

PRECISE TORQUE MEASUREMENT OF A MODEL TURBINE WITH A HYDRAULIC STATIC BEARING

TAI YOUNG CHO¹, JONG WOONG CHOI², YOUNG IL KIM³, AND YONG CHO⁴

¹ K-water, 125 Yuseong-daero 1689beong-gil, Daejeon 34045, KOREA, *tycho@kwater.or.kr*

² K-water, 125 Yuseong-daero 1689beong-gil, Daejeon 34045, KOREA, *jwchoi@kwater.or.kr*

³ K-water, 125 Yuseong-daero 1689beong-gil, Daejeon 34045, KOREA, *glorysun@kwater.or.kr*

⁴ Corresponding author, K-water, 125 Yuseong-daero 1689beong-gil, Daejeon 34045, KOREA, *ycho@kwater.or.kr*

Precise main torque measurement for a small-scale model turbine is essential to get accurate efficiency. Since bearings, sealing, and gear system used in a model turbine make friction, two methods are usually used in the model testing. One is estimation of friction torque calibrated for rotational speed and axial thrust, and the other method is directly measurement with an expensive hydraulic static bearing. In leading model testing laboratory, a hydraulic static bearing system is usually used to obtain main torque including friction torque or only small friction torque. The torque calibration with a hydraulic static bearing system is carried out before the model testing, in while very small torque of the sensitivity of the hydraulic bearing has not been confirmed for accurate measurement. The hydraulic bearing consists of journal bearing and thrust one supporting horizontal and axial thrust respectively, and each bearing should be confirmed to keep sensitivity especially for large axial thrust according to the international model test standard of IEC 60193⁽¹⁾. For the testing, non-contact thrust loading devices with high pressure oil and magnetic force were developed and it has been used for sensitivity measurement of the hydraulic static bearing and calibration for axial and horizontal thrust. In the results, it is confirmed that the measured torque sensitivity under 0.01 Nm keeps in designed range of 5kN of axial thrust as shown in Fig. 1, and measured errors of axial and horizontal thrust are in proper range for a model testing.

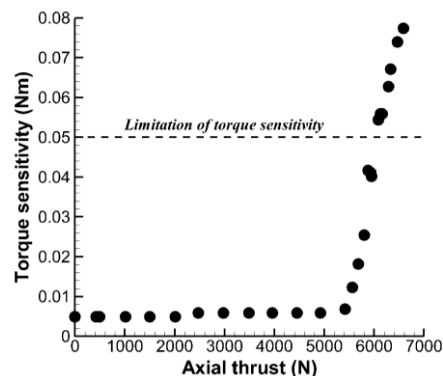


FIGURE 1. TORQUE SENSITIVITY FOR AXIAL THRUST.

ACKNOWLEDGEMENTS

This study was supported by Korea Institute of Energy Technology Evaluation and Planning (KETEP) as "Development of 50 MW Francis turbine runner and on-site verification" (NO.20153010060310).

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