

ENGINEERING  
TOMORROW

*Danfoss*

Case story | VACON® NXP Air Cooled drives

**Clean** power!  
Shore supply system responds to **peak demands** with **low idle consumption**

**2** months  
return on  
investment

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**VACON®**



## Solving the shore supply challenge

When in dock, ships rely on shore power supply. The load on a ship is not stable, and is characterized by many peaks, presenting a major efficiency challenge. Supplying enough power to meet these peak demands, while simultaneously ensuring low baseline power consumption, is a difficult balance to achieve. Normally it requires a large reserve supply.

The solution for FAYARD A/S shipyard in Denmark was to convert from a diesel-generator based to an electric shore supply system using VACON® NXP Air Cooled drives.

### Before: Costly to run

FAYARD A/S is a modern repair yard with four dry docks up to 415 m in length and 90 m breadth. Here all types of maritime vessels can be repaired, maintained and upgraded.

Before 2010, when ships were in dock the electrical shore power supply was supplied by rotating converters. This equipment converted the 50 Hz shore power to the 60 Hz grid on board the ship. Unfortunately they were costly to run, since the rotating converters typically had a stand-by consumption of 1000 kWh per day due to mechanical and electrical losses.

For larger ships, the power was supplied by portable diesel generator sets which were leased for each project. The diesel gensets typically consumed 800 liters of fuel per day. Efficiency was also very poor since the generators ran at extremely low loads most of the time.

### Pilot

FAYARD has an installed base of 25 large VACON® AC drives on site. Therefore the electrical supervisor, Jesper Gravesen, is very familiar with these drives. He has experienced only very few failures, and any malfunctions have been promptly solved by the service team.

Therefore Jesper Gravesen did not hesitate to contact the experts in VACON® drives to find an alternative to the rotating converters and the diesel gensets. Together with the application engineering team he built a pilot system comprising:

- A VACON® NXC Air Cooled drive to convert the 50 Hz shore power to 60 Hz
- A sine-wave filter to create a near sinusoidal waveform
- A separation transformer to eliminate common mode noise and create an IT grid as required on board the vessels

The results clearly demonstrated that the operating costs of the pilot system were far lower than for the existing systems. Therefore it was easy for FAYARD to decide to invest in two full-scale shore power systems.

### After: High-efficiency electric systems

In 2010, FAYARD Shipyard installed two portable shore power systems, each with a maximum power of 500 A at 440 V, or 300 A at 690 V.

Two VACON® NXC systems were built into two 20-foot (6.1 m) containers. These containers are easy to position on the deck of a ship, or at the quay side, depending on the vessel and the type of project.

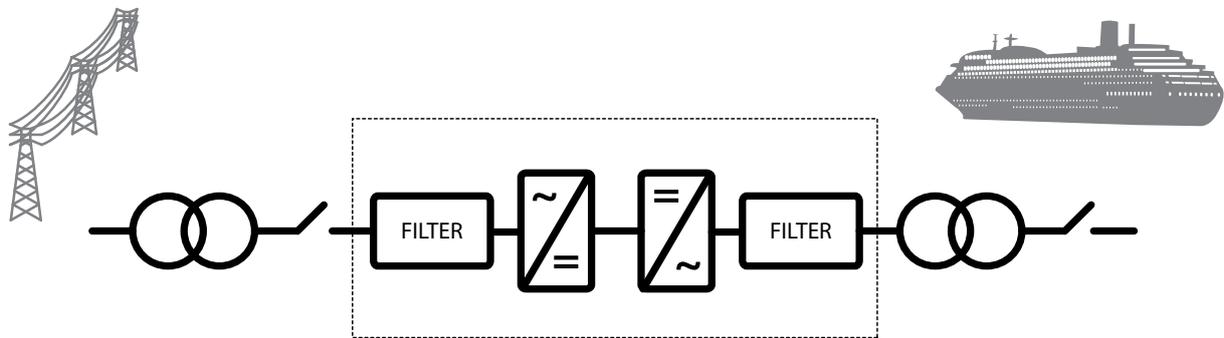
For vessels with large power consumption, the two systems can operate in parallel, on board the same vessel. Alternatively, they can be used as stand-alone systems for two different vessels.

### Payback in two months

The energy savings are impressive. The standby losses per system are reduced to less than 50 kWh per day, and efficiency is typically above 90% with an average load profile.

## Shore supply system configuration

This illustration shows the typical configuration for a shore power supply application



The payback period was calculated to be less than two months, based on:

- Reduced energy cost. The fuel cost for each diesel generator was approximately 43k € for a 40-day project
- Elimination of leasing cost for diesel generators
- Maintenance of the generators no longer being required

Due to the good experience with the first two shore power systems, FAYARD built another system in 2013. The total shore power capacity is now 1500 A at 440 V.

In spite of the turbulent business conditions in the marine and offshore industry, FAYARD has been operating at 75–80% capacity over recent years. The shore power systems run for 180 days per year on average.

## Reduced emissions and acoustic noise

As an extra benefit, the working environment at the shipyard has improved, with better air quality and reduced noise. FAYARD is in the process of implementing an ISO 14001 environmental certificate and it is very important for the yard to validate the green company profile. These documented reductions in emissions and acoustic noise provide the much-needed proof.





*"With a payback time of less than two months, the shore power supply systems are some of the best investments we have made in recent years," says Jesper Gravesen, Electrical Supervisor at FAYARD A/S."*

### A bright future with more VACON® NXC drives

FAYARD has been pleased with the fast service response from the local support team. Usually however, the shipyard performs much of its own maintenance and does not often use the service team.

"We have also recently installed VACON® NXC drives to maintain the water pressure on our firefighting systems, which resulted in great savings. We have also installed VACON® NXC drives on two 400 kW sea water pumps for the dry docks. The pumps can empty the dock in just 4 hours. The next investment is to replace two old pumps with new 105 kW pumps, also regulated by VACON drives."

The VACON® NXC drive is available in air-cooled, liquid-cooled, and low harmonic variants.



**FAYARD** is a family-owned repair yard at the Lindø Industrial Park, in the Port of Odense in Denmark. FAYARD has been owned by the Andersen family since 1916 and moved from Fredericia to Lindø in 2010. FAYARD has a workforce of 700 – 800, consisting of its own staff as well as sub suppliers and contractors. Many of the suppliers have their own site offices nearby at Lindø. Today, FAYARD is a modern repair yard with four large-scale dry docks equipped with high-capacity cranes and a 700 m working berth. The shipyard performs repair, maintenance and upgrade of all types of maritime vessels.

[www.fayard.dk](http://www.fayard.dk)