

Arctic Passion News

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Viljami Karhu in Memoriam

After a sunny September weekend we returned back to work, to hear the sad news that one of our youngest employees, Viljami Karhu, passed away due to a long lasting serious illness on 15.09.2011. Viljami had been working in Aker Arctic since spring 2009. He worked besides his studies assisting in ice model testing. We remember him as a hard working person with a great sense of humour.

We will all be missing him.

Announcements

Kari Laukia

Design Manager.

Kari transfers to us from Kone Marine Elevators and has a strong background in Arctic shipbuilding, earlier designing propulsion systems for ice going vessels and later by developing propulsion units e.g. the Azipod.



Annu Oikkonen

Ice Physicist. Annu

graduated from University of Helsinki 2008 with geophysics as her main subject. Before joining AARC she was working on her PhD in the department of physics with special interest in Arctic sea ice.



Karl Hamberg

Karl Hamberg has chosen to work part-time and has given room for Kari Laukia as Design Manager while continuing with AARC as Senior Adviser, Ship Design and IPR.



Topi Leiviskä

Manager of Research and Testing Services. Topi has been working at AARC since 2008 as a Senior Research Engineer.



The Polar Code is needed urgently

The IACS members have been working for practically two decades in developing "harmonised" rules for vessels trading in polar waters. The topic of safe navigation in those waters was finally considered to be of such importance that the issue was raised to IMO for creation of general guidelines and finally - as a consequence of the sinking of MS Explorer in Antarctica - a mandatory Polar Code.

The preparation of the mandatory Polar Code was started at IMO in 2010. Between February 13th to 17th, 2012, the IMO DE 56 meeting made some progress, but unified understanding was only achieved on a few details and the existing correspondence group will need to continue with further preparatory work. As a result of the situation the target date for the Code was postponed for two more years.

The fundamental difference between the so far leading Baltic ice class regime and the planned new Polar Code requirements is that a future vessel's ice class will not automatically guarantee vessel performance, but only the basic hull and propulsion integrity and safety. The intended performance level and its implications on the class to be selected will become the responsibility of the Owner. This approach will better allow the Owner to make a realistic risk assessment and to optimise new vessel concept designs to meet his actual needs. However for this approach the Owner should be capable of defining his intended operation areas and seasons and fully understand the risks of navigating in such icy waters.

Last summer 41 vessels passed through the Northeast Passage (Northern Sea Route), carrying a total of 834.931 tons of commercial cargo under seven various flags. The Russian authorities' minimum requirement for these voyages is a Baltic Ice Class IA, by definition made for passage in a channel made in 0.8 metre thick ice. The transit season in 2011 lasted from late June to the end of November.

On April 14th at 23:40 a hundred years will have passed since Capt Edward J Smith directed SS *Titanic* to the fatal collision with an iceberg off Newfoundland. Have we learnt anything? Every year we see hundreds of large non-ice class cruise ships calling in various icy fjords in Alaska, Greenland and Antarctica.

Aker Arctic is undertaking serious work in developing and making sustainable, safe and economic operations possible in polar waters. The shipping community, unfortunately, is still lacking proper guidelines for safe access to these areas, thus endangering innocent people and risking to make the work of responsible developers and industry null and void in the case of a serious accident in the near future.

The Arctic Council has already reached a treaty on joint search and rescue in the Arctic waters. What we urgently need is a well prepared and enforced Mandatory Polar Code!


Mikko Niini



Source: An Bord magazine

Front cover AARC has continued developing the Icebreaking Trimaran concept. Model tests have shown the potential of the Trimaran concept also for arctic waters. Annu Oikkonen and Kari Laukia acquainting themselves with the newest model. See also page 17.

Aker Arctic Technology Inc's newsletter

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Printed in February 2012 by DMP



Breakthrough for oblique icebreaker concept



The first unit of the Aker Arctic developed Oblique Icebreaker concept has been ordered by the Russian Government from Arctech Helsinki Shipyard.

Oil spill combat

Aker Arctic and its predecessors have worked intensively in development of a revolutionary new icebreaker concept that despite its small size can create a wide channel and provide a solution for oil spill combat in harsh environmental conditions. Last fall Arctech Helsinki Shipyard was awarded a contract to build the first multipurpose emergency and rescue vessel for the Russian Ministry of Transport based on this ARC 100 concept. Arctech was awarded the contract together with Yantar JSC. The value of the contract is about EUR 76 million.

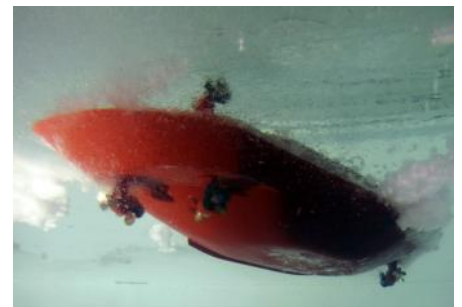
The project was kicked off immediately and the vessel will be delivered in December 2013. The hull of the vessel will be built in Kaliningrad by Yantar shipyard, which is one of the yards belonging to United Shipbuilding Corporation, a Russian state-owned

company and co-owner of Arctech. The outfitting and finalizing of the vessel will be done by Arctech in Helsinki.

Completely new technology

This new and unique multipurpose emergency and rescue icebreaker represents a completely new type of icebreaking and oil spill combat technology. The vessel features a patented oblique design with an asymmetric hull and three Steerprop pulling azimuthing propulsors, which allow the vessel to operate efficiently ahead, astern and obliquely (sideways). The vessel can proceed in typical Baltic Sea ice conditions in continuous mode in 1.0 meter thick level ice both ahead and astern and in oblique mode she will be able to generate a 50 meter wide channel in 0.6 meter level ice.

The vessel will be used in icebreaking operations and emergency towing of vessels and floating facilities. It features a very advanced oil recovery system suitable for operation even in heavy waves. The vessel measures 76,4 meters in length and 20,5 meters in breadth. The three main diesel generator



sets run by STX diesels have a total output of 9 MW. The total propulsion power is about 7 MW.

"Oil combat in ice conditions is one of the major challenges for the international oil industry. After many years of development work the oblique icebreaker concept represents a breakthrough approach for the solution," says Mikko Niini, Managing Director of Aker Arctic. *"We are now developing the concept further and introducing the improved ARC 100 concept in March at the London workshop of International Association of Oil and Gas Producers, which is planning to establish a multi-million dollars development program for mechanical spill recovery in ice conditions."*

Towards Arctic LNG

One of Aker Arctic's main ongoing works recently has been for OAO Yamal LNG, a joint venture between Novatek and the French Total S.A. (20%), which has engaged AARC in the planning of LNG production and transports from their very rich Tambey gas field on the eastern coast of the Yamal Peninsula in the village of Sabetta.

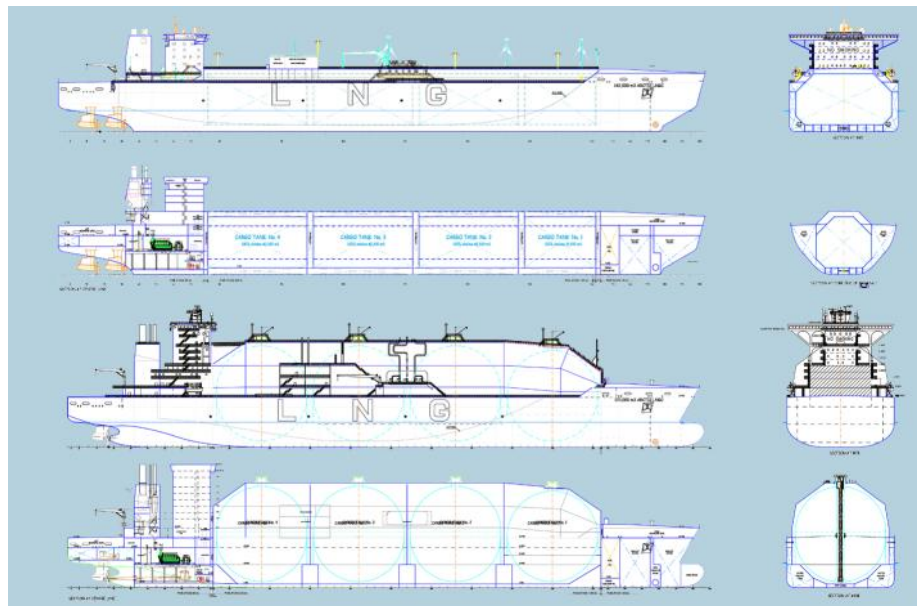
In the first phase Yamal LNG hired CB&I Lummus to conduct a Pre-FEED with the aim of studying the overall viability of the idea and the alternative options available. In spring 2010 AARC was hired to support CB&I by studying the various shipping alternatives, ship types, ship sizes and possible locations of the export terminal. Also some new and updated environmental information, especially on the ice conditions, had to be collected to be certain of the design basis requirements. These were gathered by AARI of St. Petersburg with AARC's participation during winters 2010 and 2011.

Development of LNG carriers

In the FEED AARC has been working directly with Yamal LNG in further development and optimisation of the LNG carriers for the challenging Arctic route from Sabetta in the Ob Bay over the Kara Sea to the markets. First a generic 200.000 m³ vessel was created and model tested. The first iteration showed that the size of the first option had to be modified and in July the tests verified the good performance and



AARC participated in April 2011 in a trial cargo shipment from Arkhangel to Sabetta arranged by OAO Yamal LNG. The SA-15 class cargo vessel Kapitan Danilkin was escorted by nuclear icebreaker Rossiya.



capabilities of the upgraded 170.000 m³ vessel concept, powered by the newly developed Aker Arctic Hybrid DAS™ propulsion solution with one large centre propeller and twin azimuthing pulling thrusters. This will give the vessels a performance securing independent operation with a minimum 5 knots scheduled speed.

AARC now continues with adaptation of LNG driven machinery for ice operation together with Wärtsilä and ABB, creating practices and equipment for the ice management in the terminal area, performing the conceptual development of the LNG fuelled channel management and terminal icebreakers and assisting Yamal LNG in preparations for the

forthcoming shipbuilding and ship operation international tenders. Tendering phase will take place later in 2012. ■



The Aker Arctic Hybrid DAS™ hybrid propulsion performed well also in shallow water brash ice.

Novatek sent nine tankers on Northern Sea Route in 2011

In November 2011 OAO NOVATEK announced that the Aframax tanker MT "Perseverance", had passed through the Bering Strait into the Pacific Ocean and thus became the company's ninth large-size tanker in 2011 using the Northern Sea Route.

Novatek also established a new record for the longest use of NSR during a single year, June to November. During the period, NOVATEK transported approximately 600.000 tons of stable gas condensate to consumers in South Korea, China and Thailand. Two of the tankers, belonging to Neste Shipping's Palva-class fleet, sailed under Finnish

flag and made it in record 6,5 days at a 14 knot average speed.

The regular use of the NSR has established this route as an economically viable alternative to the existing routes through the Suez Canal and the Strait of Malacca. The Northern Sea Route will also be an integral part of the development of NOVATEK's Yamal LNG project providing transportation routes for both LNG and stable gas condensate.

In 2011 the Aker Arctic DAS™ "Zapolyarny" passed through the NSR in September independently carrying an export nickel cargo from Dudinka to China, with return to Dudinka on November 24th. These have led OAO MMC Norilsk Nickel to consider building a larger Aker Arctic DAS™ type vessel "Leader" with the NSR ice conditions as a design basis.

Canada to build polar icebreaker

Aker Arctic participates in the design of the Canadian Coast Guard's new polar icebreaker.

The Honourable James Moore, Minister of Canadian Heritage, Official Languages and Regional Minister for British Columbia on Friday February 3rd announced on behalf of Minister of Fisheries and Oceans, and Minister of Public Works and Government Services and Minister for Status of Women an important step forward for Canada's Northern Strategy: selection of the designers for the Canadian Coast Guard's future Flagship, the Polar Icebreaker, *CCGS John G. Diefenbaker*.

Design team

Aker Arctic is a member in the team led by local STX Canada Marine that has been awarded the contract to design the new polar icebreaker for the Canadian Coast Guard. The awarding of this 9.5 M CAD contract formally launches the detailed design effort for the Polar Icebreaker. Expected to take 18-24 months to complete, STX Canada Marine Inc. will, based on the conceptual design produced by the Canadian Coast Guard, advance the design work to the point where a comprehensive design package can be provided to Vancouver Shipyards Co. Ltd. to build the vessel.

"I am pleased to announce that the team at STX Canada Marine Inc. of Vancouver is taking on this important project," said Minister Moore. "This project is yet another example of our Government's commitment to support jobs and growth, and we look forward to seeing the *Diefenbaker*, designed and built in



Vancouver, defending Canada's Arctic sovereignty in the North."

Boost to marine industry

The polar icebreaker will be named after former Prime Minister. It will be able to operate autonomously for 270 days in the Arctic, over a larger area, and in more difficult conditions than any of Canada's current icebreakers. The new icebreaker will be delivered to coincide with the decommissioning of the CCGS Louis S St-Laurent in 2017. The Polar Icebreaker is one of the vessels included in the National Shipbuilding Procurement Strategy (NSPS) Non-Combat contract awarded to Vancouver Shipyards Co. Ltd in October. The vessel will, therefore, be designed and built in Vancouver. The project will provide a significant economic boost to Canadian marine industry and west coast shipyard workers and marine related companies in particular.

The new vessel will replace the CCGS Louis S St-Laurent as the CCG Flagship. The polar icebreaker will be designed to accommodate 100 personnel with space for 25 additional people and have the ability to break through 2.5 meters of ice at 3 knots.

Experienced partners

STX Canada Marine will be supported in the Polar Icebreaker Design project by a team of highly experienced partners including Aker Arctic Technology (AARC), SNC-Lavalin, INDAL Technologies and Noise Control Engineering. Aker Arctic will provide their world leading icebreaker design and construction expertise to the project. Aker Arctic's main roles will be assessment of the ice loads, development of the hull form and structure, propulsion conceptual design and descriptions on winterization principles. ■

Arctic Offshore Patrol Vessel to be built in Halifax

STX Canada Marine (previously Kvaerner Masa Marine) is a naval architecture and engineering services company with offices in Vancouver and Ottawa. For almost 30 years they have been providing ship design and engineering services nationally and internationally. In recent years, they have had the privilege of working with the

Canadian Coast Guard on the design of the Offshore Oceanographic Science Vessel (OOSV) and with the Department of National Defense on the design of the Arctic Offshore Patrol Vessel (AOPS) in which AARC also participated.

On January 12, 2012 Irving Shipbuilding at their Halifax Shipyard facility concluded an agreement in principle to build Canada's combat vessels under the National Shipbuilding Procurement Strategy (NSPS). Irving Shipbuilding is privileged to be poised to negotiate the combat vessel contracts, commencing with the Arctic Offshore Patrol Vessels.





Improving ice-class tankers

The maritime traffic in the Baltic Sea was seriously affected by difficult ice conditions during the winters of 2010 and 2011. News on nearly 200 vessels trapped in ice for weeks spread around the world and the question was raised again, what ice capabilities should ships have when sailing in the Baltic Sea and Gulf of Finland?

In the end of 1990's, Russia made the strategic decision to build the Primorsk terminal and to start shipping oil bound for destinations in Europe from the new port located in the eastern part of Gulf of Finland. At about the same time, oil production in Sakhalin started where ice conditions are similar to the Baltic Sea, especially close to De-Kastri. There were not enough ice strengthened tankers available for oil shipments in these areas at that time so charter rates climbed into the skies and a boom to design and build Aframax-size tankers began.

Aker Arctic Technology Inc developed the Double-Acting Ships for Neste Oil, first intended for arctic use but later the decision was made to design the vessels

mainly for Baltic Sea conditions due to the delay of oil production in the Arctic. *Tempera* and *Mastera* were designed to operate independently with an icebreaking capability of more than 1.2 meters of level ice with a power of 16 MW. They entered service at the end of 2002 and in the cold winters of 2003 and 2004 both ships worked independently in the Baltic Sea, mainly between Primorsk and Porvoo oil terminals, while other ice strengthened tankers were trapped in ice and unable to move without icebreaker assistance.

Change in regulations

During this time, the Finnish and Swedish authorities decided to ease ice

Vessels waiting for icebreaker assistance in the Gulf of Finland in winter 2011.

classification regulations by allowing for assignment of an ice class notation based on model test results. There was a fear that the rule formulas, which required a power of about 22-25 MW, would be too costly to fulfil and therefore there was a risk that low ice class ships would enter the Baltic Sea at winter time and the environmental damage risk would increase in case of an accident. Typically Aframax tankers have a power of about 13-15 MW.

As a consequence, reduced power levels for large ice class tankers were accepted and an ice strengthened ship could have a chance to get ice classification by demonstrating in model tests the ice going capability at 5 knots speed in an ice channel specified by the regulations. Several tankers were then built with ice strengthened hulls but with bulbous bows designed for open water.



The AARC designed Double-Acting ship MT Tempora operates independently regardless of the ice situation.

In this way a slightly modified standard open water design can be used, and savings on ship prices are achieved, but the drawback is that the engine power/propeller design might not be optimal for economical fuel consumption in either open water or ice," Tom Mattsson, R&D Manager Test Services at AARC, points out.

During several winters there was not enough ice on the Baltic Sea to cause any problems, but the winters of 2010 and 2011 showed again the value of ice going capabilities. Dozens of tankers, cargo ships and passenger vessels were trapped in ice and waited up to two weeks for icebreaker assistance. Delayed schedules end up very expensive and cause problems with imbalance in stocks, congestions in terminals, not to mention the capital cost of the valuable cargo tied up during the waiting times.

Improving tankers

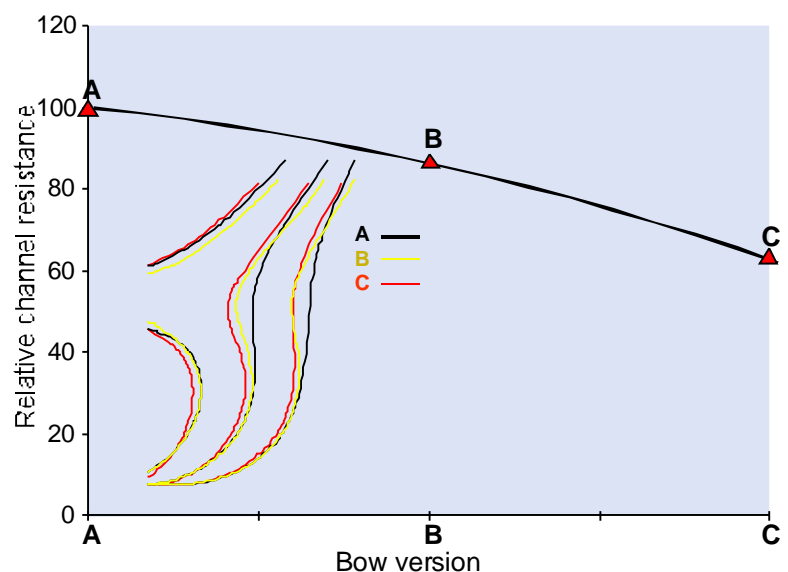
During the past five years, Aker Arctic has made significant efforts in helping improve ships that were built in order to obtain ice classification with good ice performance along with a low investment cost.

"During the boom, many low-cost tankers were built. They obtained ice classification but in reality they were in trouble in ice," Tom Mattsson says.

"For example, if the bow is of open water design, it will push the ice in front and the ship loses speed, and a poor propulsion line design causes the ship to finally stop. By making relatively small changes in the bow design so that the ice moves easier to the side, this problem can be solved. We have done lots of systematic ice model tests for vessels with a challenging design where we changed the bow and other parameters in order to improve ice going capabilities, and good results have been achieved



Typical bow shapes of ice strengthened tankers



The bow form improvement in modifying a bow shape of a standard bulbous bow tanker

where the channel resistance has been decreased by more than 30 %. Now we have cooperation agreements for developing arctic tankers with several shipyards so that problems can be avoided in the future."

During the past five years, Aker Arctic has made significant efforts in helping improve ships that were built in order to obtain ice classification with good ice performance along with a low investment cost.

Mr. Tom Mattsson is a member of the Research and Development team at AARC.

Propulsion solutions

“The normally used propeller engine combination, slow speed engine in combination with a direct shaft line and a propeller with fixed pitch blades, often creates problems in ice. This kind of propulsion is often optimized for the service speed (14-15 knots), and at lower speeds it is not able to absorb full power. Close to bollard pull the power might be as low as 30-40 % of full power and that gives low available net thrust when it is needed,” Mr. Mattsson explains.

One solution to improve the thrust at low speeds is the Controllable Pitch Propeller. With the CP propeller solution the engine is able to create full power at the whole speed range while the propeller blades constantly optimize the angles. It is a bit more expensive as an investment and to use in open water but gives a much better chance to manage in ice conditions. The net thrust with CP propellers can be up to 50% higher in typical ice going speeds than with a poorly designed fixed pitch propeller.

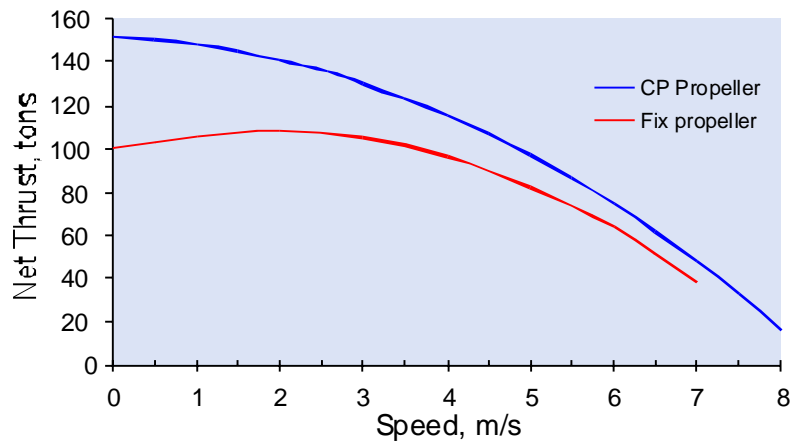
Aker Arctic has conducted several monitoring studies on Primorsk traffic which have also shown the benefit of the CP propellers, the assistance time these vessels needed is about half of those with fixed propellers.

The trafficability study clearly shows the assistance time needed for different types of propulsion. It is to be noted that DAS vessels did not need any assistance in winter 2004 at Baltic Sea.

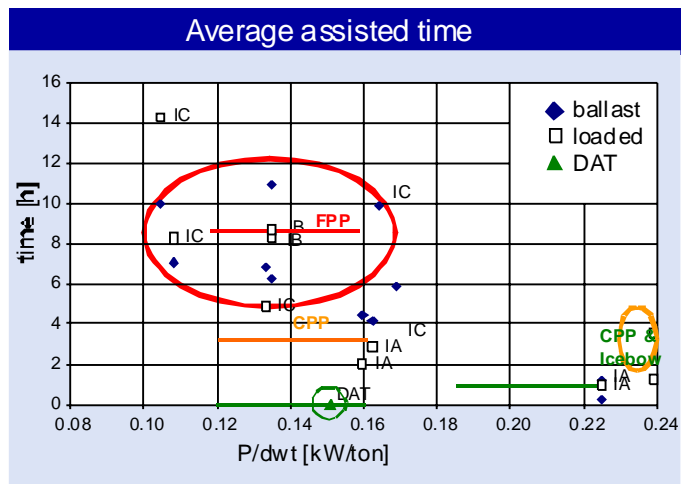
“The most efficient propulsion for ice going ships is the azimuth thruster, as it is designed to move in astern mode in ice and will have at least as good ice going capabilities as conventional tankers when going ahead, but then the investment and operation costs are often higher,” Mr. Mattsson admits.

New options

Aker Arctic is always preparing for the future and developing better solutions. One of them is the AARC-developed Vertical thruster; with this water flushing system the ice is moved to the side. Originally it was developed for floaters and drillship use in drifting ice, but could be a solution for standard ice class tankers in order to increase ice going capability. It might even be possible to retrofit vertical thrusters on existing



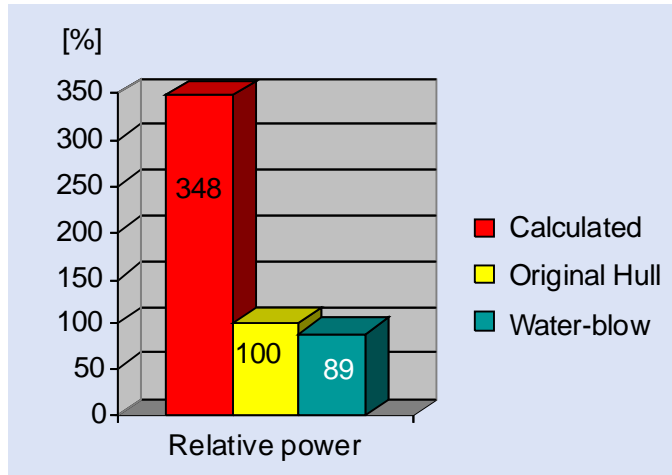
The difference in the thrust curve of a fixed propeller and a CP propeller is shown in the picture. Maximum generated power of both versions is 14MW.



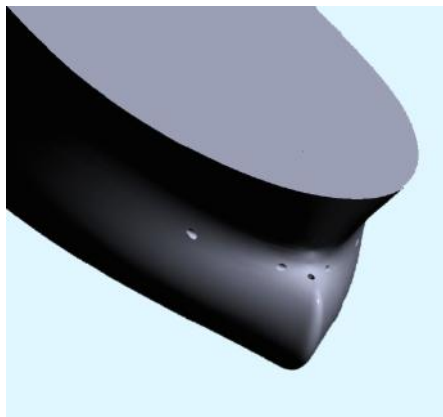
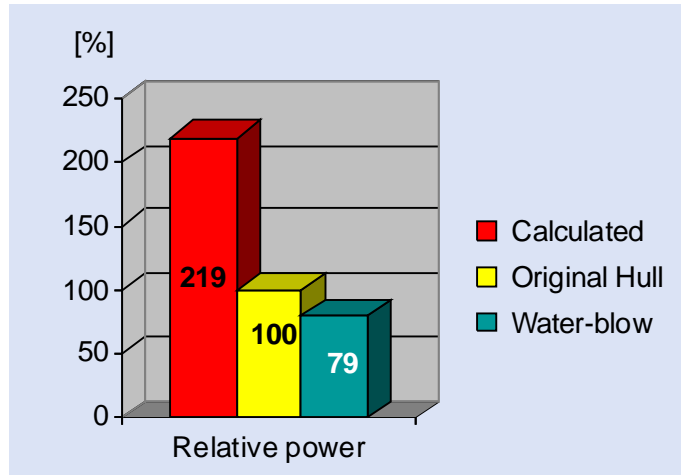
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The traffic ability study shows clearly the assistance time needed for different types of propulsion. Notice that DAS vessels did not need any assistance. Winter 2004 Baltic Sea.

The estimated total power at 5 knots speed in Finnish-Swedish Ice Class Rules 1A channel



The estimated relative total power at 5 knots speed in Finnish-Swedish ice-class Rules 1A Super channel



The total power reduction benefit with the help of the vertical thruster system in unfrozen and consolidated channels is up to 20%. The channels are defined by the Finnish-Swedish Ice Class Rules.

AARC has made a wide range of tests for various shipyards. Open water ships were improved to manage ice circumstances in the Baltic Sea without compromising open water efficiency.

vessels. Model tests with a standard tanker have demonstrated an increase of ice going capabilities of more than 10 % and for IA Super class of more than 20%, meaning similar energy and fuel cost savings.

"We are also in the process of developing a Combibow that works well in both ice and open water. There is a requirement from the market to develop solutions that are economical to use in both conditions," Mr. Mattsson reveals.

Next generation

Looking to the future, Mr. Mattsson believes the next generation of tankers, which will replace the existing ones in

the Baltic Sea, will be more self-going in ice and more fuel economical to use. AARC's target is to develop a concept that works well in ice and is economical in open water, without too high investment costs. STX Offshore & Shipbuilding of Korea has expressed interest in offering such AARC-developed tankers to the market.

"The operator always needs to balance investment with risk. How much is it worth to invest in ice going features, as the Baltic Sea is open for ten months a year and the problem is during 2 months? Is it worth taking the risk to be trapped in ice and delayed?"

Maritime traffic was seriously affected by record tough ice conditions in the area outside St. Petersburg last winter. Dozens of inbound and outbound vessels waited for icebreaker assistance. Icebreakers from other areas were called in to help; one of them was the Finnish-built nuclear powered IB Vaygach, the icebreaking capability of which was developed by AARC.

"When the Arctic oil fields increase production, there will be a need for more tankers for Arctic use. Now there are five ships built for Pechora and Varandey and it will not be enough. The following boom will come when drilling north of Alaska gets the green light. Ice there is up to 2-3 metres thick and includes multi-year ice floes so the tankers for that area will indeed be more in the need for an icebreaking bow, 40-50 MW power and Hybrid Aker Arctic DAS™-stern," Mr. Mattsson adds.



6th Arctic Passion Seminar

Following the success of previous Passion Seminars, Aker Arctic invited offshore and shipping industry key customers and friends to attend the sixth annual Arctic Passion Seminar in Helsinki in the beginning of March. The event gathered leaders from different parts of the world for a day of networking and sharing experiences.



Minister Alexander Stubb opened the day and emphasized Finland's commitment to active but sustainable developments for the Arctic.

Finland's Minister of Foreign Affairs Alexander Stubb (today Minister for European Affairs and Foreign Trade) opened the day recalling to the auditorium the Rovaniemi Process led to the establishing of the Arctic Council, describing Finland's initiatives among others for a high-level Arctic Summit as well as the recently adapted Arctic Strategy of Finland, which emphasizes Finland's commitment to active but sustainable developments for the Arctic.

Then followed the keynote speech about today's Arctic offshore challenges in Russia, where Mr. Mikhail Grigoryev emphasized the long term perspective and some technology gaps in the utilisation of the arctic hydrocarbon resources in Russia.

Mr. Dauren Madin, Chairman for Circle Maritime Invest in Almaty talked about the Kashagan Project and North Caspian Developments and especially about the role of Caspian Offshore Construction, which very recently had taken deliveries of the first "Mangystau" class Aker Arctic-developed ARC 104 icebreakers from STX OSV Braila shipyard.

The day was filled with interesting topics such as discussions on the Mandatory Polar Code, class rules for future Arctic tankers, demonstration model tests and examples of voyages on the Northern Sea Route. Read about the interesting voyage of SCF Baltica on the next page. ■



Frederic Hannon (left) of Total SA and Robert Tustin of Lloyds Register Asia



Viktor Rokhlin of Sovcomflot (left) and Göran Wilkman of AARC celebrated 30 years anniversary of their joint ice trials of IBs Kapitan Nikolayev and Kapitan Dranitsyn in the Kara Sea in 1981.



Vyacheslav Peresyepkin, General Director of CNIIMF, St. Petersburg, was congratulated for his 80th anniversary. Here with Mikhail Grigorev of GECON and Ilmari Aro of Finnish Transport Agency in the background.



Göran Wilkman (left) in discussions with Henrik Hannus of Aker Solutions, Catherine Jahre-Nilsen of Statoil and Leo Barendregt of Spliethoff. In the background Olli Kaljala of Bureau Veritas, Lasse Mäkelin of ABB and Andrew Bush of ExxonMobil Development Co (to the right).

SCF Baltica, a first-step in regular oil products trade to Asia



The vessel chosen for the voyage was SCF Baltica, an Ice Class 1A Super (Arc 5) shuttle tanker. Here escorted by Russian nuclear icebreaker Rossiya.

Source:
SCF Unicorn



Mr. Sergey Frank, President and CEO for Sovcomflot, is very enthusiastic about the new Finnish-Russian cooperation which includes joint development of ship designs for Arctic energy projects.

One of the main topics during the 6th Arctic Passion Seminar was the Northern Sea Route, its opportunities and its challenges. Mr. Sergey Frank, President and CEO of Sovcomflot told about the trip one of their tankers made from Murmansk to Cape Dezhnev in August 2010. This first "opening" has already led 41 other ships to follow.

SCF is a global leader in energy shipping and strategically positioned to provide seaborne services for Russia's growing offshore activities in the Arctic. The company wanted to make an experiment on the Northern Sea Route because of practical requirements of clients and the logistical potential of the route.

Risk factors identified

Prior to directing the bow to the north a risk assessment was carried out and major risk factors identified: vessel's construction, machinery and equipment; vessel's ice going ability with and without icebreaker support; weather and ice forecasts and transit window selection; reliability of available hydrographical data; aids to navigation performance; available communication facilities and reliable communications in high latitudes; crew experience in arctic ice navigation; additional training requirements;

available search and rescue facilities and ability to render emergency assistance.

"The vessel chosen for the voyage was the 117.000 tdw "SCF Baltica", an Ice Class 1A Super (Arc-5) shuttle tanker with engine power of 22.600 hp, service speed 14 knots and cargo parcel 70.000 tons of gas condensate. We also chose the best professionals for the crew and a very experienced Ice Management team," Mr. Frank told.

Normally all areas eastwards of Murmansk are excluded from insurance but "SCF Baltica" was granted coverage during the NSR passage as she has been designed and built for trading in heavy ice conditions.

Voyage summary

"SCF Baltica" left Murmansk on the 14th August 2010. In Kara Sea she faced no ice. Reaching the Yamal Strait there was tough ice and between Cape Zhelanya and Vilkitsky strait she was accompanied by icebreaker escort until Longa Strait. The estimated average speed between Vilkitsky Strait and Longa Strait was 7.5 knots but the achieved speed reached 8.7 knots.

"The voyage went well and the experience and statistical data collected will assist in optimisation of future logistical solutions for the Arctic. The sailing time compared to the Suez Canal is 40% shorter and resulted in 800 mt fuel savings and reduction in CO₂ emissions by 3000 mt," Mr. Frank said in summing up the benefits.

With the promising results from the voyage, SCF adjusted their programme for commercial voyages for 2011 and 2012.

"We are proud to have the best fleet available for harsh ice conditions. Our three Panamax-size tankers designed by AARC are used for shipping oil in Varandey without problems. The new oblique oil spill combat icebreaker has great potential in areas where there is risk for pollution e.g. Yamal. AARC is the leading organization in its business area and we are very enthusiastic about the new Finnish-Russian cooperation," Mr. Frank concluded his presentation.



During 2011 a new route North of the New Siberian Islands was established, where the water is deep enough to accommodate tankers with draughts of over 12 metres, and for the first time in history, the route was navigated by the Sovcomflot tanker Vladimir Tikhonov, a Suezmax ice class 1A vessel with a deadweight of over 160.000 tons. ■

New tools for Ice monitoring

AARC conducted ice monitoring in the Northeast Caspian Sea during last winter. Partnering with a local environmental company in Kazakhstan, AARC investigated ice conditions in a new area as a preparation for a client considering starting operations in the area.

At AARC ice data has been gathered for many years by doing ice expeditions and sampling ice on the spot. This is still very necessary for new areas to be exploited, but relatively good and cost effective results can also be achieved by remote long-term measurements. Last year was the first time when monitoring with both satellite images and underwater sonars were used simultaneously by AARC.

New services

"We develop our services all the time and this is something new we can offer our customers. Remote measurement over a long period is a good addition to our existing tool kit for customers wanting to have ice condition evaluations before starting to plan operations," says Mr. Mikko Elo, Project Engineer at AARC.

"Technically a similar method is to use laser profiling from helicopters or airplanes, which we have done before for example in the Barents Sea, Pechora Sea and Kara Sea. It gives good data of the ice surface profile for a certain time but does not tell us what is below the surface."

Oil companies need to have an understanding of ice conditions for several reasons. One reason is to be able to plan the right equipment for operations. Another reason is to ensure safe operations in the fragile polar areas.



Underwater sonars were installed at two different sites in the Caspian Sea. Picture Pekka Kosloff.

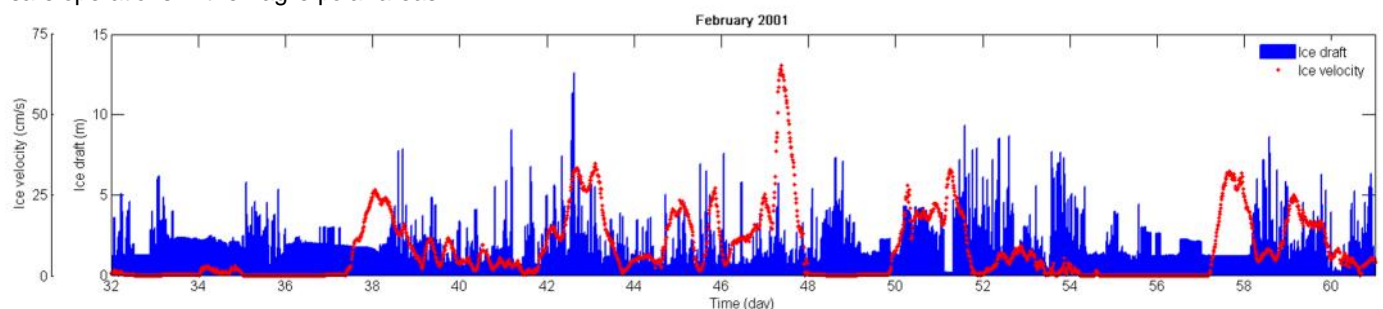
The third reason is governmental requirements, for instance Russia requires measurements from several different years before any permits are given. AARC has been involved in this process for example in the Shtokman and the Barents Sea areas.

"Last winter's ice monitoring gave a good overall picture on how the ice evolved and moved during one winter. From a researcher's point of view, the best combination would be to have sonar measurements over a longer period, laser profiling from a bigger area but a shorter period, satellite images for a longer period and short calibration ice measurement on the spot for a few consecutive years," Mr. Elo recommends.

Combining two methods

The North Caspian Sea has one of the largest offshore oil discoveries of this decade. With its shallow waters and harsh ice conditions, it is a challenging

and fragile area which needs to be mapped out before starting any operations. The ice monitoring project AARC undertook in the Kazakhstan waters was divided into two parts: satellite image analyses and underwater ice profiling with bottom-mounted upwards looking sonar moorings. AARC teamed up with the Finnish Meteorological Institute, one of the world leaders in ocean and ice monitoring as well as in satellite image interpretation. For the underwater ice profiling AARC decided to cooperate with Canadian company ASL Environmental Sciences, which makes instruments for measuring ice thickness and movement and prepares corresponding analysis reports. "The underwater sonars were installed at two different sites in November 2010 and taken up again in April 2011. The satellite supervision lasted from December until April. The data gathered from the sonars was then combined with data from



Typical sea ice draft and velocity time series in the Beaufort Sea in an area of about 200 m water depth. Ice draft and velocity are recorded with moored upward looking sonar and ADCP. Data from National Snow and Ice Data Center.

satellite images in order to get a full understanding of the ice situation, ice thickness and ice movements during the winter," Mr. Elo explains.

The Finnish Meteorological Institute was responsible for the satellite images.

"For these we used three types of satellite images; all available MODIS satellite images (visible light instrument), SAR images (Synthetic Aperture Radar) and high-resolution visible FORMSAT-2 satellite images. The first purpose was to have a general overview of ice conditions over the entire area. The second purpose was to study the extent of the ice coverage and ice concentration, and the third purpose was to monitor ice ridges, and especially grounded ridges. From the images areas with ridges could be seen around areas of interest," says Mr. Ari Seinä, Head of Ice Research, Finnish Meteorological Institute.

Good results

"The underwater sonars measured water current, ice movement and ice thickness profiles. The data from both locations is very similar, which means that the results are reliable and can be extended to cover a bigger area. Analysis of the data gathered by the sonars gives a good picture of the ice thickness and ice movement. We were able to identify the size of the ice ridges. From the satellite images we get an overview on how the winter proceeded in the area," Mr. Elo tells about the results.

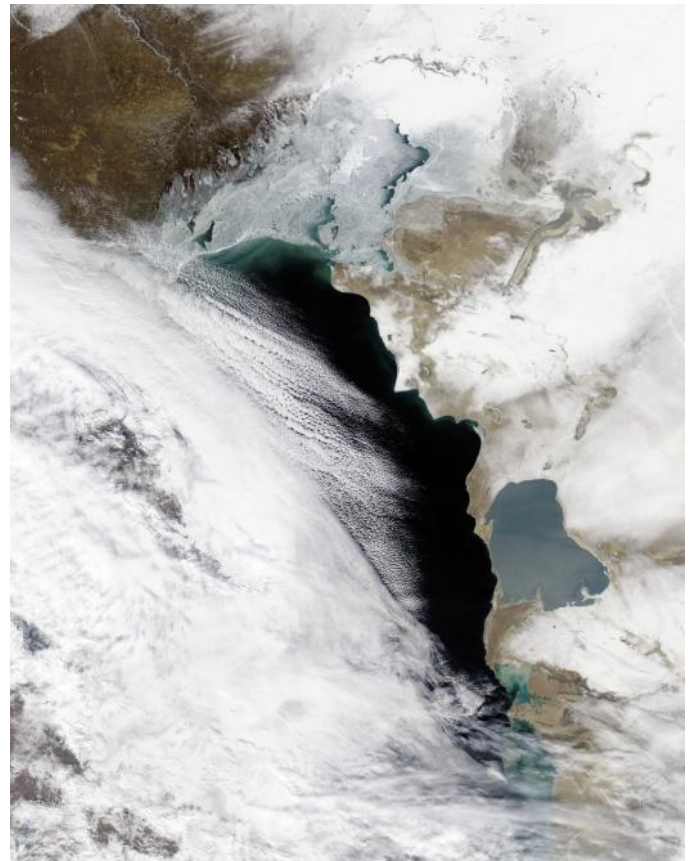
Satellite image of the Caspian Sea from the MODIS instrument. Picture NASA/GSFC, Rapid Response.

"By combining these two methods, the picture of one winter is good. In order to reach a better understanding of the yearly variation, the same should be done for a few consecutive years. For even better results, I believe an expedition to the area should be done to measure and sample the ice. Then also data from mechanical properties of ice and structure of the ice ridges would be available. It would give us a reference value to compare with satellite and sonar measurements." ■



Mr. Mikko Elo works as a project engineer at AARC and started his career in the

company ten years ago. He is responsible for the company's ice database and also participates in ice model testing and projects related to ice management and dynamic positioning in ice as well as theoretical calculations for shipbuilding. Mikko graduated from the Helsinki University of Technology and spent one year of his studies at the University Centre in Svalbard specializing in arctic marine technology.



FMI and AARC partner in Arctic research

The Finnish Meteorological Institute is a leading expert in meteorology, air quality, climate change, earth observation, marine and arctic research areas. The main objective is to provide the Finnish nation with the best possible information about the atmosphere above and around Finland, but FMI also offers expertise services for commercial use. AARC has been cooperating with FMI on earlier projects, e.g. on Yamal Peninsula, where the customer needed to find out locations for a potential harbour, and this was done by field measurements and satellite data based study. In the Caspian ice monitoring project FMI

was responsible for the satellite data and also participated in deployment and recovery of bottom-mounted sonar moorings in the Caspian Sea.

"The cooperation with AARC was very good for us as we could both widen our knowledge area and explore a new place for us, the Caspian Sea. We are happy to continue with new challenges with AARC," says Ms. Riikka Hietala, Head of Marine Technology Services, FMI.

At the end of last year FMI inaugurated its own satellite image receiving station in Sodankylä, North of Finland, which further enhances FMI's abilities in this area.



Riikka Hietala and Ari Seinä are working with arctic research at The Finnish Meteorological Institute.

Expanding into ice propulsion

From August Mr. Kari Laukia has been the new Design Manager at Aker Arctic Technology Inc. He is responsible for engineering and consulting and continues the work of Mr. Karl Hamberg, who stays with AARC as part-time Senior Advisor, Ship Design and IPR. Mr. Laukia has a strong background in design and project management and thirty years of experience in the shipbuilding industry, especially Arctic vessels. This gives AARC new opportunities in the ice propulsion business area.



Nuclear icebreakers

"I started my career as a propulsion design engineer at the Helsinki Shipyard in the beginning of the 1980's. I graduated from Lappeenranta University of Technology in 1984. At that time, there were many ship prototypes on order, which was really exciting for a young engineer. I started with propulsion dimensioning and vibration calculations especially for ice going ships. I was

involved in developing, for example, a series of river icebreakers and became gradually the chief designer for this area. One important project going on at that time was developing the Taymyr nuclear icebreaker for a Russian customer," Mr. Laukia recalls.

Azipod® creation

Wärtsilä Marine was founded in 1987 and Wärtsilä Arctic Sea Transportation

with an ice model testing facility (called WARC) was one of the business units responsible for developing Arctic solutions. Kari Laukia became the chief designer responsible for developing propulsion units for arctic ships. Masa-Yards continued the business after Wärtsilä stepped out from shipbuilding and Mr. Laukia started to develop the azimuthing propeller unit today known as the Azipod®.



Kari Laukia was part of the project team that developed Taymyr nuclear icebreaker for a Russian customer in 1980s.



"I was responsible for the technical development. We saw the potential of the product and started to develop it for commercial use. A large TEKES and Eureka-project with partners from different parts of Europe was created in order to secure enough resources and the best available technology at that time."

As a result of the success with the prototype the first contract was realised with Nemar Shipping Company and the tanker Uikku became a piloting project with an 11,4 MW propulsion unit with high ice class. Kari Laukia was responsible for the project. Results from the piloting project were excellent so a new business unit called Kvaerner-Masa Azipod was created and Mr. Laukia became the Design Manager of the unit in charge of design and delivery projects.

"We started to sell Azipods together with ABB and the breakthrough came when Carnival Cruise made an order for cruise vessel "Elation". More and more orders came as cruise vessels and ice going vessels started to use the Azipod® and in 1997 ABB took charge of the product. I continued my work as Manager of Design and Projects at ABB Azipod Oy."

After working more than ten years in Azipod development, in 2001 Kari Laukia took on new challenges and went to McGregor's division in France to lead the contract management department until Kone four years later bought the division. He worked for and founded Kone Marine elevators division in Hyvinkää. Mr. Laukia became the New Equipment Business Director in Marine Division until he now returned to Aker Arctic Technology Inc.

Expanding business at AARC

"I have a history of successful product development projects which have resulted in new commercial products. In addition to good teamwork one of the keys to success is listening to our customers. By doing this we can concentrate on the main things and even find new business opportunities we should start to develop. In addition to our normal business we should always think about new business possibilities," Mr. Laukia tells about his plans at AARC.

One of the main issues is to ensure that new product concepts, which AARC develops for new areas such as Yamal and Baffinland, are reliable and workable. Especially in propulsion we have to extend our present portfolio due to high ice classes and powers. I hope that my experience in this field will help to develop the concepts.



The projects are economically so huge that there is simply no room for mistakes."

Another important task for Mr. Laukia is to ensure that the older generation of experts at AARC transfer the knowledge they have to the younger experts before retiring. This is part of the project Arctic Horizons that AARC initiated 2010. (see page 16)

Mr. Laukia led the development work for the azimuthing propulsion unit today known as the Azipod®.

"Uikku was a huge leap in this technology and development of Azipod business. We could not just scale the design up because the jump from first prototype 1,5 MW unit to 11,4 MW heavy ice class unit was huge. By using the best technology available in the market we were able to achieve all our goals in the project," Mr. Laukia says. After 20 years vessels such as Varzuga are still trading successfully in the northern waters.

The U.S. polar icebreaker Healy. Mr. Laukia and his team used the experience of Taymyr design and operation when designing the propulsion system for this ship which was built at Avondale shipyard in the U.S.

Kari Laukia believes we should challenge the way we work every day and search for new ways to do things in order to work more efficiently.

"The best part of this work is to see results so clearly. When things move on and our customers come back again with new challenges we know that our team did a great job!"

In his free time Mr. Laukia enjoys ball sports and family time. He plays badminton in winter with his old friends from the University and golf in summer ■

Openings in new areas

Aker Arctic has recently been assisting various propulsion system providers like Rolls-Royce, Steerprop, ABB, Wärtsilä and Thrustmaster in their development of high ice class thruster units. Recently another co-operation agreement was signed with Tevo Oy in Turenki, Finland, which lies some 100 km north of Helsinki.

TEVO delivers NiAl bronze-cast custom and fixed pitch propellers. Propellers are tailor designed based on basic data from the client to reach optimal performance on functional parameters and comply with permitted noise and vibration values. Casting, machining and grinding are carried out at Tevo's Turenki works in Finland. The max weight of the propellers delivered so far is 33 tons and max diameter up to 7 meters, but after commissioning of the newly acquired heavy-duty carousel lathe Tevo will be able to fabricate propellers up to 10 meters in diameter and 60 tons in



finished propeller weight. The new carousel lathe is one of the biggest in Scandinavia. The facility extension has been incorporated into the propeller unit complex. In order to increase lifting capacity, a 100-ton bridge crane with a lifting height of 13,6 meters has been mounted in the extension part. AARC will assist Tevo especially in the higher ice class propeller designs and developments.

A generation of knowledge to transfer

One of AARC's key assets is its human capital and the know-how based on the staff's lifetime experience in ship design, ship building and ice technology. In order to prepare the new generation of experts, AARC initiated a project on how to transfer the accumulated "hidden" knowledge so that it stays available in the company when experienced key personnel retire.

The project, named Arctic Horizons, started almost two years ago with identifying potential future leaders. The employees were tested to identify individual assets and potential as well as training needs in order to reach their potential in the future. A consultant was called in to support the project and make sure that the schedule was kept.

Real projects to work with

As part of the process, it was agreed to form three project teams around real development projects that had been on the agenda for a while. The project teams consisted of the younger generation of AARC experts, while the older generation experts acted as sponsors and mentors. Each project had a sponsor that set the goals and supervised the progress and every participant had the opportunity to discuss matters with a mentor and at the same time learn from the mentor. Every project group distributed the tasks among the participants so that everyone had a share to take responsibility of. The purpose was to get familiarized with project work as most of the work at AARC is formed around projects, and to learn how to use the expertise available in the company. At regular intervals sponsors and project groups met up for guidance and to assess how the projects advanced.

The projects chosen were: Multi-model test program, ARCHULL™ branded design project and Knowledge Base-files management project. The Multi-model test program meant that the group was to find out how several vessels can be



Teambuilding events are regularly arranged to increase networking among staff.

tested simultaneously in the ice basin and how this can be done with remote controls, i.e. without cables.

The ARCHULL™ design project dealt with performance guaranteed service packages for developing hull-propulsion combinations for customers. The Knowledge Base-project's target was to find systematic documentation procedures for new and old know-how.

In addition to these projects, four training sessions were arranged for the entire staff. Every training session lasted one and a half days and focused on a key strategic issue. Mentorship training was also part of the training days' programme. One of the key values at AARC is to listen to the customer and understand the customer's business. Therefore the customer based mindset was a topic that was emphasized throughout the training

and several key customers, like ExxonMobil, Sovcomflot, Transatlantic, Kone Marine and Elomatic were pleased in attending and describing their expectations from AARC teams.

Tools for the future

"The Arctic Horizons project was successful and we all learnt a lot from it. The younger experts learnt how to work in a team and take responsibility for a project and how to utilize the knowledge assets of older experts. We learnt how to use mentorship as a tool for transferring know-how within the company. Now we will continue and enforce this way of working and at the same time support efficient leadership roles," says Ms. Kirsi Rosenström, Manager Finance & Administration and HR, responsible for the Arctic Horizons project.

Senior Consultant Ann Wallén-Fogde, who helped AARC with the project, thinks the simultaneous development of key individuals and the strategic development of the company worked well at AARC.

"We were aiming for an individual impact as well as an organizational impact. The idea of action learning in knowledge transfer is to learn through challenges. During the process individuals grew for the benefit of the company and through the real projects we were able to develop some of AARC's core capabilities for the benefit of both the company and its customers."

"According to customer surveys, what our customers value most in AARC is our extensive know-how of our business but also of our customers' businesses. It is important for our customers to know that we will keep up this know-how in the future. Every project is unique and there is no ready-made solution. Our challenge is to always find the best solution for our customers, today and in the future," Ms. Rosenström emphasizes. ■

Ms. Kirsi Rosenström is responsible at AARC for Finance and Administration and also for human resources. Before joining AARC she worked with capital markets in a stock broker company until she decided to change career and went to study economic administration at the same time that her first child was born. After her maternity leave she worked with finances in several companies until she joined AARC when the company was founded. Kirsi has built up the financial systems of AARC and now that everything is working she is concentrating more and more on human resources, which she finds a very interesting new challenge. Workdays tend to be quite long, but Kirsi makes sure to schedule outdoor and sports time as well as time for her teenagers at home.



Trimaran gives high potential for cost-efficient icebreaking

One of the latest innovations in icebreaking is the use of a trimaran concept. AARC conducted recently screening studies with Mobimar Ltd and Finnish Environment Institute for assessing the suitability of the concept for oil spill combating in icy waters. The results were encouraging. After having found the right location for the side hulls, a preliminary icebreaker concept was created and tested. The surprising conclusion was that a trimaran was able to operate in thick ice conditions,

the concept was able to create a rather clean channel twice the width of a channel of a traditional icebreaker, but with the same propulsion power! The penetration astern through ridge fields did not either create any problems for the concept. Therefore the way forward has already been made; next phase will be development of two AARC designs, one for oil combat icebreaker, the other for special dry cargo movements in the Baltic Sea and Arctic waters. Possibility for a seismic vessel will also be looked at.

Offshore patrol vessel for the Finnish Border Guard

An LNG fuelled icebreaking offshore patrol vessel will be built for the Finnish Border Guard.

In December 2011, the Finnish Border Guard awarded to STX Rauma shipyard a contract on construction of a next generation offshore patrol vessel for delivery in November 2013. The highly advanced vessel will be 96 meters long and 17 meters wide and will be capable of serving a large variety of functions. The main duty of the offshore patrol vessel is to operate in open sea patrol. In addition to ensuring border safety and serving defence purposes, the vessel will be used for prevention of environmental damage, search and rescue, and different underwater assignments. The vessel is capable of operating in Baltic Sea ice conditions.

The Finnish Border Guard and the Finnish Environment Institute (SYKE) launched this project together and had earlier commissioned Elomatic in partnership with Aker Arctic for the feasibility verification and the concept design work.

The vessel complies with the client's functional specifications of excellent seaworthiness, sufficient speed (about 18 knots), efficient surveillance and communication capacity, efficient self protection and outfit for the special tasks, ability for oil spill collection also in winter conditions, capacity to collect and carry 1200 m³ of recovered oil/chemicals, capability to operate in a chemical disaster, emergency towing capacity up to 100 tons, provision of helicopter landing facility and launching and lifting of auxiliary craft in demanding sea states.



Aker Arctic assists Royal Wagenborg with icebreaking support vessels

Aker Arctic has assisted Royal Wagenborg in the development of their next generation of Shallow Draft Ice Breaking Multi-Purpose Support Vessels (IMSV) now under construction.

Royal Wagenborg is currently constructing a pair of new ice breaking multi-purpose support vessels, *Sanaborg* and *Serkeborg*, at their Group yard Royal Niestern Sander in Delfzijl. These vessels are based on a platform design intended for operation in harsh weather and shallow ice-infested waters such as Wagenborg Kazakhstan B.V. encounters in the North-Caspian Sea. Aker Arctic

has assisted Royal Wagenborg in the early phases of the development of the platform design especially for the stem-first ice-breaking hull form and propulsion system, which will consist of two Wärtsilä developed 1,75 MW IcePods. The two new vessels are a further development based on the *Arcticaborg* and *Antarcticaborg*, which have been operating successfully for more than 13 years in the Kashagan project in the Northern Caspian waters. The new vessels, able to break 60 cm of level ice, have a length of about 70 meters, breadth of 14,0 meters and design draft of 2,5 meters.

Multi model testing started

The first multi-model tests at AARC have been conducted successfully. In multi-model tests battery driven models are used and measurements are made remotely



Silverburn's IBSV *Arctic* to start Caspian operations this year

The *Arctic* is currently under construction at Sefine yard in Turkey and is scheduled for delivery in third quarter of 2012.

Today Silverburn operates a fleet of 25 tugs and 17 barges and four river cruise vessels as accommodation units in the Caspian. Since the building of the *Tarpan* and *Tur* in 2009 and 2010 Silverburn has been developing plans for a new class of very shallow draft AHTS vessels working down to 2.5 meters operating draft. Together with Ijmuiden-based OSD-Holland



a design for a very robust and simple to repair AHTS with Ice Class 1A performance was created. She can work in 70 cm of ice, has significant load carrying capability on a shallow draft and 50

tonnes bollard pull. Main dimensions are Loa 49.6 m, beam 16.5 m, seagoing draft 3.9 m, shallow draft 2.5 m. Aker Arctic conducted the ice model tests and provided invaluable feedback and assistance in finalising the hull form for good sea keeping ability through clever design features, as well as in refinement of propeller, rudder and bow thruster arrangements. The vessel is fitted with two 1.6 MW Cummins high-speed diesels and Berg ducted c.p. propellers.

Aker ARC 104 Caspian Tug series delivered



Mangystau-5, the last vessel of the Caspian shallow draught icebreaking tug series, at the STX OSV SA Braila shipyard in Romania.

Aurora SLIM for monitoring of the Arctic seas

The research icebreaker *Aurora Borealis*, developed under the European Union's four-year project ERICON, ended up too costly to construct and has now been trimmed down by Aker Arctic without compromising on any scientific goals.

Global climate models demonstrate the sensitivity of the polar areas to changes in the ocean/climate system. In spite of the critical role of the Arctic Ocean in climate evolution, its long-term environmental history and tectonic structure is poorly known, which is also relevant for the field of hydrocarbon exploration.

Three vessels in one

The research icebreaker *Aurora Borealis* has been planned to be a novel research icebreaker with no national or international competitor. The design of the *Aurora Borealis* integrates the concept of three different vessels, a research vessel, a drilling vessel and an ice breaker into one vessel, making her a new state-of-the-art polar research drilling vessel capable of operating year-round in all Polar Regions.

Cost-efficient version

The European Research Icebreaker Consortium (ERICON - AB) project, funded by the European Commission, started in 2004 with a technical feasibility study and later Wartsila Ship Design Germany started to work on the conceptual design of the ship and develop a scientific and technical layout of the research vessel. The design, however, appeared to be very costly, a cost estimate of up to 800 M EUR was



The construction of Aurora SLIM as a joint European research icebreaker for the Arctic would strengthen European polar research and Europe would contribute to meet the Arctic drilling challenge with in IODP and retain its top position in Arctic research.

presented, which led European Commission to drop the project. However, as a lot of good results had been achieved in other parts of the project, the ERICON-AB Stakeholder Council in 2011 asked Aker Arctic to study the possibilities for a more cost-efficient version for the task. Having received a positive response from ABB for the possibility to use PC1 ice class pods in the concept AARC created a "slim" version for the vessel and ended up in a cost estimate under 500 M EUR, without compromising any of the scientific goals. The performance of the *Aurora SLIM* in 2.5 m of ice was verified by model tests in



The Aurora SLIM by Aker Arctic is operated on the Aker Arctic DAS™ principle.

early 2012 and the definition documentation is now underway for the Consortium and European Commission. The *Aurora Slim* by Aker Arctic is operated on the Aker Arctic DAS™ principle, is based on triple 15 MW pods and has a displacement of only 42.000 tons instead of the old 65.000 tons. Similarly the installed power has been reduced from 101 MW to 58,5 MW.

Yamalo-Nenets perspectives

The reserves in the Yamalo-Nenets Autonomous Region of Russia play a vital role in the development of hydrocarbon resources in the world and will offer coming generations working fields for centuries.

In order to develop business opportunities, Russian and Finnish governments have established working groups within the governmental commission for economic co-operation, one of them with Yamalo-Nenets region. The chairman from the Finnish side for this working group is Mr. Mikko Niini, Managing Director of AARC. The co-operation partners met last fall in Salekhard by River Ob at the northern polar area to discuss how to diversify local businesses and how Finnish companies could participate in new oil and gas projects.



A visit was also paid to the new area museum, which displayed mammoths found during construction work at the new oil sites. A recently found well pre-served baby mammoth has received special attention, in the picture next to the working group's secretary Martta Halonen (Ministry of Economy and Employment of Finland).

Ice load measurements on propeller blades

Aker Arctic, in co-operation with Marin of the Netherlands, has successfully carried out unique measurements of ice loads acting on the propeller blades.

Ice loads have been generally described in literature and have been investigated in model and full scale in the past, but a clear definition and understanding of the most important physical phenomena has still been lacking. Contrary to hydrodynamic loads it is clear from interviews with captains and experience from ice going vessels that wrong use during operation

can easily overload and damage the equipment.

The two-year project set up within the Marin CRS-consortium is aiming to improve the technical designs and provide operational guidelines for propulsion systems, specifically for azimuthing propulsors, but also for propellers in general. The ProPolar project strategy is to develop new experimental results from ice model testing which can be used to validate and improve the developed analytical methods, as well as to provide new testing possibilities.



The measurement team after the successful results at AARC laboratory with the instrumented thruster unit in the centre. From left to right: Joris Brouwer, Gerco Hagesteijn, René Bosman (Marin), Petter Öhman, Tom Mattsson (AARC), Harry Siebers (Marin) and Reko Suojanen (AARC).

Arctic on the environmental agenda

Arctic topics are a high level interest in many countries and especially for authorities responsible of environmental issues. Mr Sergey Donskoy, Deputy Minister, Ministry of Natural Resources of the Russian Federation, paid a visit to AARC and wanted to discuss the possibilities of new technological advances in the exploitation of the Arctic natural resources.

In the picture from left Mr Igor Pankov of Sovcomflot, Dr Mikhail Grigoriev of GECON and Deputy Minister Sergey Donskoy. Recently Prime Minister Vladimir Putin appointed Sergei Donskoi as the new Director-General of the state corporation Rosgeologiya.

Rosgeologiya is planned to become a strong and competitive player both on the Russian and international markets.

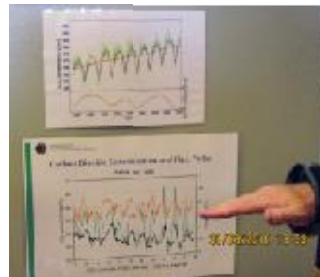
It will focus on exploring mineral resources, especially in promising areas, including offshore regions.



Briefing on climate change

Last spring the Finnish Meteorological Institute (FMI) invited their partners- among others AARC- and heads of staffs in various ministries of Finland for a briefing on global climate change. The Sammatunturi station is considered to be the cleanest place in Finland (located on the 68th parallel)

and has been selected as one of the global observation points to measure the carbon dioxide in the atmosphere. The graph over the last fifteen years (on top in the picture) clearly demonstrates the current trend which governments are trying to stop.



Meet us here!

We will participate in the following events:

16.-27. February

Ice Day 2012 Conference

Ivalo, Finland

26.-28. March

Russia Offshore 2012

Moscow, Russia

17.-18. April

Northern Maritime Challenge

Helsinki, Finland

24.-27. April

Arctic Shipping Forum 2012

Helsinki, Finland

30. April - 3. May

OTC 2012, Offshore Technology Conference

Houston, USA

23.-25. May

Arctic Oil & Gas North America

St. John's, Canada

17.-22. June

ISOPE 2012

Rhodes, Greece

25.-29. June

Neftegaz

Moscow, Russia

17.-20. September

Icotech 2012

Banff, Canada

3.-5. December

Arctic Technology Conference

Houston, USA

Networking in Finland

AARC employees' recent teambuilding trip was a study trip to the Finnish cities of Rauma and Uusikaupunki to get acquainted with other actors in the shipbuilding industry.

The bus left Helsinki early morning on the last day of May and the first stop was Steerprop Ltd., an AARC co-operation partner manufacturing azimuth propulsion systems for maritime and offshore industries. The interesting tour of the factory showed their state-of-the-art facilities and latest products. Next on the programme was a visit to Rauma Shipyard, which belongs to the same STX group as AARC. Being part of the same group does not mean knowing each others' work and therefore visiting is an important part of networking. The passenger ferry *Spirit of France* was almost ready and AARC employees were shown the beautiful ship. A South-African Antarctic research and supply vessel is



Oil and chemical response vessel Louhi was built by Uki Workboat Ltd, one of the hosts for AARC employees teambuilding and study visit. During the vessel trials AARC staff conducted field ice measurements.

also being built at the shipyard and seeing this was even more interesting as model testing and calculations were made at AARC during the design stage of the ship. The ship will be a multi-purpose vessel, operating as a supply and research vessel, icebreaker, expedition vessel and as a passenger ship. The ice-strengthened vessel will be ready for delivery and ice trials in which AARC will attend in spring 2012.

After a bus ride to the city of Uusikaupunki, a visit to Uki Workboat Ltd. showed an unbelievable example of entrepreneurship. Uki Workboat manufactures highly advanced vessels for professional use with a small staff

and a lean organisation. For instance their oil and chemical response vessel *Louhi* commissioned by SYKE, the Finnish Environment Institute, has won international recognition.

Louhi represents state-of-the-art technology in responding to marine oil and chemical spills. It is able to collect oil from the sea in open waters in higher waves than any of Finland's existing response vessels and also in ice conditions with the aid of its stern-mounted SYKE brush skimmers.

Last but not least the group enjoyed a nice dinner together before returning to Helsinki.

Rowing Team gathered at Sulkava

Aker Arctic has its own rowing team, which participates in two big rowing events every year; the Sulkava and the Kulosaari rowing events. The most experienced team member had his 23rd race at Sulkava.

The yearly Sulkava rowing event gathered AARC employees in July for the 7th time. Participants came directly from model tests, from vacation trips, summer cottages and leisure boats to spend a day of sports and fun together before returning back to their vacation.

The Sulkava rowing event is one of the major summer events in Finland and is held every July in the Lake Saimaa district. The popular event gathers today close to 7.000 participants. The boat is a traditional Finnish wooden boat style, 12 meters long and 2 meters wide, which



people used as transportation to church in earlier days. The distance in the event is about 60 km and each team has 15 members.

"This year AARC's rowing team participated in a race, which started on Saturday morning. Expectations were a bit mixed as the previous participations have been in the evening races, when the weather has been somewhat cooler," Mr. Göran Wilkman, Manager Research and Testing Services, AARC, tells about the event. "The air temperature was around

+30°C and fortunately the sun was hiding most of the time behind thin clouds, which helped. However the race was exhausting and drinking enough liquids became more essential than ever."

Mr. Wilkman is the most experienced participant of the team, having challenged the waters at Lake Saimaa 23 times! He thinks the end result was rather good considering the circumstances: 5hours 27.5 minutes and 40th place out of 96.