

Case story | VACON® NXP AC drives

Baltika – the innovative multi-purpose icebreaker



Baltika is the world's first oblique icebreaking vessel, classified as a multipurpose emergency and rescue vessel. The main propulsion azimuth propulsors – delivered by Steerprop, from Rauma, Finland – are controlled by VACON® AC drives. In comparison to a traditional hydraulic steering system, modern AC drive control is more accurate, reliable and silent. Additional benefits include smaller space requirements and easy installation.

Designed by Aker Arctic Technology, based on the Aker Arctic ARC 100 concept, Baltika has been deployed in icebreaking, rescue and oil-spill-combat operations in the Gulf of Finland since the spring of 2014. The vessel represents completely new technology; a patented oblique design

with an asymmetric hull equipped with three azimuth propulsors. This allows the vessel to operate efficiently, ahead and astern, in up to 1-metre-thick ice levels. In oblique mode (sideways), the vessel is able to clear a 50-metre-wide channel in up to 0.6-metre-thick ice. Baltika features a very advanced oil recovery system suitable for operation even in heavy waves; conditions where oil recovery is very challenging and demanding.

Sailing even sideways

The three main diesel generators generate a total power of 9 MW. The total propulsion power is 7.5 MW. Steerprop has delivered mechanical propulsors that combine outstanding reliability and efficiency with environmental-friendliness and low

lifecycle costs. 18 VACON® NXP AC drives (72 A) are used for steering the propulsors that enable the vessel to move ahead, astern and obliquely. "Baltika is able to move sideways when the AC drives control the azimuth thrusters that keep the vessel's position correct and simultaneously steer it to the right direction. Baltika can crash through ice while moving sideways to make a wider ice channel for larger vessels," explains Aarno Niemi, Automation Manager, Steerprop.

The VACON® NXP AC drives are installed in close vicinity of the propulsion thruster system and they communicate via a Profinet fieldbus. Thanks to the IP54 enclosure, the drives are installed on the wall and no switchgear is needed.

Three roles and many benefits

Steerprop has used VACON® AC drives in their vessel projects since 2001. "We use VACON® AC drives in three roles: to control vessel steering and lubrication pump motors and for controlling slipping clutches. In total, we have more than 2250 VACON® NXS and VACON® NXP AC drives in the power range of 3–205 A in our projects," describes Mr Niemi.

Compared to a traditional, hydraulic steering system, AC drive control enables many benefits:

- Easy installation and maintenance
- Less need for maintenance
- Clear savings in space
- Low noise level
- Accurate control of the azimuth thruster, no crawling due to valve leakage
- Less mechanical wear
- Oil or oil filters are not necessary in the azimuth propulsor's steering gear, which results in decreased costs and maintenance needs
- Redundancy: always a minimum of two or more parallel motor + AC drive combinations in use. If one combination stops, the steering system continues to operate.



- Motor + drive combination consumes energy only when the azimuth propulsors are actively turned
- Improves the overall efficiency of the propulsion system by 1–2% compared to hydraulic steering systems. This has a major economic impact during the entire lifecycle of the vessel.

Ro-Ro/Passenger ship to Canada

In addition to Baltika, another good example of Steerprop's interesting projects is F.A. Gauthier. This Ro-Ro/Passenger ship, built by Fincantieri at Castellammare di Stabia dockyard in Italy, is to be delivered to STQ (Société des traversiers du Québec) in Canada. "This is Fincantieri's first ship with an electrically steered azimuth propulsion system," says Timo Ainasoja, Project Manager. "Despite their doubts, we managed to convince the dockyard's R&D department that electric steering is more accurate and quicker to respond than a hydraulic one, which can cause inaccuracy and delays in steering the vessel, especially when autopilot is in use. In sea trial tests our propulsion steering system has operated without errors. Both the dockyard and the end customer have been very pleased with the performance," Mr Ainasoja concludes. The vessel will be handed over to the end customer in the spring of 2015.

SP 60 PULL, Steerprop Arctic Azimuth Propulsor used on Baltika. Photo courtesy of Steerprop.

Cover photo: Baltika, measuring 76.4 m in length and 20.5 m in breadth, is the first vessel designed to break ice obliquely. The oblique mode allows the vessel to create a 50-m-wide channel in 0.6-m-thick ice, which is over two times wider than her breadth. This improves cost efficiency. Vacon has delivered 18 VACON NXP AC drives to control Steerprop's three 360-degree rotating propulsors, which allow the vessel to operate efficiently sideways, astern and ahead. Photo courtesy of Arctech Helsinki Shipyard.

Inspiring cooperation since 2001

Steerprop, founded in 2000, develops and manufactures azimuth propulsors for the global maritime market. The Company has a focus on reinforced propulsors designed for the demanding conditions of the Arctic Ocean. To ensure the durability and reliability of its propulsors, Steerprop has conducted extensive research and development. "For us, a Finland-based AC drive manufacturer is a great benefit. We have developed together many new items and features, and it has been easy to get in contact with the best experts. For instance, redundancy is an excellent feature," Mr Niemi explains.

"Steerprop is one of our most significant customers in the marine and offshore segment in Finland. They want to be in the forefront of technical development, which also inspires us to do our very best,"

relates Harri Haikonen, Steerprop's Key Account Manager at Vacon.

Steerprop and their end customers have a positive user experience of VACON®'s AC drives. "We wouldn't use them if there were problems," concludes Mr Niemi after 15 years of experience with more than 2250 VACON® AC drives.

This case story was originally released before the merger of Vacon and Danfoss Power Electronics was fully completed on 15 May 2015. As a result, Vacon as a company brand no longer exists and contact persons mentioned in the story may have changed. Future case stories on VACON® products will be released on behalf of the new organization – Danfoss Drives – which is part of the Danfoss Group.