The Institute of Hydraulic Fluid Machinery is part of the Faculty of Mechanical Engineering and Economics at the Graz University of Technology. It can look back on more than a hundred years of history. Our institute is a highly specialised competence centre for turbines, pumps, valves and entire systems. It is one of the leading institutions for hydraulic issues in application-oriented mechanical engineering.

Through tests at the institute’s test rigs in our laboratory, numerical simulations and on-site measurements, we obtain valuable information for the assessment and optimisation of machines and systems for our customers, who are primarily small and medium-sized industrial companies from the hydropower sector and the pump industry. In doing so, our 10-person team focuses precisely on their needs and offers tailor-made solutions.

We are an independent institute. Research and teaching are at the heart of our activities. Hence, we permanently incorporate current research results into our university lectures and specialist study courses. For knowledge transfer, networking and exchange of experience, we regularly organise conferences in annual and 2-year cycles on the main topics of hydropower/turbines/systems and pumps.
Our laboratory has ultra-modern and high-performance test rigs equipped with the latest measurement technology, which enable industry-oriented and practice-related research work. This state-of-the-art setting allows for operating and life cycle tests following applicable standards (IEC 60193, IEC 62006, ISO 9906, IEC 60534). For the design, realisation and adaptation of the test rigs, customer-specific requirements are given priority.

The major advantage: Based on a scale model, we can demonstrate on the test rig whether the conveying parameters and performance guarantees assured by the manufacturer are actually met.

OUR TEST RIGS

4-QUADRANT TEST RIG
For standard-compliant measurements on hydraulic model machines and shut-off devices.

TEST RIG FOR MECHANICAL SEALS
For durability testing and wear determination of mechanical seals under realistic operating conditions.

VARIOUS SMALL TEST RIGS
For the determination of hydraulic parameters (e.g., determining characteristic curves or pressure losses of valves, etc.) according to customer specifications.
OPTIMISATION BY NUMERICAL SIMULATION

For decades, our institute has been using numerical simulation to solve fluid mechanical issues. Our simulations include the determination of applicability limits, the investigation of fluid-structure interactions, as well as pressure surges and transient states of liquid and gas flows.

One of the particular strengths of our institute is that we can support the experimental results achieved at our test rigs using 3D-CFD.

This feature enables us to develop ideal solutions for the design and ultimately the optimisation of hydraulic fluid machinery, components and systems. For the highly complex computing processes, we not only use our powerful computing cluster but can also rely on the high-performance computing system of the Graz University of Technology.
ON-SITE SYSTEM MEASUREMENTS

We check systems in industrial companies and power plants concerning hydraulic criteria such as flow rates or economic benchmarks such as the efficiency with state-of-the-art and individually adapted measuring technology. Based on the results determined according to the standards IEC 62006 and IEC 60041, we present detailed proposals to the operators for the improvement of plants or components. Our institute provides the necessary equipment for the most suitable methods for on-site measurements. These include current meter measurements, ultrasonic flow measurements, and thermodynamic efficiency measurements.

ASSESSMENT AND CONTRACT RESEARCH

With our comprehensive know-how and state-of-the-art technical equipment in measurement and simulation, we are the competent partner for the modernisation and optimisation of power plants and systems, the implementation of planning and feasibility studies or the investigation of damage cases. With our hydraulic expertise, we provide technical reports to support our customers in a wide range of judicial and extra-judicial proceedings.
We offer numerous lectures and courses with high practical relevance at our institute. Mechanical engineering and process engineering students receive in-depth specialist knowledge on hydraulic machines and systems, numerical simulation, testing and metrology, and other special fields directly related to hydraulic machines. Thereby they benefit from the modern equipment provided by our institute and from the lecturers’ project experience and expertise.

UNIVERSITY PROGRAMME “HYDROPOWER”

This university programme aims at people from the field of hydropower who wish to develop their technical and professional skills. The study course is designed as a distance learning programme with 6 to 8 days of attendance per study period and lasts 5 or 4 semesters (graduation as “Master of Engineering (Meng) – Hydropower” or “Academic Hydropower Engineer”). Graduates work in planning, consulting, and management positions in national and international companies active in hydropower and public authorities.
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