

GREASE FREE THORPLAS® FOR KAPLAN RUNNER BLADE BUSHINGS

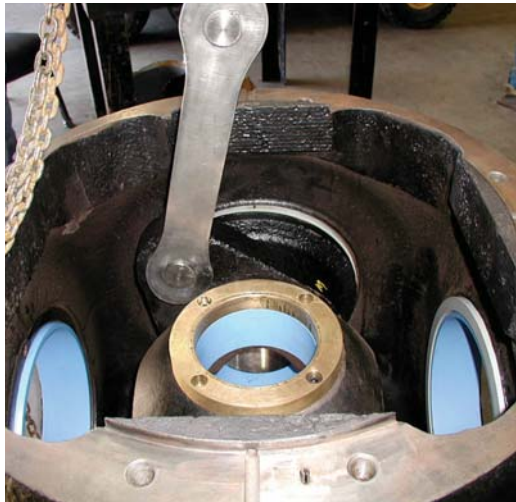
In April 2005, operators at Alabama Electric Cooperative's 3-MW Gantt hydroelectric plant on the Conecuh River in Alabama, U.S.A., decided to replace the four runner blade trunnion bushings in the vertical Kaplan turbine of Unit 4. The bushings reduce friction when the runner blade pitch varies according to head and flow.

The powerhouse originally contained three vertical Francis turbines. In 1984, Alabama Electric replaced Units 1 and 2 with a single 2-MW vertical Kaplan unit (Unit 4). Unit 3 remains in service.

For Unit 4, Alabama Electric selected a bushing manufactured by Thordon Bearings. The bushing is the company's new ThorPlas®, a grease and oil-free engineered (i.e., non-elastomer) thermoplastic bearing.

"We chose the Thordon bushing because we have been using a Thordon turbine main guide bearing without any problems since 1984," says Wes Thomasson, a mechanical engineer in the central generation section of Alabama Electric.

ThorPlas® is a crystalline, premium



grade, homogeneous, engineered thermoplastic bushing that is self-lubricating and can accept operation pressures up to 31 MPa (4,500 psi) without the need for metal backing, says Ingrid A. Muschta, P.Eng., Product Manager for Thordon.

"ThorPlas® has demonstrated exceptional wear and abrasion resistance and has one of the lowest wear rates among nearly all rigid polymers," says Muschta. "Due to its ratio of static to dynamic co-efficient of friction, it does not exhibit any stick slip effect. Instead, it provides a smooth, quiet, stable operation in demanding applications such as wicket gate trunnion bearings."

The material has good thermal stability (minimal to no changes due to temperature) and low water absorption (minimal to no changes due to exposure to water), which allow for tighter installed clearances, Muschta says. Furthermore, she says it is easy and safe to machine because it produces no hazardous dust and releases no dangerous byproducts.

Alabama Electric's Thomasson says the fact that the bearing is self-lubricating was the most important characteristic in its selection. "The runner location is not easily accessed," he says. "You have to stop the unit, put down headgates or

stoplogs, dewater the pit, and climb in there. And even then it's still not easy to get to the bearings. It was not designed to be lubricated.

He also appreciates the environmentally friendly nature of ThorPlas®. "If you used one with grease and the seal failed, you could contaminate the stream," he says.

Thomasson cited ease of installation as another key factor in choosing the Thordon product. According to Muschta, the product is installed using a "freeze fit" or "shrink fit" method. "Due to its coefficient of thermal expansion, ThorPlas® will contract or shrink somewhat when cooled," she says. "You can then place the bearing into the housing by slipping it or lightly pressing it in."

Thomasson reports no problems so far. "The bushings are easy to work with," he says. "And in the year they have been in use at the plant, they have been trouble free." **NW**

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Alabama Electric installed ThorPlas® runner blade trunnion bushings for their Kaplan turbine

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