

Case story

Dampskibsselskabet **NORDEN A/S** saves energy on seawater pumps with frequency converters

Frequency converters from Danfoss VLT Drives help Dampskibsselskabet NORDEN A/S reduce the flow from seawater pumps, thereby saving the company more than 500,000 \$ per year.

Dampskibsselskabet NORDEN A/S, one of the world's oldest stocklisted international shipping companies, operates a fleet of 217 dry cargo- and tanker vessels, and is among the biggest shipping companies within several vessel types. The company's fleet is a mix of owned- and chartered vessels which provides greater flexibility.

In 2011, the company decided to run a test with variable speed control on its seawater pumps on the oil tanker Nord Butterfly. This proved to be a profitable decision which has resulted in significant energy savings for Dampskibsselskabet NORDEN A/S.

Adapting pump flow to actual cooling demand

Vessel cooling systems are designed for 100% load at 32°C seawater temperature, regardless of the actual water temperature. Since not all vessels sail in equatorial waters or at maximum speed, the maximum cooling capacity is rarely needed.

To save energy, Dampskibsselskabet NORDEN A/S has therefore retrofitted Danfoss VLT® frequency converters on seawater cooling pumps on 17 tank- and bulk vessels that adapt the pump's flow rate to the actual demand needed. This has reduced the company's energy consumption significantly.

"We save up to 30,000 \$ per year on each vessel with frequency converters," says Martin Meldgaard, fleet manager for product-tanker vessels at Dampskibsselskabet NORDEN A/S.

The pay-back time for the investment is less than 14 months. Martin Meldgaard emphasizes that this calculation is based on a fuel price of 650 \$/MT, so with the increasing prices, he estimates that the current pay-back time could be less than a year.

A tailored solution

The close cooperation between Dampskibsselskabet NORDEN A/S and Danfoss VLT Drives ensured a solution that matched the specific needs of Dampskibsselskabet NORDEN A/S.

"Safety is a crucial parameter for NORDEN. Danfoss has created a system that meets our requirements in this area. They also provide good service, so it has been a very positive experience to collaborate with them," says Martin Meldgaard.





The solution at Dampskibsselskabet NORDEN A/S consists of 3 VLT® AQUA Drive FC 202, 45 kW frequency converters with a cascade pump controller, an electrical switch box for control, and two temperature transmitters.

The frequency converters were installed and commissioned during the vessels' dry dock schedules. Martin Meldgaard is very satisfied with Danfoss' flexibility in commissioning the systems to fit their schedules.

Redundancy and class requirements

To ensure that the solution meets the requirements for redundancy, a control cabinet has been installed. The cabinet has one main system switch for all three pumps. Each pump has a three position switch for Manual-Off-Automatic mode, allowing the operator to prioritize the operation of the pump.

The frequency converters have also been delivered with the VLT® Extended Cascade Controller MCO 101. The cascade controller uses a master/follower pump control system where one frequency converter is master while the other two are followers.

The followers are back-up systems for redundancy in case the master breaks down. The master will keep a constant temperature by regulating the speed of all the pumps. If necessary, the master will automatically start and control extra pumps in order to obtain the required temperature.

"There is redundancy in the system so if a pump or a frequency converter malfunctions, one of the others will take over and function as master. The switchbox makes it possible for us to decide which frequency converter is the master. It also allows us to drive manually, meaning that the system will be running as it was originally built to. This fulfills the class requirements," explains Martin Meldgaard.

Frequency converters on new vessels and other applications

Danfoss' retrofit solution has been so successful that Dampskibsselskabet NORDEN A/S now uses the system on new vessels as well.

"We have used Danfoss' setup on all new vessels based on our experiences with the retrofit solution", says Martin Meldgaard.

Danfoss VLT Drives is on the maker's list for new vessels built in Asia. With the increasing fuel prices, Dampskibsselskabet NORDEN A/S is also considering retrofitting frequency converters on other applications such as on freshwater pumps and machine room ventilation.

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Martin Meldgaard, fleet manager for product-tanker vessels at Dampskibsselskabet NORDEN A/S



VLT® frequency converters

Type:	VLT® AQUA Drive FC 202 with cascade pump controller
Voltage:	380-480 V AC
Shaft power:	45 kW
Nom. current:	90 A
Enclosure:	IP 55 with back plate
Ambient conditions:	Suitable for 50° C engine room
Hardware:	Suitable for IT – Marine grids and with ruggedized and coated boards
Mains disconnect switch:	Built-in for easy and safe maintenance