

Most advanced port icebreaker in the world



The port icebreaker Aker ARC 124 will assist large LNG carriers in approaching and berthing in Sabetta.



The port icebreaker Aker ARC 124, ordered to support LNG-carriers' operability in Sabetta harbour in the Russian Arctic, will have state-of-the-art technical solutions.

With two pairs of thrusters, the icebreaker will be moving extremely well in the harbour basin in Sabetta.

Basic design is now in process for the port icebreaker Aker ARC 124. Both ice and open water model testing has been completed, confirming the vessel's performance. Design work will be completed in June and construction is planned to begin this summer at Vyborg Shipyard PJSC in Russia.

Cutting-edge technology

The technical decisions made for this vessel are new, modern and cutting-edge.

"What is special in this icebreaker is firstly the propulsion solution," says project manager Mika Hovilainen. The vessel has four thrusters, two in the bow and two in the stern.

"Manoeuvrability has been taken to a new level with two pairs of thrusters. The icebreaker will be very capable in the harbour basin in Sabetta when it is assisting large ships in berthing. Additionally, the propellers will be efficient in flushing the ice away when cleaning the quayside from ice," Hovilainen adds.

The icebreaker will also be competent in the worst possible situation, when the brash ice level grows to several meters thick. Brash ice is created every time a vessel breaks ice. The pieces mix with cold water and freeze again. As there will be frequent traffic in the Sabetta harbour, an increasing amount of brash ice will be created, making navigation extremely difficult.

"The second special feature of this ship is the new direct current electrical system developed by ABB," Hovilainen says. The system, Onboard DC Grid, consists of rectifiers that convert the alternating current from the diesel-driven main generators to direct current. This is then fed to two DC drive line-ups that convert it back to alternating current for propulsion units and other onboard consumers. In Aker ARC 124, each DC drive line-up provides power for one propulsion unit in the bow and one in the stern and full load for auxiliary consumers.

The Onboard DC Grid offers several advantages over the conventional AC systems that have been used in diesel-electric icebreakers since the 1980s. Firstly, the system allows the main diesel generators to run at variable speed rather than fixed speed, reducing fuel consumption and emissions when the power plant runs at partial load. Secondly, the system allows running the harbour generator parallel to the main engines without limitations. Finally, the equipment is somewhat smaller and lighter than the conventional frequency converter setup, an advantage to the designer.

New engine type

Aker ARC 124 will be the first vessel in the world to feature Wärtsilä's new 31 series main engines, recently acknowledged as the world's most

efficient four-stroke engine type. The main power plant will consist of three 8-cylinder Wärtsilä 8V31 main engines. The installation will also include Wärtsilä's online engine monitoring, thereby enabling the operating condition of the engines to be closely followed remotely.

"The new engine type has improved fuel economy, especially on lower speeds. This is achieved because the optimal speed range is wider than other engines," Hovilainen says.

An additional characteristic of the newly introduced engine is that it will feature a new approach to maintenance. The first major service required by the Wärtsilä 31 comes only after 8,000 running hours (compared to 2,000 running hours for engines of a similar class). This improvement reduces maintenance costs as well as increases the vessel's uptime availability. Its modular design also allows parts to be removed and replaced, thus simplifying service.

"Our propulsion solution brings energy efficiency, lower power needs and savings in operational costs as a result," Hovilainen emphasises.

"The electrical and engine solutions also aim to lower operational costs and decrease emissions, thus resulting in both a powerful and more environmentally friendly port icebreaker."