technically speaking we have not encountered any problems at all."

But biodiesel costs almost twice as much as conventional diesel. Therefore, the company has been forced to raise prices for its corporate customers.

"Having said that, it has worked out well as many of our clients look upon environmentally sound ship operation as something positive. Hopefully this will be even more important in the future."

However, the biggest problem according to Henrik Börjesson is that local authorities, municipalities and other official bodies have failed to appreciate the value of rewarding environmental initiatives when negotiating procurement contracts with independent service providers.

"It is, and has been for a long time, costs that are foremost in their minds when tenders are submitted for review. I think that these officials need to realize that an investment in environmental improvements, even if they are more expensive, are worthwhile and that costs have to be shared. They need to reassess the way they reason in these matters."

Limited availability

Another problem is the inadequate availability of biodiesel which contributes towards its higher cost. Currently there is no large-scale production of biodiesel taking place in Sweden which means that the fuel Börjessons uses has to be imported from Finland.

"At the moment, we have limited access to the fuel we need and therefore have decided not to convert our smaller vessel, Fjordskär to HVO operation at this time. But if more people where to opt for fossil free fuels in their vehicles, then I am convinced that production of biodiesel in Sweden will be viable and that costs will come down."

Apart from Börjessons' Lyrön, few other vessels operate using biodiesel in Sweden. One is Drottning Silvia which is based in the town of Gävle, The other is the state-owned, Färjerederiet (a road ferry operator) whose Hönöleden ferries in Gothenburg are entirely reliant on HVO100 fuel for power.

Adam Bergman

PÄR-HENRIK SJÖSTRÖM

Tryggve Möller of Terntank.

Terntank goes SCR

In cooperation with Fayard and Gesab Terntank has installed Catamisers with SCR on further two of their product carriers.

An annual reduction of NOx emissions by 25 tons per ship will be the result of a recent installation of Gesab Catamisers including SCR units on the auxiliary engines of the product tankers Tarnbris and Ternvind.

The decision was based upon excellent results from the product tanker Ternvag, where a similar installation was made in 2011.

"We reduce our NOx emissions by 25 000 kg per ship and year with the installation of SCR on the auxiliary engines. This happens while generating electric power with the auxiliary engines when the ships are alongside or at anchor in the port area", Tryggve Möller of Terntank explains.

Made possible by Preem

Tryggve Möller points out that this investment in Catamiser/SCR units would not have been possible without collaboration with a committed and environmentally conscious customer like Preem. The fact that the equipment on Ternvag has run like a clockwork since the start in 2011 had of course an impact on the decision.

"As icing on the cake Preem has taken Tern Ocean, which is one of our four newbuildings, on time charter. She is powered by LNG and has Catamiser SCR units installed on her auxiliary engines. It is our long term cooperation with a number of key customers that makes our extensive investment in green technology possible."

Four days

The retrofit of the Catamisers on the three auxiliary engines onboard Tarnbris and Ternvind was planned in advance down to the smallest detail based upon the experience from the retrofit on Ternvag in 2011. Also in that case the project was enabled by Preem who was the charterer of the vessel.

Now Terntank again chose to collaborate with the same partners. The installation was therefore carried through by the Danish repair yard Fayard and the supplier Gesab.

"The work was done in just four days thanks to extensive preparations prior to the arrival at Fayard and seamless cooperation on site. The goal was to do this plug in and I think we succeeded quite well", Tryggve Möller says.

Incentives needed

Tryggve Möller thinks that shipowners would do even more investments in green technology on board their ships if there were sufficient incentives. With the current model the reduction of fairway dues is too low for vessels with reduced impact on the environment to have any significant impact when calculating for green tech investments.

"The incentive on fairway dues does not come close to cover these investments. But both Preem and we are convinced that over time it is the right thing to do and show politicians and the public that shipments by sea is the most environmentally friendly option."

Continuing process

Tryggve Möller also highlights that reducing emissions by saving fuel is a continuing process where charterers, operators and agents work together with the owner. He talks about their just in time concept , meaning that the sea transport does not have to be fast but right on time. The speed and the time of arrival is adapted to the actual situation regarding the slots for cargo handling.

He informs that over the last three years, Terntank together with customers have saved between 175 and 200 tons of bunkers on their three spot vessels by working continuously with their just in time concept.

"We cooperate with our partners both within the just in time concept and by constantly calculating and trying to find environmental incentives that follow the trade of the vessel", he says.

Pär-Henrik Sjöström

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For the sixth time, the island of Donsö will host the industry-renowned Donsö Shipping Meet. Over the course of two days, representatives from 100 shipping companies will gather to partake in a knowledge-rich agenda of seminars and speed meetings, capped off by a banquet dinner in the harbor.

Donsö, September 3rd - 4th, 2019.

Swedens's biggest shipping event

Donsö Shipping Meet

A unique event with shipping at heart

Donsö Shipping Meet aims to elevate Swedish shipping in the international arena, to be a rewarding and productive event for all involved, and to serve its time-honored role as a meeting point for the entire maritime cluster. We want to offer all participants a more intimate event, where meeting new contacts and making connections is prioritized.

We strive for all to feel welcomed and taken care of. Our mission is to create a fantastic environment for all participants to network with customers, clients and colleagues, and to support exhibitors and shipping companies in doing business.

In Donsö, we convene innovators, operators and owners under a common theme – shipping – and invite all to contribute their diverse perspectives, in an effort to build a comprehensive shared understanding of industry needs. We know that this will support a sound and robust shipping business climate.

Our mission is to create a fantastic environment for all participants to network with customers, clients and colleagues, and to support exhibitors and shipping companies in doing business.

Key figures from DSM17

SHIPPING COMPANIES	EXHIBITORS	VISITORS
90	260	2000

Delegates from 33 different countries gathered to discuss shipping and shipping related topics. DSM19 will take place September 3-4, 2019.

Welcome to Donsö, let's meet!

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STM

STM nearing the finish

At the end of this year the STM Validation project will come to an end. But the standards developed during the years will continue to evolve.

STM (Sea Traffic Management) Validation Project has been going on since 2015 and is a successor of the previous projects Monalisa and Monalisa 2.0. It is partly financed by European Union and the goal of the project is to validate and standardize a format of data when exchanging information from ship to both other ships and shore based actors.

"It will improve both safety, efficiency and the environmental footprint from the whole international shipping industry", says Ulf Siwe, Communications Officer at the project.

Exchange of information

The idea behind STM Validation, as well as the Monalisa-projects, is to promote information exchange between actors in shipping. For example ships can share their planned routes with anyone they choose and get feedback from i.e. VTS-operators on how to improve the route.

"They can also get information from the port if the quay is ready when they plan to arrive, or if they should slow down and arrive later and then save some bunker as a bonus", says Ulf Siwe.

"The largest commercial gain with STM will be the ability to better plan and streamline port calls. And the industry is very clear in its demand of a general standard."

Since 2010

Ulf Siwe has been working with the projects since the beginning in 2010 and has always tried to promote information exchange.

"We've been working hard all these years to promote STM. Until now the interest and adoption has increased slowly, but steady. But now I think we may have reached a tipping point where we see great increase of interest and more and more projects are introduced. We see an exponential growth right now and more and more actors see the benefits of STM.

"We see an exponential growth"

Ulf Siwe, Communications Officer, STM Validation project

The standards developed by STM Validation Project are now used in several other projects. An example is the Efficient flow-project where the goal is to improve the flow of goods and passengers through the two corridors of Gävle-Rauma and Stockholm-Turku.

Also Port of Rotterdam has developed a system where ships share their routes with the port to make the planning of port calls more efficient. The data exchanged is based on the standards developed by STM Validation Project.

Growing interest

Ulf Siwe also says that the general interest in STM has increased substantially.

"We know that China has been working a lot with e-navigation and they have shown interest in our projects."

And recently China signed a memorandum of understanding, together with Sweden among others, in which the participants will try out each others e-navigation solutions.

"It is really great for STM when such a large country like China sees the benefits of information exchange in the industry", says Ulf Siwe.

"The technical committee in IMO has also shown interest and said that STM is something they would like to promote. That would give STM-projects easier access to larger funding and other benefits, which is great."

2030

When the STM-project started Ulf Siwe and his colleagues set a goal that Sea Traffic Management would be internationally implemented by 2030.

"I don't think that it will advance any faster because the industry moves slowly, which might not be bad. But we didn't

ANNA LUNDBERG

Ulf Siwe explaining STM at the World Maritime University.

expect this great increase in interest to come before 2020."

According to Ulf Siwe the greatest threat for a larger implementation of STM in international shipping would be if stakeholders started to implement their own solutions with their own standards.

"That would create a situation with conflicting systems and the shipping companies won't accept that."

"Luckily we already see that companies delivering things like ECDIS and AIS are already building STM-solutions according to standards into their systems. Solutions that wont cost companies extra."

Another thing that will benefit the adoption of sea traffic management systems is the development of autonomous shipping, says Ulf Siwe.

"Rolls Royce, which is investing heavily in autonomous shipping, says that STM is crucial for autonomous ships to be able to navigate alongside conventional ships."

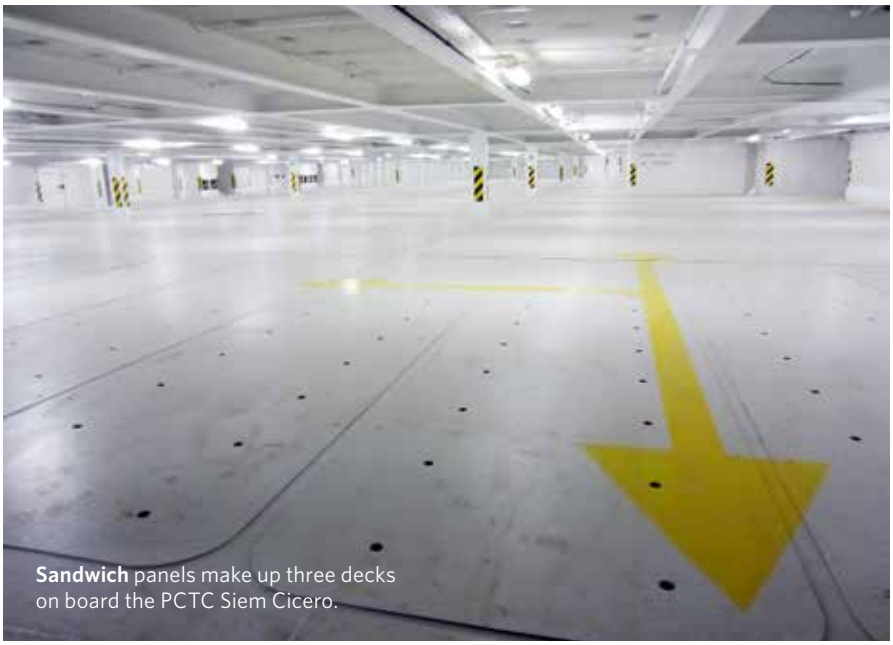
Until end of 2018

STM Validation Project will go on until the end of this year, and in November a final summit will be held at IMO in London where the results will be presented.

"We see the project as successful and we have made great impact. And when this project is over other projects will follow. STM has already become a part of other projects like autonomous shipping."

"It will be very exciting to see what will happen in the future", Ulf Siwe says.

Adam Bergman



DIAB

Sandwich panels make up three decks on board the PCTC Siem Cicero.

Replacing steel with foam

Only the imagination sets the limit for how Diab's core material can be used. And sometimes IMO regulation.

When you have a piece of Diab's core material Divinycell in your hand, it feels light and porously fragile. But when the stiff foam material is coated for example with fibreglass and hard plastic, even a thin board of Divinycell becomes extremely strong, enough to replace steel in the construction of ship hulls and decks.

In the small town of Laholm, on the southern west coast of Sweden, Diab have manufactured Divinycell since the 1960s. Laholm is also where Diab's headquarters are located, but the company is present at many locations around the world.

Well-known concept

Divinycell has been a well-known concept for boatbuilders for many years. Decks and hulls on pleasure craft are often constructed with a core of Divinycell coated with fiberglass armored polyester. The principle is called sandwich and the material is called sandwich composite, accordingly.

Swedish sea rescue society (Sjöräddningssällskapet) use Diab's sandwich composite for their rescue craft of the Victoria class. The battery powered commuting ferries BB Green and Sjövägen – the latter is employed in Stockholm public transport – are other examples where the superstructure and hull are built of Divinycell sandwich composite. The Swedish Navy's Visby-class corvettes are yet another Swedish example where the material is used.

Recently, Diab in Norway and Norwegian Brødrene AA received the JEC World Innovation Award for their electric hybrid ferry Vision of the Fjords, which Brødrene AA have developed together with Diab to meet the environmental requirements of the World Inheritance listed fjord of Nærøy, where the ferry is employed. All structural parts of the catamaran ferry Vision of the Fjords, including bulkheads, decks and the 42 metres long hulls, are made of sandwich composite material.

> ***"You couldn't do that with steel"***
>
> **Louise Eriksson Jacka, Market Coordinator, Diab**

"We can make stronger, lighter and stiffer constructions, that is our competence. Since it is a moldable material you can avoid all the rivets and welding, you get a very fine surface. Also, the material demands very little maintenance, it obviously does not rust, and thereby has a much longer life span", says Roger Jansson, Products and Marketing Manager at Diab International.

Enormous gain

Roger Jansson points out that the environmental gain from using their core material Divinycell is enormous when you consider the energy you save by reducing the weight of a vessel.

Diab has worked a long time to gain a place in the market for large-scale shipbuilding. The company made a recent break-through when the Croatian ship yard Uljanik began the construction of a series of three PCTCs for Siem Car Carriers. The first ship in the series, the Siem Cicero of 17170 dwt, was put into service last year and sails with three out of thirteen decks where the steel has been replaced with sandwich panels from Diab. That way the vessel's total weight was reduced by 25 per cent or 200 tons.

Easy handling

Diab's Market Coordinator Louise Eriksson Jacka tells the Swedish Shipping Gazette about the ship yard workers' joy when handling the Diab panels:

"Roger and I were at the shipyard during the construction of the Siem Cicero. Everyone was so engaged, as it is so

Diab's core material product range includes several densities.

DIAB

much easier for those who work with the material to handle it. Two men can lift a three times ten metres panel just like that. You couldn't do that with steel."

Lost in regulation

The Swedish shipping company Stena Line has shown interest in building ships with Diab's composite material and had far advanced plans to realize it some years ago.

"The project got stuck in IMO regulations and the cost of implementing the material on passenger ferries", says Roger Jansson.

In onboard areas where there are people, crew or passengers, the SOLAS regulation for fire safety on ocean going vessels demands in practice that steel is used in the construction. The Diab panels could be used on the Uljanik-built car ferries since no people enter the car decks while on route. The regulation for ferries in service close to shore also allows for alternative materials.

Hope for further assignments

Roger Jansson says that Divinycell has shown good results in large-scale fire testing, but the process from there to using the materials in passenger ferries is long and costly. But Diab are not giving up, but hope that the Uljanik-built car carriers will result in further merchant fleet assignments.

The large market segment for Diab is Marine, mostly pleasure craft but also submersible craft, and the segment Wind, where they construct parts for windmills.

Divinycell can be cut, joined and milled into any shape, which makes it suitable for instance for ROV parts, where high pressure resistance is required.

DIAB

"The Marine is our foundation. Therein lies our history and it involves pleasure craft above all", says Christian Karlsson, Sales Director at Diab.

Large-scale baking

The manufacturing process of the core material Divinycell resembles baking on a large scale, says Christian Karlsson when showing the factory in Laholm. There is a strict ban on photography in the factory, in order to protect Diab's patents. The Divinycell "batter" consists of PVC, polyurethane and other plastics, following secret recipes.

The batter is poured into baking tins and put in great ovens. Under a process of high temperature and high pressure, bubbles form in the plastic, which is how the cells in the foam are created. The material is then swelled to different densities depending what it is meant to be used for.

The largest boards of the plastic foam is about as large as regular plaster boards and they can be joined to other pieces, cut, milled and coated in practically endless combinations, depending on the end purpose.

Anna Lundberg

ORESUND DRYDOCKS

Oresund aiming at growth

Repair yard Oresund Drydocks has recorded its highest capacity utilization since 2010 and is planning to lengthen its dry dock.

So far 2018 has been a good year for Landskrona-based Oresund Drydocks, the largest ship repair yard in Sweden.

"It is for us a considerably better year than the earlier ones. The market has been weak, especially in 2017. Since 2010 our order book has not been as filled as it is today. Our docking facilities have been fully utilized since January and now we are fully booked until mid November," says Anders Larsson, VP at Oresund Drydocks.

The shipyard has been contracted for two extensive conversions this year. The first one was Stena Lines ferry Stena Danica, which was upgraded at the shipyard for almost three weeks. In addition to that there were installations under way before and after the docking.

The second large project is the docking of the Bornholm-ferries Hammerodde and Leonora Christina. Hammerodde has been sold to Stena and will be renamed Stena Vinga. The hi-speed ferry Leonora Christina has been sold to Fred. Olsen in Spain. During a five to six weeks long visit at the shipyard the vessel will be almost completely refurbished.

New markets

During 2017 Oresund Drydocks has also received projects from new markets.

"We have docked a number of large bulk carriers for various owners. These projects have filled up the capacity of our dry dock quite well."

There has also been more activities towards the offshore market, regarding as well normal dockings as dockings of offshore vessels prior to change of ownership.

"Above all we have been quite aggressive on our market, which has lead to results".

More capacity

There is also a generation shift going on, leding to changes in the organisation.

"We have many new employees coming in and also people returning to us. It has been a challenge, but now our planning start to show results."

Increasing the docking capacity is a key feature in the planning for the future.

"Our plan is to lengthen the existing dry dock with 30 metres. This also means that the fairway has to be improved enabling us to receive larger vessels."

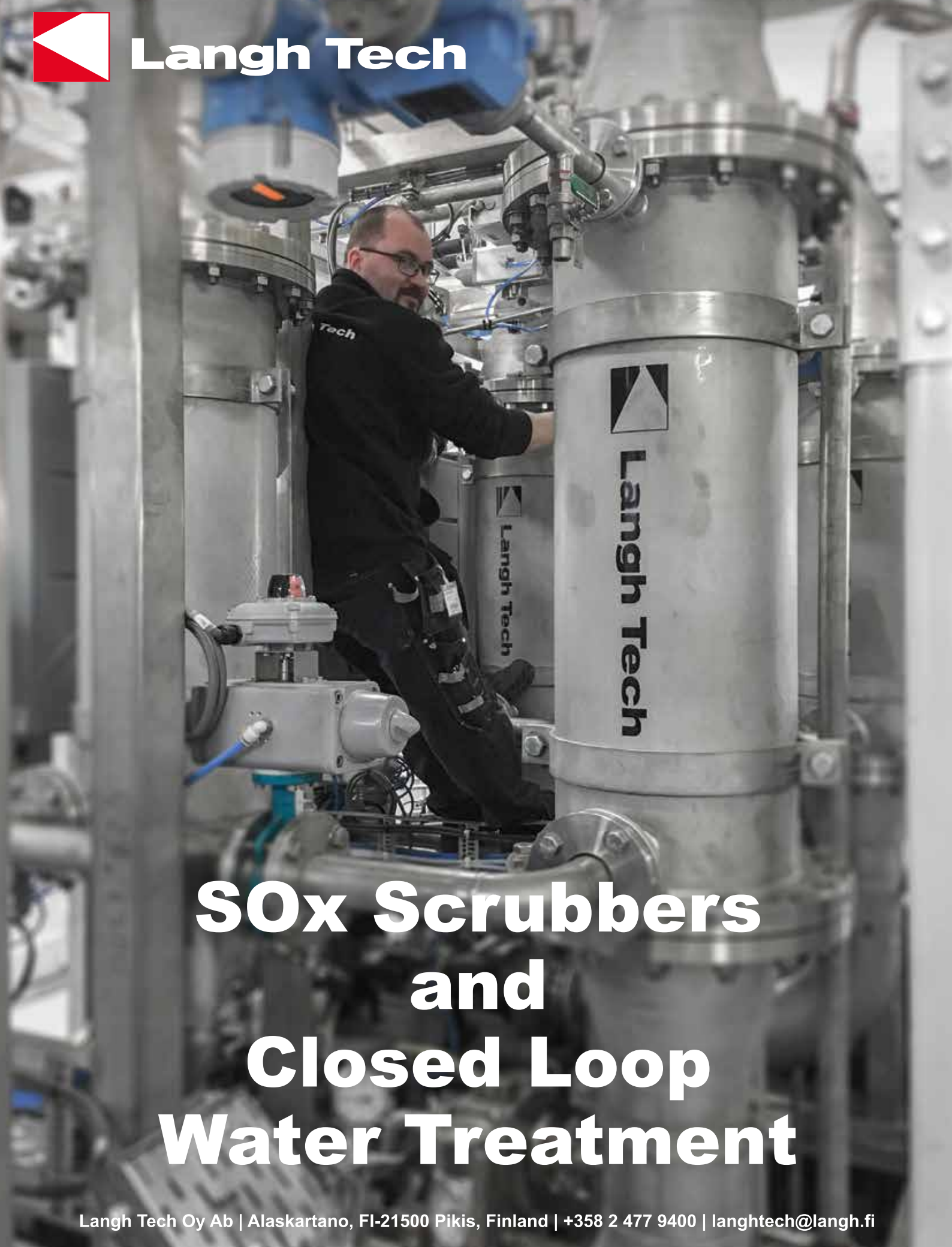
Now a comprehensive study about the fairway project is going on including several stakeholders, such as the industry and different authorities. It will be completed in 2019.

"Our goal is to have an improved fairway to Landskrona within two to three years."

Pär-Henrik Sjöström

ORESUND DRYDOCKS

Langh Tech



SOx Scrubbers and Closed Loop Water Treatment

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PÄR-HENRIK SJÖSTRÖM

Clean without chemicals

There is an increasing interest in a water treatment technology that keeps the HVAC system clean without the use of any chemicals.

Regardless of many years on the maritime market, the interest for the proven EnwaMatic technology is larger than ever, according to Enwa Water Technology. With focus on environmentally friendly and energy efficient solutions an increased demand especially on the cruise- and yacht market is experienced by the company.

Proactive way

Protecting HVAC (Heating, Ventilation, and Air Conditioning) systems is a proactive way of safeguarding the environment. Continuous filtration and treatment prolongs the HVAC/chilled water system and component lifespan without exposing the environment to harmful chemicals.

As HVAC systems require major capital investment as well as long-term operating costs and energy consumption that impacts environment and profit, Enwa Water Technology emphasizes that it is crucial to protect and maintain system efficiency.

Improved system efficiency

The energy carrier within most HVAC systems is water, it has no COSHH (Certificate of Substances Hazardous to Health) requirement and is therefore environmentally friendly. But when the water enters an HVAC system it will react physically, chemically and biologically generating process that are interrelated and will fuel each other's development. In broad terms they include corrosion, scaling, bacterial growth and general fouling.

The EnwaMatic creates changes in the key water parameters pH, alkalinity and hardness to elicit corrosion inhibition, control of scale formation and prevention of bacterial growth.

The process is self-regulating and continuously adjusts to achieve the design chemistry buffering against system "top up". In soft water applications, hardness is elevated to prevent corrosion. In hard water applications, the excess hardness is actively precipitated within the filter bed as a fine sludge that is backwashed to waste.

More than 300 units installed

Crystal cruises was early to introduce the technology. After installing EnwaMatic onboard the cruise ship Crystal Harmony, on a 50 cbm chilled system, 2000 - 3000 kg mud was removed within six months and compressor efficiency improved by 25 per cent.

TUI Cruises has chosen to install EnwaMatic onboard their newbuilt cruise ships Mein Schiff 1, 2, 5 and 6. After having used the EnwaMatic technology for about half a year at one of their ships their Chief Engineer stated:

"The EnwaMatic filtration and water treatment for Re-heat and Pre-heat systems operates without any problems up to this moment. It seems that there are not suspended solids remaining from the construction, or are generated by corrosion, precipitation of minerals, biological growth or mechanical defections."

"Like drinking water"

From their short-term observation, Enwa Water Tecnology states that it improves the energy efficiency and reduces maintenance cost. The water sample is clear as well as ther is a reduction to none chemical use leading to improved health and safety.

Another customer described his latest samples of the chilled water stating that "the samples is like drinking water" and that it's the first time he has seen such clean chiller water.

Pär-Henrik Sjöström

WALLENIUS MARINE

The first of four HEROs

The Neo-Panamax PCTC Titus has joined the Wallenius Wilhelmsen Ocean-fleet.

On June 11, Wallenius Marine's latest newbuilding project, the HERO-class PCTC (Pure Car Truck Carrier) Titus, sailed from Xingang Shipyard, China. She is the first vessel in a series of four that will be operated by Wallenius Wilhelmsen Ocean. Her capacity is 8 000 cars (CEU).

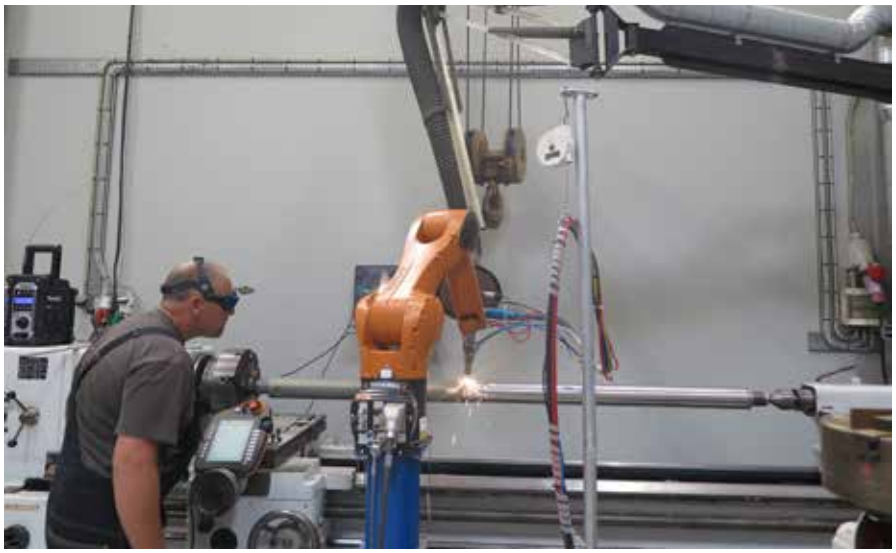
HERO stands for High Efficiency Ro-Ro. When the project was initiated the aim of the design team from Wallenius Marine was to create the most efficient PCTC within the frames set.

The hull is tailored for efficient operations in a wide range of sea conditions, and dramatically improves the cargo to ballast ratio. The increased beam of 36.5 m provides better stability, hence less need for ballast water. Extensive model testing has been performed to optimize the hull to reduce drag and wave resistance, thus improving fuel efficiency.

"Titus will be hard to beat on the efficiency side as she runs on 15 per cent less fuel compared to benchmark level," says Urban Lishajko, Head of Ship Design & Newbuilding Wallenius Marine.

The engine has been tuned for low-load operation to reduce the specific fuel consumption in normal operation and she has an efficient bunker system that can operate on different bunker qualities. The cargo hold, with its two-pillar design and electrically hoistable deck panels, allows for flexible operations and is optimized to transport breakbulk, rolling equipment and cars.

Pär-Henrik Sjöström



MARINESHAFT

Laser cladding specialist

MarineShaft is using laser technology to repair and rebuild marine propulsion components.

Last year, while at sea, the coupling went loose onboard the fishing trawler Emmely Pilegaard causing damage to the coupling and the gear shaft. An unplanned docking and repair yard visit was required.

Normally a damage like that means a long and costly downtime, but MarineShaft in Hirtshals was contracted to carry out the repair using a new laser cladding technology that significantly reduced the time of delivery.

Reduced by 50 percent

The welding of the coupling was completed using Inconel 625 welding powder that was applied by a laser robot. Subsequently the coupling was machined to its original size without any heat treatment. The company's laser technology proved that this kind of repair reduce the time of delivery significantly and in this case it was carried out in just half the time compared to traditional solutions.

This is just one of many tasks carried out by the company, which proves that its robotic welding solutions save shipowners time and thereby money. Ever since the company invested in its state-of-the-art robotic facility for material welding and repairs, it has rarely stood idle.

A recent job that included the laser cladding technology was for the Danish naval support vessel Absalon. MarineShaft received two 21140 mm long propeller shafts in the workshop and on both shafts the stern journal was welded up by the laser cladding "robot".

Both marine and industrial work

Senior Project Manager Peter Pallesen is satisfied with the results of the company's investment.

"It's been little over a year since we installed the system and our 'new employee' has proved its worth many times over."

He points out that work is now coming into the order book from both the maritime sector and industrial manufacturers.

"The fact that laser cladding has a minimal temperature impact to the material and delivers the highest possible tolerances in application has been a major focus area for us, as classification societies do not approve welding on propeller shafts."

Class approved

MarineShaft has recently completed weldings on propeller shafts, which were class-approved by both RINA and DNV-GL.

"Reduced downtime is a huge money-saver for owners. Class approval is given on a case-by-case basis, but we have proved that our technology works", says Peter Pallesen and adds that a second laser plant might very well be needed in the near future.

Extremely precise

According to MarineShaft laser welding using a three kilowatt application system can create a precise laser cladding cover on a variety of components to exacting tolerances.

"Using a wide range of powders and metallic materials combined with the unit's numerically controlled robotic arm, the potential to provide inter-geometric options for applying the substrate material has been greatly enhanced. Lathe technology allows only a small window where material is applied in a continuous string. However, with laser cladding, an extremely precise and accurate welding process is achieved while at the same time the adjacent and surrounding areas remain unaffected by heat", Peter Pallesen explains.

Repairs and manufacturing

MarineShaft carries out repairs on propellers, propulsion equipment and rudders and is specialized in class-approved cold straightening of propeller shafts. They also offer new manufacturing of shafts.

The company is engaged in ship repairs such as engine, gear, hydraulics, RSW, HVAC and has a team of experts who perform mobile machining work worldwide. This includes drilling, milling, laser measurement and associated tasks.

MarineShaft is located in Hirtshals, Denmark, on three sites with more than 9 000 m^2 workshop facilities. The company has 80 employees.

Pär-Henrik Sjöström

Newbuildings with Swedish connection

Vessels on order on 15 August 2018

Ordered by	Shipyard	Type	Dwt	Del	Remarks
Ektank	CSSC Chenigxi Shipyard, China	Prod/chem	18 600	2018	LNG-ready, Ek-Stream
Furetank	Avic Dingheng Shipbuilding, China	Prod/chem	16 300	2018	LNG, Fure Valö
Furetank	Avic Dingheng Shipbuilding, China	Prod/chem	16 300	2019	LNG, Fure Ven
Gothenburg University	Nauta Shiprepair Yard, Poland	Research		2018	900 t, Skagerak
JT Cement	Ferus Smit, Holland	Bulk (cement)	8 000	2019	LNG
Marinvest+Waterfront	Hyundai Mipo, Korea	Prod/chem	49 000	2019	Methanol
Marinvest+Waterfront	Hyundai Mipo, Korea	Prod/chem	49 000	2019	Methanol
Mercy Ships	CSIC, China	Hospital	4 500	2019	Project: Stena RoRo
OljOla	PaxOcean, Cina	Bunker tanker	5 600	2019	Cooperation Stena Oil
Rederi AB Gotland	GSI, China	Ropax		2018	LNG, Visborg
Rederi AB Gotland	GSI, China	Ropax		2018	LNG, Thjelvar
Sirius	AVIC Dingheng, China	Prod/chem	7 999	2018	LNG-ready, Saturnus
Sirius	AVIC Dingheng, China	Prod/chem	7 999	2019	LNG-ready, Mercurius
SLU	Armon, Spain	Research		2019	69 m, Svea
Stena	AVIC Weihai Shipyard, China	Ropax		2019	3 100 lm,E-Flexer
Stena	AVIC Weihai Shipyard, China	Ropax		2019	3 100 lm,E-Flexer
Stena	AVIC Weihai Shipyard, China	Ropax		2020	3 100 lm,E-Flexer
Stena	AVIC Weihai Shipyard, China	Ropax		2020	3 100 lm,E-Flexer
Stena	AVIC Weihai Shipyard, China	Ropax		2021	3 100 lm,E-Flexer
Stena	AVIC Weihai Shipyard, China	Ropax		2021	3 100 lm,E-Flexer, LNG
Stena	AVIC Weihai Shipyard, China	Ropax		2022	3 600 lm,E-Flexer
Stena	AVIC Weihai Shipyard, China	Ropax		2022	3 600 lm,E-Flexer
Thun Tankers	Avic Dingheng Shipbuilding, China	Prod/chem	16 300	2018	LNG, Thun Venern
Thun Tankers	Avic Dingheng Shipbuilding, China	Prod/chem	17 500	2019	
Thun Tankers	Avic Dingheng Shipbuilding, China	Prod/chem	17 500	2019	
Thun Tankers	Avic Dingheng Shipbuilding, China	Prod/chem	17 500	2019	
Thun Tankers	Avic Dingheng Shipbuilding, China	Prod/chem	17 500	2020	
Thun Tankers	Ferus Smit, Holland	Prod/chem	7 999	2018	LNG, Thun Eos
Thun Tankers	Ferus Smit, Holland	Prod/chem	7 999	2019	LNG
Thun Tankers	Ferus Smit, Holland	Prod/chem	7 999	2020	LNG
Thun Tankers	Ferus Smit, Holland	Prod/chem	7 999	2021	LNG
Färjerederiet	Baltic Workboats, Estonia	Ferry	600	2019	Battery, Tellus
Waxholmsbolaget	Baltic Workboats, Estonia	Passenger		2018	27 m
Wallenius Wilhelmsen	Tianjin Xingang Shipyard, China	PCTC	23 700	2017	Traviata
Wallenius Wilhelmsen	Tianjin Xingang Shipyard, China	PCTC	23 700	2017	
Wallenius Wilhelmsen	Tianjin Xingang Shipyard, China	PCTC	23 700	2017	
Älvtank	Avic Dingheng Shipbuilding, China	Prod/chem	16 300	2019	LNG, Ramelia
Västtrafik	Uudenkaupungin Työvene, Finland	Passenger		2019	Batteri, 33 m

THE TREND REMAINS

Brea-king the
record two years in a
row means we had big shoes
to fill. Hats off, be-cause we have now
broken the record for the third year in a row.
No less than four of them, actually! During 2017 the freight volume increased by 3,3%, the number of freight vehicles with as much as 9,8% and the number of cars with 5,0%. Thanks to the ferry traffic, the number of passengers increased by 4,5% which means a total of 2.180.475 passengers. If the trend remains, we will break another record in 2018. So we now roll up our sleeves and aim at turning the trend into a classic.

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