

CASE NOTE

ACS1000 variable speed drive provides reliable and efficient control of dredger sludge pump



An ACS1000 medium voltage drive controls a 3600 kW sludge pump on Taizhou Xiangyun Engineering's cutter-suction dredger.

Compared with hydraulic or diesel engine systems, the control with an ACS1000 variable speed drive results in a 30 percent increase in productivity, lower maintenance costs and lower environmental impact.

The dredger of Taizhou Xiangyun company.

Background

Taizhou Xiangyun Dredging Engineering Co., Ltd operates a fleet of vessels used to dredge waterways to ensure safe passage for ships.

The cutter-suction dredger is the most commonly used and employs hydraulic and diesel engine systems for the cutter and the jet, mud and underwater pumps. However, this technology gives poor environmental performance, low efficiency and high maintenance costs.

Electric drives provide a better option, benefiting from improved energy efficiency, greater environmental friendliness and lower maintenance costs.

Challenge

Dredgers operate in harsh environments. Humidity and temperature inside the electrical room are high, requiring the use of equipment with a rigid mechanical structure and a high degree of ingress protection.

As conventional hydraulic systems need costly maintenance and have low efficiency, Taizhou Xiangyun Dredging Engineering wanted a more reliable sludge pump control for its Xiang Yun Jun 4500 m³ cutter-suction dredger.

Highlights

- High reliability
- Low maintenance costs
- Improved productivity
- Lower environmental impact

Solution

ABB delivered a water-cooled ACS1000 medium voltage (MV) drive for Taizhou's Xiang Yun Jun dredger to ensure precise and reliable control of a 3600 kW sludge pump.

The CCS (China Classification Society) certified drive features an output sine filter for sinusoidal voltage and current output on the motor side. The closed water-cooling system and redundant cooling pump configuration provide optimal cooling control.

The drive's technical specifications are:

- Power: 3600 kW
- Input voltage: 2 x 1903 V
- Output voltage: 3.3 kV
- Output frequency range: 0 - 66 Hz
- Dimensions: 4700 (L) x 902 (D) x 2002 (H) mm
- Protection class: IP54

Benefits

High reliability and low maintenance costs



Compared with hydraulic or diesel engine systems, electric drives deliver higher reliability and require less maintenance.

The ACS1000 medium voltage, variable speed drive can significantly reduce the dredger's maintenance cost throughout its life.

Improved productivity



The ACS1000 delivers outstanding control performance. The drive's motor control is ABB's award-winning direct torque control (DTC), which provides rapid, accurate and stepless control from zero to full speed. DTC delivers full torque with optimal speed accuracy over the entire speed range, even without an encoder.

Compared with hydraulic and diesel engine systems, the ACS1000 can control a wider range of speed and also regulate speed quicker and more accurately.

According to the fleet operator, the dredger's daily productivity has increased by 30 percent following the installation of the ACS1000 water-cooled drive, while impressive fuel savings are achieved.

Lower environmental impact



Operating in harsh environments, a dredger featuring a hydraulic system is prone to oil leakage, leading to energy wastage and marine pollution. Replacing the hydraulic systems with electric variable speed drives ensures a reliable system while lowering costs and eliminating marine pollution.



ACS 1000 variable speed drive.

Key data of ACS1000 product family

Inverter type	Three-level Voltage Source Inverter (VSI)
Power range	Air cooling: 315 kW-2 MW Water cooling: 1.8 MW-5 MW
Output voltage	2.3 kV, 3.3 kV, 4.0 kV, 4.16 kV (optional: 6.0 kV-6.6 kV with step-up transformer)
Maximum output frequency	66 Hz (optional: 82.5 Hz)
Converter efficiency	Typically > 98%
Type of motor	Induction motor
Marine certification	Available for ABS, CCS, DNV

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