

Panametrics liquid clamp-on ultrasonic flowmeter

Improves hydro turbine's reliability and availability

Summary

Hydroelectricity, a green energy, is critical for the Brazilian power grid, representing 60% of the country's energy mix.

A Brazilian hydroelectric operator wanted to improve its water turbine fleet availability and reliability by live monitoring the lubricating system. In doing so, it wanted to ensure efficiency and so could not contemplate any interruption to operations while a solution was being installed.

Water turbines vary in model and size depending on the water height and water flow rate feeding them. There are several models available based on this. Each hydropower plant operates several turbines simultaneously depending on the power demand.

Regardless of the model, there are several bearings on the main turbine shaft that must be properly fed with lubricating oil to help ensure a flawless operation. The lube oil circuit is cooled down to dissipate the heat generated by the bearing friction.

It is therefore critical to have a highly reliable lubricating system for each of the water turbines. In this case, the operator's power plant has four Francis turbines fed by three penstock lines for a total power capacity of 210 MW.

Benefits:

- Easy to install
- No process interruption
- No pressure drop
- High reliability
- Advanced diagnostics
- Long term stability and drift characteristics
- Wide turndown ratio

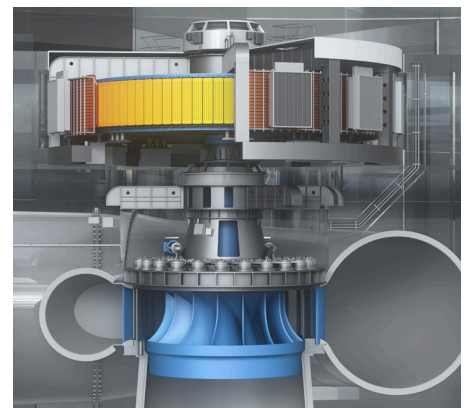


Fig. 1: Francis turbine sectional view

Specifications

Fluid:	Lubricating oil upper bearing	Lubricating oil lower bearing	Cooling water
Pipe Size and thickness:	1 ¼" Sch40S	2" Sch10S	6" Sch40
Pipe material:	CS	CS	CS
Viscosity:	81 cst	81 cst	1 cst
Density:	880 kg/m ³	880 kg/m ³	~1000 kg/m ³
Process Temp.:	Close to ambient	Close to ambient	Close to ambient
Process Pressure:	2 - 5 barg	2 - 5 barg	2 - 10 barg

Challenge

The customer wanted a technical solution providing good accuracy and high reliability that could be installed without process interruption.

The customer also requested that any potential flowmeter errors be reported in case a lubrication line is not fully filled, as this is vital for the turbine's mechanical integrity and performance.

Solution

The Panametrics Team recommended eight ultrasonic AT600 clamp on liquid flowmeters with AT20 transducers for the lubricating lines and four AT600 ultrasonic clamp on liquid meters with AT10 transducers for the cooling water lines. The meters have a Modbus output to transfer the flow metering data as well as the diagnostics and errors to the control room. This allows the customer to have live insights across all its critical lines.

After running a successful demonstration, the customer purchased the 12 meters and installed them on the lines with no process interruption.

As a result the customer was delighted - its critical equipment is now benefiting from accurate and reliable flow measurements, which has translated to the increased availability and reliability of its water turbines, better enabling it to meet its power generation commitments.

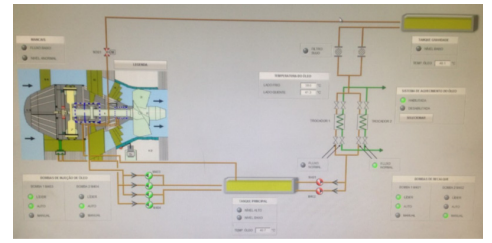


Fig. 2: Francis turbine monitoring system



Fig. 3: AT600 and AT20 installation on two of the lubricating lines