

# THREE-SCREW PUMPS KEEP THE WORLD'S LARGEST HYDROELECTRIC POWER STATION HUMMING

The Three Gorges Dam is a hydroelectric river dam spanning the Yangtze River in Yichang, Hubei province, China. It is the largest hydroelectric power station in the world, with a total generating capacity of more than 22,400 MW. The project is comprised of 32 power generator units (14 on the left bank, 12 on the right bank and six underground).

## THE CHALLENGE

The pumps for the governing system at the hydropower plant operate continuously, requiring them to possess the utmost in quality and durability to withstand the enormous wear and tear they are subjected to, as well as perform safely.

The dam's unique circumstances, however, presented some additional challenges, especially variations in outlet pressure. While it is relatively simple to design components to operate under steady pressure, frequent pressure variations can damage the pump's housing as well as the rotating and bearing parts of the pump. The original pumps used for this application failed to meet these unique demands, and did break the housings. The China Three Gorges Project Corporation needed a better solution.

## THE SOLUTION

As the authorized exclusive CIRCOR distributor for the Three Gorges Dam project, Wuhan KLF Pump Co. recommended a retrofit package of 78 Allweiler SN and SM three-screw pumps based on their proven safety, compliance with quality standards and available local technical support from a full-service manufacturing and service center in Wuxi. Three-screw pumps are a technology well suited to powering hydraulic machinery: they move liquid continuously, virtually without pulsation, turbulence, crushing or loss of lubrication.



Ordinarily there are compatibility hurdles to be overcome in replacing pumps within an existing setup, but once having a firm grasp on the precise operating conditions presented, the team could determine the most reliable pump setup, including engineering a custom-designed baseplate. Designed in collaboration with the Changjiang Water Resources Commission, the malfunctioning pumps on the hydropower plant's left bank were replaced with 16 units of SM pumps.

Subsequently, another 47 units were installed in the newbuild right bank portion of the plant. In addition to the governor pumps, low-pressure pumps were also installed for the lube oil system at the plant, a total of 14 units of SN pumps.

One of the unique applications at the dam is pumping hydraulic oil to open and close the heavy floodgates and regulate the water inlet. The SM governor pumps (lube oil feed/boost pump) were selected due to their heavy-duty design. They are used in the hydraulic system for opening and closing the water turbine's inlet blade. The SN lube oil circulation pump and the lube oil drain pump were configured to cool the water turbine bearing.

## THE RESULTS

To this day, the Allweiler pumps continue their smooth operation. Wuhan KLF's service team has always offered support to address small issues as they arise.



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