

CONVERSION FROM OIL LUBRICATED GIUDE BEARINGS TO WATER LUBRICATED GIUDE BEARING – THE TECHNOLOGY AND ITS PROSPECTS

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ABSTRACT:

This paper outlines the prospects of conversion from oil lubricated turbine guide bearings to water lubricated turbine guide bearing and its advantages. Hydro power is considered as one of the cleanest/eco friendly source of power. However, in hydro plants too, accidental leakage of lubricating oil into water always pose a threat of environmental degradation. Any accidental or operational release of oil into the environment for whatsoever reason must be avoided/be kept at minimal level at any cost. With this spirit, conversion from oil to water lubricated turbine guide bearing is under progress at Parbati III Power Station. The paper is an epitome of the technology available and the conversion work being carried out at Parbati III Power Station.

1. THE TECHNOLOGY AND ITS ADVANTAGES AND COMPARISION WITH OIL LUBRICATED BEARING:-

Engineered thermoplastic homogeneous self-lubricating polymer based bearings are available in market which need not be submerged in oil rather works efficiently/reliably with water only. Advantages of water lubricated bearings are:

- . Is totally Oil and Grease free and is Self Lubricated.
- . No additional cost required for lubricant
- . Easy to Machine and carry out the fitment
- . Can calculate estimated time of bearing life by knowing the wear factor over a period of time, plan ahead for maintenance so that replacement / maintenance and reduce lead time.
- . Most of all water lubricated bearings are environment friendly
- . Cost of water lubricated system, initially may seem high, but during overall life cycle total cost will be very less compared to Oil lubricated due to self lubrication, low maintenance cost and reduced down time for maintenance.

Compared to Oil lubricated systems wherein

- . Lot of Oil / Grease will be consumed adding to the costing.
- . Create pollution due to leakage of oil / grease into the river / canal
- . Failure of oil lubricating system is unpredictable and can occur anytime due to which downtime is high and planning of maintenance is uncertain.
- . Initially it is low cost in operation but during overall life cycle it become expensive considering the cost of oil / grease, pollution created and high maintenance cost.

2. DESCRIPTION OF TURBINE AT PARBATI III:

The vertical shaft francis turbine at Parbati III, have following rated characteristics:

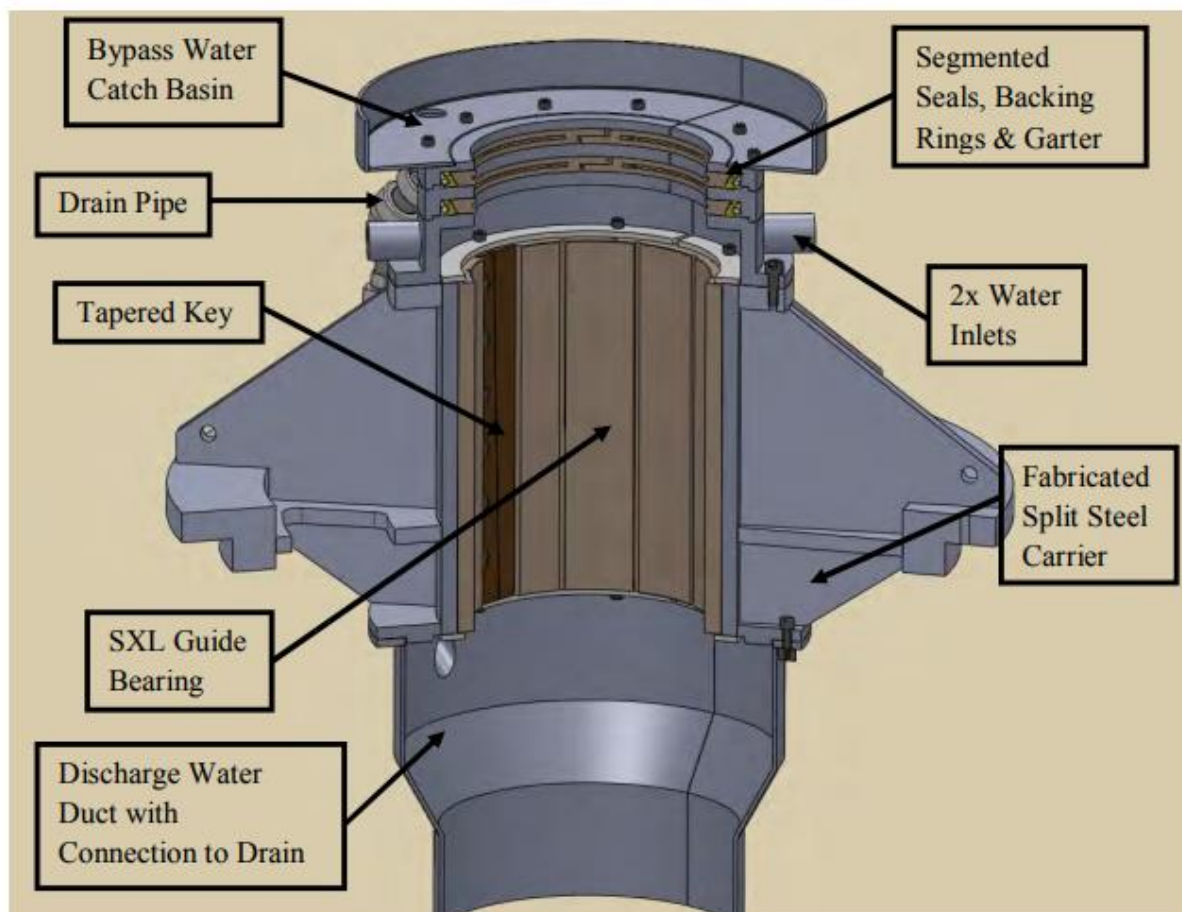
Rated output	:	130000 KW
Rated Speed	:	333.33 rpm
Run away Speed	:	560 rpm
Discharge at rated load	:	43.6 cumecs

3. ORIGINAL TURBINE GUIDE BEARING SETUP AT PARBATI III:

Turbine guide bearing is located above the runner on a journal face machined on the periphery of turbine shaft. The clearance between individual pads and the journal is set by adjusting the tapered wedges & shims. Segmented turbine guide bearings consist of twelve pads. Guide bearing pads has a layer of Tin based babbitt metal chemically bonded to steel backing plate. The pads are polished to high surface finish. The TGB housing encloses the bearing assembly and is filled with lubricating oil of ISO VG-46 grade which serves the purpose of lubrication as well as heat transfer/dissipation. External Water cooler is provided for cooling oil, additionally open water jacket arrangement is in place for further cooling.

4. ENVISAGED WATER LUBRICATED GUIDE BEARING SET UP:

Parbati III is under process of conversion from oil lubricated babbited turbine guide bearing to water lubricated bearings.



5. CONCLUSION:

Potential environmental and financial cost of oil leakages can be minimized by exploring options/alternative available in the fast changing technological arena. Evaluation of each conversion has to be considered on case to case basis. Internationally, some small hydro power projects have successfully converted to water lubricated bearings. Parbati III is on its way for the same. Success story of Parbati III case in coming future will certainly bring about a paradigm shift in the industry in India.