

ENGINEERING
TOMORROW

Danfoss

Case story | VLT® AQUA Drive FC 202

Driving efficient **life support systems** at **Lodz Zoo**

The situation

What do Indian elephants have to do with energy efficiency? Both are an integral part of the more than 2-hectare complex that provides protection for animal species of Southeast Asia. The animals bred at the Lodz Zoo Orientarium have 9 pools and 6 aquariums with total volume exceeding 5,800 m³ at their disposal.

Thanks to Life Support Systems (LSS), the Lodz Zoo Orientarium's visitors can admire sharks, gaviel crocodiles, anoas, and Malay bears in close-to-natural conditions. The designers and builders of the LSS ensured animal comfort and safety, whilst also prioritizing climate protection and energy efficiency.

Therefore, the LSS help to achieve optimal electricity and water consumption. Technologies used in the LSS systems had to meet stringent reliability and durability requirements in saltwater conditions, achieved by selecting high quality components such as...

...VLT® AQUA Drive FC 202, built to operate in harsh environments.

50%

less power
required to run life
support systems
for rare animal
species

The challenge

The main challenge facing the investment project was to provide the animals with a close-to-natural environment adequate for breeding. To achieve this, the Orientarium required life support systems (LSS) to control water parameters such as purity and salinity. The LSS also needed to stabilize gas balance, and control lime and phosphate concentration for coral reef environments.

Vital processes included mechanical filtration using separators to remove mechanical impurities from the water. Another example was 2-step biological filtration using nitrification and denitrification to remove ammonia and nitrogen from the water, with the aid of aerobic and anaerobic bacteria.

Other processes included disinfection via ozone and UV light, and fresh and saltwater recovery systems. Saltwater required dilution several times before being discharged to the sewage system.

The solution

An expert team comprising architects, specialists in the field of sanitary installations and biologists prepared a requirement specification for elements of the facilities, procedures, and technologies. Based on prior experience, they estimated the number of water filtering devices required. They also designed tanks able to control gas balance by maintaining adequate levels of oxygen and carbon dioxide.

Life support systems operate thanks to pumps transporting water between installations. Each pump is equipped with a VLT® AQUA Drive FC 202 to control its operation. AC drives reduce energy consumption by adjusting the power at which the pumps operate to the exact load, based on filter contamination. The lower the contamination, the lower the pressure and resistance, and hence the pump power.

VLT® drives operating at the Orientarium are protected by enclosures with ingress protection rating IP55, and an anti-corrosion coating on the electronic boards.

The outcome

The systems installed by Danfoss partner Transcom meet customer expectations for water purification and quality by controlling the required parameters. The pumping station systems enable reuse of fresh and saltwater from filter rinsing, to reduce water consumption. Otherwise, the daily water consumption would reach 200 m³. Residual saltwater, which cannot be recovered, is diluted with rainwater collected in underground storage reservoirs.

VLT® AQUA Drive FC 202 reduces pump load to 60-80% of maximum, generating at least 50% reduction in energy consumption compared to systems not equipped with drives.

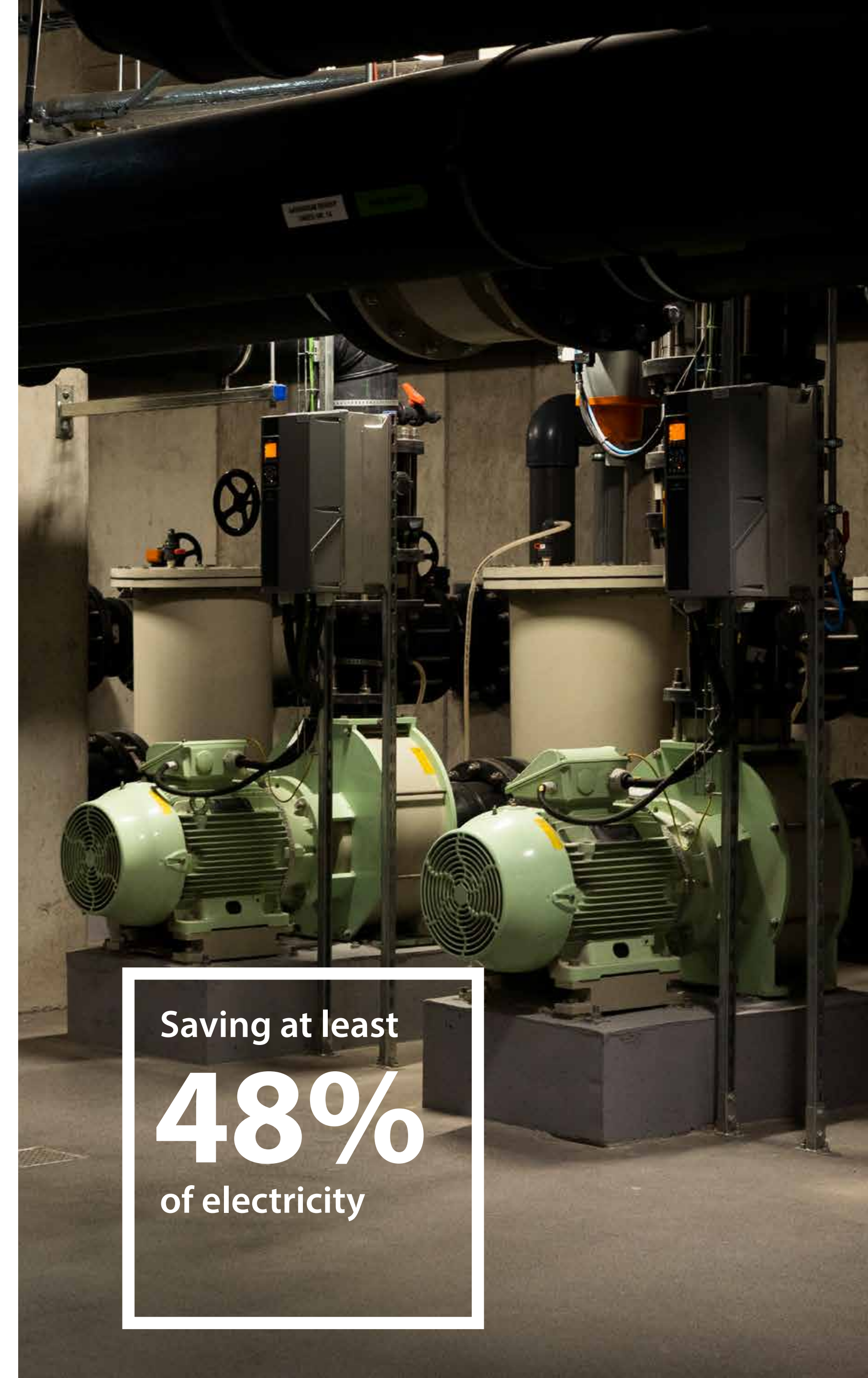
The contractor, Transcom, prioritized reliable operation and the longest possible warranty. Midway through the 9-year period, the AC drives will be inspected by Danfoss partners.

The Lodz Zoo Orientarium is equipped with reliable and durable Life Support Systems (LSS) which use 50 Danfoss VLT® AQUA Drive FC 202 units. The LSS reliably ensures comfort and safety of animals, with low electricity and water consumption.

“Our installations use less electricity and water while providing animals with a close-to-natural environment. Thanks to AC drives, we can fulfill the core mission of the Zoological Garden, which is the protection of endangered species”.

Łukasz Jędraszek, Head of Investment at Lodz Municipal Zoological Gardens

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Saving at least
48%
of electricity