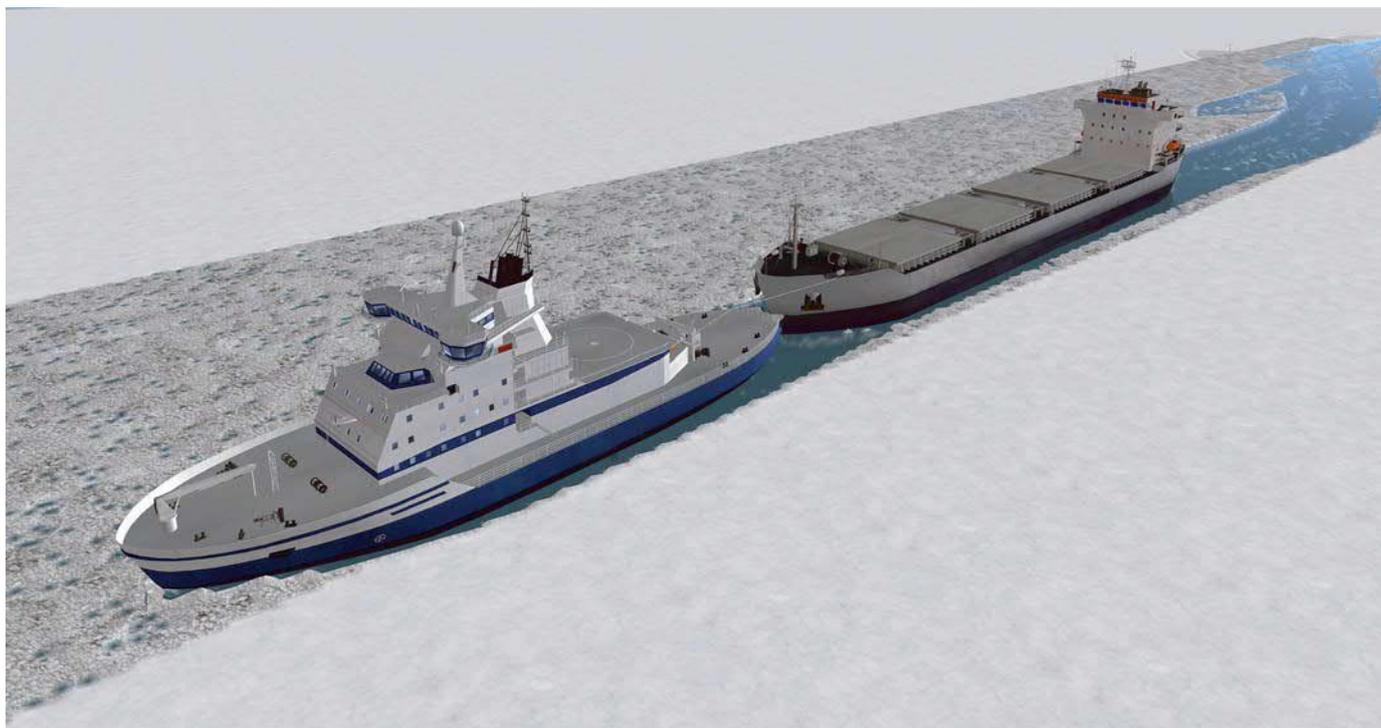


Enhanced vessel handling skills with Ice Simulator



Handling large vessels in confined areas such as harbours, is a challenging task. When ice resistance, wind and other vessels are added, the challenges multiply. With the Ice Simulator that Aker Arctic has developed over the past ten years, operations in ice can be practiced in advance.

The Ice Simulator is an educational tool used for simulating ice navigation. Maritime students and ship officers can learn how to operate a vessel in various ice conditions and gain experience in a safe and controlled manner before handling the real vessel where the risks are higher. Existing vessels are programmed into the simulator so that the training is realistic, useful and fun.

Aker Arctic's Ice Simulator is currently installed on two simulation bridges at The Finnish Maritime Academy Aboa Mare in Turku, where it can be used in educational programs by enrolled students and ship crews from all over the world. Aboa Mare has educated sea captains for over 200 years and also offers ice navigation courses that meet Polar Code Operation and Manning requirements.

The Ice Simulator is also in use at maritime academies in the Philippines and Romania.

Operational studies

In addition to education, the Ice Simulator is useful for operational studies before a vessel is constructed. A feasibility study was, for instance, conducted for Yamal LNG before Sabetta harbour was ready. "A model of the Arctic heavy module carrier we designed for transporting construction modules was added to the Ice Simulator along with the exact design of the planned Sabetta harbour and an icebreaking tug," explains Sales Manager Jukka Salminen from Aker Arctic. The customer could then navigate the module carrier in different weather and ice conditions in the harbour and practice how to manoeuvre the vessel to the pier with the assistance of the tug. After that, plans were jointly evaluated to see if any adjustments would be needed.

Training in advance

Risk prevention is a top priority in shipping. When acquiring a new vessel with new dimensions and propulsion arrangements than previous vessels, it is beneficial to practice how to handle the vessel before it is delivered. This is even more important when the vessel will operate in ice. "The crew for the Finnish icebreaker *Polaris* was trained using simulation," says Director Tom Ekegren,

Finnish Otso-class icebreaker escorting cargo ship in Aker Arctic Ice Simulator.

Arctia Icebreaking Oy. "We wanted to prepare the crew how to handle *Polaris* in advance, taking into consideration her propulsion solution which differs from previous icebreakers. The crew was trained how to operate her in general, as well as in ice fields." *Polaris* has a propulsion configuration with a triple azimuth solution; two propulsion units in the stern and one in the bow. This makes her agile but at the same time the captain has to be cautious of sudden moves as she turns quickly. "Training with the Ice Simulator before *Polaris* was delivered was very useful, especially for those who had not steered a vessel with azimuth propulsion before," says Captain Pasi Järvelin, who commands *Polaris*.

The Ice Simulator can also be used as a tool to further develop skills or to refresh operators on icebreaking operations during the ice-free months. "Some of Arctia's Icebreaking officers have continued with the advanced skills level, while taking the 'Ice Operator course' at Aboa Mare," Järvelin adds.

Salminen highlights that Aker Arctic can offer clients a tailored package including ship design, operational study, support during construction and training in both open water and ice before a vessel is delivered.



Captain Sampo Karppinen from ZPMC – Red Box Energy Services used the Ice Simulator to reverse the Arctic Heavy Module Carrier in Sabetta Harbour as part of a feasibility study for Yamal LNG.



The crew of Finnish Icebreaker Polaris practiced manoeuvring the vessel in general and in ice fields with simulation at Aboa Mare before the icebreaker was delivered.



Basic and Advanced Ice Navigation Courses are offered at The Finnish Maritime Academy Aboa Mare in Turku, Finland. Courses include training with the Ice Simulator.

Upgraded features

The Ice Simulator is a system that requires continuous development and it is regularly upgraded with new features. "We have recently added more target-ships, which can be used when practicing assisting as well as operational features needed when assisting ships in ice," says Project Manager Jukka-Pekka Sallinen, Aker Arctic. "For example, cutting a vessel loose from ice in a realistic way and how to react in various situations. It is now also possible to learn how to release a vessel stuck in ice by flushing the propellers."

Towing in ice is one of the most challenging tasks as the vessels are very close to each other during the operation. However, icebreakers operating in the Baltic Sea is a common practice when commercial vessels cannot manage in the ice conditions. Close towing is one of the recent upgrades of the Ice Simulator.

The newest addition, which is still pending final visual details, is dynamic icefields. Until now, the ice has been static. "We have improved the Ice Simulator to include ice movement with wind and currents. For example, when a ship interacts with an ice field, the ice actually moves away enhancing the real-feel of using the simulator," Sallinen says.

The development work of the simulator includes cooperation with various partners, such as ImageSoft, Simulco, Aboa Mare, Finnpiilot, Alfons Håkans and Arctia. "Our partners help us with feedback and visual appearance, while our four-person team at Aker Arctic focuses on programming the simulator, as well as developing other software and modelling services for our customers, such as the Ice Load Monitoring System and solutions for autonomous vessels," Sallinen says.

Realistic tool

The Ice Simulator has been praised as visually appealing and realistic.

"At Aboa Mare, we currently have three simulators in use, which can be connected to our ship bridges," says R & D Manager Mirva Salokorpi, Aboa Mare. "They all have different features. The Aker Arctic Ice Simulator is for instance the best one for teaching icebreaker manoeuvring and assistance such as close towing. We especially appreciate the ice modelling in the software and are looking forward to new tools and features in the future."

Icebreaker captains have helped to give valuable input which has been used when developing new features of the simulator. Captain Järvelin has for instance provided full-scale test drives with *Polaris*, which will be incorporated in the Ice Simulator.

"Our long experience in gathering ice information, analysing ice properties and designing icebreakers have given us an advantage when creating the simulation tool," Salminen adds. "We have been able to give users a realistic experience based on real vessel models and dynamics. They can maintain and enhance their professional skills, which is beneficial for themselves, their employers as well as ship owners." ■



Meet Jukka Salminen

Jukka's interest in icebreakers arose when he visited the Finnish icebreaker *Otso* for the first time at the age of 9. *Otso* was also the first icebreaker he worked on after graduating as a master mariner from Turku Maritime College. He worked for eleven years for the Finnish icebreaking company Arctia Ltd., first on-board various Finnish icebreakers as a navigation officer before moving to office work as a chartering manager. Jukka joined Aker Arctic as a sales manager in 2017. His background in navigating icebreakers is a great asset in a

company designing icebreakers. "For me, this gives the opportunity to learn a new aspect of icebreaking, for example how the design work is performed," Jukka says.

Jukka has also competed in alpine skiing in the Finnish championships. "Although I don't compete anymore, I love downhill skiing in winter," he says. Jukka spends his summer holidays in the Finnish archipelago with his wife and two small children. He also enjoys golfing.