

# Twenty years of icebreaking expertise

Over the past two decades, Aker Arctic has designed and developed proven concepts for 59 built vessels in our highly specialised segment. These vessels are capable of independently breaking ice and operating in freezing regions, underscoring the company's unparalleled expertise in this niche.

The company's model testing background traces back to the late 1960s when Exxon Mobile's tanker the SS *Manhattan* was modified for the Northwest Passage with the assistance of the Finnish shipbuilding company Wärtsilä, renowned for its icebreaking experience. This pivotal milestone in Arctic shipping sparked the idea of creating an ice model basin in Finland to evaluate the performance of ice-capable vessels.

The Wärtsilä Icebreaking Model Basin (WIMB) was inaugurated in 1969, laying the foundation for Finland's cutting-edge ice expertise. Fourteen years later, a new facility was built and named the Wärtsilä Arctic Research Centre (WARC), serving also universities and research institutions alongside the shipbuilding industry. Although ownership and the name of the research centre evolved over time, its core functions remained steadfast.

## Turbulent times

The 1990s brought challenges, including the dissolution of the Soviet Union and the end of long-running joint projects. However, renewed interest from Western oil companies in Arctic oil and gas reserves created demand for Finnish ice expertise. During this period, a new kind of electric azimuthing propulsion unit – Azipod® was developed in Finland. This in turn led to the revolutionary Double-Acting Ship concept (DAS™) invented for ice navigation.

A historical moment for Aker Arctic came when Aker Group acquired ownership and separated the ice technology expertise from Helsinki Shipyard, establishing a new dedicated research facility in Vuosaari, Helsinki. Mikko Niini, managing director for Aker Arctic from 2005 to 2014, underlines the foundational role played by the original owners Aker Group, Wärtsilä, and ABB, in supporting to shape the company's successful identity.

"They trusted our expertise and helped us establish ourselves as an independent global ice partner, enabling us to engage with international clients," Niini says. "Our first complete ship design project, an Arctic container ship, included an extraordinary clause that allowed the client to cancel the order if ice performance targets were not met. This successful reference was a game-changer."

## Major milestones



## Technical excellence from the start

Niini also credits the initial team, comprising experts from the Arctic Research Centre and seasoned designers from Helsinki Shipyard, with ensuring the company's technical excellence from the outset.

According to Niini, developing new technology and new operations jointly with the owners was key in the growth process, mentioning the DAS™ principle and the vision of Arctic liquefied natural gas (LNG) tankers as examples. He also remarks on the oblique icebreaker as a special design project, which showed that even the wildest innovations can become successful.

"Overall, all our successes were the result of cooperation; with the owner, with the customers, and with the shipyards constructing the vessels."

## Strategic growth

Reko-Antti Suojanen, managing director from 2014 to 2024, highlights the company's strategic decision to remain focused on icebreaking ships, while expanding services from model testing and consultancy to complete ship design projects.

"This required recruiting more experts and systematically developing our portfolio of services for icebreaking and ice-strengthened vessels," Suojanen explains.

## Innovative milestones

Suojanen reflects on several pioneering projects that defined the company's first decades and gave way to new innovations and business areas.

The development of 300-metre Arctic LNG tankers with groundbreaking features that enabled year-round Arctic operations set new standards for the industry. The project evolved through collaboration with end customers, equipment suppliers, and constructing shipyards.

"The Arctic module carriers were exceptional with their high Polar Class 3 ice class and traditional shaftline propulsion," Suojanen says. "This opened the need for Arctic propellers, which relied on our engineering expertise, and was a new market segment for Aker Arctic. Many successful propulsion deliveries have been made since."

The Finnish icebreaker *Polaris*, designed by Aker Arctic and built in Finland, showcased innovative features, including a third azimuthing main propulsion unit in the bow thruster and LNG fuel. The project was important from many aspects.

"Using LNG as fuel in icebreaking was a novelty together with the triple-azimuth propulsion configuration, allowing significantly improved manoeuvrability and efficiency in both icebreaking and assistance work," Suojanen notes. "Also, the vessel was built at Helsinki Shipyard, with its close ties to Aker Arctic, proving yet again the well-functioning cooperation between the designer and the Finnish shipyards."

## Delivering on promises

Recent highlights include designing Canada's new Polar Icebreaker and Multi-Purpose Vessels (MPVs), featuring cutting-edge technologies such as the Ice Load Monitoring System for real-time structural load analysis in ice-covered waters.

Propulsion to detachable bow  
Arctic port icebreakers  
Second generation  
Arctic LNG carriers

Baltic Sea icebreaker  
for Sweden

Canadian CG Polar  
Icebreaker

Aker Arctic  
20 years

2017 2018 2019 2020 2021 2022 2024 2025

French Polar  
Logistics Vessel

Arctic condensate tanker  
Polar research vessel  
Propulsion for Finnish Navy  
corvettes

First PC2 cruise ship  
Canadian CG Multi-  
Purpose Vessels

SOV concept for  
freezing seas





"Le Commandant Charcot, the combination of a heavy icebreaker with a luxury exploration cruise ship, was an extremely interesting engineering project. It has proven highly successful, offering safe travelling to remote areas in the Arctic, Antarctica, and Greenland," Suojanen adds.

"Aker Arctic has earned a strong reputation for its deep expertise, inspiring confidence in its ability to deliver on promises."

### Model testing continues

In addition to advanced ship design projects, Aker Arctic has maintained its commitment to model testing for 56 years. The current ice basin, inaugurated in 2006, is located in the same building as the main office in Helsinki.

"The ice and the testing techniques are continually updated with the latest technology and uses state-of-the-art computers, instruments, and equipment for the model tests. For example, autonomous models were introduced some years ago," Suojanen notes.

### Adapting to change

The geopolitical shift, following Russia's invasion of Ukraine in 2022, prompted Aker Arctic to cease all activities with Russian customers and projects. The company strengthened its focus on likeminded international partners through initiatives, such as the ICE Pact signed by Canada, Finland, and the United States in November 2024.

Mika Hovilainen, managing director since 2024, emphasises the company's forward-looking vision: "We will continue to advance our expertise and leadership in the icebreaking sector by developing solutions that utilise our extensive experience and meet customer expectations."

Today, Aker Arctic is the only organisation in the world specialising exclusively in icebreaking vessels. With a team of 56 employees and a turnover of over €15M (2024), it continues to lead in innovation and technological advancements. ■

## A journey of growth



The Aker Arctic team on a trip to Åland in 2016.

Ann-Cristin Forsén, Kirsi Rosenström, and Sami Saarinen have been with Aker Arctic since the beginning, witnessing its transformation from a small model testing firm with 12 employees to an international engineering company with a staff of 56 from eight different countries.

Ann-Cristin Forsén joined the ice model testing laboratory in 1982 and has worked in all three ice laboratories (WIMB, WARC, and Aker Arctic's current laboratory). She started as a trainee, preparing ice for tests, measuring ice properties, and equipping models

before progressing to conducting tests herself. She has dedicated her entire career to model testing, as she has enjoyed the diversity of tasks, opportunities to expand her skills, and limited desk work.

"Model testing was very different in the early 1980s," she recalls. "The first tests were conducted using an integrator, which generated a graph that we then calibrated. Reports were handwritten in pencil and later typed by our secretary."