Aker Arctic Technology Inc Newsletter September 2012

# Arctic Passion News

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Photo: Yantar JSC/Arctech

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## Announcements

**Tatiana Aaltonen**
*replaces Jana Vamberova as Management Assistant during Jana's maternity leave until spring 2013.*

**Artur Nerman**
*joined AARC in May as Hydrodynamic Engineer.*
*He graduated in January 2012 from Aalto University specializing in Marine Technology.*

**Elena Tsvetkova**
*has been appointed Marketing and Sales Assistant. She was born in Russia and has graduated as an engineer from Finland's Mikkeli University of Applied Sciences in 2002 and from Helsinki Institute of Marketing in 2007.*

***Riikka Matala***
*has in September been appointed Research Engineer in the testing department. She is completing her studies at Aalto University and finalising her thesis work on ice pressure .*

# Towards new environmental challenges

We are living in an era where environmental thinking and new policies are revolutionising the world shipping framework and setting new challenges, especially for the winter navigation. Only a few weeks ago the European Parliament adopted the IMO MARPOL Annex VI resolution on SOx emissions reduction to 0,1 % for the ECA areas, including the Baltic and North Seas, from 31.12.2014 onwards and to 0,5 % for other European areas from 31.12.2019 onwards. Similarly NOx emissions are pushed down by the Tier III regulations, valid from 2016 onwards.

It is not too many years ago that the strive for higher ship speeds in new ship design was very important. A containership with a 20 knot service speed was overridden by another with a 21 knot service speed, an so on, but the escalating price of fuel eventually brought this race to an abrupt halt. Now all operators are slow-steaming their ships.

Today, commercial, regulatory and environmental imperatives dictate that fuel efficiency is the new bible for naval architects and marine engineers. The challenge is to mitigate the impact of rising fuel prices, meet impending international regulations and to make sure that shipping improves even further on the already excellent record as the most environmental-friendly mode of transportation.

Nobody in the shipping community can be unaware of the breakthrough adoption, in July 2011, at IMO's Marine Environment Protection Committee (MEPC), of mandatory technical and operational measures to reduce greenhouse emissions from international shipping. The new regulations will make mandatory the Energy Efficiency Design Index, or EEDI. The regulations will apply to new ships and are expected to enter into force on 1.1. 2013.

This is an opportunity for world shipping to bring their effort into sharing the principles of the Kioto 1997 Protocol, which entered into force February 16th, 2005 after Russia's ratification.

Aker Arctic has already produced its first LNG fuel driven vessel design. This example clearly proves that we are on the brink of a new era in energy efficiency and environmental performance - and that shipping can help lead the way forward.

The new regulations and environmental standards are quite a challenge to winter and Arctic shipping as breaking of ice always used to call for added power. Therefore new innovative solutions are needed, not only for traditional shipping, but especially for ice going vessels, where totally new energy-efficient solutions will be in high demand. At Aker Arctic we have put our brains together to bring new solutions; the DAS™ concept is known for the 40% energy saving, as is the high efficiency of the trimaran mode for icebreaking. A new ICE-ECOtanker is also being introduced to the shipping community soon, as another example of AARC's innovative search for new concepts in this work.

*Mikko Niini*

*Front cover: Mangystau 2 is one of the five Caspian icebreaking tugboats that Aker Arctic has developed and designed for STX OSV AS, who delivered the series successfully to Caspian Offshore Construction group of companies in Kazakhstan. The tug's normal icebreaking capability is 0,6 m level ice, which was verified in recent full scale ice trials (see page 6).*


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# First Chinese polar research icebreaker

## Aker Arctic has been selected for the conceptual and basic design of the new Polar Research Vessel for China


A plan has been organized by State Oceanic Administration (SOA), China, Chinese Arctic and Antarctic Administration (CAA) and the Polar Research Institute of China (PRIC) to build an advanced new icebreaking research vessel to meet the increased need of polar scientific research.

### Advanced equipment

The new vessel will be equipped with advanced scientific equipment for polar oceans research. The integrated survey systems include marine geological and geophysical equipment and marine biological and ecological instruments. Meanwhile, helicopters with associated systems will also be provided.

For the integrated environmental science programs the vessel will have marine and atmospheric observing and sampling capabilities closely related with climate change monitoring. The marine geological and geophysical capabilities will give possibilities for seasonal polar marine geology, marine gravity, magnetic and seismic surveys. For marine biological and ecological programs the vessel will enable marine organism and ecological surveys and act as a biological research platform. The vessel may also be used for Antarctic station logistic tasks undertaking some of M/V Xuelong's missions especially in heavy sea ice conditions.

### Second governmental icebreaker project

Aker Arctic has been selected to perform the conceptual and basic design of the new vessel. This is already the second governmental icebreaker project in a short time for Aker Arctic and thus a proof of the increasing interest in the Arctic areas and the need for reliable and efficient vessels. The design is expected to take 7 months to complete. The contract value exceeds five million euros.

The polar research icebreaker for China will be designed to accommodate a total of 90 persons and will have a length over all of about 120 meters, a maximum breadth of 22,3 m and draught of 8,5 m. The vessel will have the ability to break through 1,5 m of level ice at 2 to 3 knots speed, including multi-year ice. The vessel will be fitted with twin azimuthing propeller drives. Ice class will be PC3 and the vessel will have dual classification from China Classification Society (CCS) and Lloyds Register (LR).

### Long traditions in shipbuilding co-operation

China and Finland have quite deep and long traditions in shipbuilding co-operation.

Very few still remember that Finland was among the first nations to open foreign trade relations with China in the early 1950s, one of the highlights being a number of contracts from China for six 3.200 ton general cargo steamers with our Turku shipyard, the vessels being delivered between 1955 and 1957.

”Several efforts to intensify the co-operation were made over the years. At the end of the 1990s our President Martti Ahtisaari made an official state visit to China. We then initiated and carried out several years of discussion on technological co-operation on LNG carriers with various Chinese organisations, including three shipyards, all of them with whom our shipyard group in Finland signed co-operation agreements.”

”A breakthrough, however, was reached on the more icy front. Under the framework of the Technology Co-operation between our Governments a deal was reached for model tests for a Floating Production Unit, which had the challenge to operate in the freezing Bohai Bay. Model tests were conducted in Finland and the ice problems were solved. This project already showed the strength and depth of the Finnish expertise in ice technology.” says Mikko Niini, Managing Director of AARC. ■

*“This contract is very important for solving the increasing needs of polar scientific research. As the first polar scientific research icebreaker for China, its successful design and build will not only push forward our polar scientific research career by achieving more successes, but will also make great development on Chinese ship construction industry", says Mr.Qu Tanzhou, Director General, Chinese Arctic and Antarctic Administration of State Oceanic Administration.*
*“The award is a significant milestone for the Finnish icebreaker design and construction expertise”, says Mikko Niini, Managing Director of Aker Arctic Technology Inc. “Working currently already for the Canadian John G. Diefenbaker polar icebreaker, this contract in China is a clear evidence of our global role in the development of advanced Arctic technologies and solutions".*

# M/T ENISEY - one more DAS™ Arctic tanker in service

As the first step in their export logistic system renewal six years ago JSC GMK Norilsk Nickel took delivery of the first unit of a new double-acting ship that was developed by Aker Arctic. The first unit MS Norilsk Nickel was built in Helsinki at the yard now known as Arctech Helsinki Shipyard. The success and the benefits of the first unit operating independently without icebreakers in the astern mode were so evident that the company decided to build four more of these 14.500 tdw vessels. The Monchegorsk, Zapolyarny, Talnakh and Nadezhda were completed under an Aker Arctic licence in 2008 and 2009 from Aker-Yards in Germany (today Nordic Yards).

Today these vessels already have a long cumulative service record on their route from Dudinka (Yenisey River) to Murmansk and Archangelsk, demonstrating average transit speeds of close to 10 knots in the Kara Sea winter season while operating without any icebreaker assistance.

According to Norilsk Nickel statements, the savings with the new astern working vessels built to ice class Arc7 were so high that the investment costs in fact were paid back in three years when comparing to the costs of the old logistic system based on the use of the SA-15 type multipurpose vessels with icebreakers.


*MT ENISEY loading gas condensate in Dudinka.* Photo: Norilsk Nickel

A long term monitoring and data collection system was installed onboard MS Norilsk Nickel and valuable and unique ice impact data has been collected over the years. These records have been the basis of developing new Aker Arctic DAS™ concepts - like the Yamal LNG carriers - and new more powerful ABB Azipods up to Arc 8 and PC1 ice classes.

The satisfaction to the patented Aker Arctic DAS™ concept performance has been so high that JSC Norilsk Nickel last year took delivery of the first tanker MT ENISEY, which is built into the same hull and machinery concept giving a deadweight of 15 344 tdw in Arctic draft and 18 902 tdw in fully loaded draft at 10,0 metres. Since delivery the vessel has visited several times Neste Oil's terminal in Naantali, bringing gas condensate from OAO Norilskgazprom gas fields.

OAO Norilskgazprom is a gas production company, which engages in well drilling, processing and transportation of gas and gas condensates. It delivers natural gas to the Taymyr Autonomous District and Norilsk industrial region in North Siberia and increasing amounts of gas condensates for export. The company has a strategic partnership with Norilsk Nickel JSC. Norilskgazprom OAO is based in Norilsk, the Russian Federation. ■

# *MERI* - first Double-Acting dry cargo ship for the Baltic Sea


Photo: P-H Sjöström

*MERI on sea trials in May 2012. She will be used for transporting special project cargoes such as offshore wind farm structures, a booming business in the Baltic Sea.*
*The hull form was developed and verified in model tests at AARC.*

*Minister of Transport Merja Kyllönen and CEO of Meriaura Group Jussi Mälkiä at the naming ceremony performed at STX Turku Shipyard in June 2012.*
*"We are very greatful to Aker Arctic and their ability to bring added value for our business opportunities with their innovative thinking" says Jussi Mälkiä, the Shipowner.*

**The first ship for transporting dry cargo in the Baltic Sea using the Aker Arctic Double-Acting DAS™ principle has been completed. Double-acting ships have previously been used in the Arctic region and for oil shipment.**

The multifunctional vessel *MERI* built in Turku, Finland, for Gaiamare Oy is an ice classed open deck carrier intended for transporting demanding project cargo, for instance offshore wind farm structures as well as containers and bulk cargo such as energy wood, in the Baltic Sea region. The Aker Arctic DAS™ vessel is able to operate bow and stern ahead in ice conditions that reflect to Finnish-Swedish Ice Class 1 A notation. Gaiamare Oy is part of shipping company Meriaura Group.

## Promoted for years

The AARC developed double acting concept, where a ship using forward bow movement in clear waters and a forward astern movement in ice, had a breakthrough in Arctic waters many years ago. Norilsk Nickel has five container ships and one tanker built in the DAS™ concept, five Aker Arctic DAS™ shuttle tankers for JSC Sovcomflot are being used for transporting oil in Pechora Sea, the new OSV's in the Sakhalin projects as well as the Mangystau series of shallow water icebreaker tugs are all built according to the DAS™ principle.
“Since *Tempera* and *Mastera* entered service in 2002 and started to transport oil between Porvoo and Primorsk oil terminals, we at AARC have promoted the idea that DAS™ ships, able to work more independently and cost-efficiently in ice, would be useful also for other cargo in the Baltic Sea” Mikko Niini, President of AARC says.
”Meriaura Group's owner Jussi Mälkiä is known as an innovative entrepreneur who challenges conventional thinking. When we introduced the idea of a DAS™- ship during planning stage he immediately grasped how his business could benefit. Although the investment cost was slightly higher than a conventional ship, his vessel will not have to stand in line for icebreaker assistance during winter time,” Mr. Niini adds.

## Environmental impact

*MERI* is meaningful for the Baltic Sea area in many ways. In addition to her highly advanced technical content, she can be used for oil combat tasks in open sea and in the fragile archipelago. The dynamic positioning system can keep the vessel in place even in rough sea and she can also move steadily sideways, making oil recovery efficient.
The ships machinery and fuel systems are designed for minimised environmental impact due to low emissions and the use of liquid bio fuel as an alternative to fossil fuels. The bio fuel is produced from fish industries side streams at Sybimar Oy, which is part of the owner’s group.
Mr. Niini believes that the new EU directive on reducing ship traffic's sulphur emissions in the Baltic Sea, North Sea and the Channel will in the long run lead to commercial vessels with lower machinery capacity than today. One consequence will be that ice going capabilities on average will decrease and the need of icebreaking services during winter time will increase.
”Against this background, Meriaura's decision to invest in an independently managing ship is definitely a step ahead and will boost the competitiveness of their cargo services.” ■

Photo: Esko Peltay

## Technical specifications

Vessel type: Multipurpose deck cargo carrier, strengthened for heavy cargoes, oil recovery ability

DP:DP CLASS 1, DYNAPOS
Classification: Bureau Veritas, Ice Class 1 A
Engines: diesel electric, 3 x Wärtsilä 6L20
Fuel: bio fuel oil/ marine diesel oil
Length (Loa): 105,40 m
Breadth: 18,80 m
Draught ballast/ max: 3,5 m / 4,9 m
Air draught: 26 m
Engine: diesel electric, 3 x Wärtsilä 6L20
Bow thruster: 2 x 450 kW
Speed laden: 13 kts
Total deck area : 1635 m² (87 x 18.8 m)

Owner/TC-Owner: Oy Gaiamare AB

# Ice performance verified in the Caspian Sea

AARC developed shallow water ARC104 Icebreaking Tug Mangystau-5 was tested in full-scale ice trials in March 2012. The first vessel in the series has already been working successfully 1.5 years in the shallow waters of the Caspian

A team of five AARC experts boarded Mangystau-5, the last vessel in the series, on March 7th in Bautino, Kazakhstan. The purpose was to verify by full-scale ice trials, that the vessel fulfils the agreed specification and to have one more correlation curve for the ice model tests performed earlier.
"The five Mangystau Caspian tugs are extraordinary vessels," Göran Wilkman, Senior Advisor, Research and Testing at AARC, emphasizes. "The minimum operating draught is only 2.5 metres with 50 tonnes bollard pull and excellent icebreaking capabilities. In the planning stage the shallow draught created a hydrodynamic challenge related to air suction phenomena, in which AARC has substantial experience. It was solved by a special hull form.
Bow form is a moderate icebreaking bow with good icebreaking performance together with minimized displacement loss.
Vessels are fitted with three Schottel azimuth propulsion units, 1600 kW each and two pumpjet units, 550 kW each in bow. The built vessels are more ice-capable than required and in fact real icebreakers."

## During normal duties

The ice trials were run between March 7th and 12th while the vessel was performing normal duties such as towing and pushing tugs and barges between Bautino and the D island of the Kashagan oil field.
"We were driving along the planned route and when we saw a good place for testing, we made a stop. Some of the tests were even done in the middle of the night because the location was right. The crew was extremely helpful and co-operation was smooth," Mr. Wilkman tells.

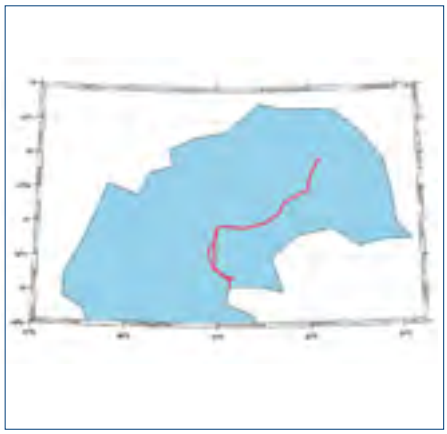
He led the group which included Mika Hovilainen, Teemu Heinonen, Esa Hakanen and Niko Miettinen from AARC. The main target was to perform tests in first year level ice. This winter had the most ice in 25 years, which was favourable for testing as many suitable ice fields could be found. The area was almost 100% icebound and in such situations there is very little ice movement.
The ice tests were performed in three different areas with ice thickness 35-50 cm. Snow depth on the ice was 2-5 cm. The tests included running ahead at different speeds, turning circles and running ahead and astern over a ridged area. Propulsion torque was followed during the whole trip through instrumentation on propulsion input shaft. Ice thickness was measured in the beginning of each test area and then visually followed. Ice properties were defined by uniaxial compressive test, beam test and salinity/temperature analysis. Compressive strength was 2.4 MPa, flexural strength from beam test was 400 kPa.

## Performance in ice

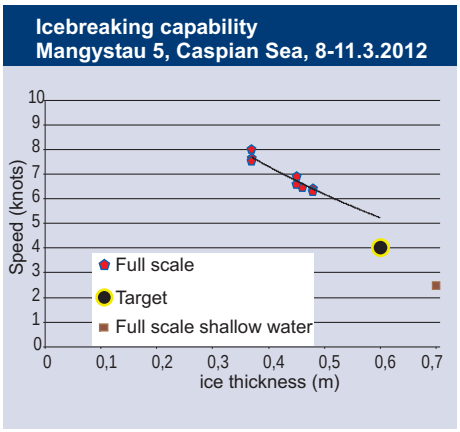
Most of the tests were performed in water depths of 7-8 metres as deepwater testing was the main target. The results are presented in the charts on next page. Tested in level ice of 45-50 cm, the maximum speed with full 4800 kW power was 6.5 - 7 knots and in ice thickness of 35 cm the speed achieved was 7.5 - 8 knots. In addition a turning circle with full power and thruster angle of about 37 degrees was done in both ice thicknesses and the measured turning radius was 0.17 - 0.217 NM.
One test was also made in shallow waters of 4 metres to indicate the performance. The speed was 2.5 knots in 0.7 metres thick ice.

*The Mangystau full-scale tests verified that the agreed specifications were fulfilled and exceeded. This is yet another example of AARC's capability to create reliable forecasts on vessel performance.*

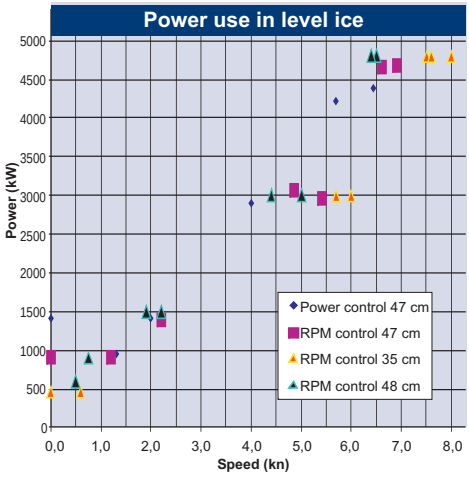
*The Mangystau shallow water icebreaker tugs are even more ice capable than required and perform all duties with no difficulty in the Caspian waters.*



*The North Caspian water depths range from 2.5 metres to 8 metres. The map shows where the tugs are working and where testing was made.*




*Icebreaking capability of Mangystau 5*




*Ice resistance of Mangystau 5*

## Ice ridges tested

"At one location a small ridge were measured having the total thickness of 2-3 metres, so we decided it was a good target to try out," Mr. Wilkman continues. Running ahead the vessel stopped once and after turning the thrusters from side to side the vessel started to move again. In running astern mode the vessel was steered to go along the ridge sail and thus the speed was continuous between 1-4 knots. The latter indicated that the ridge destruction capability is at least the required 30.000 $m^3$/ hour.

## Ninety-seven full scale ice trials

"The conclusions of the tests are that the vessel is performing extremely well, even better than expected. In the prevailing ice conditions she had no difficulties handling any of the duties required. Her icebreaking capability is excellent and she has no problems getting out of the channel in both ahead and astern mode. Ice management with active thruster handling is very efficient and towing operations are performed without problems. Also ice ridges are demolished well," Mr. Wilkman says.

"This is yet another example of AARC's capability to create reliable forecasts on vessel performance. It verifies that our model tests work really well as all the agreed specifications were once again fulfilled and exceeded. We have to date successfully tested ninety-seven vessels in full-scale ice trials, which - as we believe - is the widest correlation data file among the world ice model tanks."

"It was a pleasure to see the five Mangystau vessels driving back and forth between Bautino and the Kashagan fields performing their duties with no difficulty," he adds. According to Wilkman this type of vessel could successfully be modified for other use, for instance oil spill combat in ice conditions. ■

Göran Wilkman, Senior Adviser for Research & Testing until August 2012, has been on nearly one hundred field trips during his career in the following regions: The Baltic Sea, Russian Arctic (Ob Bay, Pechora Sea, Barents Sea, Sea of Okhotsk, and rivers), Caspian Sea, The Antarctic and Canada (Beaufort Sea and Arctic Islands) are all on his impressive list. Additionally he has travelled the world giving presentations on countless projects. He started in the ice business in 1973 and made his first test report in 1974. Since then he has been working with R&D, Arctic projects, sales and marketing and until recently leading AARC's testing services. After a work career of almost 40 years with ice technology, Göran Wilkman decided to retire at the end of August 2012, but continues serving AARC and its clients as an independent consultant, whenever he is needed.Göran Wilkman is the heart and soul in AARC's rowing team and participated this summer in his 24th race in Sulkava and his 14th race in Kulosaari rowing event.

# Full scale references of Aker Arctic

*In total 203 ship tests and ice reconnaissance expeditions*

| | |
|---|---|
| Baltic Sea, Scandinavia | 104 |
| Lake Saimaa, Finland | 10 |
| Lake Vänern, Sweden | 1 |
| Arctic, Canada | 3 |
| Alaska, USA | 2 |
| Great Lakes, USA | 3 |
| Antarctic | 5 |
| Arctic, Russia | 39 |
| Arctic, Greenland, Spitzbergen | 3 |
| Rivers, Russia | 3 |
| Sakhalin, Russia | 7 |
| Caspian Sea, Kazakhstan | 3 |

# Full-scale ice trials:

*In total 97 ships have been tested in 144 individual trials.*

**Baltic Icebreakers**

| 15 vessels/ 28 trials | **Year tested** |
|---|---|
| Tarmo | 1964/1979 |
| Varma | 1969/1979 |
| Njord | 1970/1971 |
| Apu | 1974/1983 |
| Urho | 1976/1977/ 1978/1980 |
| Sisu | 1976/1982 |
| Voima | 1977/1980 |
| Ymer | 1978 |
| Hanse | 1981 |
| Thorbjorn | 1981 |
| Dikson | 1983/1988 |
| Otso | 1986/1987 |
| Kontio | 1987/2009 |
| Karhu | 1986 |
| Sampo | 1988/1989 |

**Lake Icebreakers**

| 3 vessels/ 4 trials | |
|---|---|
| Ale | 1975/1982 |
| Mobil Bay | 1984 |
| Arppe | 1991 |

**Harbour Icebreakers**

| 3 vessels/3 trials | |
|---|---|
| Teuvo | 1976 |
| Kapitan Izmaylov | 1976 |
| Kapitan Kosolapov | 1977 |

**Arctic Icebreakers**

| 9 vessels/ 13 trials | |
|---|---|
| Murmansk | 1968 |
| Vladivostok | 1969 |
| Yermak | 1974 |
| Kapitan Dranitsyn | 1981/1998 |
| Kapitan Nikolaev | 1981/1990/1995 |
| Taymyr | 1990/1995 |
| Krasin | 1992 |
| Kapitan Sorokin | 1992 |
| Svalbard | 2002 |

**River Icebreakers**

| 7 vessels/ 14 trials | |
|---|---|
| Kapitan Chechkin | 1978/1979 |
| Kapitan Chadaev | 1978/1979/ 1982/1986 |
| Kapitan Zarubin | 1980 |
| Kapitan Evdokimov | 1983/1984 |
| Kapitan Moshkin | 1986/1987/ 1988 |
| Avramyi Zavenyagin | 1988 |
| Röthelstein | 1996 |

**Antarctic Icebreakers/ Research Vessels**

| 4 vessels/ 4 trials | |
|---|---|
| Almirante Irizar | 1979 |
| Aranda | 1991 |
| Suunta | 1981 |
| S.A. Agulhas II | 2012 |

**Salvage Vessels**

| 2 vessels/ 2 trials | |
|---|---|
| Spravedlivyi | 1981 |
| Suvorovets | 1980 |

**Buoy Tenders**

| 4 vessels/ 8 trials | |
|---|---|
| Seili | 1980/1991 |
| Lonna | 1982/1984/ 1985/1988 |
| Letto | 1991 |
| Baltica | 1986 |

**Tugs**

| 6 vessels/ 8 trials | |
|---|---|
| Jelppari | 1971/1973 |
| Protector | 1977/1985 |
| Kraft | 1985 |
| Porin Karhu | 1985 |
| Ahti | 2003 |
| Svitzer Sakhalin | 2008 |
| Svitzer Aniva | 2008 |
| Mangystau 5 | 2012 |

**Supply Vessels**

| 2 vessels/ 3 trials | |
|---|---|
| Miskaroo | 1987/1988 |
| Antarcticaborg | 1999 |

**Coast Guard Cutters**

| 3 vessels/ 5 trials | |
|---|---|
| Valpas | 1972/1974 |
| Silmä | 1972/1974 |
| Uisko | 1972 |

**Fishing Tawlers**

| 2 vessels/ 2 trials | |
|---|---|
| Baltica | 1984 |
| Järvsaar | 1986 |

**Coastal Ferries**

| 4 vessels/ 4 trials | |
|---|---|
| Nagu 2 | 1978 |
| Replot 2 | 1979 |
| Aurella | 1980 |
| Turella | 1980 |
| Mergus | 1985 |
| Gudingen | 1987 |
| Skiftet | 1987 |

**Mine Layers**

| 1 vessel/ 1 trial | |
|---|---|
| Pohjanmaa | 1980 |

**Aircushion Vehicles**

| 4 vessels/ 4 trials | |
|---|---|
| Towed prototype | 1980 |
| Tiger S | 1980 |
| Larus | 1982 |
| VP1 | 1982 |

**Barges**

| 2 vessels/ 3 trials | |
|---|---|
| Panda | 1977/1987 |
| LLD 18 | 1986 |

**Pushbarges**

| 1 vessel/ 2 trials | |
|---|---|
| Finnpusku | 1986/1987 |

**Motor Barges**

| 1 vessel/ 2 trials | |
|---|---|
| Vekara | 1997/2001 |

**Cargo Vessels**

| 8 vessels/ 10 trials | |
|---|---|
| Finncarrier | 1970 |
| Hans Gutzeit | 1977 |
| Walki | 1979 |
| Kontula | |
| Igarka | 1983/1984 |
| Kapitan Danilkin | 1987 |
| Yuri Arshenevsky | 1993 |
| Norilskiy Nickel | 2006/2007 |

**Tankers**

| 6 vessels/ 13 trials | |
|---|---|
| Manhattan | 1969 |
| Kiisla | 1974/1984 |
| Sotka | 1977/1979/ 1982/1984 |
| Lunni | 1978/1996 |
| Uikku | 1994/1999 |
| Mastera | 2003/2010 |

**Passenger Car Ferries**

| 4 vessels/ 4 trials | |
|---|---|
| Finnjet | 1977 |
| Aurella | 1980 |
| Turella | 1980 |
| Viking Saga | 1981 |

**Experimental**

| 1 vessel/ 3 trials | |
|---|---|
| Bow pontoon | 1985/1986/ 1987 |

*In addition several trips on transiting ships have been performed by Aker Arctic personnel.*

# Feedback from ice operations - measurements on S.A. Agulhas II

S. A. Agulhas II is a South African icebreaking polar supply and research ship built by STX Finland this year. A JIP on ice impact measurements was arranged in the ice trials giving new and valuable data to AARC.

The multi-purpose vessel S.A. Agulhas II, ordered by the South African Department of Environmental Affairs in order to replace the 35-year old S.A. Agulhas in demanding tasks in the Antarctic, has safely arrived at her home port, Cape Town and is now preparing for the first voyage to Antarctica. She was constructed in Rauma, Finland.

## Research onboard

The ice-strengthened ship has been designed from the beginning to carry out both scientific research and supplies to research stations in the Antarctic.
She can spend several months out at sea and acts as a mobile laboratory. Scientists can conduct a variety of marine research onboard the ship, which is also classified for carrying passengers. Furthermore, the vessel keeps record of weather data for meteorological institutions around the world. The vessel has a shelter and landing area for two helicopters and it features eight permanent and six removable laboratories, a gym, a library, and a small hospital.

**Technical details:**

| | |
|---|---|
| Length: | 134m |
| Breadth: | 22m |
| Draught: | 7.65m |
| Crew: | 45 persons |
| Passengers: | 100 (46 cabins) |
| Laboratories: | 8 permanent plus 6 removable |

## Ice loads on ship

S. A. Agulhas II conducted her open water sea trials in February 2012 and, in order to study her ice performance, a Joint Industry Project was organised for the ice trials in the Bay of Bothnia in March 2012. During the ice trials the ship encountered level ice up to 0.4 metres and rafted ice 0.7 metres thick. The hull and machinery of the vessel were instrumented to measure full-scale ice loads, and in the future S. A. Agulhas II will be used as a research platform in the Antarctic areas. AARC is a member of the JIP, led by Aalto University of Finland supported and also by the Technology Fund Tekes of Finland. The main goal of the JIP is to gain more knowledge about the interaction between ice and the ship. AARC's focus areas in the research plan are the aft shoulder impacts as well as the underwater noise created by icebreaking.

"The ship not only offers excellent working conditions for oceanographic and climate researchers but valuable information will also be gathered by studying the ice loads on the ship itself," says Sami Saarinen and Mikko Elo, AARC, jointly responsible for AARC's duties in ice trials as well as the analysis work with the collected data.

"Various Aalto University partners participated in the ice trials, such as researchers and specialists from the constructing shipyard STX Rauma, from Aalto and Oulu Universities in Finland, Stellenbosch University in South Africa, Finnish Meteorological Institute and Det Norske Veritas. Additionally there were technical specialists from several companies," Mr. Saarinen adds.

S.A. Agulhas II is more powerful than her predecessor, with the ability to break one meter thick ice at five knots. This means that scientists can go earlier in the season to Antarctica and come back later, which gives them an extended research period.

AARC prepared the first draft proposal for STX which was submitted for the initial tender. During the design stage of the ship, hull form development, model testing and key performance predictions were made at AARC. ■

*As a member of the Joint Industry Project, AARC is responsible for the aft shoulder ice load analysis in the ice trials of the newly built research and supply vessel S.A. Agulhas II bringing useful data and knowledge for ice impact loads to the design of new vessels.*

*Jukka-Pekka Sallinen measuring flexural strength of ice.*


# Multi model testing visualises ice management

*The entire ice management operation can now be simulated, where one or two icebreakers protect a fixed construction or floater by breaking the ice and keeping an ice free area around it. This helps in decision making.*

Until recently, it was only possible to test one model vessel at a time in ice.I

AARC has now solved this by introducing multi model testing in ice, which helps to visualise the entire ice management operation.

Oil and gas explorations in Arctic areas are constantly increasing. Drifting ice creates enormous problems for tankers, drilling units and other constructions that need to stay in position. Managing the ice becomes crucial for successful operations because the forces of drifting ice will easily damage the structures. Investments are huge and therefore every measure is taken to design the equipment with necessary protection. Efficient active ice management is a new way of organising such proactive protection.

## Simultaneous testing

The entire ice management operation can now be simulated, where one or two icebreakers protect a fixed construction by breaking the ice and keeping an ice free area around it, with AARC's new multi model testing. Multi model testing means that there are several model vessels simultaneously in the testing basin, for instance an icebreaker and a loading tanker, or a drillship, which needs to be protected from drifting ice.

”This is the first time remote controlled multi model testing in ice is possible. Earlier only multi model open water testing has been available. One reason is that until recently there was no need to test several vessels at the same time in ice but with the mounting activity in the Arctic area, ice management needs are increasing and also the need for simultaneous testing,” Topi Leiviskä, Manager Research and Testing Services, AARC, tells.
“If there are several vessels in use, it is simply not the same if they are tested separately or simultaneously. In order to understand the ice management operation, seeing it in a testing facility visualises the entire procedure much better than any figures in a report,” Mr. Leiviskä emphasizes.

## Technical solution

In multi model testing, there are no cables involved in the actual testing situation. This is possible by using battery-driven models, remote controls for moving the vessels and remote measurements.
“Technically we have chosen DC servo propeller motors, step motors for steering the vessels, mini PLC control unit, Lithium-ion battery for powering the engines, amplifier for rpm, torque, thruster angles measurements and Bluetooth data transfer,” Mr. Leiviskä presents the tool kit.

"There were many technical options available and we chose the most reliable system, which is also extendible," says Topi Leiviskä, Manager Research and Testing Services at AARC.

"We have also invested in a completely new data acquisition system, which we will use in our traditional model testing as well. The system we chose is a highly flexible, modern system which is extendible and can be connected to various kinds of amplifiers both with wires and wirelessly. The wireless connection uses Bluetooth data transfer." Mr. Leiviskä stresses that there were many technical options available during the developing stage. All options were thoroughly evaluated and the best and most reliable systems were chosen for the AARC multimodel testing. Another crucial element was the extensibility of the system so that it can be adapted for future needs.

## First experiences

Mr. Leiviskä is pleased with how everything works. The tests made so far are promising, the system works well and the tests look realistic. Everyone familiar with full-scale ice management agrees that simulation is authentic and gives an excellent picture of what would happen in the real world.

Prior to developing multi model testing, several customers approached AARC with such requests and interest is growing. So far tests have been made for one oil major client, but several projects are under way.
"The tests made so far included a unit with mooring lines under water keeping the target vessel in place while an icebreaker was assisting it in crushed ice. The customer was very satisfied with the multi model tests, which will help them in the final decision making" Mr. Leiviskä says.

## Future development

AARC has now a prototype for testing small vessels and will continue the development process so that also large vessels can be tested. Large vessels need more power and bigger engines. One of the benefits with the remote system is that the models can be packed in a car and transported to Aalto University, which has the largest ice model testing facility in the world, 40x40 metres, in such cases where more space is needed than AARC's own basin can offer. Both laboratories use the AARC developed FGX model ice and such an alliance strengthens the lead of the Finnish Arctic technology cluster.
Mr. Leiviskä considers multi model testing as most useful for ice management testing but also testing icebreaker assistance performance.

"Cable-free testing will not replace traditional methods in the near future when testing only one vessel's ice going capabilities. Especially with sizeable vessels it is faster to just attach to the cable-system which is always in place. But in testing smaller vessels it is likely that cable-free testing will take over in time," he says. ■

"Everyone familiar with full-scale ice management agrees that simulation is authentic and gives an excellent picture of what would happen in the real world"

Topi Leiviskä succeeded Göran Wilkman as Manager of Research and Testing Services from the beginning of this year. His work field includes all model tests and full-scale tests as well as ice expeditions.
"The nature of ice expeditions has changed from previous years," he says. "Now we use under water sonars, satellite images and laser profiling from helicopters in addition to ice measurements in place. The latter are, however, still needed for calibration purposes."
Topi has been four years with AARC working with ice model testing and measurements. Previously he worked with similar tasks at the ice laboratory of Aalto University.

# AARC Ice Simulator nears completion

As part of efforts in improving the services for future needs in Ice Management Aker Arctic has launched a development program for an Ice Simulator, primarily as a design tool but also opening up the possibility to use it for crew training purposes in a tailored set up for icebreaking vessel operators.
The development under the working name Naviquantum Ice has been done in collaboration with Finnish software and system development companies Imagesoft and Simulco. AARC has been responsible for the vessel operation algorithms as well as the mathematical modelling of the various ice conditions. The system functioning trials are now underway with Aker Arctic's own ARC 105 IB OSV concept (see picture) making way for opening up the discussions for tailored solutions for our Clients. AARC is able to offer a software "ice package" to be used by ship operators' own training simulators.


# 7th Arctic Passion Seminar

The seventh annual Arctic Passion seminar was held in March at Aker Arctic Technology headquarters in Helsinki and gathered key maritime business personnel from different parts of the world.

*Close to one hundred AARC clients gathered together for the 7th Arctic Passion Seminar which was opened by Mr. Jyri Häkämies, Minister for Economy and Employment in Finland (right).*

Finland's Arctic strategy and the government's plans for its implementation was the opening topic by Mr. Jyrki Häkämies, Minister for Economy and Employment in Finland. He emphasized the importance of the experience and high level of Arctic technologies in the country already today.

The first keynote speaker was Mr. Jan Helge Skogen, President of Statoil Russia, who talked about Statoil's visions in unlocking the oil and gas resource potential in the Arctic.

Then Dr. Mikhail Grigoryev, Gecon, presented the prospects in the Russian offshore in the light of recent licence awards and expected ones.

Development projects in Yamal are one of AARC's main ongoing works and recent projects in Sabetta and other R & D works for OAO Yamal LNG were presented, such as the development of LNG carriers. Mr Dmitry Pospelov described the logistic needs of OAO Yamal LNG in building up the LNG producing plant in the Yamal peninsula.

Other new products were also introduced, for instance the AARC developed Oblique Icebreaker, a revolutionary concept for large vessel escort and oil spill combat, which is being built at Arctech Helsinki Shipyard for the Russian Government.

Multi model testing is now available at AARC for testing ice management operations before making costly investments. Mr. Topi Leiviskä showed the participants what solutions in remote model control AARC has made available for the clients. Read also the interview with Mr. Leiviskä on page 8.

*Dr. Mikhail Grigorev of Gecon updated the audience on the oil and gas development visions in Russia.*

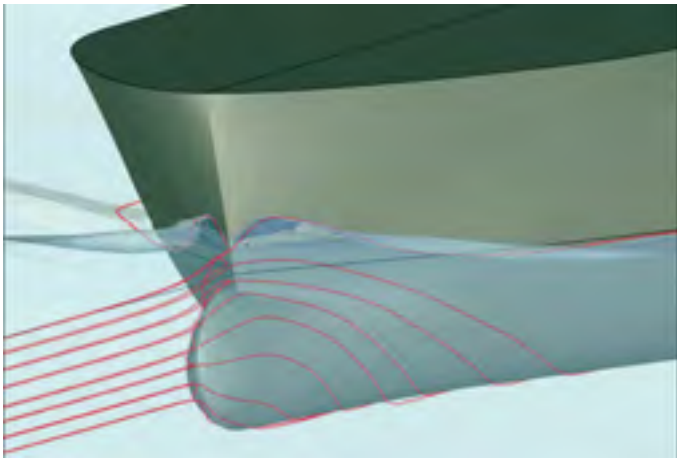
Ice management in shallow waters, growing arctic energy markets and the requirement of new vessel service capacity was other topics discussed as well as marine seismics in Arctic waters. The Finnish Meteorological Institute also told about available tools for support of vessel operations in the Arctic and demonstrarted an online example for the Kara Sea.

The next Arctic Passion seminar will be held in March 2013. ■

*Mr. Jan Helge Skogen describing Statoil's visions in unlocking the oil and gas resource potential in the Arctic.*

*Mr. Oskar Levander of Rolls Royce Marine together with DNV's Freddy Friberg analysing the Aker ARC 100 Oblique concept, with the prototype now under construction.*

# New Computational Fluid Dynamics program in use



*With the new Computational Fluid Dynamics program more alternatives can be evaluated in detail before open water model tests.*

"For our customers the use of the new FINE™/Marine tool means lower installed power and reduced fuel consumption and emissions during the ship operation helping to fulfil the new regulations."

AARC has invested in a new Computational Fluid Dynamics (CFD) program for full-scale modelling of ship hulls and in-depth analysis of flow phenomena.
The program chosen is considered one of the most advanced CFD-packages for naval architects.

Although AARC specialises in designing ice going vessels, the open water characteristics and energy efficiency are also very important as today's icebreaking vessels are operating most of the year in open water and overall fuel economy is of key interest for the customers. With the aid of the new Computational Fluid Dynamics tool open water characteristics of the ship can now be calculated with higher accuracy, and thus we will be able to better optimise the overall performance of the ships for our customers.

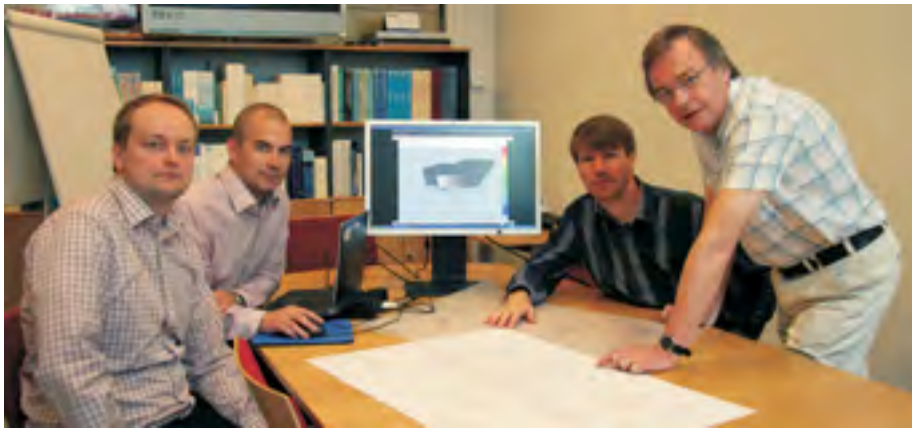
## Increased quality

With the CFD program, a calculation grid for the designed 3D ship hull model is created and then different flow phenomena around the ship hull are calculated, for instance wave profile, flow directions, velocities, pressure and turbulence. A vast amount of data is generated in a short time and this helps the design process with showing where the hull form can be improved. Model or full scale resistance of the ship hull in open water can be calculated with high accuracy, even for complex and extreme hull forms. The level of detail in calculations can be easily adjusted depending on the time available, but even full scale viscous CFD calculations can be performed as part of the normal hull form design process.
"The benefit for our customers is that we can easily analyse more alternatives thoroughly before open water model tests, offer varied and more comprehensive work scopes and better service. Our product quality will further increase as we can analyse vessels in more detail," Project Manager Risto Kurimo explains.

"Also complicated issues, such as nonlinear deck wetness in waves and shallow water effects, for instance amount of squat, can be calculated and analysed with the program," Project Engineer and hull form designer Riku Kiili adds.

## Savings for customers

The team trained to use the program is Riku Kiili, Esko Huttunen and Artur Nerman. In the interpretation and practical utilisation of calculated results they are advised and supervised by Risto Kurimo, who has over 30 years experience in the field of ship hydrodynamics. They are all very excited with the possibilities of the new program. Mr. Nerman, a newly recruited hydro-dynamics specialist, points out that this new FINE™/Marine CFD-program has excellent graphic tools, which can be used to visualise the calculated results.
"This is a new service we offer our clients. We can now more efficiently optimise the balance of ice capabilities and open water characteristics, which mean savings for our customers," Mr. Kurimo says. ■



*The team trained to use the program is (from left) Riku Kiili, Esko Huttunen and Artur Nerman with Risto Kurimo as an advisor. Mr. Kurimo has over 30 years' experience in the field of ship hydrodynamics.*

# Hull assembly of the first Oblique icebreaker started

Yantar JSC in Kaliningrad, Russia has started construction of the unique Aker Arctic developed ARC-100 oblique icebreaker ordered last fall by the Russian Ministry of Transport. The concept is exceptional because of its asymmetric hull, which enables icebreaking sideways and efficient oil combat in hard weather. Yantar is responsible for building the hull and Arctech Helsinki Shipyard will finalize the ship for delivery in 2013. Laying down the keel took place 6th of July.

For six months Mika Hovilainen from AARC has been working at the Helsinki Shipyard designing the unique ARC-100 oblique icebreaker. His responsibilities have included ensuring vessel performance and integrating the different design disciplines used by the shipyard. He has supervised all model tests made during the spring. As this is a completely new concept, more model tests than usual have been made in order to check propulsion, steering, resistance, performance in ice among others.

## Flexible operation in ice

The oblique icebreaker is a unique concept in every way. It is the most flexible vessel to operate in ice conditions ever built because of its propulsion system with two rear propulsors and one in the front. The front propulsor enables the vessel to steer sideways. The vessel can also be turned around on the spot in ice, which is something completely new. The hull form is asymmetric with an additional icebreaking bow on one side, which can be used to create a 50 metre wide channel in ice when moving sideways. The other side of the ship can be used in oil spill combat. This can be performed in up to 2 metres significant wave height, which is much more than existing oil spill combat vessels can manage. Because of the sideways movement, oil can be collected along the entire length of the ship, skimmed in a transverse tunnel and directed into tanks. Water movement on the brush collectors is calm, thus the recovery of oil is safer than before.

## Oil traffic increasing in the Baltic

The vessel will be used to assist tankers and vessels in terminals, rescue operations and oil spill combat in the Baltic Sea. The newly built Ust-Luga harbour on the southern shore of Gulf of Finland will become a significant oil export terminal in the future. This will in the first phase increase oil tanker traffic in the Gulf of Finland by 30 mill. tons and therefore the efficient oil spill combat function in the assisting icebreaker is an essential feature.

The Russian Ministry of Transport ordered the oblique icebreaker last fall from Arctech Helsinki Shipyard in Finland jointly with Yantar JSC Shipyard in Kaliningrad. Yantar is responsible for building the hull and in spring 2013 the hull will be towed to Helsinki, where the ship will be finalized, open water tested and finally delivered to the customer in St. Peterburg in the end of 2013.

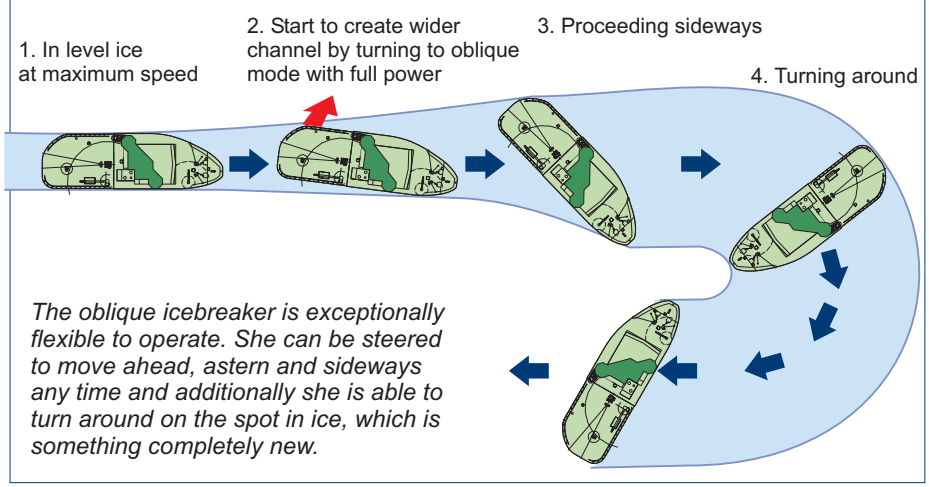
## Perfect for ice management

Mika Hovilainen recommends the concept for icebreaking and oil spill combat in different areas.

“The oblique icebreaker could be very useful for ice management functions in arctic oil drilling. Because of her exceptionally flexible steering she would bring safety to drilling operations as none of the vessels in use today can move as she can. Her strength in oil spill combat is another feature needed in oil drilling. In Arctic operations her propulsion power would have to be increased though.”

The oblique ship concept was a result of an internal innovation competition in the 1990's. It was invented to resolve the cost of having two assisting icebreakers in escorting large Aframax tankers to Primorsk oil harbour. Efficient oil spill combat is of key importance in all future arctic oil operations. The concept was for the first time introduced to the Russian ministry in 2003. This is the first vessel being built according to the new innovative concept. The next AARC target is to introduce a high-capable unit for the Arctic ice conditions. ■

**Harbour operation assistance**
**Breaking space for manoeuvring operation in harbour area**




*The oblique icebreaker is exceptionally flexible to operate. She can be steered to move ahead, astern and sideways any time and additionally she is able to turn around on the spot in ice, which is something completely new.*

**Technical details:**

| | |
|---|---|
| Length over all | 76.4 m |
| Length at dwl | 72.1 m |
| Breadth over all | 20.5 m |
| Breadth at dwl | 19.2 m |
| Draught, minimum operating | 6.0 m |
| Draught at design waterline | 6.3 m |
| Draught maximum | 7.0 m |
| Depth to main deck | 9.0 m |
| Propulsion Power | abt. 3 x 2.5 MW |
| Main engine power | abt. 9000 kW |
| Bollard pull | abt. 75 ton |
| Accommodation | 36 persons |

Classification: RMRS KM* Icebreaker 6, [1], AUT1-ICS, OMBO, FF3WS, EPP, DYNPOS-1, ECO-S, Oil recovery ship (>60°C), Salvage ship, Tug

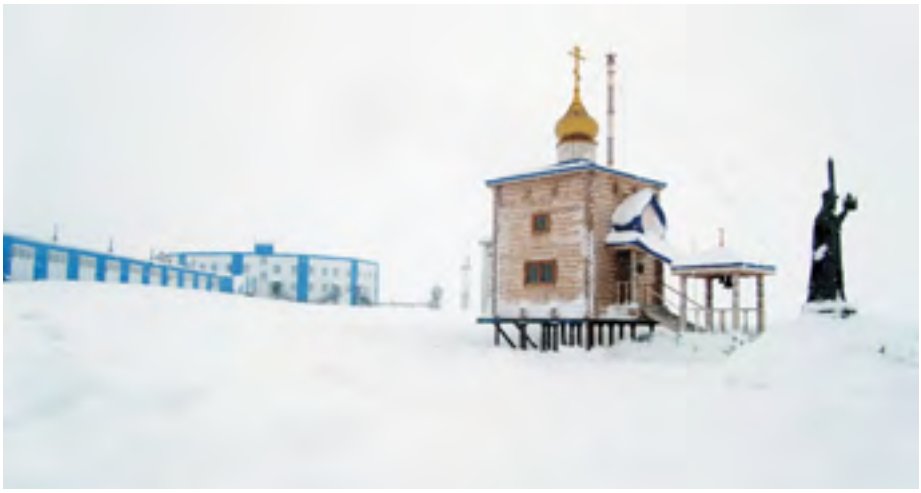
Flag: Russian Federation

# AARC at Franz Josef Land

Russian Federation is actively revitalising the Northern Sea Route and expects rapid growth for the transit traffic, offering one to two weeks cuts in the transit time between the Atlantic and Pacific basins. The Arctic Council is playing an important role in developing the Arctic by creating a regulatory framework and promoting international co-operation. In addition to new nuclear and polar icebreakers to be built (in which designs AARC has had the opportunity to co-operate) the plans also include building up a number of new search and rescue stations along the route.

Last spring the Russian Security Council invited delegations from all Arctic Council member states to join for an introductory tour to the newly built Nagurskoye Border Station on Alexandra Land in the Franz Josef Land archipelago, the closest place to the North Pole on the earth (at 82nd parallel). The archipelago consists of 187 islands with a total area of 16 500 square kilometres. One seventh of the area is not covered by glacier, which has an average thickness of 180 metres. The islands were found in 1873 by Julius von Payer and Karl Weyprecht, whose sailing steamer Tegethof was on a year-long drift in ice and stranded on a previously unknown land. The unknown archipelago was bestowed in honour of Austro-Hungarian Emperor Franz Josef I of Austria and the northernmost island was named after Emperor's son Rudolf.

AARC President Mikko Niini attended the tour together with Finland's Arctic Ambassador Hannu Halinen and Admiral Matti Möttönen from the Finnish Border Guard. After three hours of flying on two Russian Federal Security Service An-72 jets from Murmansk the guests were welcomed by the Secretary of the Federal Security Council Mr. Nikolay P. Patrushev and Ambassador at large at the Ministry of Foreign Affairs Mr Anton V. Vasilyev and led on a tour around the brand new station and the supporting facilities accommodating more than 40 persons on 24/7 duty.



**Pictures:** *The approach from the air strip to the Nagurskoye station goes by the St. Nicholas the Consecrator chapel. International delegation in front of the main entrance to the "Nagurskoye" station built on pillars in permafrost.*

*A superior Arctic lunch was served in the station's fabulous winter garden and toasts were raised by Mr Patrushev and Mr Artur N. Chilingarov, Special Representative of the President of the Russian Federation for International Cooperation in the Arctic and the Antarctic (centre).*

*Mr Niini (in the Arctic overall) was also invited to present a paper to the Arctic Council delegates in Murmansk in the follow-up International Conference on Security and Cooperation in the Arctic; New Prospects, hosted by the newly appointed Governor of Murmansk Region Ms. Marina Kovtun.*

# Drilling in Arctic resumed after 25 years' time-out - Aker Arctic in the picture

Photo: John Dawson

*IM vessel Aiviq towing the Arctic drilling unit Kulluk out from Dutch Harbor towards the final drill site in the Beaufort Sea.*

*The Finnish-built icebreakers Fennica and Nordica, operated by Arctia Shipping have succesfully taken care of Ice management in Shell's drilling campaign in offshore Alaska.*

Royal Dutch Shell is engaged in a multi-year drilling programme to explore for new oil & gas resources in high-potential blocks in offshore Alaska. Important progress has been made with this programme, with two drill ships, more than twenty support vessels, an approved capping stack, and other redundant oil spill response equipment mobilised to Alaska.

Aker Arctic was invited five years ago to assist Shell in their Arctic plans. The unique drilling platform Kulluk, inherited from the early eighties drilling campaign, was upgraded, and the Noble Discoverer completely rebuilt for the Arctic: both tasks undertaken with AARC's contribution. The Finnish built icebreakers Fennica and Nordica operating now in Alaska are based on an innovative multipurpose Aker Arctic hull concept and AARC also conducted an assessment for the oil company on the said ships into their current tasks in the icy waters around Alaska. AARC also had involvement in the development of the U.S. built and operated icebreaker Aiviq.

Shell already successfully started the drilling operation in two locations in the Chukchi and Beaufort Seas. However, due to steps taken to protect local whaling operations and to ensure the safety of operations from ice floe movement, Shell was led to revise the plans for the 2012-2013 exploration program. In order to lay a strong foundation for operations in 2013, Shell decided to forgo drilling into hydrocarbon zones this year. Instead, Shell will begin as many wells, known as 'top holes,' as time remaining in this season allows. The top portion of the wells drilled in the weeks this year will be safely capped and temporarily abandoned, in accordance with regulatory requirements. Shell looks forward to the final receipt of the drilling permits for the multi-year exploration program upon the successful testing and deployment of the Arctic Containment System.

These large capabilities mobilised have, most recently, been evident in Shell's ice management operations as it successfully moved one of its drill ships and support vessels safely out of the path of approaching sea ice. The Noble Discoverer resumed its position and drilling operations over the 'Burger A' prospect.

“We have tested and assembled drill ships and support vessels, trained personnel, and acquired numerous final approved plans and permits. This exploration program remains critically important to America's energy needs, to the economy and jobs in Alaska” said Shell in a statement.

# Finnish flag transits through the Northern Sea Route continue

*In 2010 we saw the first experimental transits over the Northern Sea Route (Northeast Passage), among others the Aframax tanker SCF Baltica. Last year there were 41 ships transiting, carrying more than 800,000 tons of commercial cargo. This summer season has again brought life to this new sea lane, linking the Atlantic and Pacific basins with the shortest connection, typically taking only a little over one week for the passage.*

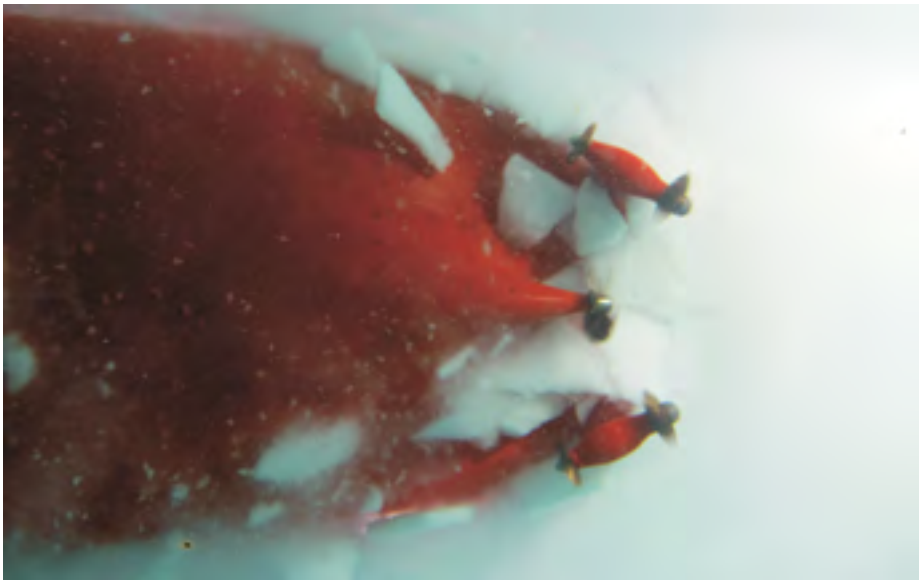
*This summer season has again seen Neste Shipping's Panamax carriers MT Palva and MT Stena Poseidon trading on the route. These images have been taken at the end of July in the Laptev Sea and in September in the Chukchi Sea. The first foreign flag cargo transits on the route were made by Nemarc Shipping Corporation's (a J/V between Neste Shipping and Kvaerner Masa-Yards) MT Uikku in 1997. Known today as MT Varzuga, she still successfully trades in these Northern waters with the prototype 11,6 MW Azipod under the flag of the Murmansk Shipping Company.*

Photo: Neste Shipping

Photo: Arctia Shipping

# CRP solutions show their potential in ice

Steerprop is a Finnish manufacturer of high ice class azimuthing thrusters, with delivery references e.g. in Russian Rosmorport and Varandei icebreakers. Steerprop has also been selected to provide the azimuthing thrusters to the oblique ARC 100 oil spill combat icebreaker now under construction at Arctech Helsinki Shipyard for the Ministry of Transport of the Russian Federation.



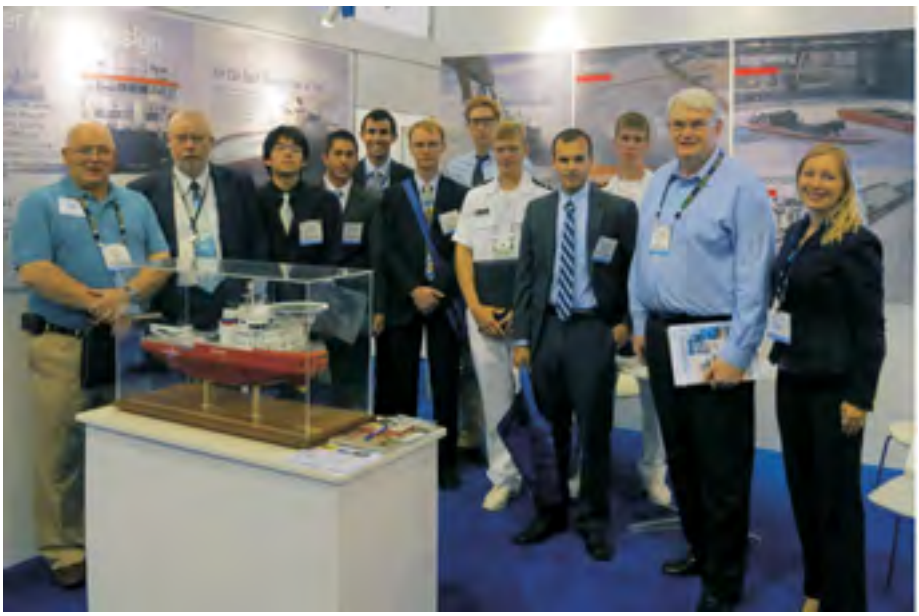
The contra-rotating propellers (CRP) have commonly been used in open water solutions due to their typically higher efficiency, which is very important for any ship designer and operator in the forthcoming days of energy saving goals and emission controls. Aker Arctic and Steerprop decided some time ago to join forces for developing ice capable CRP thruster solutions. Various applications have been brought to initial testing, including solutions for the oblique icebreaker, for large size LNG carriers, and most recently in offshore support vessels for verifying the expected higher ice management efficiency.
In all ice operating cases the energy saving efficiency has been proven. In these cases the icebreaking capability appears to be improved, but different types of thruster installation will be required compared to traditional thrusters.

The development program continues, but the parties already decided to start incorporating these applications into new projects for the market.

*CRP azimuthing thruster application in an Arctic LNG carrier, showing very clearly the water stream out from the unit with higher ice washing and clearing potential compared to traditional pulling or pushing units.*

# AARC at OTC 2012

Experts from the offshore energy industry around the world came together 30 April-3 May for the 2012 Offshore Technology Conference at Reliant Park in Houston. Attendance at the conference reached a 30-year high of 89,400 and the sold-out exhibition was the largest in event history. The exhibition had 2,500 companies representing 46 countries, including 200 new exhibitors that included exhibitors from Bahrain, Hungary, Israel, Lithuania, New Zealand, and Taiwan.



Aker Arctic Technology Inc. was represented in the Finnish stand as in previous years. Interest to the Arctic has increased so much that the OTC organisers decided to establish a sister conference on Arctic matters. The first "Arctic Technology Conference" (ATC) was arranged in 2011 and the second will be in December 2012, where AARC will have a stand and a couple of conference papers," says Arto Uuskallio, Sales and Marketing Manager at AARC.

# AARC at NEFTEGAZ MOSCOW


*One of the regular June events on Aker Arctic's agenda is the Neftegaz exhibition in Moscow. The display theme this year was shallow water icebreaking which was well illustrated to visitors.*

*In the picture (from right) representatives of DOAO ZKBN OAO "Gazprom" together with our new sales and marketing engineer Elena Tsvetkova, Area Manager (Russia) Alexander V. Nemchinov and Ms Daria Malchevskaya, secretary in the Moscow Representative Office, on her first working day with the group.*

# Trimaran oil spill response icebreaker demonstrated

As has been described in the previous issues of Arctic Passion News, AARC is currently developing a trimaran type icebreaker, which could be utilised in escort icebreaking, ice management as well as a deck cargo carrier or an icegoing seismic vessel where the large deck area could be used for higher capacities than in traditional monohull ships.

One special solution, where the potential is expected to be quite high, is the use of the trimaran concept for oil spill response in ice conditions. Then a specially designed sloping grid is installed between the main and the side hulls. The grid will push the ice floes down, allowing the oil to surface through the grid into skimmers and further into the collecting tanks.

In June 2012 Finland was hosting the Arctic Council's working group preparing for an International Arctic Oil Spill Response Agreement. The national delegations visiting AARC were shown this new novel concept in model scale whereby small plastic bubbles of specific gravity comparable to oil were used to simulate the spilled oil. The grids collected the bubbles from the ice as planned and the demonstration thus gave clear encouragement for further R & D work in the area.

# AARC at ISOPE 2012

## The 22nd International Ocean and Polar Engineering Conference was held in Rhodes in June. More than 1100 delegates joined the conference this year.

AARC's Göran Wilkman and Teemu Heinonen participated in the conference, mainly concentrating on the Arctic sessions. Mr. Wilkman held the keynote speech at the Arctic session on navigating in pack ice. He told about the technical and operational development of icebreaking ships. Mr. Heinonen held another presentation in the Arctic session on operations in ice, discussing full-scale on board ship measurements in various Arctic conditions. Both Mr. Heinonen and Mr. Wilkman participated in the full-scale ice trials of the AARC developed shallow water ARC104 Icebreaking Tug Mangystau-5 in the Caspian Sea last March (see also page 4).

ISOPE is one of the biggest ocean and polar engineering conferences arranged every year. The conference location alternates between Europe, Asia and North America. Next year it will take place in Anchorage, Alaska, end of June 2013.

# Competence-Horizon program continues employee development

Two years ago, AARC initiated an employee development program named Arctic Horizons, with focus on mentorship as a tool for transferring know-how, efficient team and project work. This program is now almost completed and a new competence program continues employee development.

*AARC employees joining forces to pull the same rope at Culture Centre Sofia.*

Focus in the new program is competence teams and how to develop efficient methods for combining customer projects with on-going research and development.

"In the Arctic Horizons program we formed three project teams around real development projects. The Multi model testing project was one of them (read more on page 10). In the new Competence-Horizon program every team selects its own topics and shares the tasks among members, in order to find a systematic approach to work in that team. R & D is constantly on-going at AARC and we find it important to support it in every-day work," Kirsi Rosenström, Manager Finance & Administration and HR, emphasizes.

# In the heart of the city

In the beginning of September, AARC rowing team celebrated the traditional end of the summer event, the Kulosaari rowing competition.
Kulosaari is an island in the heart of Helsinki, capital of Finland, which lies by the Baltic Sea. The rowing competition around the Kulosaari Island has been arranged during the first weekend in September since the 1940' s and ends the season for both professional and leisure teams. There are around 500 participants every year on the eleven kilometres long tour.
"We had great sunny weather during the actual competition this year, but on our way back we got thoroughly soaked with both rain and hail," Kari Selonen, Boat master, tells. "But the spirit was high as it always is!"
"Our team consisted of 15 persons and this year two of our new employees joined in, which we really appreciated since they didn't have any previous experience in rowing church boats. Unfortunately we practiced a bit lesst than usual as everybody was rather busy with work projects this summer," Mr. Selonen continues.
"Regardless of tight schedules we also participated in the Sulkava rowing event in the Lake Saimaa district for the 24th time. Sulkava is a much bigger island and the 60 km tour around it took 5 hours and 35 minutes. The Kulosaari tour was our 14th time and we made it in nearly 54 minutes.

*Matti Arpiainen and Kari Selonen at pace oars.*

## *Meet us here!*

**We will participate in the following events:**

29.- 30. October
**Arctic Shipping North America Conference 2012** Montreal, Canada

Nov.20-21
**Design and Operation of OSV's for Ice and Cold Climates**
London, UK

8.- 11. November
**Gastech 2012**
London, UK

29.- 30. November
**Arctic Oil & Gas 2012** Oslo, Norway

3.- 5. December
**Arctic Technology Conference**
Houston, USA

April 23-26, 2013
**9th Arctic Shipping Forum**
Helsinki, Finland

June 9-13, 2013.
**POAC 2013**, the 22nd International Conference on Port and Ocean Engineering under Arctic Conditions.
Espoo, Finland

June 25-28, 2013
**MIOGE 2013**
Moscow, Russia