

## **AN EXTERNALLY WATER PRESSURIZED BEARING IN A HYDRO GENERATING SET**

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### **ABSTRACT**

An older hydro-electric power station in Tasmania, Australia, has had two of its four turbines fitted with new externally water pressurized hydrostatic guide bearings during a unit upgrade project. The objective of the upgrade project was to increase the turbine and generator capacity and efficiency, and also to increase the reliability and availability of the station.

The hydrostatic bearing in this application is a simple and robust design, and the innovative bearing offered a number of advantageous for this project. They included simplified turbine design, elimination of oil and oil loss with associated environmental and safety improvements, reduced maintenance time and costs, elimination of the shaft water seal, improved turbine efficiency, improved reliability and availability, and the bearings were the most economic option.

For hydro generating sets the speeds are relatively low and usually the first critical speed of the shaft system is well above the operating speed. In these units the first critical speed was always close to the operating speed, and the upgrade project resulted in a higher transient over speed that went above this critical speed and resulted in an unacceptable resonant vibration. This was resolved by stiffening the support structure of one of the retained original bearings, the new hydrostatic bearing was already very stiff and not contributing to the problem.

Another interesting aspect of these hydro machines is that they also have externally pressurized oil injection into their thrust bearing, for use at slow speeds, such as during starting and stopping and during maintenance.

### **Keywords:**

Bearing, pressurized, hydrostatic, hydro-electric, vibration