2027 Edition of Annual Training cum Workshop on

Hydro-Turbine Model Testing, Cavitation, Silt and Abrasive Erosion Measurements

by Independent Hydraulic-Turbine R&D Laboratory at HRED, IIT Roorkee

January 05-07, 2027







INTRODUCTION

The annual training cum workshop will focus on turbine model testing, a highly specialized area in hydropower engineering to share the comprehensive insights into model testing, including test procedures, interpretation of reports, and their practical applications to the participants. The workshop shall also provide the hands-on training to strengthen understanding through real-world practice.

A special highlight of the program is the discussion on erosion of hydro-turbine components, a major challenge in the Himalayan region due to sediment-laden river water. Such erosion leads to weight loss in turbine parts and reduced efficiency. The workshop will delve into this critical issue and present general remedial measures to address it.

MAJOR TOPIC

The following topics will be covered during the training cum workshop:

- Hydro-Turbine Model Testing as per IEC 60193:2019
- Flowmeter calibration by primary gravimetric weighing method as per ISO 4185:1980
- Model Testing Facilities at HTR&D Lab, IITR
- Cavitation and turbine setting
- Modern Instrumentation used at HTR&D Lab, IITR
- Hands-on model testing
- Hands-on model testing data processing
- Hydro-abrasive erosion and silt measurement
- Cavitation and turbine setting
- Ultra-low head Laboratory and turbine model

TARGET PARTICIPANTS

This workshop is intended for engineers and officials involved in the procurement of hydro turbines and large pumping stations, as well as those engaged in powerhouse operations, maintenance, and turbine selection. Participation is limited to 40 seats only, and registration will be on the first-come first-served basis. There is no fee for attending the workshop. Accommodation may be provided in the Institute Guest House on a single/twin-sharing on chargeable basis. Acceptance of the participation will be confirmed by HRED.

ABOUT HRED, IIT ROOEKEE

The Indian Institute of Technology Roorkee (IIT Roorkee) is one of the nation's premier institutions, renowned for excellence in higher education and research in engineering, basic sciences, and applied sciences. With a legacy of over 175 years, IIT Roorkee has consistently contributed to both academia and industry.

The Department of Hydro and Renewable Energy (HRED), formerly known as the Alternate Hydro Energy Centre (AHEC), was established in 1982 by the Ministry of New and Renewable Energy (MNRE), Government of India. HRED offers specialized expertise and services covering all aspects of hydropower and renewable energy for government bodies as well as private organizations.

ABOUT HT R&D LAB, HRED

With the support of the Ministry of New and Renewable Energy (MNRE), Government of India, an international-level Hydraulic Turbine R&D Laboratory has been established at the Department of Hydro and Renewable Energy, IIT Roorkee. This state-of-the-art facility serves as a hub for design, validation, and research on hydro turbines and other hydro-mechanical equipment, confirming to national and international standards.

The laboratory is having NABL accreditation in the field of Testing scaled models of hydraulic pumps and turbines (IEC 60193), and in the field of calibration of fluid flow both by Gravimetric method (ISO 4185:1980) and comparison method using reference flowmeter (ISO 20456:2017) as per ISO/IEC 17025:2017.

The laboratory has ± 0.25% overall absolute accuracy of measurement efficiency. The test rig has a flexible setup to accommodate all types of turbines and pumps of various designs. The laboratory conducts tests on scaled models of hydraulic turbines, reversible turbines, and pumps for weighted average efficiency and turbine output, cavitation performance, pressure pulsation, runaway speed, characteristic curves, hydraulic thrust, and torque. Four quadrants for reversible pump turbine.

The guiding framework for the laboratory is meeting international standards (IEC 60193:2019 and ISO/IEC 17025:2017) requirements. The laboratory has been accredited by the National Accreditation Board for Testing and Calibration (NABL) as per ISO/IEC 17025:2017 for fluid flow testing as well as

Flow calibration. The laboratory has conducted witness tests for various organizations successfully such as Voith India, Flovel, Andritz Hydro and KBL. The chief of laboratory has also witnessed a model test as an independent consultant at Andritz Works, Linz, Austria for KPCL.

A key advantage of an independent laboratory is the assurance of unbiased and reliable testing, free from commercial pressures. This impartiality enhances quality assurance (QA) and builds greater confidence among power project owners.

OTHER FACILITY AT HT R&D LAB, IIT Roorkee

Erosion of hydro-turbine components caused by sediment-laden river water is a major challenge in the Himalayan region. Such erosion results in weight loss of turbine components and a significant reduction in efficiency. To address this, a dedicated facility for online/offline measurement of silt content and erosion is available.

The department is also equipped with advanced Computational Fluid Dynamics (CFD) facilities for analyzing flow patterns and turbine behaviour. Using the latest software and a high-performance computing server, CFD enables detailed investigation and optimization of hydro turbine performance.

With the support of the Ministry of New and Renewable Energy (MNRE), Government of India, a Centre of Excellence for Small Hydropower is being established. This centre will focus on the development of ultra-low head turbines and hydro-kinetic turbines, as well as the creation of guidelines for evaluating the performance of small hydro turbines and reversible pump turbines using CFD.

WORKSHOP DETAILS

The workshop will provide specialized training in turbine model testing, enabling participants to effectively attend witness tests and interpret model test reports for both new and refurbished turbines. It will also offer a unique opportunity to witness live model testing.

The training program will be held at HRED, IIT Roorkee, from January 05 (Tuesday) – 07 (Thursday), 2027 (09:00 to 17:00). The last date for submitting nominations is December 18, 2026 (Saturday).





For further information and registration :
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