ENGINEERING TOMORROW

Success Story: WAPLANS Mekaniska Verkstad AB

Danfoss Products Used in Upgrade of **Swedish Hydroelectric Power Station**

Location
Nälden, Sweden

Segment
Hydroelectric Power Station

Problem
Customer wanted to upgrade hydroelectric power source

Solution
Customer utilized Vickers by Danfoss' KBHDG5V-10 two-stage proportional directional valves with onboard electronics

Results
Forsse Power Station was modernized and upgraded

"Vickers by Danfoss' KBHDG5V-10 two-stage proportional directional valves with onboard electronics came just in time for this important water turbine project on Sweden's Ångerman-älven River."

— Håkan Erlandsson, Chief Engineer, Hydraul Syd

Background

Danfoss and a distributor partner played an important role in the upgrade of a clean and renewable hydroelectric power source in Europe. The Forsse Power Station, built in 1968, was modernized with an upgrade of a Kaplan-brand water turbine made by WAPLANS Mekaniska Verkstad AB of Nälden, Sweden. With an annual capacity of producing over 250-gigawatt hours of electrical power from moving water, the water turbine features a variety of Danfoss products supplied to WAPLANS by Danfoss distributor Hydraul Syd of Ystad, Sweden.

The products used in the installation include:

Two Vickers® by Danfoss KBHDG5V-10 two-stage proportional directional valves with onboard electronics (1,200 liters per minute in a 30-bar system) — used in parallel to control the angle of runner blades

Vickers by Danfoss KBHDG5V-8 valve equipped with a double-acting stroke limiter and emergency control valves (550 liters per minute in a 140-bar system) — used to control water inlet (wicket) gates to the turbine

Vickers by Danfoss PVH 98 and 141 Series piston pumps — used in tandem to provide the needed hydraulic power for the runner blades and water inlet gates

Vickers by Danfoss DG3V-3 and DG4V-3 directional control valves and sandwich valves — used for emergency closing and auxiliary functions

Vickers by Danfoss slip-in cartridge valves — used for miscellaneous hydraulic pressure control and logic functions

VICKERS by Danfoss

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Challenges

WAPLANS has depended on Hydraul Syd for numerous years to supply hydraulic system design assistance for its turbines. This included the Kaplan turbine models that are dubbed the most environmentally friendly in the world, in part because of their reliance on biodegradable hydraulic oil.

For the Forsse Power Station project, WAPLANS called on Håkan Erlandsson, chief engineer at Hydraul Syd, to supply the layout, assembly, and testing of the water turbine's hydraulic system. The job required taking into account the head, water flow, operating conditions, and local regulations.

"*We specify Danfoss products whenever possible in our system designs,*" Erlandsson says. "*But Danfoss did not offer a size 10 proportional valve prior to this year. I had to seek out alternative valve sources in the past for similar projects.*"

Solutions

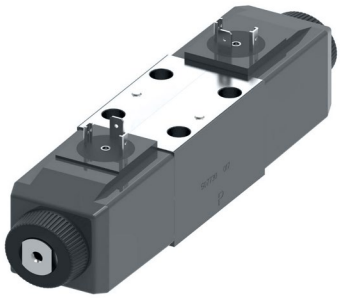
With the Forsse Power Station project on the drawing board, Erlandsson recalled a product training session conducted by Danfoss that mentioned the upcoming release of the KBHDG5V-10 valve.

"I checked with Danfoss on the availability of the size 10 valve, and its release came just in time for the project," Erlandsson says. "*The Danfoss team was very helpful in providing us with prototypes needed for the application.*"

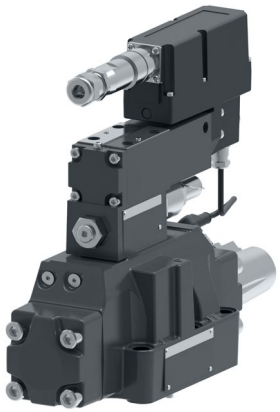
Results

Following prototype approval, the KBHDG5V-10 valves, along with the other Vickers by Danfoss products, were delivered to Hydraul Syd, who then assembled, tested, and supplied the complete system solution to the WAPLANS manufacturing facility.

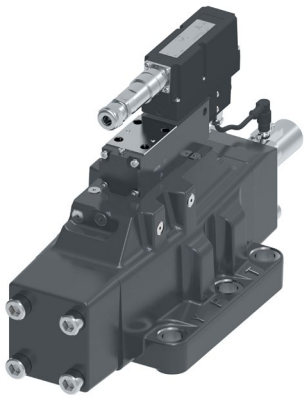
The Vickers by Danfoss product-equipped water turbine was commissioned at the Forsse Power Station and has been operational since fall 2006.



DG4V-3



KBHDG5V-8



KBHDG5V-10

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