

Cooperation on Arctic project Novy Port

Novy Port terminal, currently under construction at Cape Kamenny in the southern Gulf of Ob, will be used to export oil from the Novoportovskoye oil and gas field. Aker Arctic has been involved in developing the transport solutions for the oil shipments, including icebreakers to secure safe operations.

The oil terminal, owned by Gazprom Neft Novy Port LLC, is located near the settlement of Novy Port, some 400 km south of Sabetta, where Aker Arctic is involved in the harbour project as well as the development of double-acting LNG carriers and the port icebreaker fleet. The area is characterised by shallow waters and harsh winters during which the ice cover can grow up to two metres thick and remain in place for nine months.

Small-scale oil drilling began in Novy Port in 2012 and indicated that the high-quality oil has low sulphur levels. The plan is to increase the production to 5.5 million tonnes per year. Full-scale production should be ready to begin by 2017.

In order to transport the oil to market, a loading terminal, oil tankers and icebreakers need to be constructed. The loading terminal will be a tower solution in the middle of Gulf of Ob, where tankers will attach for loading. Samsung Heavy Industries will construct the six tankers for the oil shipments. We have assisted Samsung Heavy Industries in developing the hull form and have conducted an extensive series of model tests for the tankers.

We have also developed a new powerful icebreaker design, Aker ARC 130 A, to support operations in the Novy Port oil terminal.

"The icebreaker is a new design, which we believe could become a popular new polar-class icebreaker for arctic projects," managing director Reko-Antti Suojanen says. "One of the new features is an azimuthing bow thruster."



"Our extensive know-how in ice technology has been useful in both the tanker development and icebreakers. We

were happy to develop the concept together with experts from Gazprom Neft," explains Mr Suojanen.

Two powerful icebreakers

The challenging ice conditions in Novy Port combined with shallow waters need to be managed. Therefore, we have developed a new powerful icebreaker design, Aker ARC 130 A, to support operations in the terminal.

The icebreaker represents a further development of the Aker ARC 130 concept, which was originally developed for the Finnish Transport Agency and is currently under construction at Artech Helsinki Shipyard. In April 2015, Gazprom Neft Novy Port LLC ordered two vessels based on the new design from Vyborg Shipyard JSC.



Comparable to Taymyr and Vaygach

Project manager Mika Hovilainen highlights that the new icebreakers are comparable to well-known nuclear-powered icebreakers *Taymyr* and *Vaygach* in terms of icebreaking capability, but require about 40% less propulsion power.

"The new icebreakers are capable of breaking level ice two metres thick with 30 cm snow cover both ahead and astern," Mr Hovilainen says.

The tanker traffic will become intense once the oil terminal is completed, resulting in a large amount of brash ice. The consolidated brash ice cover is estimated to grow to a thickness of up to seven metres, in an area where the water depth can be as little as ten metres. The new icebreakers are designed to operate in these challenging conditions. Their manoeuvrability, which is considered an important safety factor when operating in close proximity to oil tankers, is also exceptionally good for such large vessels.

High ice class

The propulsion system consists of three azimuth thrusters: two in the stern and one in the bow of the vessel. This propulsion layout is considered to be particularly suitable for difficult ice conditions such as thick brash ice and ice ridges. Compared to the Baltic escort icebreaker designed for the Finnish Transport Agency, the new vessels are adapted for operation in the arctic, with increased propulsion power and a higher ice class. The hull form has also been optimised to break thick level ice, which is not found in the Baltic Sea.



Nuclear-powered icebreaker Vaygach escorting Pavel Vavilov from the port of Sabetta on April 3, 2015. Aker ARC 130 A is designed to operate in the same region where powerful shallow draft icebreakers are needed.

Low resistance in ice and open water will result in improved fuel economy and reduced environmental footprint.

"Based on the extensive ice and open water model testing, the new icebreaker design will meet all operational requirements," Mr Hovilainen says.

Unlike the Finnish icebreaker, which is the first icebreaker to use liquefied natural gas (LNG) as fuel, the icebreaking vessels operating in the Gulf of Ob will not use LNG because there is no possibility for bunkering natural gas near the Novy Port oil terminal.

The technical design work is currently in its final stages, and construction should begin in autumn 2015. Aker Arctic will support Vyborg Shipyard during the construction of the two vessels, which are planned to be ready for delivery in autumn 2017.

Aker ARC 130 A technical specifications:

Length:	122 m
Beam:	25 m
Design draft:	8 m
Deadweight:	2400 tons
Open water speed:	16 knots
Bollard pull:	200 tons
Propulsion power:	21.5 MW
Ice class:	RMRS Icebreaker8



Model tests for oil tankers



Six double-acting oil tankers have been ordered from Samsung Heavy Industries to transport oil year-round from Novy Port to Murmansk and other destinations along the Northern Sea Route. The hull form was developed in cooperation with Aker Arctic in addition to five weeks of model tests.

Aker Arctic conducted an extensive series of model tests lasting nearly five weeks for the Novy Port tankers in autumn 2014. Two alternative designs were tested in order to choose the more suitable one for the working conditions in the Novy Port area.

"During the first testing period, we carried out all the basic performance tests to compare the designs and to make sure that they fulfilled the requirements set by Gazprom Neft," project manager Riku Kiili says. "All performance requirements were met."

"The next testing period focused more on testing operational performance, such as breaking out from the channel, performance in a narrow channel and ice ridge tests. One key function was to see if the tankers could follow the narrow, curved channel an icebreaker had made. Gazprom Neft wished to have extensive operational testing in addition to testing of the contract performance."

Representatives from Samsung Heavy Industries, Gazprom Neft and CNIIMF followed the tests and were actively involved in testing and evaluating the results.

The tests went well and the customers were pleased with the cooperation work and Aker Arctic's support.

The first of the six tankers being built in Korea will be ready in 2016, and all of them will be delivered by May 2017.

The tankers will be ARC7 ice class vessels and they will be used to transport crude oil from the Novy Port oilfield near Russia's Yamal peninsula to the ice-free Murmansk harbour. The 42,000 DWT icebreaking tankers will be 249 metres long and 34 metres wide.

In 2007, Samsung Heavy Industries delivered the first double-acting icebreaking oil tanker to Russia's Sovcomflot, followed by two additional tankers. Aker Arctic developed the concept design for these tankers.

Preparing to test breaking out from the ice channel. Pictured are Mr Riku Kiili from Aker Arctic and Mr Seung Hyun Lee from Samsung Heavy Industries.

The tankers are designed to break ice 1.4 metres thick at a speed of 3.5 knots and to withstand temperatures of minus 45 degrees Celsius.

They are double-acting ships with two 11 MW Azipod units in the stern.

In 2007, Samsung Heavy Industries delivered the first double-acting icebreaking oil tanker to Russia's Sovcomflot, followed by two additional tankers. Aker Arctic developed the concept design for these tankers. ■



Photo: Sovcomflot OAO