

Yearbook ²⁰¹⁹

Finnish Maritime Cluster

**World class
innovations**

**The Finnish
maritime cluster
knows collaboration**

**First in the world
Viking Grace – Wind
and LNG hybrid**





Finland's seaway to the world

Finnlines is one of the leading shipping operators of ro-ro services in the Baltic Sea, North Sea and the Bay of Biscay as well as a passenger service provider in the Baltic. Our environmentally friendly and modern fleet transports both cargo and passengers safely, efficiently, and responsibly to their destination.

Sustainable development and environmentally friendly vessels

Investments in the fleet

In recent years, we have invested heavily in our fleet: EUR 100 million in environmental technologies that enabled us to significantly reduce our carbon footprint, and EUR 70 million in increasing the energy efficiency of our vessels. We will continue to implement our strategy with determination and consistency by investing over EUR 500 million more in the coming three to four years.

New energy-efficient vessels

Three ice-class newbuildings will start in traffic in 2021–2022. These hybrid ro-ro vessels will be the most energy-efficient in the market due to their size and design. We are also planning a new series of Superstar ro-pax vessels with the goal of creating the most environmentally friendly ship design ever to have operated in the Baltic Sea. With the new vessels the energy consumption per transported unit will decrease and our carbon footprint will be reduced further.

*In 2018
we transported*



163,000
cars



754,000
cargo units



655,000
passengers



1,226,000
tons of
non-unitised freight

Accross the Baltic Sea

Germany, Finland, Åland and Sweden – sail around the Baltic Sea with Finnlines. Explore and discover the best offers at finnlines.com

Finnlines
a Grimaldi Group company



Juha Mutru, Tiina Tuurnala, Elina Vähäheikkilä and Annaleena Mäkilä from the Finnish Maritime Cluster. (The Finnish Maritime Cluster includes Tiina Tuurnala, the Managing Director of the Finnish Shipowners' Association, Annaleena Mäkilä, the Managing Director of the Finnish Port Association, Juha Mutru, the Managing Director of the Finnish Port Operators Association and Henrik Bachér, the acting Managing Director of Finnish Marine Industries.)

The Finnish maritime cluster knows collaboration

The Finnish maritime cluster is significant by international standards. There is strong high-technology development like digitalization and environmental expertise in Finland, and these areas represent two global megatrends.

Among Finland's defining characteristics are its small size, agility and mutual trust, which are reflected in strong collaboration between the public sector and companies. Various joint projects are also spawning startups.

Collaboration is bearing fruit in the form of innovation. Finnish vessels act as references and testing platforms for innovations in the marine industry and, once testing is complete, they can be launched on world markets. The competitive ship-owning sector underpins the growth of the maritime cluster as a whole.

The industries are intrinsically linked – ports and port operators do well when ship owners and the marine industry are buoyant. In turn, these industries require good ports and fairways, functional logistics chains and good mutual collaboration.

- | | | | |
|----|--|----|---|
| 5 | Editorial: Finland is a pioneer in digital seafaring and environmental technology. | 42 | Port operations |
| 6 | Breaking Waves brought the maritime sector to Helsinki. Interview with Magda Kocpczynska and Jens Meier. | 48 | Ship owners |
| 14 | Meyer going strong both in Finland and Germany. | 55 | Harbour operation |
| 22 | Shipyards | 56 | FinnPilot |
| 29 | Shipbuilding and design expertise | 57 | New services and solutions |
| 38 | Marine industry | 62 | The Finnish Border Guards |
| | | 66 | Column, Mikko Niini, Chairman, Finnish Maritime Association |

navigatoromagazine.fi

The website keeps you updated on sea cluster topics!

Publisher
Omnipress Oy
Mäkelänkatu 56
00510 Helsinki
tel. 020 6100 115
toimitus@omnipress.fi
omnipress.fi

Editor-in-chief
Kari Martiala
tel. +358 45 675 7122
kari.martiala@omnipress.fi

Editor
Markku Pervilä
Tel. +358 44 945 4375
markku.pervila@hotmail.com

Layout
Oona Kavasto/Hank

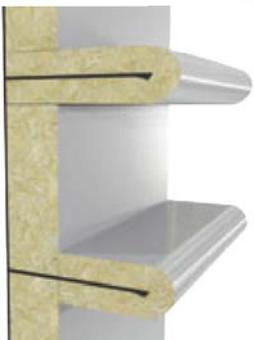
Advertisements
Matti Poijärvi
Tel. +358 40 848 4098
matti.pojjarvi@omnipress.fi

Printed by
Printall AS
Tallinna
ISSN 0355-7871
2019

Navigator Magazine:
Finnish Maritime Society,
Finnish Marine Industries,
Finnish Shipowners' Association,
The Finnish Society of Naval Architects,
Finnish Port Operators Association,
Finnish Port Association, LOGY,
Shipbrokers, Finnish Waterway,
Meriupseeriyhdistys.



PAROC® LIGHT MARINE



PAROC Light Marine solutions are new lightweight solutions for A60 aluminium constructions and A-class steel decks and bulkheads.

With a weight reduction of up to 40% these solutions enable significant weight and cost reductions in the ship building industry.

READ MORE
[PAROC.COM/LIGHTMARINE](https://www.paroc.com/lightmarine)



PAROC®



Finland is a pioneer in digital seafaring and environmental technology

” Finland’s unique strength is the exceptionally open-minded collaboration, enabling innovative experimentation.

In cooperation:



Finland’s maritime cluster is one of the country’s most significant business sectors with annual revenues of EUR 13 billion. The sector employs more than 50,000 people all over the country. The positive outlooks that have prevailed in recent years are down to the development of autonomous maritime traffic among a group of pioneers, successful trials of the deployment of new, environmentally friendly technologies, and an unprecedented upswing in cruise ship construction. The maritime cluster encompasses about 3,000 companies from various sectors, all of which are connected by their maritime expertise. Our diversity differentiates us from many other countries. Among our number are passenger and cargo ship owners, specialist ship owners, marine industries ranging from shipyards to software companies and startups, as well as the ports that handle almost 90 per cent of Finland’s foreign trade. Passenger traffic is also an important category. The Port of Helsinki is the busiest passenger port in Europe. In 2018, more than 12 million international passengers passed through the Port of Helsinki.

Finland’s unique strength is the exceptionally open-minded collaboration between entities, enabling innovative experimentation. Examples of this include the One Sea innovation ecosystem, which is promoting autonomous maritime traffic, the remote pilotage experiment, which is current under preparation, and the smart fairway, which is based on using data and data exchange in an entirely new way. Seafaring history was made in Finland at the beginning of December 2018 when the world’s first fully autonomous ferry sailed through the Turku archipelago.

The Finnish maritime cluster is also a pioneer in environmental innovation and it is at the global spearhead of the development and deployment of low-emission technologies that enhance energy efficiency. Liquefied natural gas (LNG), wind, electricity and biofuels manufactured from waste are already in use – they have long since graduated from the planning phase. Finland also has very strong Arctic expertise. The Baltic Sea could even be considered an “Arctic test laboratory”. Finnish seafaring expertise is unique, and the icy winter and difficult navigation conditions require seafarers and entities in the maritime industry to have special skills.

The entities in the maritime cluster have begun collaborating more closely in recent years. For example, the Breaking Waves 2018 event was held in Helsinki in December 2018, bringing together key players in the European maritime cluster to consider the keys to success in increasingly tough global competition. The event was part of one of Europe’s largest startup events, Slush.

Automation and digitalization will lead to an unprecedented transformation in seafaring. Climate change is challenging the maritime cluster to identify solutions for low-emission maritime traffic. This publication highlights the world-class Finnish expertise and innovations that will address these challenges.

Tiina Tuurnala
 Managing Director, Finnish Shipowners’ Association
 Chairman, Finnish maritime cluster



The organisers were satisfied with the feedback they received on the event.

The event was opened by Alexander Stubb, Vice President of the European Investment Bank (EIB).

Breaking Waves brought the maritime sector to Helsinki

The two-day event, arranged to coincide with Slush in December 2018, brought together the top entities from the maritime cluster in Finland and Europe, offering ideas and inspiration for addressing future challenges.

The seminar, organized by the Finnish Ship Owners Association, the Finnish Port Association, the Finnish Port Operators Association, Finnish Marine Industries and the City of Helsinki, brought about 250 people to the Messukeskus Convention Center to hear the latest news from the industry, analysis of future challenges and potential solutions.

The attendees included from business-people, civil servants, researchers, students and startup entrepreneurs.

The event actually began on the previous day with a think tank session for invited guests.

“Our discussion was open and forward-looking, and the attendees were particularly pleased to be involved in debates across

sectorial boundaries,” says Tiina Tuurnala, Managing Directors of the Finnish Ship Owners Association.

Consensus

The think tank’s ideas were presented to the seminar audience on Tuesday by **Magda Kopczynska**, a Director from the European Commission; **Martin Dorsman**, Secretary General of the ECSA; **Jens Meier**, Chairman of the Hamburg Port Authority; and **Jaakko Eskola**, President and CEO of Wärtsilä. They came to a consensus on the think tank’s objective: Things must change, and quickly.

But what can be done to effect change? That was a more contentious issue.

“The industry requires young new entrants who see things from different perspectives,” Eskola said.

Meier agreed, but he also highlighted the importance of experimentation.

“We need to experiment more boldly and not be afraid to fail more quickly than we do now,” he said. “The Americans are ahead of us in this area.”

Dorsman called upon the EU to stimulate innovation in the industry. He considered it necessary for the public sector to provide more support for investment.

Kopczynska reminded the audience of the upcoming EU elections and the fact that the EU will have a new parliament and commission in less than one year. These bodies will be responsible for financing decisions in forthcoming years. She also emphasized that a lot depends on the maritime industry itself.

“In my opinion, there is often too much focus on the negatives – where does that



come from? It would be better to think that we have the expertise and knowledge in Europe to take these matters in hand,” she said. “Therefore, the maritime cluster holds the keys to the solution.”

“Optimizing operations in the logistics sector is the next major challenge facing the European Commission as the environment is changing rapidly. This raises questions of regulation as well as funding. First, we must analyze what is required, and then we must create a common European solution.”

The think tank’s work also gave rise to proposals for tangible steps forward.

“One necessary reform is to open up the data used in different sectors for everyone to use. At present, the data collected by different sectors is underused and it is not shared between companies or organizations enough,” Eskola said.

“In addition we need to expand the terms of debate to include parties outside the sector, as well as entities that are substantially incorporated into our ecosystem.”

Added Meier, “In this respect, we could take a cue from the aviation sector, where data is shared and exchanged very efficiently. This problem would be fairly easy to solve.”

Flashes from the future

During the afternoon, Finnish and European companies and organizations presented the latest advancements to the audience. The most rapturous applause was reserved

” **We need to experiment more boldly and not be afraid to fail.**

for Finferries and Rolls-Royce, who demonstrated the world’s first autonomous ferry trip and presented the related SVAN project on the previous day.

The historic autonomous voyage combined autonomous passage through the fairway, guided by a computer with a captain remotely controlling the vessel from terra firma.

Despite the hugely successful maiden voyage, **Iiro Lindborg** and **Oskar Levander** from Rolls-Royce predicted that autonomous vessels and remote control will only become widespread in international waters midway through the next decade.

“We expect the IMO to issue guidelines related to automatic control in 2025 or thereabouts. However, the success of our project and the tangible demonstration of its functionality will apply some pressure to this, so it may be possible to get things in motion,” they stated.

The Maritime Accelerator 2018 project also sought new ideas for addressing the

various challenges facing the maritime cluster. To round the day off, the collaboration network set up by Turku Business Region and Avanto Ventures for startups presented its three best ideas.

Of these, a thermal-imaging model developed with Wärtsilä is only just progressing to the practical-testing phase, while Meyer Turku is already using POINTR, a supervision- and monitoring-system provided by Delta Cygna Labs. Vital Vio is launching an application of its antibacterial lights for cruise ships, with testing carried out on Royal Caribbean Cruises’ Harmony.

Appreciation from the participants

The organizers were satisfied with the feedback they received on the event.

“The conference was a success and the speeches provided plenty of information on the future challenges facing the maritime cluster. It was great to see how Finland is pioneering environmental innovations, digitalization and automation in the maritime industry,” says **Tiina Tuurnala**, Managing Director of Finnish Ship Owners Association.

“We have clearly succeeded in creating an atmosphere conducive to collaboration, interaction and opinion-sharing,” says **An-naleena Mäkilä**, Managing Director of Ports of Finland.

She said there are plans to continue the event this year.

The Commission would like to see a unanimous sea cluster

TEXT MICHAEL HUNT
PHOTO ANTERO AALTONEN

As a representative from the European Commission at the recent Breaking Waves 2018 think tank in Helsinki, **Magda Kopczynska** asked European maritime cluster leaders what she should do to help them solve the industry's future concerns.

"I haven't got one answer," said Kopczynska, Director for Waterborne in the Directorate General for Mobility and Transport of the European Commission. "Of course, there was a lot of discussion about regulation, whether we have enough regulation in Europe, whether we have the right kind of regulation.

"Nobody questions, and neither do I, the fact that maritime transport is a global business. So we need global regulation. But the European maritime cluster functions in Europe hence it is important to also recognize the role that the European Union can play. Hence my questions about the role the Commission could – and should – play.

"So my question again and again, but not answered yet, is what needs to happen to make sure the mari-

”

We'll never have enough money. There is always a need to make choices.



Kopczynska came to the European Commission in 2006, and has been in her current post since 2016.

” I was impressed with the think-tank results, as well as Slush, the Helsinki-based start-up convention with which Breaking Waves was affiliated.

time cluster has access to new technologies, new solutions, better infrastructure, better skills and so forth.”

Few cluster leaders, she said, asked about finance during the round-table discussion. Instead, most of the questions she received involved European Commission regulation and cooperation within the industry.

“We’ll never have enough money,” she said. “There is always a need to make choices.”

Financial prioritizing toward reducing emissions, alternative fuel sources and more efficient energy, information technology, security and other concerns were also topics of discussion at the think tank. But few points were as salient as data sharing.

“Everyone saw big value in working together and sharing the data,” she said. “That is a very interesting point for me because I think in the shipping sector data sharing has not been as prominent as in the land transport modes, and in particular passenger transport.

“The idea that you need to share data to have new types of businesses is very present. That’s a very strong statement we’ve been hearing from other transport modes for a couple of years now. In the maritime industry data sharing is relatively new, the last two or three years.

“As always, my question back, to which the answer will differ depending on whom I’m asking, is, ‘What is the ideal approach that will allow the sector to make full use of the potential offered by digitalization and data sharing? Shall regulation come first or shall it follow innovative and breakthrough solutions, developed and implemented at industry level?’ “

Such industry-wide cooperation is necessary to keep the European maritime cluster competitive in a changing global economy, as is the need to reduce shipping’s carbon footprint.

As a regulator who was once head of clean transport for the European Commission, Kopczynska said, “If we had this think tank two or three years ago, the environmental discussion would have looked differ-

ently. Now, it’s good to hear, for example, from people in the Finnish maritime sector that because of the requirements for low-sulfur fuels that kicked in 2015, today they find themselves at the forefront of new environmentally friendly solutions.

“Now the big question is CO2 emissions, how are we going to work on it, how quickly will be able to respond and meet the targets. It’s not only about ship owners. It’s about ports, it’s about shippers, it’s about users.”

Kopczynska, who came to the European Commission in 2006, has been in her current post since 2016. Before joining the Commission, she served as Director of the Brussels Office of the Polish Private Employers Confederation, as well as holding positions within Warsaw local government.

She said she was impressed with the think-tank results, as well as Slush, the Helsinki-based start-up convention with which Breaking Waves was affiliated.

“Slush is overwhelming,” she said. “You have thou-





The think tank's ideas were presented to the seminar audience on Tuesday. The summary was presented by Magda Kopczynska, a Director from the European Commission, Jens Meier, Chairman of the Hamburg Port Authority, Martin Dorsman, Secretary General of the ECSA and Jaakko Eskola, President and CEO of Wärtsilä.

sands of young people with ideas from across the entire life spectrum, from education to health to business to data sharing. It's a question to companies to ask if they found something in Slush that was a surprise for them.

"For me, a definite takeaway was that we need to work together more and we need to work together slightly differently. Sometimes simply putting people around a table makes them come up with the right solution. I think that's a bit of what Slush is about, to make people meet in one place and talk about ideas."

Such was the goal of the think tank, which brought industry leaders together for the good of the cluster, however it is defined.

"I'd say we have European maritime clusters, and not just one European maritime cluster," Kopczynska said. "Depending on where you go in Europe, we may have a slightly different focal point of such a cluster."

"Sometimes it is around stronger ports, sometimes it is around a stronger participation of technologi-

cal providers, sometimes it has to do with a stronger presence of ship-management companies. But I'm not saying this diversity is wrong. Diversity is absolutely essential when we are talking about the EU."

Kopczynska said industry leaders agreed on an overall vision for the future of the European cluster. But what does it mean for regulators?

"It's a very difficult question to the EU Commission," she said. "I can tell you what I would like to see the European maritime cluster look like and what I would like it to be."

"I'd like it to be European, I'd like it to support European companies, I'd like it support European research and innovations, technologies, European business and social models."

"The big political objectives, the climate and emissions, the overall environmental impact. And I'd like the cluster approach, as I said at the conference, to not have only one definition of a European maritime cluster that will be the same all over Europe."

Hamburg port boss is a firm believer of teamwork

TEXT MICHAEL HUNT
PHOTO ANTERO AALTONEN

As chairman of the Port of Hamburg at the mouth of the North Sea, **Jens Meier** oversees Europe's third-busiest maritime point of entry after Rotterdam and Antwerp. Known as Germany's "Gateway to the World," Hamburg is also the planet's 15th-largest port, handling about 10 million cartons annually.

Celebrating its 830th anniversary on May 7, the Port of Hamburg is firmly established as one of the Europe's most viable commercial and cultural hubs, a source of pride and emulation among the continent's maritime cluster.

The 52-year-old executive with a background in computer science and sports keeps the port humming through a time-honored philosophy:

Teamwork.

"My approach is always one team, one success," Meier said during a recent interview at Breaking Waves 2018 in Helsinki. "There is competition, but you can only survive in the worldwide competition when you cooperate with partners with fair trade in an environment that must fit."

To that end, the Port of Hamburg has teamed with Finnish multinational telecommunications firm Nokia on 5G technologies as a way to address the future.

"We're thinking ahead with that with Nokia for the next 10 years," he said. "We have to work on that step by step. We cannot stop. It will never come to an end, but I

like this kind of sporting competition. You can only win as a team. You cannot fight as one port or one company. It's the clever combination of expertise and letting some new ideas in.

"We stay competitive because we are not dependent on one client, one market. We learn there progress working in a fair-trade mode, and working together in a partnership."

That is why Meier said he enjoyed participating in the Breaking Waves think tank that was part of Slush 2018, the world's largest start-up convention. He said the continent's maritime leaders were able to come to a consensus about the need to work together.

"Many in the think tank saw that teamwork is there in the European cluster," Meier said. "Think tanks like this help you keep the trust up. Trust increases over time and when you have such meetings and learn each others' behaviors, you become friends and friendships leads to close partnerships. I believe that is one of the good factors for the future."

For example, Finland's healthy maritime industry could continue to prosper through international cooperation. "I think the Finnish shipping industry does it very well," he said. "They are familiar with cruise vessels, and special ships like icebreakers and so on. I think to keep this level of competition high in Finland, go in a cooperative way with ports like Hamburg to exchange knowledge."

Meier said one of the most beneficial outcomes of the think tank was shared information that will help reduce the shipping industry's carbon footprint in the coming years. By reducing traffic jams and the amount of empty trucks around ports, as well as deploying smaller vessels to meet the demands of modern supply chains, ports may become more efficient for the future.

"We have a big change coming in the industry from supply-chain management," Meier said. "It's no longer a chain. It's more like a supply community."

He explained that if a consumer wants a sweater, it might no longer come from a central warehouse, but from instead culled from a local store to create a new way of solving delivery logistics.

"The target is always to make the consumer happy," Meier said. "If you get something out of China, you don't care via which port the container is coming in. You don't care about which logistics company will serve it to you as the end user. You are interested in when you can receive the parcel at home."

Meier said he also foresees better technology and an influx of young minds such as those attending Slush as means to a brighter future for the shipping industry.

"We have to bring in younger people," he said. "What do they think of the future, customer and consumer behavior and what the future will be? We must combine our expertise with their views of the future."



“We stay competitive because we are not dependent on one client, one market. We learn there progress working in a fairtrade mode, and working together in a partnership.”

” **My approach is always one team, one success.**



Chairman of Meyer Turku Oy Mr. Bernard Meyer:

**“Meyer going strong
both in Finland
and Germany”**



The Meyer family-owned company Meyer Werft of Germany has been in the shipbuilding business since 1795. During the last several decades its emphasis has shifted to passenger vessels. Today, Meyer is one of the world leaders in producing specialized cruise ships.

TEXT EERO MÄKINEN PHOTOS MEYER



Meyer operates today two yards in Germany: the main yard in Papenburg and a smaller yard in Warnemünde, the latter for the construction of smaller vessels and large floating sections for the Group's other yards.

In 2014 Meyer took a big step of expansion by the acquisition of the biggest yard in Finland, the Turku yard - another specialist yard for cruise vessels.

Meyer Group with its three yards is going through a major capacity expansion. What are the key figures of the group after say 3 years?

The biggest capacity increase will take place in Finland where we delivered one mid-size cruise ship per

year when we took over the yard. By 2020 Meyer Turku will be able to produce two large cruise ships a year. In Papenburg we are reaching already this year our expansion target by building two big cruise ships a year and one small size cruise ship. Our shipyard in Warnemünde, Neptun Werft, is supporting Papenburg and Turku with floating engine room units and they have been growing recently to supply the demand of engine room units for Papenburg and will further grow for the increasing demand of engine room units in Turku. Currently the whole Meyer group is employing about 7600 employees and will grow to 8500 by 2022. We will then be able to deliver from Papenburg about 400,000 gross tons and Turku about 400,000 gross tons each year.

The four Managing Directors of the Meyer shipbuilding group, Thomas Weigend, Dr. Jan Meyer, Bernard Meyer and Tim Meyer.

The order book covers today exclusively cruise vessels. Will that be the name of the game also for the foreseeable future of Meyer group?

Definitely our core business is building cruise vessels. Besides that in the last two years we delivered as well a small coastal ferry, a big innovative RoPax ferry and innovative an LNG tanker.

The cruise shipbuilding market has really exploded during the last four years. Does Meyer see that as a sustainable development that would continue and even intensify?

Shipbuilding was, is and will be in the future a cyclical business and the current order volume is also a result of the low order book after the Lehman crisis. So it is a natural phenomenon that after years of low order income there are also a couple of years with high order income. This is one reason is that cruising really fits the current consumer market as cruising is a very comfortable nice and relaxing way of travelling and seeing different destinations in one holiday. It is and will be also in the future successful as it offers very high value for money due to the very efficient business model of the ship owners. And one major difference to other shipping markets is that the building capacity is limited. That secures that there is no over-supply of cruise vessels in a short time as we have seen in other markets like in the container or tanker market some years ago.

One would think that the overall business environment must today be exceptionally good with a never-seen workload and the improved prices resulting from the huge demand. Do you foresee any dark clouds for years to come? What are potential risks in the market, if any?

Yes, the good news is: We are not short of orders and we are in good market conditions at the moment with improved prices but also with much higher

”
Another risk definitely is governmental intervention.

costs. Especially the supplier market is over-heated and price level is not where it should be. Ship owners are not forced to place new orders. As soon as the price level is getting too high they can also easily wait with new orders. Therefore it is really essential to us and the whole shipbuilding cluster that we stay price-competitive. There are definitely big clouds coming up as we see in Europe many new small shipyards building now smaller cruise ships as well and first contracts and a clear strategic goal of Chinese government supported shipyards to enter the cruise shipbuilding market. The capacity for cruise ships which is built up in China is completely out of balance to the demand and will destroy the market not only for shipyards that suddenly have too much building capacity and not enough orders but also in good years there is a high chance that too many cruise ships will be built and enter the market and by that ship owners will finally also be faced much more with the cyclical market. Up to now the limited building capacity for cruise ships was also very beneficial to the ship owners because the cruise market was by that growing maximum with 5-7% per year and therefore the ship owners were also able to do long-term planning because they were assured that not too much capacity will enter the market. Another risk definitely is governmental intervention. Most of our competitors in Europe are either partially or fully government controlled and supported and definitely the new competitors in China are heavily supported by their government while we are a family business and purely rely on our tradition, experience and the strong ability to innovate, be agile and have a long-term business target to develop the company to secure it for the next generations.

It seems that Meyer very much concentrates on large cruise vessels while the small cruise vessel market also is extremely active. Why is that? Why not also small vessels?

Our current order book goes from river cruise vessels with 3,000 gross tons, small cruise vessels with 50,000 gross tons via mid-

MS Aida Nova, delivered from Papenburg to Aida Cruises in the fall of 2018. The first ever cruise vessel using LNG as primary fuel.



sized cruise vessels with 110,000 gross tons up to big cruise vessels with 180,000 gross tons and more. So we have a big variety in our order book. Neptun Werft in Warnemünde is specialist for cruise vessels up to 15,000 gross tons. Meyer Werft covers the spectrum from 20,000 to 180,000 gross tons and Meyer Turku from 100,000 gross tons onwards. We are very happy with our current order book of all sizes of cruise vessels, even though we are not active in the expedition market at the moment. However, this market is extremely cyclical. There were more or less no orders for more than 20 years and suddenly there is a huge order book and many small cruise vessels will come into the market in the next years and the market will be saturated for a while.

Meyer acquired the Turku yard about 4.5 years ago. Was the cruise market explosion already seen at that time or was that a positive surprise to Meyer?

At the time of the acquisition it was not foreseeable that the cruise market would develop so positively. Sometimes we simply need to be at the right time at the right place.

What were the main reasons for the acquisition in Finland? Why to Finland?

Since I started my career in 1973 at Meyer Werft we were always competing with the Turku shipyard first in ferries and gas tankers and later on many, many years in cruise ships. The shipyard in Turku was always our hardest competitor because like we they have been always very innovative, very hard working people and delivering good quality in time - all the attributes which are also very important for us. It is not only important that we could grow with the acquisition of the new shipyard, very important for me was also that their DNA is very close to our DNA.

Acquisition in another country often includes a lot of business risks. How after almost five years has the case been with the Turku yard?

We had a good start as at the beginning the Finnish government had a stake as well in the shipyard. They helped us to understand Finnish business practices. On the other hand, as the culture between Finland and Germany is not too different, we had a good start and we are now very happy that we did this decision.

Obviously the operational integration between the yards in Germany and Finland is a must down the road for maximizing efficiency. How is that process developing?

Operational integration comes not from one year to the other, specially if we are building such highly complex products like cruise ships. However, the best visible example of the integration is the floating engine room unit which arrived here in Turku from Neptun Werft in Warnemünde last year as well as all

the nine ships which have been ordered by the Carnival group - three AIDA ships and two P&O ships in Germany and two Costa and two Carnival ships for Turku - and which are designed on a common platform being the first fully LNG driven cruise ship platform in the world which was jointly developed by Papenburg and Turku design teams, and all the engine rooms being built at Neptun Werft. This integration process is developing very well and will continue.

There have been quite big differences between the operational procedures and practices in Germany and Finland as the facilities are quite different. Harmonization is an obvious target. How is that process developing?

The most visible difference between both yards is that we are building the ships in Papenburg in a covered building dock and the ships in Turku in an open building dock and that the integration of the subcontractors is slightly different. However, there are also many areas where we had and have a similar approach like high amount of modularization, high focus on process efficiency, high focus on quality and in-time delivery not only for the whole ship but also for the intermediate processes. Due to many changes in ownership in Turku in the past there was a huge backlog of investments that we are catching up now. So Turku will get for example latest laser welding technology installed at the moment with all the learning and improvements from twenty years of laser welding experience in Papenburg compared to new and innovative ideas from the production team in Finland.

Are there differences between Germany and Finland in the state support role and the attitude of the states to shipbuilding industry? What are they? Any improvements desired?

Germany and Finland act very similar. They are both supportive of the industry and both have more the Northern European attitude of following international rules and regulations extremely strictly with tight interpretations compared to the one or the other South European country which is stretching the rules. Therefore Germany and Finland are playing on the same equal field. Major difference between Germany and Finland is that due to the size of the country and economy the role of shipbuilding in Germany is insignificant and in Finland it plays an important role.

Cruise ship construction requires very specific skills. In today's labor market this must be a major challenge. How does it look for years to come? Any differences between Germany and Finland in this area?

Yes, it is right, construction of cruise ships requires very specific skills. We require workforces in all sectors and that is also the big beauty of shipbuilding



Mr Bernard Meyer.

that each and every skill and task is needed to engineer, design, build and test such complex products, and you easily can see that on our homepage while screening open positions that the labor market in Germany is at the moment much tighter due to the much lower unemployment rate but due to our attractive conditions giving a long-term perspective we are also an attractive employee and therefore we continue to find the right persons. There are not many businesses where you are producing such interesting products and having such a long-term view of contracts up to 2020.

We in Finland are very proud of our innovative activities and track record in cruise shipbuilding segment. How do you assess the contributions by Finns in the past and potentially in the future?

The Finns have shown in the past that they are extremely innovative and we are 100% sure that they will be very innovative in the future too. Finnish education is top in the world and together with good and strong universities this is the basis for not only our but also Finland's success. Our task is to give our employees also the right platform to innovate and we are showing that with each and every ship delivery. Right now we have many innovations under development, which you will see afloat in a few years and we will show and talk about them when they are ready to present.

Ships based on one and the same technical platform are being built nowadays in Germany and Finland for a total of four Carnival brands. What are the experiences of this kind of rationalization?

Of course it helps to generate a good purchase power. However, the biggest effect will be later on for the ship owner as he saves a lot of costs with a harmonized fleet in spare parts but also in crew training.

Three yards of the Meyer shipbuilding group: Papenburg/Germany, Turku/Finland and Warnemünde/Germany the last one for delivery of smaller vessels and floating "engine room units" for the other two big yards.

”
As a privately owned company we have to solve our problems by ourselves.

Meyer and Fincantieri with STX France under the acquisition process together cover today about 90% of all cruise ship new building volume. How likely is that the duopoly also will continue in the future?

We definitely see other shipyards in the future there as well, starting from MV Werften in Germany but also especially Chinese government-owned shipyards will have share in the future.

Differences between Fincantieri and Meyer? Meyer is a private group, Fincantieri is majority owned by the Italian state. Is this difference an element in competition? Is there a real level playing field with European yards?

We should not touch about others. We definitely know that we as a privately owned company have to solve our problems by ourselves. This was our strength in the past and will be our strength in the future.

The entrance of Asian yards to cruise-ship construction has been discussed for the last twenty years. Japan seems to be out and so is South Korea. But China is becoming an issue. How do you see the potential role of Chinese yards in the future and when?

The difference between South Korea and Japan trying to enter the cruise market in the past compared to China nowadays is that the Chinese government has a long-term strategy to enter into that market and that the shipyards entering the market are government controlled. In Japan and South Korea the attempts were driven by commercially driven shipyards where after a proper risk analysis they had not started to enter the cruise ship segment or when they started and failed they have withdrawn. In China the whole case is completely different as the government support is so strong that for many years they do not need to make money with building cruise ships. They just have to fulfill their strategic approach with the full support of the government without any relation and correlation to normal economic standards.



”
Innovation combined with high quality and high reliability will be a key factor of success.

Laser technology based steel hull production in Papenburg/Germany”

How will Meyer tackle the upcoming competition from China?

Due to the nature of our family business we are extremely customer-oriented with the focus of long-term business relationship combined with a high focus to innovate and deliver always the best and most efficient solutions for ship owners. In the end innovation combined with high quality and high reliability will be a key factor of success and to reach that we have a very loyal, encouraged and highly motivated and innovative workforce and this will be the backbone of our future success.

Large cruise vessels are now being built in Europe at yards that build only cruise vessels and practically no other products. Does that indicate that the only way to build cruise vessels competitively is to build at yards dedicated to cruise ships only?

Large cruise ships definitely need a very special infrastructure and also very special workforce. Therefore it is quite natural that a yard that will be successful in that market is not only specializing the whole organization but also the shipbuilding cluster around this ship type and due to the long lead time and the early commitment of cruise ship owners it is quite difficult to have other products in the portfolio as well at the same shipyard and the same slots.

Meyer group has today numerous wholly owned subsidiary companies for specialized operations like ship design, cabin manufacturing, AC systems, interior accommodation, turnkey piping system production, painting etc. Is further expansion of delegation to subsidiaries anticipated? What is the business rational of this development?

In the last twenty years we have created a very intelligent and highly competitive and innovative shipbuilding cluster with a good split between companies which only deliver products to Meyer shipyards and which are exclusive producers like the two cabin factories, which are fully occupied by the own demand and where we are completely relying on them as our single source suppliers. And we have in other areas other subsidiaries that compete with similar companies in the market, which we use to develop innovations first. However, the biggest part of the business we will work together with specialists in the whole world and only for a few dedicated areas we will have own subsidiaries or joint ventures and we feel very happy with this balance at the moment.

You personally represent the sixth generation of the Meyer family in the history of the group. Obviously the seventh generation is already stepping in. Do you see a smooth transition?

The smooth transition has already been proven since many years. My oldest son, Dr. Jan Meyer, is very successfully leading the shipyard in Turku while my second son, Tim Meyer, is focusing on the shipyard in Papenburg, and my third son, Dr. Paul Meyer, is CIO for all three shipyards and all affiliated companies of the Meyer Group, making sure that our IT systems are fit for the future. So they all have already taken over big responsibilities for years and we are talking a lot within the family, have a very good exchange, and my sons are running the day-to-day business and I can give my advice with 45 years of shipbuilding history when I am asked. The transition between my father and me worked extremely well and that helped me a lot to manage also the transfer to the next generation. This is all in good hands.

Finally, what overall message would you like to convey to the Finnish maritime industry cluster?

Our aim is to secure long-term shipbuilding success in Finland. We are investing heavily in the shipyard in Turku and we will be a very reliable and long-term-oriented owner of the shipyard who permanently likes to develop and optimize to stay competitive not only the own shipyard, but together with all the hundreds of suppliers in the Finnish maritime network. We are happy to be in Finland and are looking forward to a long and fruitful cooperation.





Antwerp • Gdynia • Hanko • Kotka • Lübeck • Paldiski • Rauma • Rostock • St. Petersburg • Tilbury



MEMBER OF SPLITHOFF GROUP

Belgium - Antwerp
☎ +32 3 570 9292
✉ info.belgium@transfennica.com

The Netherlands - Amsterdam
☎ +31 20 44 87 600
✉ amsterdam@transfennica.com

Estonia - Paldiski
☎ +372 6 318 870
✉ info.paldiski@transfennica.com

Poland - Gdynia
☎ +48 58 660 1260
✉ info.poland@transfennica.com

Finland - Helsinki
☎ +358 9 132 62
✉ info.general@transfennica.com

Russia - St. Petersburg
☎ +7 812 339 9189
✉ info.russia@transfennica.com

Finland - Kotka
☎ +358 9 132 6327
✉ info.kotka@transfennica.com

United Kingdom - Tilbury
☎ +44 1375 363 900
✉ info.uk@transfennica.com

Germany - Lübeck
☎ +49 451 484 850
✉ info.germany@transfennica.com

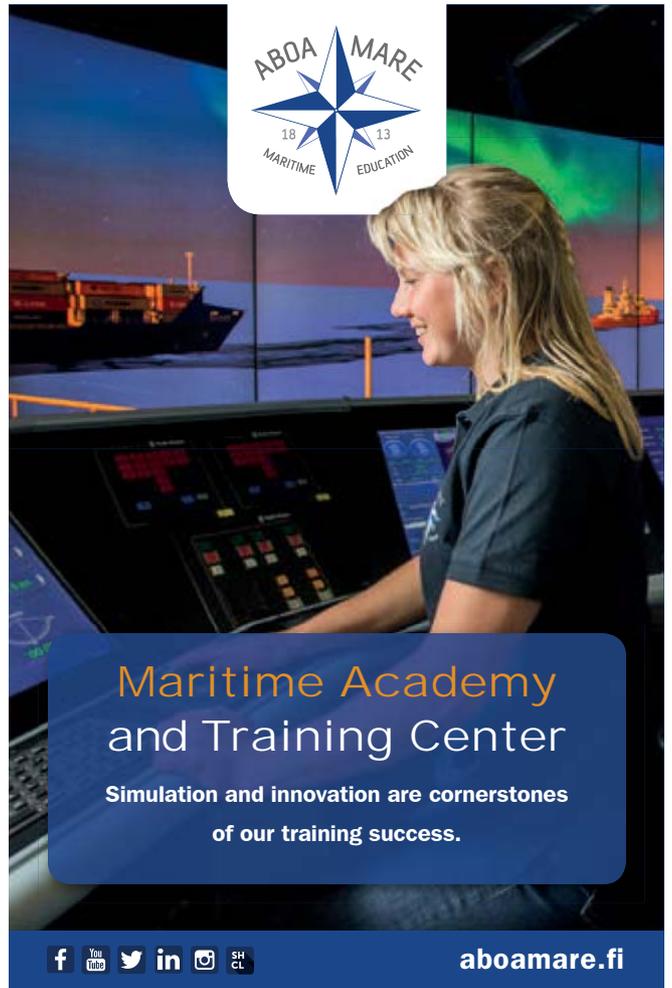
Our vessels are very versatile and can practically carry any general cargo including Sto-Ro, containers, trailers, cassettes, mobile cargoes and project cargoes as well as IMDG-classified goods and temperature-controlled goods.



PORT OF KOKKOLA

WELCOME TO THE
PORT OF KOKKOLA

www.portofkokkola.fi



Maritime Academy
and Training Center

Simulation and innovation are cornerstones
of our training success.



aboamare.fi



The LNG-powered Tallink Megastar, constructed by the Meyer Turku Shipyard, complies with the ECA's stricter emission control agreements that are also applied in the Baltic Sea.



The new Mein-Schiff cruise vessel is 10 per cent more energy efficient than her sister vessel, which was built in Turku one year previously.

Meyer Turku's order book is full up until 2024

Meyer Turku is riding on the crest of a wave in the cruise ship business, with an order book filled up to 2024. At the peak of the economic cycle, the German owner has invested EUR 200 million to the shipyard. Following these investments, Turku will be home to one of the world's most modern shipbuilding units.

According to **Tapani Mylly**, Meyer's Communications Manager in Turku, the shipyard will be operating at full capacity until the mid-2020s. Like other builders of cruise ships, Meyer expects markets to expand in Asia – particularly in China – and everywhere else in the world.

“The number of passengers has been growing steadily for a long time and we anticipate the growth to continue in the future as well,” Mylly says.

In addition to the growth in passenger numbers, the markets will continue to need new cruise ships as the oldest and smallest ships are decommissioned. The types of vessels will also change as environmental and efficiency requirements become stricter.

“Ship sizes do not necessarily grow that much



” **Meyer Turku’s list of registered suppliers contains over 1,000 companies in various countries.**

from the current 180,000 – 200,000 GT level. In addition to these large cruise ships there is more demand for smaller craft, for example expedition cruisers,” Mylly says.

Orders for cruise vessels will also change, and ship owners will offer different services to different customer groups at very different prices. The market for cruise vessels offering expensive, high-quality trips will grow.

Environmental friendliness is an expanding part of design and construction of cruise ships. Shipyards and ship owners are subject to growing requirements for environmental friendliness and efficiency when ships are designed and built. Energy consumption is becoming increasingly important. Tapani Mylly emphasizes new fuel alternatives, such as liquefied

natural gas (LNG). Meyer’s Turku shipyard is building cruise vessels that run on LNG.

“Cruise passengers are increasingly aware of environmental factors, such as citizens’ carbon footprints, and this will pile the pressure on the marine industry.”

Tapani Mylly thinks that the competitive factors driving Finnish shipbuilding are solutions that take account of energy efficiency and the environment.

“The environmental sector needs to take a leap forward and we are ready to take them. For example, the MeinSchiff cruise vessel, which was built in Turku, is 10 per cent more energy efficient than her sister vessel, which was built one year previously,” Mylly says.

He says that better efficiency is the sum of several small things rather than one large factor. Cruise >



Designing complex cruise vessels is a long and intricate process. Meyer Turku does most of the initial phase design, in concept design and basic design on its own. The client – the shipping company – has its own architecture in mind for the main aspects of the ship.

ships are like small towns or floating hotels, so they need a lot of air conditioning. For this reason, the energy efficiency solutions in the most recent Mein-Schiff focused on factors such as more efficient air conditioning.

Designing ships – particularly complex cruise vessels – is a long and intricate process. Meyer Turku does most of the initial phase design, in concept design and basic design on its own. The client – the shipping company – has its own architecture in mind for the main aspects of the ship, such as the number of cabins and the main engines.

“The rule of thumb is that as the project progresses further, the share of turnkey suppliers also increases in the area of design. This is particularly true of the indoor spaces, for which design services are often bought in,” Mylly says.

The target is naturally that both the shipyard and the subcontractors can make a profit from their deliveries. Approximately 900 different companies are involved in building a cruise ship, and Meyer Turku’s list of registered suppliers is even longer: it contains well over 1,000 companies in various countries.

Cabin modules made by a subsidiary

Meyer Turku subsidiary, cabin factory Piikkiö Works, manufactures all the cabins to Meyer Turku ships. Piikkiö Works has been operating for three decades and it employs well over 100 professionals in the area of cabin building.

As stated previously, Meyer Turku is a fixture in the future plans of Meyer family. The family’s confidence is reflected in its ongoing investment of EUR 200 million in making Turku an ultra-modern shipyard unit on an international scale.

“We expect to conclude the current investments by the end of 2019,” Tapani Mylly says.

According to him, the journey has not been all plain sailing. One difficulty has been recruiting expert workers. The industry is international, so Meyer Turku has to compete with many other companies and industries for designers and other experts.

“We have a couple of thousand employees and, every year, we recruit a couple of hundred new people. We also need foreign workers, as they often have exactly the types of skills that are lacking in Finland,” Mylly says.

The high standard of expertise expected of new recruits is demonstrated by the fact that Meyer Turku is constantly looking for more people with master’s degrees in engineering and project managing experts. According to Mylly, the shipyard’s subcontractors are facing the same challenges.

Meyer Turku: order book

Year of completion, ship, client, gross tonnage

2019

Costa Smeralda, Costa Cruises (Costa 1), ~180,000 GT

2020

Carnival Mardi Gras, Carnival Cruise Lines (Carnival 1), ~180,000 GT

2021

Costa 2, ~180,000 GT

2022

Carnival 2, ~180,000 GT

2022

Icon 1, Royal Caribbean, ~200,000 GT

2023

Mein Schiff 7, TUI Cruises, 110,000 GT

2024

Icon 2, Royal Caribbean, ~200,000 GT

Shipyard fledgling RMC is now growing up

Rauma Marine Constructions is a Finnish shipbuilder established in 2014. According to **Jyrki Heinimaa**, the President and CEO, the young company has entered an exciting phase – RMC has left the startup phase and has become a growth company in shipbuilding.

The company has an excellent order book, which includes purchases by the Finnish Navy and two car-and-passenger ferries, and letters of intent have been signed for all of these.

“We have almost one billion euros of contracts on our order book. We cannot say that our capacity is full until 2025–2026, but we have achieved a strong base level. However, a lot of work still needs to be done to ensure that the letters of intent become a reality,” Heinimaa says, describing an all-round excellent situation.

RMC is carrying the torch of Rauma’s old shipbuilding tradition, and it specializes in building and maintaining multipurpose icebreakers, car-and-passenger ferries and vessels for the Defence Forces.

The company has signed a letter of intent with the Finnish Defence Forces on the construction of four corvette-class vessels. This warship project is commonly known in Finland as Squadron 2020.

“We are also building a large and fast car-and-passenger ferry for Tallink-Silja to operate on the route between Hel-

sinki and Tallinn. Our order book also includes a Ro-Ro passenger ferry for Wasaline to operate on the route between Vaasa in Finland and Umeå in Sweden,” says Heinimaa.

The first order in the shipyard’s new phase was for a car-and-passenger ferry named Hammershus, which was built for Molslinje, a Danish shipping company. Hammershus was built at the Rauma shipyard and completed in summer 2018. The ships sails between Denmark’s main island and Bornholm.

Until last summer, RMC also carried out work on sections of large cruisers for the Meyer shipyard in Turku. Heinimaa sees no reason for this functional partnership to end, providing that the customer needs more hull sections.

“As I mentioned, although a solid baseline of work is guaranteed, we are still taking new orders as long as we are able to meet all of our obligations.”

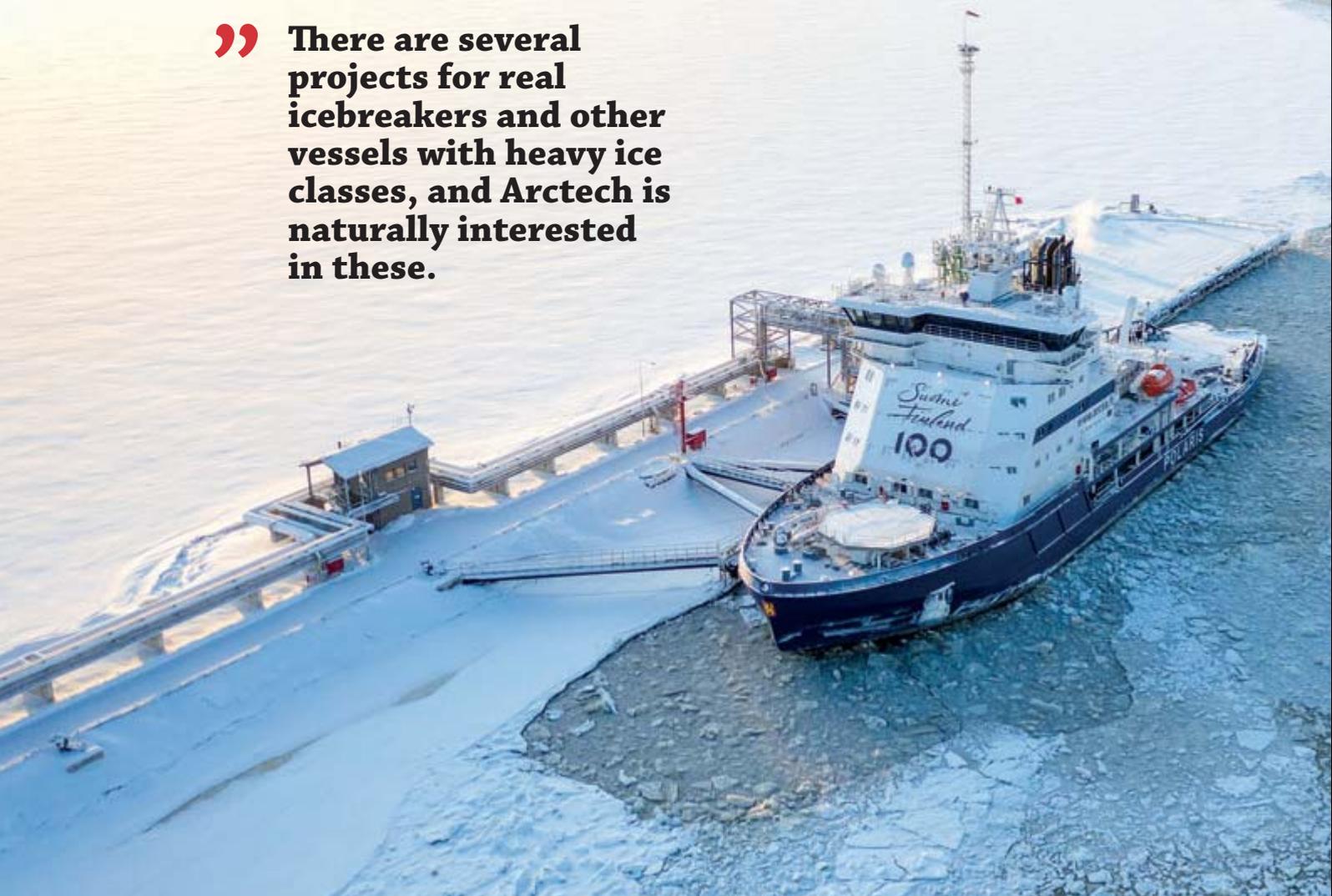
Heinimaa describes RMC as a technology firm that directly employs around 100 maritime experts. In the background, the company has a trusted network of strategic partners, subcontractors and companies operating on annual contracts.

“RMC’s startup phase is over. We have pinpointed our future challenges and we are now entering an exciting growth phase,” Jyrki Heinimaa says.

The order book of RMC also includes a large, fast and energy efficient ro-ro passenger ferry for Wasaline to operate on the route between Vaasa in Finland and Umeå in Sweden.



” **There are several projects for real icebreakers and other vessels with heavy ice classes, and Arctech is naturally interested in these.**



Arctech – High-rolling in the High Arctic

The Arctech Helsinki Shipyard has a long tradition of Arctic expertise in icebreakers and high-ice-class cargo ships. The shipyard currently has its sights on potential new orders of Russian LNG-powered icebreakers.

The shipyard is completing an arctic tanker project for Greek owners. The vessel is a condensate carrier with a high ice class (Arc7), representing a new generation of Arctic tankers capable of operating in the extremely cold-weather conditions and shallow waters of the river estuaries along the Siberian coast. Sea trials are expected to take place in April.

Arctech has delivered various ice-class vessels to Russian owners. According to **Markku Kajosaari**, SVP Sales, demand for such vessels is, unfortunately, limited today. The shipyard is looking for new-build projects in which Arctech could use all the special capabilities of the Helsinki shipyard.

“We have had several enquiries about small to medium-size cruise vessels intended for operations in remote areas and harsh conditions. These types of projects could be very suitable for us. There are also



Polaris is the world's first icebreaker on the LNG. Polaris refueled liquid natural gas directly from the Tornio terminal for the first time.

several projects for real icebreakers and other vessels with heavy ice classes, and Arctech is naturally interested in these," Kajosaari says.

Russia needs to replace its older generation of nuclear icebreakers with newer vessels. According to the shipyard's information, as many as four new LNG-powered Arctic breakers may be ordered for delivery to Russia. However, the commissioner of these vessels will have the final say over which shipyard gets to build the icebreakers.

"If the ships are ordered by a Russian state-owned operator, they will be built by a Russian shipyard," Kajosaari said. "In this case, Arctech could only be involved as a subcontractor, as was the case in the icebreaker Murmansk, where the main contractor was the Russian yard in Vyborg.

"But if the commissioner or the operator is a Russian private company, Arctech has a chance of winning

the contract. However, even in this case, there will be very tough competition, as we have seen many times before. There are several advanced Russian shipbuilders nowadays," says Kajosaari, playing down speculation of possible new icebreaker orders in Helsinki.

At the same time, there is strong demand for high ice-class cargo ships in the High Arctic but, unfortunately, some of these new vessels are so enormous that the facilities in Helsinki are not large enough.

"We have built one cargo vessel for year-round operations in the Northern Sea Route. This vessel is the first tanker ever built at the Helsinki shipyard. There is increasing demand for high-ice-class cargo vessels operating in Arctic areas, but many of these vessels are too big to be built in Helsinki. Furthermore, demand for smaller Arctic cargo vessels, like the condensate carrier currently under construction at Arctech, is more occasional."

The current owner of Arctech Helsinki Shipyard Inc is the Russian company United Shipbuilding Corporation (OSK). Until recently, the role of OSK in providing access to Russian markets and co-operation with shipping companies operating in Russian waters has been essential for receiving orders.

However, according to Kajosaari, the sanctions imposed by US authorities have presented a challenge for Arctech's operations.

"Our parent company has been on the US sanctions lists for some time now. This has also affected areas such as Arctech's payment procedures and financing possibilities. It is important to note that neither OSK nor Arctech are affected by the trade policy measures imposed by the EU or the Finnish government," Kajosaari points out.

The shipyard has been working on an expedition cruise ship project with a Japanese shipping company, but the schedule and details of the project are still unconfirmed.

"Arctech has been in discussions about a technically advanced and environmentally friendly cruise ship project with a Japanese shipping company. We hope the discussions will lead to favorable results in the future."

As the expedition cruise ship market is developing rapidly, Kajosaari believes there will be room for innovative ship concepts and additional new builds.

"However, as the average size of the vessels is rather small, the volume of new capacity is still reasonable," he said. "A great deal of the new capacity is needed to replace ageing tonnage."

Kajosaari said he thinks that developments in regulatory criteria and increases in the number of experienced and environmentally aware customers will create pressure to launch Polar Code-compliant vessels with modern environmentally friendly solutions.

Northern Europe's largest repair shipyard is going through a period of growth

Turku Repair Yard Ltd, tucked away in Naantali in Southwest Finland, is acquiring new customers from beyond the Baltic Sea while expanding its service segments for existing customers.

According to **Oskari Kosonen**, the managing director, the outlook is currently very good. Among the company's regular customers are shipping companies operating passenger ships, tankers and icebreakers. These include Tallink-Silja and Viking Line, OSM Ship Management Finland Ltd, which previously operated tankers for Neste Shipping, and Arc-tia, the organisation controlling the State's icebreakers.

"We also intend to acquire new ship-owning customers from other parts of Northern Europe. One advantage for us is that our shipyard is right next to Naantali harbour, so the fairway remains open in the winter," Kosonen says.

In addition to scheduled repairs and dockage, the company's service segment has been constantly expanding. For the company, service means offering a 24/7 on-call service and being able to dispatch ship repairers to work in other locations.

"Repairs are seasonal in the sense that owners of passenger ships prefer to bring their vessels to us in January, while owners of tankers use us in the spring or autumn. Icebreakers understandably arrive in the summer. On average, the dockage period for repairs



Turku Repair Yard's dock basin is 265 metres long and 70 metres wide, so there is space to dock more than one vessel at a time.

is 10–14 days, but it often takes much longer to prepare for maintenance and repairs," Kosonen says.

Turku Repair Yard's dock basin is 265 meters long and 70 meters wide, so there is space to dock several vessels at a time.

Vessel safety has reduced the number of ships running aground

Finland's coastline is notorious for its shallow and rocky waters. However, every year there are fewer and fewer ships arriving in Naantali for repairs due to running aground.

"As vessel safety has improved, the nature of ship repairs has changed since the olden days of ships being damaged at sea," says Kosonen.

As for other forms of shipbuilding, environmental factors are increasingly important. This can be seen in the prevalence of sulfur scrubbers and ballast water purification systems, which are both being installed and modernized as a brisk rate.

"Ships have also had sulfur scrubbers installed in Naantali, but our other daughter shipyard in Klaipeda has installed even more of them. Our group of companies consists of three repair shipyards located in Naantali, Klaipeda and Tallinn. This is a competitive advantage for us because we can provide our customers with services according to which of the shipyards has spare capacity," says Kosonen, describing BLRT Grupp, the Estonian owner of Turku Repair Yard.

In addition to repairing vessels, Turku Repair Yard also dismantles ships, and this activity is subject to increasingly strict regulations. The company is involved in an EU project through Business Finland, and last year it took a very important step forward when it joined the list of ship scrappers approved by the European Commission.

Turku Repair Yard Ltd employs over 50 maritime professionals and an enormous number of subcontractor personnel on its projects.



Foreship has been involved in more than ten polar and expedition cruiser projects in different parts of the world.



Foreship's strength lies in *passenger and specialist vessels*

The ship design company Foreship has plenty of demanding projects all over the world. The company is currently working on concept designs for cruisers, cruise vessel conversion projects and consulting for shipping companies to monitor the design of new-build ships.

According to **Lauri Haavisto**, the managing director, polar and expedition cruisers have provided a large amount of work recently. Foreship has been involved in more than ten polar and expedition cruiser projects in different parts of the world, either as the designer or as a consultant to the shipping company.

"In fact, very few ship owners ultimately operate polar-class passenger ships in the ice. The name has achieved an established status in accordance with the IMO's polar code among vessels that are capable of operating in different types of icy conditions," says Haavisto.

One car-and-passenger ferry that is highly capable of operating in the ice is a new build for Wasaline. Foreship has been involved from the very start, serving the ship owner as a technical consultant and designer.

The ferry will traffic the Kvarken link between Sweden and Finland, and it is a prime example of a vessel built to

”
In fact, very few ship owners ultimately operate polar-class passenger ships in the ice.

withstand harsh conditions. It must be able to operate to a tight schedule in narrow, freezing fairways and often in bad weather conditions.

"New-build projects begin with a meeting with the shipping company to identify the various resources, such as the transportation requirement and vessel type, and the engine equipment and fuel alternatives," Haavisto said. "The very first output of the meeting is often just a single sheet of A4, and the project develops from there."

"The shipyard only enters the picture once the client has conducted a competitive tendering process."

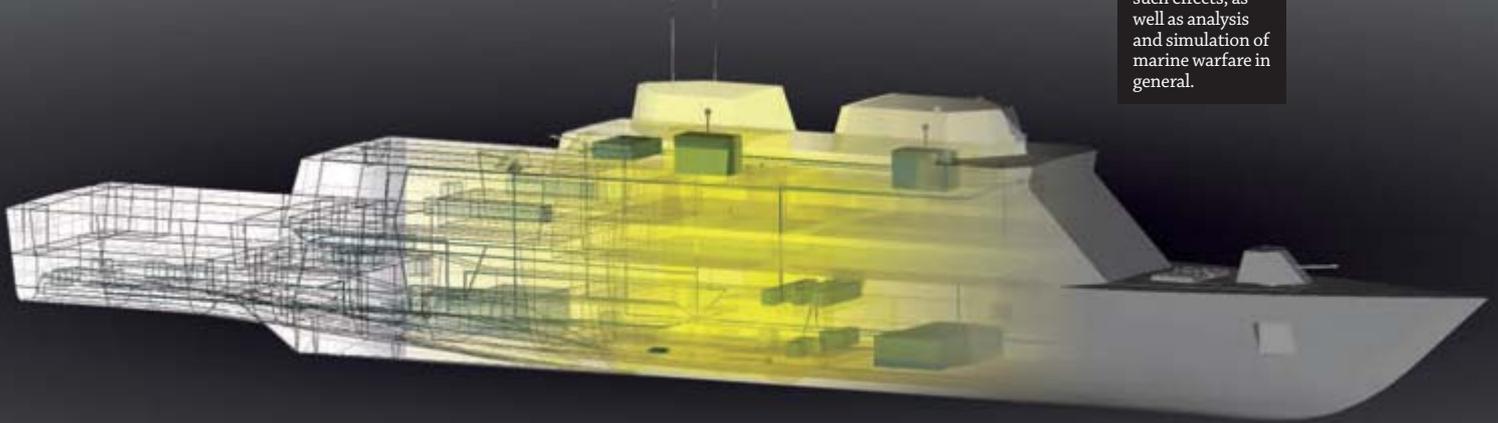
Wasaline's vessel will be built by RMC, a Finnish company based in Rauma.

Foreship has around 100 ship designers on its payroll, and they work all around the world. The company has participated in design and conversion work on vessels for cruise shipping companies such as the Royal Caribbean Cruise Line and cargo-and-passenger shipping companies such as TT-Line.

Foreship has subsidiaries in the USA and Estonia, and its net sales were approximately EUR 12.6 million last year. The private company is owned by its personnel and executive management.



Design bureau Surma's areas of expertise are electromagnetic environmental effects and the management of such effects, as well as analysis and simulation of marine warfare in general.



Surma is the market leader in its niche

Finnish design bureau Surma is the world market leader in its own field of managing ships' combat survivability and related applications. One major event for Surma in 2018 was its acquisition by DA-Group, which made Surma a subsidiary of the electronics company. Surma previously had 21 owners and the merger reduced this to one.

According to Kristian Tornivaara, who will continue as CEO, Surma's products effectively complement the parent company's arsenal, which includes embedded industrial systems with microwaves and other electronics, as well as technology that goes into space along with satellites.

"Surma is a good addition to DA-Group's range of defense equipment. Our areas of expertise are electromagnetic environmental effects and the management of such effects, as well as analysis and simulation of marine warfare in general," Tornivaara says.

Surma delivers products and services on four continents and is in commercial negotiations on six continents. At the moment, the most significant products are the Finnish Navy's Squadron 2020 procurement and an icebreaker being built for the Chilean navy.

"Both of these projects are very important to us. The vast majority of our worldwide net sales come from services," Tornivaara says.

"Our competitors are also doing marketing in this field, so we do not need to take care of it all alone."

DA-Group's net sales are more than 10 million euros with a workforce of about 120 employees. Surma, has sales of about two million euros and 13 employees.

” Luckily, our competitors are also doing marketing in this field, so we do not need to take care of it all alone.

Norsepower sailing into the eye of the storm

Norsepower has modernized an old invention, and it is hitting the market at the perfect time. The company has developed a rotor sail that applies new materials and automation to a Flettner rotor, saving ship owners money and reducing emissions.

According to CEO **Tuomas Riski**, the company has been able to demonstrate the benefits of its rotor sail through its deliveries since 2015. The question is how the company will be able to make the most of the positive publicity it has received.

“The rotor sail works on vessels of all kinds, from Ro-Ro vessels, tankers and bulkers to passenger and cruise ships,” Riski says. The sails have been installed on a Maersk tanker and on the Viking Grace cruise ship, among other vessels.

“Viking Line is a good ship owner for our product because passengers can see the environmentally friendly invention in operation. A mechanical sail is also a major image question for shipping companies operating cruisers and passenger vessels,” he said.

Conversely, the rotor sail fitted to Maersk’s tanker, the M/T Pelican, reveals the enormous benefits

of Norsepower’s invention. The tanker sails on the ocean winds using large rotor sails, saving a huge amount of fuel. For rotor sails, size and quantity are the decisive factors.

“And when ship owners have more of these vessels, rotor sails can save more money and reduce emissions,” Riski says.

Apparently, it takes time to get used to the tall cylinders that are installed on ships. However, beauty is in the eye of the beholder, and the mechanical sails also serve as an advertisement for Norsepower at sea and in harbors.

The IT and automation devices for the sails are always made in Finland. Production has been transferred to the locations where ships are built for environmental and cost reasons. The European production centre is located in Poland and, this year, Norsepower will open a new center in China.

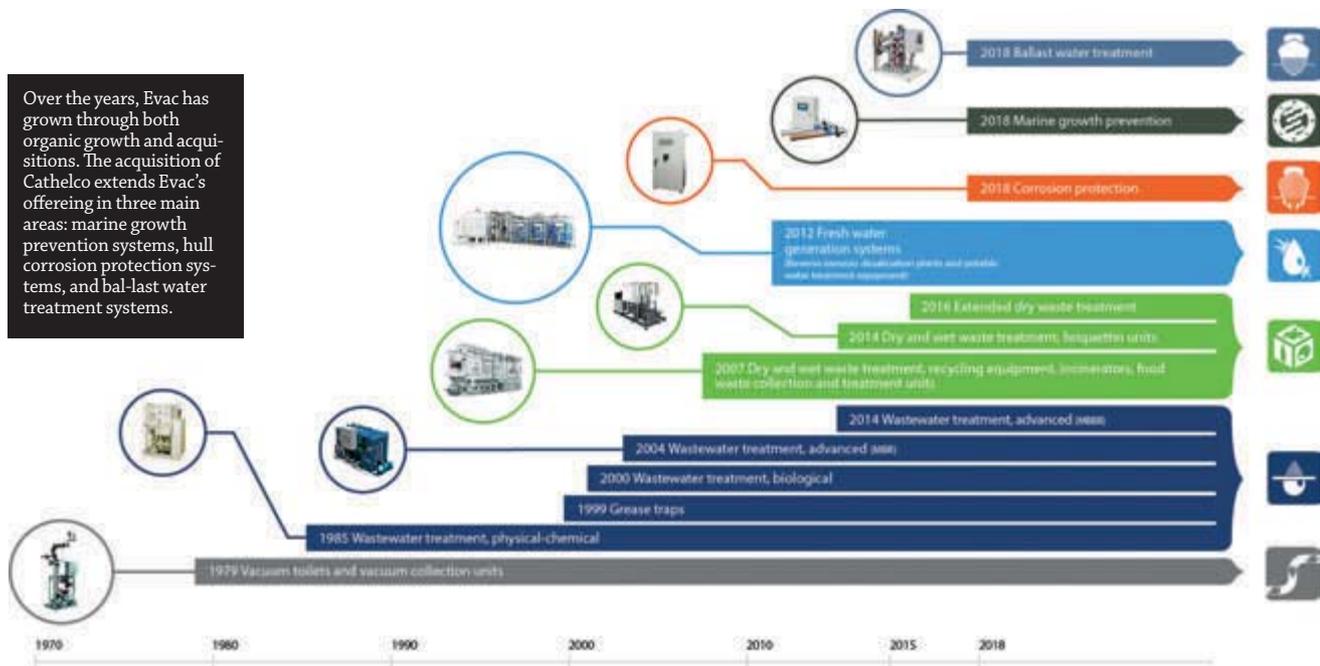
In the last couple of years, the Helsinki-based company has recorded net sales of about one million euros. The company has 12 employees.

Tall cylinder-like mechanical sails can also serve as an advertisement for Norsepower at sea and in harbours. Bore's Estraden was the first ship to have the Norsepower rotor sail installed six years ago.



Shipbuilding and design expertise

Over the years, Evac has grown through both organic growth and acquisitions. The acquisition of Cathelco extends Evac's offering in three main areas: marine growth prevention systems, hull corrosion protection systems, and ballast water treatment systems.



Evac - acquisitions and strong organic growth

Evac maintained a strong growth pattern in 2018 with sales turnover rising to 156 MEUR in comparison with 105 MEUR in 2017. All business areas met or exceeded their sales growth targets, recording about 20 % increase in sales in 2018.

The company continues to build its reputation as the world's leading supplier of integrated water and waste management systems and services for ships, as well as offshore platforms and buildings.

The acquisition of Cathelco in May 2018 with a turnover of 30 MEUR was another major step in enlarging Evac's offering. This increased the product portfolio with the addition of marine growth prevention systems, corrosion protection systems and ballast water management systems (BWMS).

"Cathelco's products provide a natural extension to our complete clean-tech solutions, because they reduce maintenance costs and extend the life of hulls and other shipboard equipment", says Evac CEO and president **Tom Gardemeister**.

"Looking to the future, the Evac Evolution ballast water treatment system developed by Cathelco, has enormous sales potential as ship owners worldwide comply with legislation to prevent the transfer of invasive species."

The acquisition of Cathelco extends Evac's offering in three main areas: marine-growth prevention systems,

hull-corrosion protection systems, and ballast-water treatment systems.

The first area prevents the buildup of bio fouling in pipework and suppresses corrosion; the second prevents hull corrosion and reduces vessel fuel consumption; the third removes organisms and pathogens from ballast water using UV and filtration technologies.

In January, Evac acquired Transvac Systems, a UK business specializing in the distribution and servicing of wastewater treatment, sanitary and ballast-water treatment systems for ships and offshore platforms.

"Transvac demonstrates the emphasis that we are placing on being life-cycle partners for our customers, providing services from initial design and installation to maintenance and refit in later years", said Gardemeister.

In early 2019, Evac will install a water-ballast management system for Quark Expeditions, the leading operator of polar expedition cruises, to ensure it will have environmentally friendly ships.

Quark's new 200-passenger ship, built by Brodosplit in Croatia, is scheduled for a 2020 launch. Quark, which sails in some of the world's most fragile environmental areas, is committed to becoming environmentally friendly with solutions from Evac.

”

The Evac Evolution ballast water treatment system has enormous future sales potential.

Rolls-Royce is guiding digital seafaring

Rolls-Royce Marine's unit in Finland has long been a leader in the fields of autonomous vessel technology and propeller devices. The Marine group is being transferred to Kongsberg, a Norwegian company, but the experience amassed in Finland will flourish under the new owner.

The company develops autonomous unmanned ships and land-based control centers. The Finnish partners include VTT Technical Research Centre of Finland Ltd and the University of Tampere. Rolls-Royce has also set up a research center in Turku to study remotely controlled and autonomous vessels and artificial intelligence. The center employs numerous experts in the field.

This advanced technology will lead to a commercial autonomous vessel. Rolls-Royce is pioneering the development of unmanned and autonomous ships, and its first commercial ships should appear in the near future.

In spring 2018, Rolls-Royce formed a partnership with Finferries, which operates connecting ferries for the Finnish State, with the aim of optimizing the safety and efficiency of Finferries' ships. The partnership is known as Safer Vessel with Autonomous Navigation (SVAN).

Further investments in propeller devices

A couple of years ago, Rolls-Royce announced that it would invest EUR 57 million in producing azimuth-propeller devices in Finland. The Rauma unit has specialist expertise in designing and pro-

ducing large propeller devices for icebreakers and Arctic research vessels.

The largest and most efficient propeller devices manufactured by Rolls-Royce in Rauma are ARC-type devices, which are intended for icebreakers, offering a power output of 7.5 MW and weighing 190 tons.

Azimuth propeller devices rotate 360 degrees around their vertical axis, providing propulsion and steering without requiring a separate rudder.

Digital technology guides seafaring

Last year, Rolls-Royce announced its intention to sell the Marine group, which includes the Rauma propeller business, to Kongsberg in Norway for a price of GBP 500 million.

The Marine group's net sales in 2017 were GBP 817 million, leading to a net loss of GBP 70 million. The net sales of the Finnish company were EUR 252 million and the net profit was EUR 11 million.

The leader of the Marine group, **Mikael Mäkinen**, continues to believe that the business will fully flourish in forthcoming years.

"The marine industry is entering a new era and digital technology will transform seafaring. Rolls-Royce has played a leading role in this development. Kongsberg can take the business to the next level," Mäkinen says.

The Boards of Directors of both companies have approved the deal, which will be concluded this year.

*The Chief Technology Officers of 2019 are Rolls-Royce Marine's **Sauli Eloranta** and Canatu's **Ilkka Varjos**.*

The CTOs of 2019 have been chosen by a jury of Finnish technology influencers.

*Since 2010, the CTO of the Year award has been given to an inspiring leader whose work has made a significant contribution to their company's technological capabilities. This year, Rolls-Royce Marine's Head of Innovation and Technology, **Sauli Eloranta**, was awarded the title of CTO of the Year in the large-scale enterprise category, while **Ilkka Varjos**, CTO of Canatu, was chosen as the winner in the SME category.*

The two winners are united in their approach of using research in product development and their strong endeavour to build ecosystems.

*"Rolls-Royce Marine utilises networks to guide an old, established sector into a new era. Meanwhile, Canatu is a pioneer in its use of networks to create and develop an entirely new, groundbreaking future sector. Both companies have built bridges between academia and business in a compelling way," says the jury chairperson **Jaakko Hirvola** from Technology Industries of Finland.*

Rolls-Royce is pioneering the development of unmanned and autonomous ships, and its first commercial ships should appear in the near future. An artist's vision of a future merchant vessel.



Shipbuilding and design expertise



Elomatic has collaborated with NYK Group to create an emission-free cargo ship, the NYK Super Eco Ship 2050. A global-class cruise vessel being built by MV Werften for Star Cruises.



MV Werften has split the design work for the giant cruise ship into two roughly equal parts, each worth approximately EUR 17 million.

Elomatic - powering ahead in ship design

Elomatic, a design company with nearly 1,000 employees, is one of the world's leading ship designers. Although competition from within the EU and around the globe is becoming constantly tougher, the outlook for Elomatic is good, says **Rami Hirsimäki**, Senior Vice President, Marine & Offshore and member of the company's management team.

"As a multidisciplinary bureau, we have deep and broad expertise to execute even the most complex engineering projects. We are the largest independent design and consulting office," Hirsimäki says.

He said cruise-ship design is heading in an excellent direction. Cruise ships are complex entities, and Elomatic either designs them independently or in collaboration with qualified partners.

Elomatic's most recent cruise ship contracts are connected to the second Global-class cruise vessel being built by the German shipyard MV Werften for Star Cruises. With a gross tonnage of approximately 200,001, the vessel is among the world's largest cruise ships. The new-build project is due for completion in 2020, and Elomatic's EUR 17 million contract covers basic design and, systems engineering, detail design and technical support at the shipyard.

Strict regulations are good for the industry

Ship projects take a long time and require major investments. How can this be reconciled with the stricter constraints imposed by the authorities or

new and emerging technologies?

"The shipping industry has long been aware of things like the upcoming IMO's emission limits and the Ballast Water Management Convention, for which the transition period was extended," Hirsimäki said. "The IMO is a specialized agency of the UN, backed by all maritime operators and flag states. The IMO's projects are very important for everyone within the maritime industry.

"It is good when stricter agreements and new technologies emerge because they mean more sustainable shipping more work for designers and engineers." He does not deny that certain parties may be milking every last drop out of the extended transition periods they have demanded.

Cadmatic offers 3D-modelling software for ship and plant design. This software was originally developed by Elomatic, but it was Cadmatic that brought it to a global prominence.

"We have really good user-developer relationship with Cadmatic. We are keen to use Cadmatic's software but if a customer wants us to use other tools, we can do that as well," explains Hirsimäki.

Elomatic Group's net sales in 2018 increased by 12% to more than EUR 81 million. During the financial period, the company recruited 162 new employees, bringing its workforce to more than 950. Elomatic will continue actively recruiting personnel next year in order to meet the needs of an expanding order book.

**”
Stricter agreements and new technologies mean more work for designers and engineers.**



Arctia's newest multipurpose icebreaker is Polaris. Built in 2016, Polaris is the world's first icebreaker running on LNG.

Foreign trade depends on icebreakers

Arctia guarantees passage throughout the winter, whatever the conditions.

Arctia is a specialized ship owner offering icebreaking and oil-spill prevention and response services, as well as assistance services in harbors. The main task for the fleet of icebreakers is to keep Finnish waters open throughout the winter. Climate change is not about to make icebreakers redundant – in fact, it may even increase the challenges faced during the winter.

Talking about icebreakers may seem a little passé in the current climate of global warming. However, **Kim Höijer**, Arctia's Acting CEO, says that this is far from the truth.

"All of our forecasts indicate that icebreakers will be needed in Finnish waters for a long time to come. No two years are exactly alike, which is why the challenges faced during the winter may vary quite dramatically. Even in milder winters, winds can compact ice into ridges, which make for difficult conditions," Höijer says.

By way of example, he points to the winter of 2017–2018, when Finland's entire fleet of icebreakers was working to remove the slushy snow accumulating in shipping fairways. This year, it seemed for a long time that winter would never arrive. However, the situation suddenly deteriorated in January 2019 and the icebreakers were called back into action. As the old saying goes, the bite of the winter can only be judged in the spring.

The harsh winter of 2017–2018 is also reflected in Arctia's net sales, which jumped ten million euros above the regular level of EUR 40 million.

Foreign trade is dependent on open seas

Finland's icebreaker fleet includes eight heavy icebreakers and one harbor icebreaker. In March 2019, five of the heavy ice-

breakers were in use and three were waiting in reserve.

"The need for icebreakers also depends on foreign trade cycles. In the last couple of years, import and export activity has been good, and this has brought extra tonnage into Finland's territorial waters on ever-lighter vessels. And these new customers need the help of icebreakers," Höijer explains. He adds that the engine power of vessels has a major impact on their ability to get through ice.

Icebreakers age in the same way as other vessels. The average age of the icebreaker fleet is fairly high and the owner – the Finnish State – has set the goal of updating the entire fleet by 2030. However, Kim Höijer warns against taking this statement too literally.

"Updating does not mean replacing old vessels with new ones. Instead, it refers to extending the life cycle of the fleet," he explains.

LNG suits well for icebreakers, too

Two of Arctia's vessels – Fennica and Nordica – are multipurpose icebreakers built in the 1990s, and they have been chartered in summer times for offshore work. Due to the disappointments over the last few years, Arctia has decided to renew the operating model and refocus the sales activities of the offshore business to adapt to the difficult market conditions. According to Kim Höijer, freight levels in the offshore industry are low and there is plenty of tonnage around the world to compete with Arctia.

Arctia's newest multipurpose icebreaker is Polaris. Built in 2016, Polaris is the world's first icebreaker running on LNG. In winter 2019, Polaris began bunkering liquefied natural gas at the new LNG terminal in Tornio on the coast of the Bay of Bothnia.

"It is too early to say that LNG is the icebreaker fuel of the future but, so far, our experiences with gas as a marine fuel have been entirely positive. We are closely monitoring the development of LNG distribution chains on the Baltic Sea," Höijer says.

Meritaito - specialist in its own field

At the turn of 2019, the Finnish State merged Arctia with Meritaito Ltd, another of the specialist shipping companies in its ownership. Meritaito specialises in marine surveys, fairway maintenance and oil spill recovery. The merger made Meritaito a wholly owned subsidiary of Arctia.

According to Meritaito's CEO, **Hannu Ylärinne**, the company has extensive experience in recovering oil in icy conditions. Oil spill recovery is difficult in open waters, but it is even more challenging in icy waters.

"Polaris is equipped with a built-in oil spill recovery system. The vessel sails through the ice side-on and collects floating ice into an opening in the hull via brushes, which take the oil into tanks. The rate of oil collection is highly dependent on the type of oil. Crude oil, diesel oil and other oil products behave very differently in icy waters," Ylärinne says.

Finland is well equipped for environmental protection and oil spill recovery. Both Höijer and Ylärinne most agree on the need for the service, there are too few parties willing or capable of paying for the preparedness. Arctia and Meritaito do have some contracts for taking care of these duties, but there is room for more – perhaps through insurance companies.

Meritaito's fleet consists of 150–200 vessels of different sizes and types, and the company recorded net sales of EUR 33 million in 2018.

Shipbuilding and design expertise

As the market-leader in 3D design software and information management solutions in the marine industry, Cadmatic has around 1,000 customers in 58 countries.



Cadmatic's all software development work is done in Turku, Finland and in the Netherlands.

Cadmatic is on the crest of a digital wave

Cadmatic, a provider of design, engineering and information management software for the marine and plant industries, believes in data-driven shipbuilding. And why not? The company has the wind at its back with its software products, which improve the quality of design and information management and reduce delivery times.

According to Cadmatic's CEO, **Jukka Rantala**, large data models and enormous volumes of data has long been the norm at shipyards. Digitalization is moving forward in the marine industry, just as it is in other sectors. Automation is reducing the number of routine tasks that ship designers need to do.

"Thanks to digitalization, ships will be designed and built without any paper being involved. Data is transferred from the designer's desk directly to manufacturing and production. Our software solutions make us very competitive in the areas of design for ship structures and handling large data models and data volumes on major projects. We also have good support for modern networked operating models, where dozens or even hundreds of networked companies and suppliers are responsible for designing and building a ship," says Rantala.

Cadmatic's position as the market-leading provider of 3D design software and information management solutions in the marine industry is reflected in its customer base: the company has around 1,000 customers in 58 countries. Around the world, there are approximately 450 shipyards in active operation, and around 200 of them use Cadmatic's software.

"Our customers are shipyards and the design and engineering offices that serve them, as well as some

ship owners. We have approximately 150 employees, around 50 of whom work in Turku, Finland, and 40 of whom are in the Netherlands. All software development work is done in these two countries," Rantala says.

The rest are in ten countries.

From Finland's perspective – and elsewhere in Europe for that matter – the construction of cruise ships has been booming for some time now and it shows no sign of abating. Somewhat surprisingly, Cadmatic's future is not dependent on the cruise business.

"Ultimately, cruise vessels account for just a fraction of the global shipyard industry," Rantala said. "Shipbuilding has suffered quite a downturn over the last few years. Now there are signs of a recovery in orders for cargo ships, which is good for Cadmatic because our software products and tools are intended for designing all vessel types.

The same can be said of Cadmatic's customers. The Finnish company is able to help shipyards to solve their problems all over the world.

"Recently, we have acquired good new customers in Europe, as well as in Asia. For example in Japan the shipyards are locked in tough competition with their Chinese counterparts. Labour costs are low in China, whereas they are not in Japan. That is why Japanese customers need more automation, and that is where Cadmatic steps in," Rantala says.

Cadmatic belongs to the Finland-based Elomatic Group. Elomatic owns 53% of the company. In 2018, Cadmatic's net sales increased by 30% to approximately EUR 20 million. More than 90% of the company's products are exported.

”
Thanks to digitalisation, ships will be designed and built without any paper being involved.

Aker Arctic is trusting in LNG in northern waters

Design company Aker Arctic's strength is its ice laboratory, which is unique on a global scale. Thanks to the Helsinki ice basin, the company has extensive experience designing icebreakers and specialist vessels that sail through ice.

According to **Reko-Antti Suojanen**, the company's CEO, one upcoming trend is the growing importance of LNG in Arctic waters.

"In northern waters, there is already more gas exploration than oil exploration. The number of gas shipments in icy waters is increasing, along with the use of LNG as a fuel for vessels," Suojanen says, describing the changes underway in seafaring related to environmental and energy needs.

Aker Arctic Technologies is well prepared for these trends. Firstly, the majority of the world's icebreakers are built in Finland, and the company has been involved in designing them. Secondly, Russia and the USA are designing new polar icebreakers, and Aker Arctic has ready-to-go concepts for both.

"Russia is replacing its 40 MW nuclear icebreakers, Taymyr and Vaygach, which were built at the end of the 1980s in Helsinki for Rosatomflot. Russia is preparing to purchase two large, LNG-powered icebreakers," Suojanen says, adding that the vessels could even be built at USC's shipyard in Helsinki.

"The new icebreakers are approximately 160 meters long and 31 meters wide. They will have very powerful engines and large fuel tanks. Previously, it was not possible to bunker LNG in northern waters, but the situation has turned on its head since the Sabetta terminal opened on the Yamal Peninsula," Suojanen says of the fuel solutions available.

Russia is preparing to purchase two large and very powerful LNG-powered icebreakers for the Northern Searoute.

Ice-reinforced tonnage for the High Arctic

The second major LNG project that Aker has had a hand in is related to the ice-reinforced tanker tonnage purchased by Novatek, a gas company, for its LNG shipments to and from Yamal.

"That project began in 2005, so it is absolutely not a one-day turnaround. We spent three years designing new tankers, after which Daewoo's shipyard won the tender competition. Since then, LNG tankers have been built in South Korea. Our collaboration with Novatek and the other Russian parties has gone very well," he says.

The United States is also planning to buy a new polar icebreaker, and President Donald Trump's government has succeeded in securing funds for the ship from Congress. According to US law, the icebreakers under the supervision of the US Coast Guard must be built by American shipyards. Three shipyards are involved in the competition to build the polar icebreakers, and Aker has a design agreement with one of them.

Vuosaari ice basin put in good use

As mentioned previously, the heart of the design bureau's specialist expertise is a 70-metre-long ice basin in Vuosaari, Helsinki, where scale models are tested for Aker as well as for external clients.

Recently, the basin has been used to test-drive scale models of autonomous vessels. According to Suojanen, a large number of experiments of similar autonomous models are planned for the future.

One significant area where Finnish technology is at the forefront of international development is oil recovery in icy waters. In Suojanen's opinion, oil recovery is difficult enough in open waters, let alone in icy conditions.

"The brushing devices produced by Lamor, a Finnish company, have proven themselves in practice in icy waters,"

Suojanen says. He notes that LNG has the advantage over oil in this area.

"If there is a leak, the liquefied natural gas dissipates into the atmosphere of its own accord, so there is no need to scrub it out of the sea."



Wärtsilä is creating smarter shipping

Technology giant Wärtsilä is one of the leading suppliers of smart technology and life cycle solutions on the marine and energy markets. The marine industry is undergoing major changes due to business networking, new business models and stricter environmental norms. In among this upheaval, Wärtsilä is leaning on its vision of smart shipping.

The basis for Wärtsilä's activities is the Smart Marine vision, which is based on digitalisation and seeks to enhance the safety of shipping, mitigate environmental impacts and boost efficiency.

According to **Juha Kytölä**, Wärtsilä's Director in Marine Business, one major milestone for the company was its acquisition of Transas, a British company. The transaction was completed for EUR 210 million in spring 2018 and placed Wärtsilä among the major players in smart shipping.

"We already had a large amount of expertise in this sector, but the Transas acquisition brought hundreds of specialists working solely on marine software to our company. Transas bundles together navigation, training and simulation solutions, as well as traffic management systems for smart technologies. Now, instead of designing smart ships, we have the capability to design smart fleets," says Kytölä.

Other development steps have included tests of automatic port arrival solutions and a project to develop an autonomous port tugboat.

"We now have the capability in Wärtsilä to design autonomous vessels with the help of our advanced automation and positioning solutions. The main focus is however not to replace skilled personnel but to use vessel automation in order to increase safety at sea," says Kytölä.

The company's customers are ship owners, shipyards and ship management companies. The customer base includes traditional merchant ships, gas tankers, cruise ships and passenger ferries, warships and specialized vessels. In the energy industry, Wärtsilä serves offshore installations and the associated

maintenance vessels, as well as the onshore gas industry facilities.

The stricter emission requirements imposed by the IMO have been widely known for a long time. According to Juha Kytölä, Wärtsilä Marine's product development work has long focused on designing new, cleaner energy solutions.

"The number of LNG-fuelled vessels has already increased, and we will see many more such vessels in the near future. Nowadays, whenever new-builds are considered, LNG is always an option."

However, there are alternatives. Kytölä notes that Wärtsilä is the global market leader in exhaust gas scrubbers. Ships equipped with scrubbers will be able to use fuels with a higher sulfur content even after 2020.

"Environmental requirements are becoming systematically stricter. The limits for sulfur in fuel were announced well ahead of time. Ultimately, it boils down to the decisions made by ship owners on whether they want to use cleaning technologies or pay more

” Now, instead of designing smart ships, we have the capability to design smart fleets.

for fuel. In the marine industry, these decisions are often left until the last minute,” Kytölä says.

Ultra-modern ship projects

The marine sector is a flurry of activity. Wärtsilä is involved in numerous projects to design and develop ultra-modern vessels. One of the most interesting of these is Wasaline’s new RoPax vessel, which will be one of the most efficient and ecologically sustainable ships in the world.

One of the ship’s most important features is its hybrid-propulsion solution. This includes four very powerful Wärtsilä 31DF multi-fuel engines, which can run on liquefied natural gas (LNG) as well as biogas. The diesel version of the Wärtsilä 31 engine is the world’s most efficient four-stroke diesel engine according to Guinness World Records.

Wärtsilä is also providing LNG storage, supply and control systems for new-builds, as well as thrusters, catalyzers, control systems and integrated electrical and automation systems, which include an energy and power management system for optimizing the use of the hybrid solution.

The combination of Wärtsilä 31DF engines, hybrid propulsion and LNG and BioLNG fuels makes the ship a prime example of efficiency and sustainability as it enters service on the route between Finland and Sweden. Carbon dioxide emissions will decrease by more than 50 per cent compared with the ship that currently operates the route.

“This ship represents a complete Wärtsilä life cycle solution with the minimum possible environmental impact. This is an important recognition of Wärtsilä’s Smart Marine approach in which digitalization is used to create efficiency, lower costs and environmentally friendly performance,” says **Henrik Wilhelms**, Wärtsilä Marine’s Director of sales.

Another interesting project with an important environmental perspective is the design of a modern depot ship for krill-fishing vessels operating in the Antarctic waters, commissioned by Aker BioMarine, a Norwegian company.

The new ship will be 168 meters long with a dead-weight tonnage of 20,300, and it will meet the IMO’s Polar Code requirements. Wärtsilä’s hybrid solutions ensure sustainable development, and the reason they

Wärtsilä is involved in numerous projects to design and develop ultra-modern vessels, such as Wasaline’s new ropax vessel and the design of a modern depot ship for krill fishing vessels operating in the Antarctic waters.



Onshore, Wärtsilä is building a new R&D and production centre in Vaskiluoto, Vaasa. The site will be known as the Smart Technology Hub and it will be taken into use by the end of 2020.



were selected was that they are the best way to ensure the protection of the sensitive natural environment in the Antarctic.

Eldar Vindvik, a Director at Aker BioMarine, says that Wärtsilä's hybrid solutions for propulsion and transmission devices and advanced heat recovery systems significantly reduce the ship's carbon footprint.

The main engines on the newly built ship are of the Wärtsilä 31 type, and the auxiliary engines are two Wärtsilä 20 engines. All of the engines are equipped with Wärtsilä's NOR catalyst systems, which reduce nitrogen emissions when the engines are running on diesel. As part of the hybrid solutions, Wärtsilä is also supplying transmission solutions along with the associated batteries, gears and propeller equipment.

The new ship will carry equipment and liquids to Aker BioMarine's krill-fishing vessels operating in the Antarctic, and it will be completed by the beginning of the 2021 krill-fishing season.

Smart Technology Hub in Vaasa

Onshore, Wärtsilä is building a new R&D and production center in Vaskiluoto, Vaasa. The site will be known as the Smart Technology Hub and it will be taken into use by the end of 2020. According to Juha Kytölä, the hub will provide a dedicated site for the entire R&D department, right by the port.

One part of this hub is the Smart Partner Campus, a center of expertise in smart shipping and energy generation. Partnership with the smart campus has aroused interest in Finland and elsewhere, and more than 200 entities have registered via the open innovation platform.

In March 2019, Wärtsilä selected its first partners

from among this number. In the first phase, Wärtsilä will design the smart campus in collaboration with Danfoss, Demos Helsinki Oy, NLC Ferry Ab Oy, Royal Caribbean Cruises Ltd, Vaasan Sähkö Oy and the University of Vaasa.

"The aim is to create a playbook, which is a flexible concept enabling as many entities as possible to be involved for different periods of time. We believe that this model will bring together experts from various fields to enhance innovation and discover new things," says **Hannu Mäntymaa**, Wärtsilä's Director of Engineering.

The smart campus has striven to attract local operators as well as global partners, since building a strong ecosystem is an important part of the whole ideology of the Vaskiluoto technohub.

"The University of Vaasa has been involved in developing a functional concept from the outset. Demos Helsinki has a wealth of experience in building different types of associations and working within them. RCC and Danfoss are global companies that will complement Vaasan Sähkö and bring an extra spark to the development of smart seafaring and energy generation.

"The new ship on the Kvarken Link operated by NLC Ferry and the proximity of the port will provide unique opportunities for building an environmentally friendly ecosystem," says **Vesa Riihimäki**, Wärtsilä Finland's Managing Director.

In 2018, Wärtsilä Corporation's net sales amounted to EUR 5.2 billion and it had approximately 19,000 employees. The company has over 200 offices in more than 80 countries around the world. Wärtsilä's shares are listed on the Nasdaq Helsinki exchange.



Azipod® propulsion has become the industry standard in the cruise segment, securing the 100th cruise ship order in early 2017. Energy savings equivalent to 700,000 tons of fuel have been made in the cruise sector due to the selection of Azipod®.

ABB aiming to digitalise the marine industry

ABB Marine's unit in Finland has plenty of work ahead of it to digitalise the marine industry, develop remote-controlled vessels and ensure the advancement of its Azipod rudder propulsion devices.

A major milestone was reached in the area of remote-controlled vessels in December 2018 when the Suomenlinna II ferry was successfully test-driven in the waters outside Helsinki harbor. The historic test, conducted by ABB and Helsinki Region Transport, is an important step forward for autonomous seafaring. The test enabled ABB to trial technologies that make vessels more efficient and that can be fitted to vessels of any type.

"We are excited about the impact of the test on the future of maritime transport. ABB's advanced automation solutions are making previously impossible things possible in many sectors, including maritime transport, a sector that is actively seeking technologies to improve efficiency and safety," says **Peter Terwiesch**, President of ABB's Industrial Automation division.

"Autonomous does not mean unmanned. As vessels become electronic, digital and networked, ABB can optimise the expertise of seafarers using existing solutions, thereby improving the overall safety of sea travel," says **Juha Koskela**, Managing Director of

ABB's Marine & Ports business unit.

For the Suomenlinna experiment, the ferry was controlled from a temporary control center located in central Helsinki. The ferry was controlled using the ABB Ability™ Marine Pilot Control system, which uses dynamic positioning.

Suomenlinna II was built in 2004 and has an ABB Azipod® propulsion system, which is suitable for icebreaking. In 2017, the ABB Ability™ Marine Pilot Vision system was fitted to the ferry to provide status data. ABB Ability™ is offered by ABB's digital solutions and services.

Azipods on Viking's new flagship

The technologies on board the new Viking Line car-and-passenger ferry being built in China will also include the ABB Ability™ System 800xA automation system, which integrates power generation, the Azipod® rudder propulsion system and the vessel's management systems on a single platform. This provides the ship's crew and ground staff with a wide-ranging overview of all the data required to operate safely and efficiently.

ABB Ability™ is a harmonized, cross-sectional platform encompassing devices, networks and cloud services. It integrates data between products, systems, solutions and services to provide the data required for operations. The ABB Ability™ platform runs on the Microsoft Azure cloud service.

"ABB's vision of electronic, digital and connected vessels is based on simplicity, efficiency and safety. The needs of today can be addressed by fully integrating various different systems on a single platform, providing an opportunity to use future technologies efficiently," says **Antti Ruohonen**, Senior Vice President of Marine & Ports at ABB.

ABB's Marine & Ports business unit operates in Hamina, Turku and Vuosaari in Helsinki, and it has global responsibility for developing marine industry solutions for ABB.

Rudder propellers in the spirit of Nordenskiöld

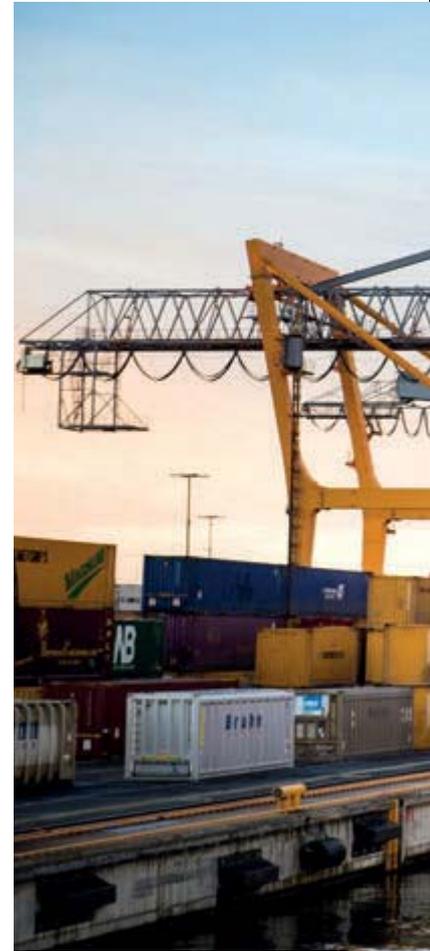
Nobiskrug, a shipyard in Germany, has developed the super-hybrid yacht of the future for the very wealthiest yacht-owners, combining performance and comfort with sustainable development solutions, such as low emissions and low fuel consumption.

The 80-meter hybrid yacht, named Artefact, is powered by ABB Azipod rudder propulsion devices. The two Azipod rudder propulsion devices cut fuel consumption by one fifth compared with conventional power transmission solutions based on propeller axles. The propulsion devices can rotate 360° and, because they are located outside the hull of the vessel, there is more space within the keel for payload and greater comfort for passengers and crew alike.

The mega-yacht's power transmission also uses the ABB Onboard DC Grid system, which enables step-free regulation of the engine power to different speeds and the use of accumulated energy as required. The Onboard DC Grid reduces fuel consumption by up to 27 per cent, and the system is also compatible with renewable energy sources.

Nobiskrug's shipyard is also well known in Finland. The German company has previously built vessels such as the bird-class icebreaking tankers Uikku, Lunni, Tiira and Sotka for Neste Corporation. In particular, M/T Uikku, which is equipped with Azipods, has created a new chapter in seafaring history by opening up the Northeast Passage in the 1990s, following in the wake of the Finnish explorer **A.E. Nordenskiöld** on his sailing ship, Vega.

In 2018, a record volume of cargo was transported via the Port of Helsinki: 14.7 million tonnes.



On the journey to becoming the world's most functional port

The Port of Helsinki is Finland's leading general port for international transport, and it works for well-being and business activity in Greater Helsinki and Finland as a whole. Helsinki is also one of Europe's busiest passenger harbors for international travel. The Port of Helsinki's vision is to become the world's most functional port.

In forthcoming years, the port will focus on efficient and effective work, and promoting efficient transport links and logistics solutions. The operations emphasize sustainable development, as well as customer satisfaction and the travel experience. The solutions offered by new technology and digitalization are expected to provide comprehensive benefits.

Cargo record: 14.7 million tons

In 2018, a record volume of cargo was transported via the Port of Helsinki: 14.7 million tons, breaking the previous record set in 2008. Imports accounted

for 7.3 million tons, while exports accounted for 7.4 million tons. The Port of Helsinki mainly handles unit traffic (12 million tons in 2018), consisting of cargo transported in containers, lorries and trailers. One factor contributing to the record cargo volume was the first full year of chemical pulp exports from Metsä Group's Äänekoski plant via Vuosaari harbour.

The network of scheduled routes from the Port of Helsinki is the most extensive and diverse in Finland and, at peak times, vessels depart to Tallinn once an hour. Vuosaari harbor celebrated its tenth year in operation in 2018, and it still has plenty of capacity. In the future, efficiency will be boosted by automation and digitalization. The turnaround time and ability to keep to schedules will be instrumental in this. Preparations are also being made for the advent of larger vessels: planning is underway on extensions to the piers and deepening of the fairway.



In 2018, a total of 12.1 million passengers passed through the port.

” Helsinki is one of the world’s busiest passenger harbours for international travel.

Amazing Helsinki entralls visitors arriving by sea

The Port of Helsinki provides an efficient setting for popular sea routes to destinations including Tallinn and Stockholm. In 2018, a total of 12.1 million passengers passed through the port. Helsinki is one of the world’s busiest passenger harbors for international travel.

A record number of international cruise passengers visited Helsinki, and the Finnish capital showed its best side. Almost 520,000 cruise passengers visited the city in total. In autumn, a new pier was completed in Hernesaari to serve large cruise vessels. The pier will be taken into use in May 2019, replacing the old Melkinlaituri pier.

A pioneer of sustainable development

The Port of Helsinki engages in environmental cooperation locally, nationally and internationally, and it

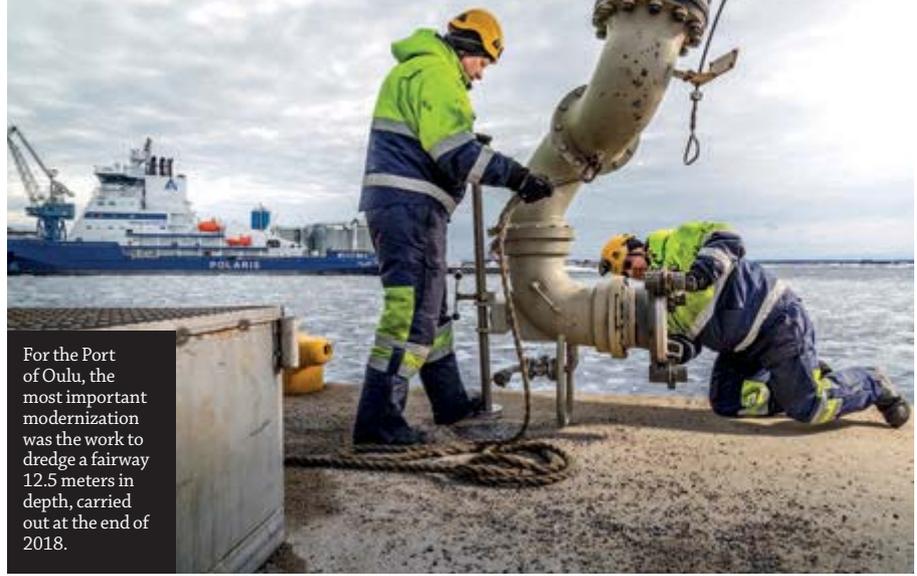
intends to become a pioneer of sustainable development in the port industry.

Every part of the port has an environmental permit guiding the port’s operations as required by law.

Several of the piers in Helsinki have shore power connections for vessels and all of the piers have systems for discharging wastewater from vessels into the city’s water treatment plants. In addition, the port has a pricing system to incentivize cruise vessels to discharge wastewater into the municipal sewer. Discounts are also on offer for vessels operating scheduled routes if the ship owner takes action to reduce noise or air emissions or makes investments to improve the environmental performance of vessels.

The Port of Helsinki, like its owner, the City of Helsinki, is committed to the target of achieving a carbon-neutral Helsinki by 2035.

Port operations



For the Port of Oulu, the most important modernization was the work to dredge a fairway 12.5 meters in depth, carried out at the end of 2018.

Port of Oulu Ltd – ready for growth

For the Port of Oulu, the last few years have been the busiest in its history in terms of development. We have built a lot of new fields and railways, and we have increased pier capacity. The most important modernization was the work to dredge a fairway 12.5 meters in depth. The work was carried out at the end of 2018. The new, deeper fairway will provide the port with greater growth opportunities. Alongside the dredging work, we also expanded the surface area of the port by more than 50 hectares. This will provide a wide range of opportunities for

new and existing customers using the port. And the development does not end there: from 2019 to 2021, the field areas will be expanded by several hectares, and we will increase pier capacity along the new 12.5-metre-deep fairway.

Digitalization is challenging us to go further. The Port of Oulu does not intend to stand by and watch development occur elsewhere – we have taken a pioneering role in development. Working with our partners, we have created a vision for the future development of the port. We took the first step at the end of 2018 when we made an agreement for a new, very fast LTE network to be constructed at the port. The new network will enable entirely new forms of digital service for port operators and customers. Alongside infrastructure construction, ICT development is playing a key role in our expanding service offering.

Port of Pietarsaari, Port infrastructure – our strength



Together with the port operator, Euroports Pietarsaari Oy Ab, the port is one of the most efficient in the world that deals with wood-processing industry products.

Trade and shipping were the original reasons for the founding of the town of Pietarsaari. The first

Finnish ship to sail around the world from 1844–1847 was the bark ship *Herkules* out of Pietarsaari.

A lot has happened since then. The harbor infrastructure has developed rapidly together with various industries in the Pietarsaari region that needed the port for their exports and imports. It is not by chance that UPM, Pietarsaari Mills – currently one of Europe's biggest pulp mills – and Alholmens Kraft – the world's biggest bio-fuelled power plant – are located just a stone's throw from the port.

Together with the port operator, Euroports Pietarsaari Oy Ab, the port is one of the most efficient in the world that deals with wood-processing industry products.

In late autumn 2015 the channel to the port of Pietarsaari was authorized by the Finnish Transport Agency to build the new 11-metre draft. The new draft makes it possible for ships to carry about 90 percent more cargo in a more ecological way compared to our earlier 9-metre channel. This means increased turnaround for our customers.

In 2016–2019, investments have been made to improve the capacity for holding stock in the area by constructing two new 4.000 m² warehouses and 18.000 m² storage area.

Port of Pietarsaari
www.portofpietarsaari.fi
www.portofjakobstad.fi
office@portofpietarsaari.fi

Tahkoluoto is home to Finland's deepest harbour

Port of Pori Ltd provides land rental, ship, crane and conveyor services. The Port of Pori consists of three harbors: Mäntyluoto, the Tahkoluoto oil and chemical harbour, and the Tahkoluoto deep harbour. The depth of the Tahkoluoto fairway is 15.3 meters, making it Finland's deepest harbor. All of the harbor areas can be safely approached along short and direct fairways.

In the future, a new pier measuring approximately 500 meters in length will be added to Kallonlahti in Mäntyluoto, providing new opportunities and improving the harbour infrastructure, while offering new business opportunities. A further aim is to invest in a new oil pier for Tahkoluoto which is currently undergoing the permit procedure. This will also increase the safety and efficiency of liquid transportation.

We also have good overland connections to Russia. Rail investments are currently being made: the tracks are being

electrified to both the Mäntyluoto and Tahkoluoto parts of the harbor.

We are making major investments in the safety and environmental friendliness of the harbor. For example, we have lowered the charges for vessels running on alternative fuels. The most recent investment was a transition to LED lighting. All of the outdoor lighting in the harbor is being placed with new LED lights, and the investment has already begun.

One of our areas of expertise is handling project cargoes, and it is cost efficient to handle special shipments via our port using the good – and constantly improving – routes available to every part of Finland. Our port offers Finland's most diverse range of services, all the way to 200-ton hoists.

Further information: www.portofpori.fi

Port offers Finland's most diverse range of services, all the way to 200-tonne hoists.



Finnpulp selects HaminaKotka as its export harbour

The Port of HaminaKotka Ltd has signed a major letter of intent with Finnulp for the routing of its chemical pulp products. Finnulp is constructing a bioproduct factory in Kuopio.

The Port of HaminaKotka Ltd is reserving and preparing a land area and connections for Finnulp for the purpose of constructing a large chemical pulp warehouse and logistics operations. In return, Finnulp will sign a long-term agreement to centralize its enormous traffic volumes, amounting to 1.2 million tons of chemical pulp every year, at the Port of HaminaKotka. Shipments destined for all of Finnulp's global export markets will be operated from the warehouse. Cargo will be handled by conventional methods and in containers.

In March of this year, the Port of HaminaKotka Ltd, Stevco and UPM agreed on the construction of a substantial chemical pulp center in the same area

– the new zone D in Mussalo – where Finnulp's operations will be located as a natural continuation. The Port of HaminaKotka Ltd is currently investing over EUR 30 million in building a field, pier and breakwater in the area.

Thanks to the letter of intent, the Port of HaminaKotka will be able to play its own logistical role in Finland's largest forestry industry investment, which will reinforce the Port of HaminaKotka's position as the country's largest universal, export and container port.

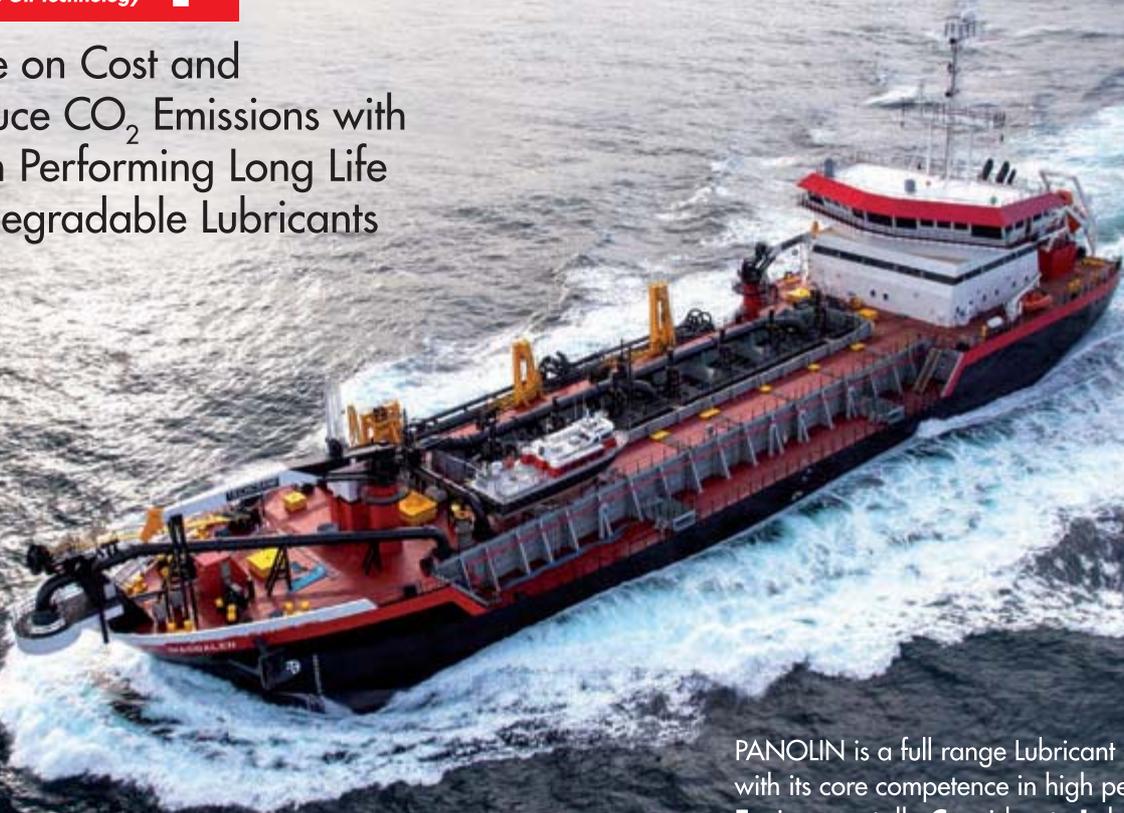
"Finnulp's decision represents an enormous opportunity for HaminaKotka, and it will add a whole new dimension to our forest industry exports, establishing HaminaKotka as the leading chemical pulp harbor on the Baltic Sea. The decision to build zone D has already proven profitable, and the work is not even finished yet," says **Kimmo Naski**, CEO of the Port of HaminaKotka Ltd.



Finnpulp for the purpose of constructing a large chemical pulp warehouse and logistics operations.

PANOLIN®
Swiss Oil Technology +

Save on Cost and
Reduce CO₂ Emissions with
High Performing Long Life
Biodegradable Lubricants



PANOLIN is a full range Lubricant supplier with its core competence in high performing Environmentally Considerate Lubricants since 1984 – 35 years of experience

M/V Magdalen – Weeks Marine, Inc.

Turku is Finland's hub for Scandinavian transport

The Port of Turku is the center of Scandinavian transport from Finland and one of the country's most important logistics hubs. The main direction for traffic from the port is Stockholm, with several departures daily. In addition to the Scandinavian countries, there are regular scheduled services from Turku to Germany and the UK, as well as connections to ocean-going lines.

The port is part of the European Union's TEN-T core network, and the cargo traffic from the port mainly focuses on traffic and project shipments requiring careful handling. The Port of Turku is the gateway to the world for goods such as machinery for the mining industry, highly refined steel products and forest industry products. The Port of Turku offers fast passage for heavy goods traffic, with uncongested connections to the main routes in Finland.

Thanks to long-term development work, the Port of Turku has become Finland's leading distribution center for cargo traffic to and from Scandinavia. The Port of Turku has plenty of modern warehousing and terminal space for imports and exports, as well as extensive field areas. The country's leading port operation professionals are responsible for careful and secure cargo handling.

Every year, approximately 3.5 million passengers pass through the Port of Turku. Four modern vessels operate the route between Turku and Stockholm, emphasizing environmental friendliness alongside passenger comfort. In 2021, a second vessel running on liquefied natural gas will begin operating the route. Like its predecessor, it will be equipped with rotor sails.

For more information, see www.portofturku.fi



The Port of Turku has become Finland's leading distribution centre for cargo traffic to and from Scandinavia.



Eckerö Line is seeking to replace chemicals with environmentally friendly solutions. To this end, the shipping company's M/S Finlandia began working with ProtectPipe, a company in the microbiotechnology sector, in summer 2018.



Shipowners on the Baltic Sea are highly environmentally aware

The sulfur and nitrogen emissions of ships are well under control in the Baltic Sea. The most important short-term goal is to promote the development and adoption of fossil-free fuels by Finnish ship owners. Everyone must work together to advance this goal.

In the short term, Finland's ship owners aim to promote the development and adoption of fossil-free fuels among Finnish ship owners. At present, sulfur dioxide and nitrogen oxide emissions have been reduced as planned.

In regard to carbon dioxide emissions, all of the parties involved must work together. Alongside ship owners, efforts will be required of fuel manufacturers, as well as ports and cities.

For example, the CO₂ concentrations of fossil fuels can be reduced by mixing them with bio-components. Energy company Neste has begun a Renewable Marine Fuel program to this end. Ports are also working to improve factors such as shore power for ships. The City of Helsinki aims to become carbon-neutral by 2035.

By 2050, Finland aims to reduce the absolute greenhouse gas emissions from seafaring by 50% in comparison with 2008. Fossil-free seafaring should be a reality by the end of the century.

Tallink Silja is reducing emissions

Firstly, the shipping company intends to fit its ships with shore power capabilities, as well as batteries for hybrid operation. Batteries can help to reduce the use of auxiliary engines while the ship performs port operations. Secondly, Tallink Group is already operating the M/S Megastar, a next-generation ves-

sel running on LNG. In addition, a letter of intent has been signed on the construction of a new, environmentally friendly ship. Thirdly, the waste heat output by the ship's engines is recovered and used for the ship's various functions.

Tallink and Silja Line ships use a real-time fuel monitoring system, which enables the passage of the ship to be optimized, thereby reducing fuel consumption and emissions.

Digital technology is being put to use. For example, the Silja Serenade, which operates the route between Helsinki and Stockholm, is involved in Business Finland's INTENS project, which aims to improve the energy efficiency of ships and reduce their emissions.

The EU's LeanShips project also seeks to improve energy efficiency, and Victoria I, which operates the route between Tallinn and Stockholm, is involved in this project.

Viking Line considers LNG a good alternative

Like others, Viking Line, a Finnish passenger shipping company, has made substantial investments in the energy efficiency of its ships and in cleaner fuels. According to **Ulf Hagström**, Senior Vice President of Marine Operations & New-builds, LNG is a good



Tallink Group is already operating the M/S Megastar, a next-generation vessel running on LNG. In addition, the shipping company has recently signed a contract on the construction of a new, environmentally friendly ship.



The M/S Viking Grace uses Norsepower's rotor sails. The company's new flagship, now under construction in China, will be fitted with LNG solutions as well as rotor sails.

option for the fuel of the future on the Baltic Sea – but it is just one of many.

Viking Line's M/S Grace, which entered service in 2013, gained fame as the world's first LNG-powered passenger vessel and, since then, the ship has bunkered gas more than 1,000 times. Viking has a supply agreement with AGA Gas Ab, which refuels the ship with its bunkering vessels as it sails the route between Turku, Mariehamn and Stockholm.

"We have had very good experiences with LNG at sea. LNG could easily become one of the future marine fuels on the Baltic Sea. However, there are other energy solutions. We are also considering hybrid solutions, batteries, biogas, ethanol and, of course, rotor sails, which we have trialed," Hagström explains.

The M/S Viking Grace uses Norsepower's rotor sails, which were fitted about one year ago. In Hagström's opinion, it is still too soon to say anything definitive about the savings available with rotor sails.

The new flagship will also have sails

The ship owner's managers have decided to incorporate LNG and rotor sails into Viking Line's future plans. The company currently has a new flagship under construction in China, and the new vessel will be fitted with LNG solutions, as well as two Norsepower rotor sails. The new-build, which has not yet

been named, will begin operating the route between Turku, Åland and Stockholm in early 2021.

The new vessel will be larger than Viking Grace but, despite this, calculations have shown that it will consume ten per cent less fuel. The energy efficiency of the flagship will be world-class.

Ulf Hagström says that Viking is always considering other energy solutions, such as biofuels, ethanol, fuel cells and batteries.

"The problem with biofuels is one of availability, so they are not a short-term volume solution for seafaring. Ships need such enormous volumes of biogas and there is simply not enough of this fuel available," he says, adding that hybrid solutions for energy generation will play an important part in the future of shipping.

"As batteries develop, fully electric ships may become widespread on suitably short routes. Some experience has been gained in this area in places such as Norway. Nonetheless, I have greater belief in hybrid solutions, such as combining electricity with different fuels," he says.

On the M/S Finlandia, microbes unblock pipes

Eckerö Line's M/S Finlandia is the only ship sailing between Helsinki and Tallinn under the Finnish flag. Seafaring is one of the most heavily regulated sectors, so shipping companies are subject to a large number of directives and laws related to safety and the environment.

Eckerö Line's goal is to minimize its burden on the environment. To achieve this, the shipping company is developing new procedures for handling the emissions and waste products from ships.

To this end, M/S Finlandia began working with ProtectPipe, a company in the microbiotechnology sector, in summer 2018. Eckerö Line is seeking to replace chemicals with environmentally friendly solutions. ProtectPipe's microbial solution fits the bill exactly – a natural alternative to conventional sewage chemicals.

The kitchens aboard the M/S Finlandia began using ProtectPipe's biological floor wash, BioFloor, which contains living microbial strains that eat the grease and other organic waste that is stuck to the floor.

The floor is first rinsed, and then the microbial solution is spread evenly over it. At the end of the process, the floor is dried using a squeegee, so the solution ends up in all of the floor drains. The microbes feed on the organic waste that builds up in pipes, forming a biofilm on the interior surface, thereby preventing new material from sticking to the pipe and causing blockages.



Tallink Silja intends to fit its ships with shore power capabilities, as well as batteries for hybrid operation.



Finnlines' actions in sustainable shipping – *new energy-efficient vessels*

The vessels will be a new kind of hybrid ro-ro vessels – they will use fossil fuel during sailing but only electricity restored in lithium-ion battery bank while in port, and hence guaranteeing 'zero emissions in port'.

During the past decade, Finnlines has made a whole series of concrete investments totaling EUR 1 billion, including actions to promote environmental sustainability and corporate social responsibility. These actions include emission-abatement system installations on 21 ships, fleet changes and route optimization, fuel monitoring and slow steaming, silicone anti-fouling treatments, propulsion improvement and vessel lengthening investments. All investments were aimed at reducing fuel consumption and emissions per transported ton.

In 2018, Finnlines completed its EUR 70 million program under which six Ro-Ro vessels were lengthened, and the achieved 30% capacity increase will reduce energy consumption per transported unit compared to the original vessel.

Finnlines continues to invest in increasing its vessel capacity and has ordered three Ro-Ro vessels from the Chinese Jinling shipyard. Their delivery is expected from 2021–2022. These new technology vessels are 238 meters long and will each have

a cargo capacity of 5,800 lane meters. The vessels will be a new kind of hybrid Ro-Ro vessels – they will use fossil fuel during sailing but only electricity restored in lithium-ion battery bank while in port, and hence guaranteeing 'zero emissions in port'. In addition, an innovative air lubrication system under the keel will create bubble layers which will reduce friction and hydrodynamic resistance and, consequently, reduce fuel consumption and emissions as well. Optimized energy efficiency is ensured with the hull lines and propellers, including the most advanced integrated propeller-rudder systems.

Furthermore, Finnlines is working on developing a new Superstar Ro-Pax class concept. These vessels will also be equipped with emission abatement and other advanced fuel-consumption and emission-reduction systems. Also, LNG as an alternative fuel is considered. The company aims towards increased energy efficiency and reduced emissions. The deliveries of these vessels are likely to take place in 2021–2022.

Meriaura's VG EcoCoaster – the most environmentally friendly vessels in the Baltic Sea

The VG EcoCoaster vessel type, developed by Meriaura Group, is a highly energy-efficient bulk carrier. The vessels are equipped with two separate fuel systems, enabling the main engine (ABC 8DZC) to run on MGO and biofuels. The vessel is optimized to sail at 10.5 knots in open water conditions, and the reserve power demanded for the 1A ice class is generated using a diesel-electric booster engine. When the vessel runs on MGO, its fuel consumption and emissions are around half those of conventional cargo ships in the same size class.

When the ship runs on waste-based biofuel, it releases no sulfur emissions and its

carbon dioxide emissions are 75% lower.

The vessels have been designed to be as environmentally friendly as possible in other regards: the hull is coated in non-toxic Ecospeed paint, which improves energy efficiency without requiring anti-fouling. The ship has systems for recovering the water used to wash the cargo holds and treating ballast water. Heat recovery, air conditioning solutions and LED lighting improve the energy efficiency of the living spaces. The first EcoCoaster vessels, the 5,000 DWT M/S Eeva VG and Mirva VG, have been operating since the end of 2016 in the Baltic Sea and Northern Europe.

When the ship runs on waste-based biofuel, it releases no sulphur emissions and its carbon dioxide emissions are 75% lower.



VISION

Merikotka is a **pioneer** and a **respected research centre** in the field of multidisciplinary maritime research

MISSION

Research for **sustainable maritime transport**

RESEARCH THEMES

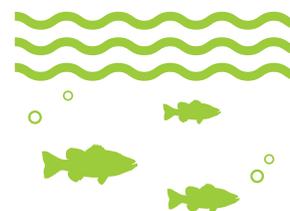
Maritime safety



Maritime industries & logistics



Marine environment



www.merikotka.fi



In 2018 Transfennica carried 4,8 million tons of cargo, fulfilling the company's objective to become the industry leader.

Transfennica - staying competitive with a modern, clean fleet

Transfennica is committed to reducing emissions with its modern fleet in order to meet high environmental standards for the future. To that end, the shipping company's entire fleet is equipped with scrubbers.

This environmentally friendly approach is, to a great extent, based on efficient use of resources. By adjusting quantities with capacity, giving special emphasis to fuel economy and bringing the goods as close to the customer as possible, maritime transportation is made more efficient by minimizing its environmental impact. For example, all Transfennica's vessels are retrofitted with scrubbers, a solution that has assured compliance with environmental laws in the SECA regions.

Transfennica, established in 1976 and owned by Dutch Spliethoff since 2002, is a European shipping company with fast-scheduled liner services. With its modern, multi-purpose Ro-Ro fleet, the company offers fast-

transport routes between continental Europe, Estonia, Finland and Russia. Its advantages include the fastest total lead times, extensive information technology backup, fast cargo handling, flexibility and safety.

With its versatile vessels, the fleet can practically carry any general cargo, including Sto-Ro, containers, trailers, cassettes, mobile cargoes and project cargoes, as well as IMDG-classified goods and temperature-controlled units. To cater to different customers' requirements and changes in the trade, the company has offices in Amsterdam, Antwerp, Gdynia, Kotka, Helsinki, Lübeck, Paldiski, St. Petersburg and Tilbury.

Speed both at sea and in port is an important feature of the Trafexpress-class of vessels, which are suitable for short-sea, as well as deep-sea traffic. These vessels are equipped with two medium-speed main engines, each with an output of 12,600 kW. To guarantee the best-ever maneuverability, the

vessels are equipped with twin bow thrusters of 850 kW each and two high-efficiency flap rudders. Maximum speed is about 23 knots at 12,800 DWT. The vessels have been strengthened to Finnish/Swedish ice-class 1A Super capability by incorporating Spliethoff icebreaking bow-shaped fin stabilizers to ensure safe passage in rough weather.

The company is committed to service and quality. By focusing on fewer ports and increasing sailing frequency, cost-effectiveness has been improved. Handling speeds have also been considerably increased during the past several years. Its challenge to develop faster, more efficient and safer vessels for a wide customer base has been realized.

Within its network, Transfennica has about 100 skilled workers dedicated to customers and suppliers. Its extensive on-line information network manages a full range of operations and electronic links with its customers.

Langh's unique water treatment method

The scrubber manufacturer Langh Tech Ltd is one of the Langh Group of companies, which also include shipping company Langh Ship Oy Ab and Industrial and Ship Cleaning Services Hans Langh.

Langh Ship has a fleet of five multipurpose container vessels. M/S Aila and M/S Linda are 11,500 DWT vessels, and M/S Laura, M/S Hjordis and M/S Marjatta are 6,500 DWT vessels.

Langh Tech designs and produces scrubbers for removing SOx from exhaust gases and water treatment units for closed loop scrubbers. Langh Tech scrubbers have been

installed on Langh Ship's vessels, which can be used as testing platforms for continuous product development. The knowledge for water purification originates from the industrial cleaning company.

Langh Tech's water treatment units can also be delivered in combination with other manufacturers' scrubbers.

This unique water treatment method enables continuous closed loop operation causing only a minimal amount of sludge, hence reducing waste removal costs. The efficiency of the water treatment method is recognized throughout the shipping industry from cargo ship owners to cruise ship operators.

Langh Tech has also developed a water treatment system to be used for cleaning the process water from Exhaust Gas Recirculation (EGR). EGR is a method to reduce

NOx emissions to meet Tier III requirements. The closed loop process is based on wet-scrubbing with fresh water and using sodium hydroxide (NaOH) to neutralise the sulphur. In open loop mode, seawater is used in the exhaust gas washing process. The small and lightweight Langh Tech scrubber can replace the silencer.

The scrubber and water treatment units are designed for retrofit installations as well as new buildings. In addition to component delivery, Langh Tech takes care of commissioning and offers installation supervision, crew training and after-sales service.

Langh Tech currently has over 100 reference vessels and the company's key message to ship owners and operators is that Langh Tech delivers scrubber systems quickly, with all the components tailored individually for each project.





Containerships' LNG-concept spreads out from sea to land; target is to create a complete, LNG based door-to-door supply chain in Europe.

Containerships Receives First LNG-powered Boxship

Multimodal transporter Containerships Plc announced the delivery of its first LNG-powered container vessel, M/S Containerships Nord. She was delivered to Containerships at Wenchong Shipyard, China, on 12.12.2018.

A press release from the Finland-headquartered shorts-sea specialist said that its LNG-story started in 2013, when the decision to build the new environmentally friendly LNG-powered vessels was taken.

LNG is a relatively new fuel source, and these vessels would be the first new-builds based on this technology to serve regularly European ports and trade, Containerships said.

– By taking this decision, we accepted the chal-

lenge of building with a new technology. It has been a rewarding project full of learning opportunities”, they say at Containerships.

– This project has required high levels of expertise and constant development. Success requires excellent co-operation between the involved parties. Needless to describe how proud and enthusiastic we are of having received the first vessel.”

Containerships' LNG-concept spreads out from sea to land; target is to create a complete, LNG based door-to-door supply chain in Europe. In addition to LNG-powered vessels, company looks for constant growth of LNG-fuelled transport capacity on land logistics by investing in LNG-fuelled trucks.

The world's most eco-friendly bulk carrier now operating on the Baltic Sea

ESL Shipping's next-generation bulk carrier ship, known as Viikki, began operating in the Baltic Sea in mid-November 2018. The first load was delivered to the Port of Helsinki, and a celebration was held for Viikki, which is the world's lowest-emission bulk ship like her sister ship, Haaga.

The 160-metre, 25,600 DWT vessel runs on liquefied natural gas, producing over 50 per cent less carbon dioxide than previous-generation vessels thanks to LNG and several technological innovations.

Viikki is full of new technologies, and one of the most important of these is the use of liquefied natural gas (LNG) in the ship's main engine, three auxiliary engines and the heating boiler. The ship already meets the 2025 environmental requirements.

“In the future, we will call at Helsinki fairly regularly. However, in the near future, we will be operating mainly in the Gulf of Bothnia,” says Mik-

ki Koskinen, Managing Director of ESL Shipping.

Viikki was built in China, after which she sailed to Japan to pick up a cargo of raw materials. From there, the ship reached the Baltic Sea via the Northeast Passage, which shortened the journey from Japan to Finland by three weeks. Using the Northeast Passage also reduced the emissions from the journey by 40% in comparison with travelling via the Panama Canal.

“We are well aware of the debate surrounding the environmental issues in the maritime sector. The design of Viikki and her sister ship, Haaga, began five years ago, and these ships represent everything that can possibly be done for environmental efficiency at this moment in time,” Koskinen says.

“This has been a long project and our entire personnel was involved, so now we are glad that the vessels have arrived in the Baltic Sea. They arrived at a good time,” Koskinen says.



M/S Viikki is the world's lowest-emission bulk ship like her sister ship, Haaga.



"Agile cloud technologies are instrumental in improving the efficiency of marine transportation and reducing emissions," says Tero Hottinen, Cargotec's Director of Emerging Digital Business.

Cargotec aiming to optimize its logistics chain

Cargotec, a provider of cargo and load-handling solutions, aims to become the leading provider of smart solutions in its industry. The Finnish listed company updated its strategy at the end of 2018 to this end. Cargotec's smart digital cloud technologies will eliminate inefficiencies, save its maritime customers money and reduce emissions.

"Through its subsidiaries, Kalmar, Hiab and MacGregor, Cargotec has a unique opportunity to enhance the efficiency of cargo logistics as a whole," says **Tero Hottinen**, Cargotec's Director of Emerging Digital Business.

"The aim is to optimize worldwide cargo flows and transform load-handling into a smart and sustainable business. In this sense, it is apt to describe our business as optimizing the logistics chain," Hottinen says.

In his opinion, the maritime industry is saturated with fragmented operators using their own systems. This leads to inefficiencies. One good example is the way that large container ships are forced to wait for free routes into harbors.

According to Hottinen, the fastest operators in the sector stand to make tens of billions automating the world's ports. Cargotec is involved in this via its Kalmar business area and Navis, which belongs to Kalmar.

Last summer, Kalmar and Navis made an agreement with the Moorebank Logistics Park in Qube in Southwest Sydney, Australia, on an automation solution worth EUR 80 million. The site will receive the world's first fully automated solution for an intermodal terminal.

The OneTerminal solution includes Kalmar's automated cargo-handling solution with container cranes and travelling gantry cranes, as well as the Navis N4 enterprise resource planning system. The deliveries will begin in the second half of 2019 and the solution is expected to be completed by 2022.

"The maritime industry is no more conservative than other traditional industries, and digitalisation is making progress in every sector. There has been much talk of smart containers. At the moment, the furthest this has gone has been in refrigeration containers, known as reefers. Until a couple of years ago, these technologies were not taken very seriously. However, new technologies tend to develop more quickly than anyone expects," says Hottinen.

Digitalization will play a key role in Cargotec's future. Navis, which belongs to the company's Kalmar business area, offers terminal operator systems (TOS) and Kalmar's XVELA stevedoring collaboration applications, which makes it faster and more flexible to prepare loading plans for vessels.

Navis is expanding Cargotec's software business organically and through acquisitions. One of the recent examples is Cetus Labs, Inc, an American company acquired in 2019. Cetus provides Octopi, a cloud-based enterprise resource planning system intended for small container and mixed cargo terminals.

"Agile cloud technologies are instrumental in improving the efficiency of marine transportation and reducing emissions," Hottinen says.

On the subject of reducing emissions, Kalmar has made an agreement with Yara, the Norwegian fertilizer giant, on the delivery of a significant cargo-handling solution. The solution will enable the world's first electrically powered, autonomous container ship, Yara Birkeland, to be loaded and unloaded without any emissions.

Kalmar is also supporting Yara with a comprehensive maintenance agreement. The Kalmar Care agreement includes warranty repairs of container gantry cranes, along with spare parts, and preventive maintenance of the automatic, rail-borne mobile gantry crane. In addition, Kalmar's experts are responsible for the solution's operations, automation and software.

“Good morning Sir, I am your agent!”

We are always happy to receive such an enthusiastic salutation, whether we are aboard a giant cruise ship with thousands of customers in the heart of a capital city or a riverboat mooring up at an inland industrial pier after a long journey through the canals.

On a September morning in Helsinki, our representative climbs the crystal-encrusted steps of the MSC Meraviglia, a 300-metre cruise ship, to greet the captain. A colleague in Imatra clambers up a rope ladder to the 80-metre RMS Saimaa dry cargo ship with the same aim in mind. The third correspondent oversees the Crownbreeze vessel as it loads sawn timber destined for the UK and a fourth is in Naantali to see the Mastera tanker unload a shipment of crude oil.

C & C Port Agency Finland is a team of 20 experi-

enced professionals. We welcome our ships in every seaport in Finland and on the inland waters of Lake Saimaa. We offer the captain our help as soon as the ropes have been knotted around the berth.

The greeting also means that the captain can relax having completed the sea crossing, handing over responsibilities to the agent who, under the high-vis jacket, turns out to be a courier, tour guide, interpreter, lawyer or even, if necessary, a therapist.

Those prone to sarcasm may say that the ship's agent is a specialist who does not need any particular competencies as long as they are able to sort everything out. Of course, we should not exaggerate: eventually, we will come across something we cannot do.

TEXT KIMMO KUUKKA



C & C Port Agency Finland Oy's office in a 101-year-old official residence on the Saimaa Canal.

Cruise businesses provide the impetus for NIT's expansion

NIT, a Finnish company specializing in turnkey deliveries of public spaces on cruise and passenger vessels, is growing on the tailwinds of the international cruise business. **Jari Suominen**, the Managing Director, forecasts an increase in net sales from EUR 17 million in 2018 to EUR 30 million in this financial period.

One of the company's strengths is its ability to handle turnkey deliveries of public spaces on vessels of all sizes from start to finish, including electrical, plumbing and air conditioning work. Naturally, NIT also makes use of its network of subcontractors depending on the situation and site.

NIT, located in Piikkiö near Turku, lives in strong symbiosis with the Meyer Turku shipyard for understandable reasons. However, the turnkey supplier has other customers all over the world.

“Meyer's order book is very strong, and our order book is also full for the next three or four years as the cruise business is booming. Of course, this requires us to remain competitive and do our work well,” Jari Suominen says.

“Meyer Turku's new Carnival series is a major step forward for NIT. It means that larger ships will be built at a faster pace. Previously, ships were being completed at an average rate of one per year in Turku, but the new Carnival series and the expansions and the efficiency improvements of the shipyard will increase this rate to around 1.5 per year. More for everyone to build,” Suominen explains.

The booming cruise ship business seems to continue its growth. As companies begin to catch up with their order backlogs, shipyards and ship owners are gradually approaching each others to negotiate

new projects. Understandably, shipyards would like to fill their future order books for an even longer period of time.

“NIT works in the same way – we would also like our voice to be heard on future projects,” Suominen says.

Cruise ship boom going on in Norway

As a subcontracting company, NIT (which stands for Naval Interior Team) has offices in Turku and Piikkiö in Finland, as well as locations in Germany, Norway and Japan. The last of these, in Nagasaki, has been shuttered until the Japanese shipbuilding industry shows signs of recovery.

“Japan would like to build cruise ships, but they are still waiting for better times. China also shares this goal, and it needs know-how from European shipyards to achieve this. China is still something of a mystery for all of us,” Suominen says. He mentions that NIT has so far held back from entering China.

Norway, on the other hand, represents a very attractive opportunity for Finnish companies as it becomes a rising star in building cruise ships.

“Norway is undergoing a cruise ship boom. Right now, ship owners over there are ordering ice-reinforced excursion vessels with a very high quality of fittings. This is a good thing for us because NIT is able to build the public spaces for slightly smaller polar or adventure cruise ships from start to finish itself,” Jari Suominen says.

NIT employs just under 100 shipbuilding professionals. The turnkey supplier's net sales will grow from approximately EUR 17 million in 2018 to a projected EUR 30 million in the current financial period.



One of NIT's strengths is its ability to handle turnkey deliveries of public spaces on vessels of all sizes from start to finish, including electrical, plumbing and air conditioning work.



“Our new Pilotage Act now enables trials of remote pilotage”, explains Kari Kosonen, the CEO of Finnpiilot.

Finnpiilot launches *Pilot Online*

Last year, Finnpiilot’s customers gained access to an electronic pilotage ordering system. “Pilot Online further enhances the efficiency of our operations and supplements our existing digital services,” says Kari Kosonen, the CEO. Finnpiilot broke several records last year, and the number of pilotage assignments along Finland’s coasts increased by more than 5%.

“Of course, the reason for this is the general growth in maritime traffic. Approximately 35% of the ships visiting Finnish ports use pilots,” explains Kari Kosonen, the CEO Finnpiilot.

Last year, 25,616 pilotage assignments were completed, racking up 484,959 nautical miles of pilotage.

“We are particularly happy to see that our customer satisfaction ratings have remained excellent and 99.9% of all pilotage assignments were carried out within the waiting time limits set in our targets.

“Thanks to the continuous development and cost-efficiency of our operations, we have also succeeded in keeping the pilotage prices stable. In fact, our price level is moderate compared with the other countries in Northern Europe.”

Added value for customers

Kosonen states that developing various applications is the everyday business of the company.

“This is how we develop our own operations from the perspectives of safety and efficiency. At the same time, we can also offer added value to our customers.

For example, the introduction of the mPilot mobile app has consigned paper-based pilotage processes to history, and all the information related to pilotage is transferred electronically to all parties involved as soon as the pilotage assignment has been completed.

We have just launched a new pilotage ordering system – Pilot Online – which enables customers to submit preliminary information, order pilotage, change information they have previously entered and monitor the orders they have placed.

“In practice, this provides customers with the option of monitoring the up-to-date situational picture on pilotage concerning the ships they operate that our pilot dis-

patchers maintain 24/7 in our center. We now aim to point customers towards placing more orders using the app and fewer by the phone or email.”

The next step will be to offer customers additional information from the Pilot PRO application, which was deployed for pilots two years ago.

“In the near future, the ships engaged in the STM project information exchange will be able to download Finnpiilot’s route plans onto the ship’s own navigation system, so the ship’s master and pilot are almost literally ‘on the same page’.”

Data for development work

In 2018, Finnpiilot’s AISLab system also underwent further development. The system is able to analyze and visualize numerous different simultaneous vessel movements and changes in ships course and speed. The system provides the option of processing historical data on how various situations have developed during pilotage.

“AISLab lays a strong foundation for organizational learning and for using the collected data for training purposes. Automated analysis functions will also be integrated into the system.”

Trials of remote pilotage

Remote pilotage means that pilot performs his or her duties somewhere other than onboard the vessel. For example, they may be located in an on-shore monitoring center.

“Our new Pilotage Act now enables trials of remote pilotage. Conducting a remote pilotage experiment will require wide-ranging collaboration between maritime industry and academia. We are heavily involved in developing remote pilotage as a part of the Sea4V-alue (S4V) project prepared within the One Sea ecosystem. Funding application for S4V was submitted to Business Finland earlier this year.

TEXT VAULA AUNOLA PHOTOS FINNPIILOT

Pilot Online enables customers to order pilotage and manage all information online.





The FinEst API, developed by Fleetrage, provides timetable, location and arrival information in real time.

With the aims of making harbour traffic flow more smoothly, efficiently supporting businesses and minimising the adverse effects of emissions and noise.

FinEst Smart Mobility – *smart traffic management for ports*

A timetable, location and arrival time service for ferry traffic; an app that shortens queuing times for lorries; a service that provides an overview of harbor traffic; and a carpooling service for ship passengers. This is the FinEst Smart Mobility project.

Traffic volumes at the West Harbor have soared, making it the world's busiest passenger harbor. Every year, nine million passengers travel between Helsinki and Tallinn. Every day, 650 lorries drive through Jätkäsaari.

With the aims of making harbor traffic flow more smoothly, efficiently supporting businesses and minimizing the adverse effects of emissions and noise, FinEst Smart Mobility has developed tailored solutions to address the challenges facing the West Harbor due to increased traffic.

The FinEst API, developed by Fleetrage, provides timetable, location and arrival information in real time for the ferry traffic between the West Harbor and Tallinn. The interface enables ferry traffic to be integrated into other traffic, enhancing efficiency and reliability. In terms of harbor traffic management and onward connections, it is crucial that the actual arrival times of ferries are openly available and accessible.

For heavy goods traffic, the project has involved a pilot of GoSwift's J-I-T app, which guides lorries to the harbor within a specified time slot, which evens out the numbers of lorries arriving at the same time. This minimizes the amount of time that lorries spend at the harbor and reduces the peak traffic loads at check-in.

Infotripla has developed a real-time traffic forecasting system for the harbor area, helping traffic managers to prepare for and react to the traffic volumes caused by arriving and departing ferries.

In addition, Kyyti Group has piloted an app for a carpooling service from the West Harbor to Helsinki Airport with the aim of providing a transportation service that supports public transport on heavily trafficked routes.

Further information

www.finestsmartmobility.com

@Finest_smart

Suvi Hänninen, Project Manager,

City of Helsinki

+358 40 627 9213,

suvi.hanninen@hel.fi

One Sea – an autonomous maritime ecosystem

One Sea is seeking to create the world's most advanced and competitive ecosystem in the field of autonomous maritime transport in Finland. The new ecosystem will carry over some of the aspects of the present maritime ecosystem but, in large part, it will be completely new. The ecosystem will create an entirely new global business in Finland alongside existing successful businesses.

The ecosystem began operating in September 2016 under the management of DIMECC. One Sea brought together global pioneers and agile ICT companies to develop the world's first unmanned maritime transport solution. Business Finland has committed to financing the autonomous maritime transport ecosystem and promoting the launch of new innovations until the end of 2021.

The ecosystem has created a roadmap for making autonomous and unmanned maritime transport a reality, and the goal of the project is to monitor progress towards this. The objective is to create the world's first unmanned maritime products, services and functional ecosystem by 2025. The ecosystem

is currently focusing on creating common industrial standards and contributing to international rules.

The partners in the ecosystem are leading companies in their fields, including ABB, Cargotec, Ericsson, Finnpilot Pilotage, Rolls Royce, Tieto and Wärtsilä. The ecosystem also has partnership agreements with the Finnish Marine Industries association, the Finnish Shipowners' Association, the Finnish Port Association and Shipbrokers Finland.

www.oneseaecosystem.net



The partners in the ecosystem are leading companies in their fields, including ABB, Cargotec, Ericsson, Finnpilot Pilotage, Rolls Royce, Tieto and Wärtsilä.

The objective is to create the world's first unmanned maritime products, services and functional ecosystem by 2025.



© Merikotka

Kotka Maritime Research Centre focuses on sustainable maritime transport research:

One target is harmful hitchhikers in the Baltic Sea

Kotka Maritime Research Centre forms a unique international research community that combines environmental sciences, economics and engineering. Multidisciplinary approach is needed to tackle complicated maritime questions.

One of Centre's projects focuses on invasive alien species, which can cause both ecological and financial damage. There are no means to stop their spreading once they are initially introduced.

The COMPLETE project addresses the major pathways of introductions via ships: ballast water and biofouling. The IMO Ballast Water Management Convention (BWMC) constitutes a significant step towards better invasive alien species management. Yet, for ensuring that the BWMC exemptions are

based on risk assessments and granted in a constant manner, the selection of target species as well as species mapping and identification in ports requires scientific knowledge.

The control of biofouling is currently carried out voluntarily. Hull cleaning enables potential for substantial fuel savings, but in-water cleaning may release harmful substances or introduced species into the water. Also, the regulations and practices vary across, which increases the risk of introduced species spreading into the port where the cleaning takes place.

In COMPLETE, 35 organizations from all Baltic Sea states are co-operating to develop consistent and adaptive management strategies to reduce risk of invasive species introductions.

COMPLETE

– Completing management options in the Baltic Sea Region to reduce risk of invasive species introduction by shipping

Project funding:

The Interreg Baltic Sea Region Programme 2014–2020

Project implementation time:

01/10/2017 – 30/09/2020

More

information:

www.baltic-complete.com
www.merikotka.fi

One of Centre's projects focuses on invasive alien species, which can cause both ecological and financial damage.





"In 2005 we started systematic development work of the Arctic LNG carriers. The first contract was signed with Novatek in 2010 and after then we spent three years working on the design of the new ice-capable LNG carriers", says Reko-Antti Suojanen, Aker Arctic's Managing Director.

Aker Arctic believes in *LNG in northern seas*

The design company Aker Arctic is betting on the rising volumes of LNG transported in ice-covered seas and on the increasing use of LNG as fuel for ships up in the high Arctic.

Aker Arctic's main strengths as a ship design company are its specialization in ice-going vessels, solid design expertise, and in-house ice model testing laboratory. As a result, the company has extensive experience in the development of icebreakers and other specialized ice-going vessels. Managing Director **Reko-Antti Suojanen** considers the growing importance of liquefied natural gas (LNG) in the Arctic seas as one of the major future trends.

- In the northern regions, natural gas is already being more sought after than crude oil. Volumes of LNG transported in ice-covered seas are on the rise and the use of LNG as fuel for ships is also increasing, Mr. Suojanen describes the key changes in current environmental and energy needs in shipping.

Aker Arctic Technology is well-prepared for these new trends. First of all, most of the world's icebreakers have been built in Finland and the company has been involved in their design. The company's design capacity has grown to cover the entire ship design process from concept development to basic design. At present, both Russia and the United States are planning to procure new polar icebreakers and Aker Arctic has concepts suitable for both.

- Russia is in the process of replacing its nuclear-powered icebreakers, including Taymyr and Vaygach

that were built in Finland in the late 1980s. Rosatomflot is preparing for the acquisition of four large LNG-powered icebreakers, says Mr. Suojanen, and adds that what comes to vessels' size, these could be built for example at the Helsinki shipyard, but the decision about the shipyard has not yet been made.

- The new icebreakers are about 160 meters long and 31 meters wide and come with very powerful gas-powered main engines and large fuel tanks. Previously, it has not been possible to bunker the LNG in the northern seas, but the situation has changed completely since the opening of Sabetta LNG terminal in the Gulf of Ob, Mr. Suojanen contemplates.

Ice-going LNG-tonnage took years to design
Another extensive LNG project that Aker Arctic has been involved in is related to the gas company Novatek, or more specifically, Yamal LNG and its ice-going carriers for LNG transportation from Sabetta LNG terminal.

- This project began already in 2005 when we started systematic development work of the Arctic LNG carriers. As a result, we were able to convince gas producers that LNG can be transported through the ice in a cost-effective way. However, this project didn't realize overnight: we signed the first contract with Novatek in 2010 and spent three years working

on the design of the new ice-capable LNG carriers, after which Daewoo shipyard won the shipbuilding tender. Since then, LNG carriers have been built in South Korea. Our co-operation with Novatek and other Russian companies has worked very well, Mr. Suojanen describes the project, in which the use of LNG has gained a completely new significance in the northern sea areas, and the shipping on the Northeast Sea Route has grown to a new record.

The United States is also currently planning to build a new polar icebreaker, for which President **Donald Trump** has managed to secure funds from the Congress. According to the US principles, the US Coast Guard's icebreakers must be built on an American shipyard. There are only local shipyards participating in the tender, one of them has a design agreement with Aker Arctic.

Test basin has been put in good use

The heart of the design know-how is located in an office building in Vuosaari, Helsinki, which also has a 78-meter-long ice model-testing basin.

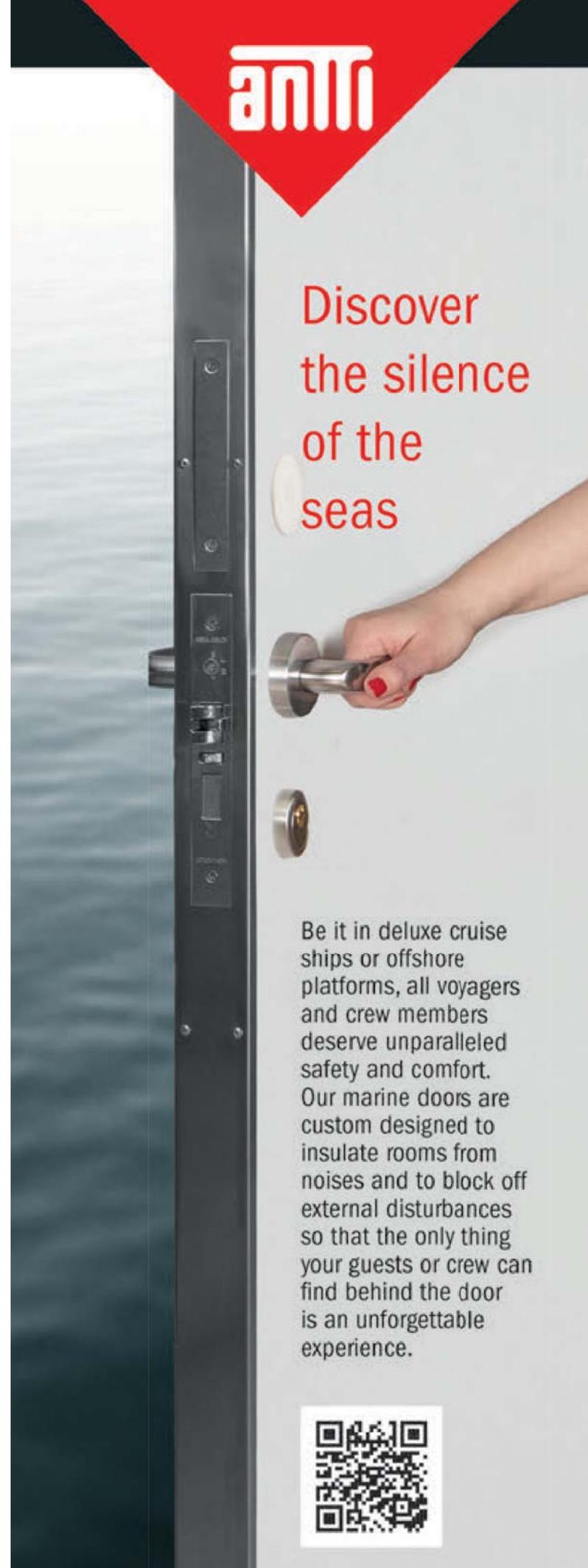
Recently the company has been testing models of autonomous ships with new technical features. According to Mr. Suojanen, these types of autonomous vessel maneuvering tests are required for the development of the marine equipment and for testing of automation systems, such as autonomous ship berthing. It is much more cost-effective/practical to do this work in the model scale in testing laboratory than with the real ships.

An important area of expertise in which Finnish ship design is a world leader is related to oil recovery in ice. Mr. Suojanen says that oil recovery is difficult enough in open water, and it is even more challenging in ice. This has brought in a necessity to think about working out solutions to this problem. One example of this is an oblique icebreaker capable of collecting and purifying oily water in a completely new way.

- The brushing machines designed by Finnish company Lamor have proven their functionality in real life, says Mr. Suojanen, and reminds that LNG has one more environmental benefit: In the event of leakage, liquefied natural gas will gasify itself into the air and there is no need for collection from the sea.



In the northern regions, natural gas is already being more sought after than crude oil.



Discover
the silence
of the
seas

Be it in deluxe cruise ships or offshore platforms, all voyagers and crew members deserve unparalleled safety and comfort. Our marine doors are custom designed to insulate rooms from noises and to block off external disturbances so that the only thing your guests or crew can find behind the door is an unforgettable experience.





An Air Patrol Squadron Super Puma landing on OPV Turva.

FIMAC - saving money on cooperation

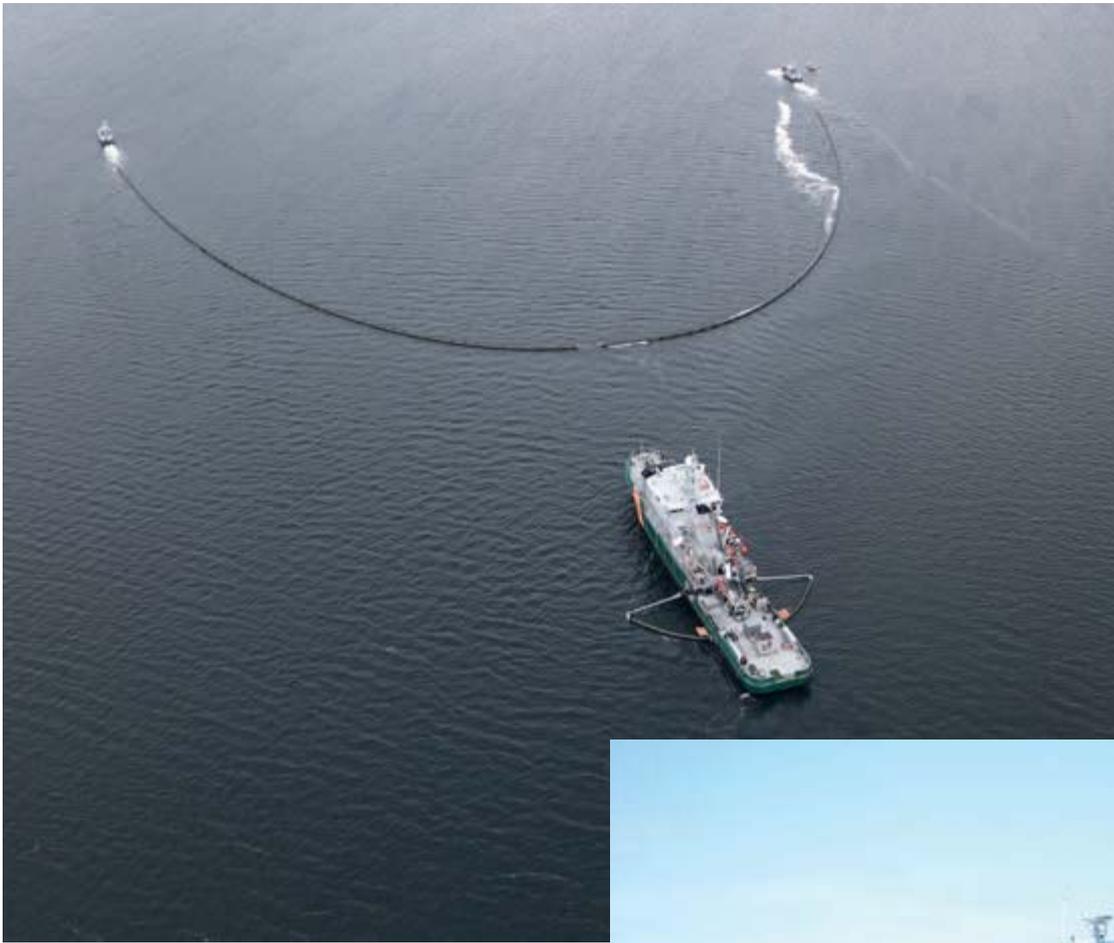
The FIMAC cooperation between maritime authorities was initiated in 1994, when the ministerial committee for administration development approved a report of a working group on the rationalization of maritime functions and organizational streamlining. The constitutive meeting for the nationwide cooperation between maritime authorities was held already on the same year.

At that time the cooperating parties were the Finnish Maritime Administration, the Finnish Defence Forces and the Finnish Border Guard. Following a reorganization of the government agencies under the Ministry of Transport and Communications on 1 January 2019, the present FIMAC parties are the Finnish Transport and Communications Agency, the Finnish Border Guard and the Finnish Defence Forces.

Orchestrated public procurements

As a result of twenty years of cooperation, during which vessel traffic monitoring and information systems have been jointly procured, savings of tens of millions of euros have already been achieved, compared to if each actor itself would have procured the same capacity.

The Finnish system for maritime search and rescue and traffic monitoring with its sensors, arrangements for information exchange and applications, which the FIMAC actors to a large extent have acquired through joint procurement, is still a unique example of extensive cooperation between authorities. In 2007, the FIMAC cooperation was awarded the Sea Sunday safety prize.



Practical maritime oil spill prevention training in cooperation with other authorities.

A new coastal patrol boat on a trial run.



Training for exceptional maritime situations.



” **The Border Guard has significantly improved its fleet in the last ten years.**



Paroc Marine and Offshore insulation is made of stone wool and developed for the needs of the modern shipbuilding and offshore industry.

Paroc - marine solutions carved in stone

Paroc marine and offshore insulation is made of stone wool and developed for the needs of the modern shipbuilding and offshore industry. The products have been tested in various A-class and H-class deck and bulkhead constructions and in numerous fire door and panel constructions.

The shipbuilding industry sets very high requirements for safety and comfort. Therefore the products and structures used in ships must be fire tested and approved according to the rules and regulations of the International Maritime Organization (IMO).

Paroc marine and offshore offers economical and safe insulation solutions for fire protection as well as for on-board thermal and sound insulation.

Fire protection and thermal insulation on ships must meet very high requirements. Furthermore,

functionality together with easy and fast installation has become more and more important in the modern shipbuilding and offshore industries.

These requirements demand alternative solutions for different fire applications. Paroc has several approvals for A60, A30 and A15 class solutions for steel and aluminium, decks and bulkheads. For offshore applications Paroc has approvals for H120 and H60 steel decks and bulkheads.

Paroc stands for energy-efficient and fire safe insulation products and solutions of stone wool for new and renovated buildings, HVAC, marine and offshore, acoustics and other industrial applications. Behind those products there is an 80-year history of stone wool production knowhow backed with technical insulation expertise and innovation.

PREMIUM EXHIBITION SERVICES

We are trade show specialists providing expertise, stand design, and project management services to help you save time and effortlessly reach your exhibiting goals. Partnering with us will provide you more time to focus on your exhibition strategy to get the best results, don't let your investment go to waste!



MARITIME & OFFSHORE EXHIBITIONS

Seatrade Cruise Global
OTC
Nor-Shipping
Cruise Ship Interiors Expo NEW
SPE Offshore Europe
Neva
Seatrade Offshore Marine & Workboats Middle East
Inmex SMM India
Kormarine
ADIPEC
Louisiana International WorkBoat Show
Europort
Marintec China
Asia Pasific Maritime (APM)
Posidonia
SMM

Wulff Entre is a specialized event service house for Marine Exhibitions. We provides a completely stress-free solution for all local or international trade show needs.





The 13,7 billion eur Finnish Maritime Cluster Continues in Successful Growth

” **The total maritime cluster turnover increased to 13.6 billion euros while the directly employed personnel was 49,500.**

The Finnish maritime cluster is a versatile entity with a wide range of very diverse companies with expertise, resources and business in a wide variety of operating environments and markets complementing each other’s expertise. The cluster’s operating environment is extremely international and constantly faces global competition. However, the development of the last few years shows the vitality of the national maritime cluster, as the companies involved have shown their ability to transform into different markets and to build international connections in difficult times.

The marine, shipping and port industries in the private and public sectors are the three main interdependent groups of the national maritime cluster. Despite of the challenging environment, the total turnover of the maritime cluster grew to 13,7 billion euros in 2017, from where the latest figures have been available.

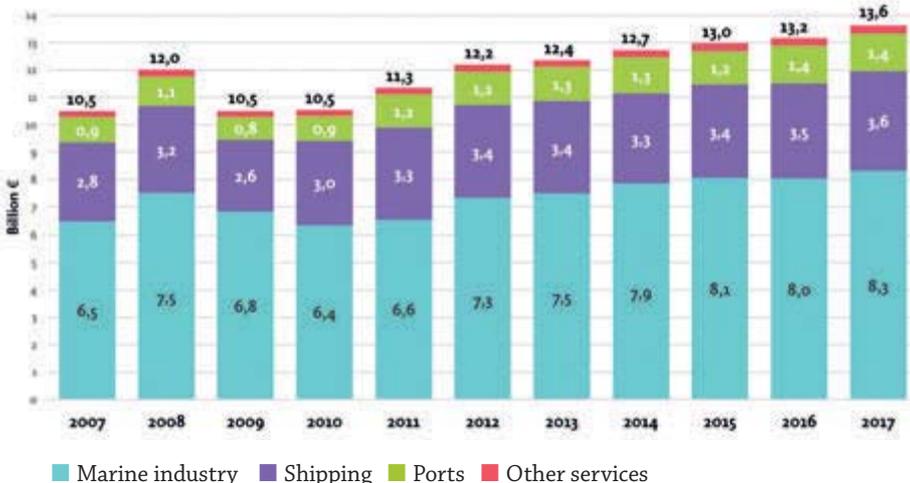
Highest growth in shipping while ports stagnate, marine industry keeping busy

About 3,000 companies operate in the Finnish maritime cluster and more than 1,500 limited liability companies had submitted their 2017 accounts to the authorities. The total maritime cluster turnover increased to 13.6 billion euros while the directly employed personnel was 49,500.

The total turnover of Finnish marine industry rose to EUR 8.33 billion, up 3.6% on the previous year. In 2017, the marine industry employed a total of 29,000 people in their marine-related businesses. The marine industry figures reflected especially the good market situation in cruise ship construction, which was forecasted already a year ago by Mr. Tapio Karvonen at the University of Turku, Brahea Center, who has led the updating study of the economic indicators. The combined net sales of the largest shipyards increased by almost 14% despite the continued weak market situation in the offshore business. Mr. Karvonen expects that in 2018 positive development will continue to be strong in shipbuilding, as the turnover growth will begin to be seen more in the subcontracting network companies.

The net sales of the shipping and other shipping-related operations grew by 4.3% to EUR 3.62 billion. The favorable development of the freight market is the most important factor. On the passenger side, the change has been much smaller. The combined turnover of port operations remained unchanged at EUR 1.38 billion. In the port industry, the previous year 2016 was a period of strong growth, which was now followed by a year of stabilization. However, in ports, more cargo was handled in the previous year, as the volume of foreign sea transport increased by 4.1%. In port operations, the number of personnel decreased, while in other sectors the number increased, down to 6,200 persons.

Total turnover of the Finnish Maritime Cluster by the various sectors in 2007–2017, billion €



Mikko Niini
Chairman, Finnish Maritime Association

SOURCE: RANTI, T., GRÖNLUND, M. & KARVONEN, T. UNIVERSITY OF TURKU, BRAHEA CENTRE 2019



BECAUSE TIME MATTERS



The Port of Turku and its partners offer a competitive logistics system to companies looking for reliable and cost-efficient services. The Port's services to vessel traffic are complemented by modern warehouse and terminal services which meet the needs of both long-term storage and fast-paced distribution operations. Thanks to the vicinity of the Port, the goods can be quickly transferred from the ships to the warehouse, which saves both time as costs. The available logistics services are complemented by diverse added value services for streamlined material flows and speeding up the deliveries of goods to retailers or directly to consumers.

WWW.PORTOFTURKU.FI



PORT OF TURKU
FINLAND



FREJA solves your transportation challenges.

You have a need, we have the solution.

[FREJA.COM](https://www.freja.com)



Tailored transport to your oversize, heavy or otherwise challenging cargo, as well as flexible worldwide project solutions by sea, air and road. You have one dedicated contact person for your whole chain of transport.



LOGISTICS SOLUTIONS
FOR A **WORLD** IN MOTION