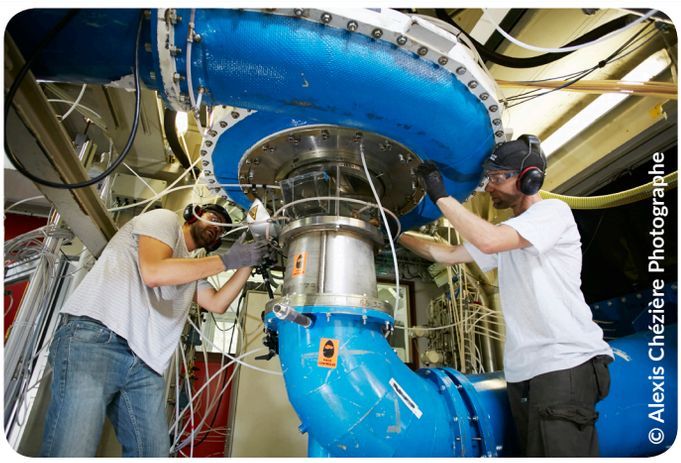
Hydraulic Machines test platform

For comprehensive pump-turbine characterisation tests

We carry out your acceptance tests in an independant laboratory, supporting your preliminary research and the development of new hydraulic designs. We provide comprehensive characteristic diagrams of reduced-scale models, enabling us to offer an extremely detailed characterisation of your product. By understanding the real operating limits of your machines, we put you in a position to target new market opportunities.

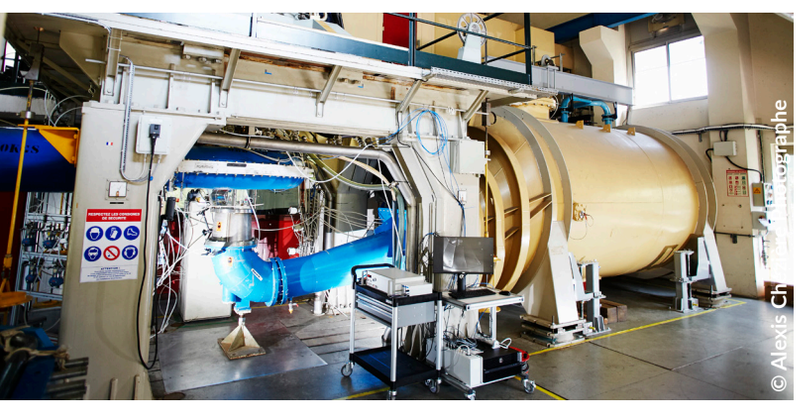


OVERVIEW

Investigating physical hydraulic phenomena to improve efficiency

Physical hydraulic phenomena such as S-shape, hump region or cavitation characteristics can be investigated thanks to combined measurements, the ability to visualise water flow on a reduced-scale experimental test rig and Computational Fluid Dynamics simulation (CFD).

A better understanding of these phenomena leads to improved efficiency and an extended operating range. These high-end solutions aim to increase system flexibility and facilitate the emergence of new ancillary services.



Qualifying hydraulic runners in accordance with IEC 60193 standards

Our hydraulic test rig offers a complete solution for performing acceptance tests on Francis turbines, storage pumps and reversible pump-turbines, according to IEC 60193 standards.

DESCRIPTION

Located in Grenoble, the hydraulic test platform is the only independent hydraulic test rig in France able to perform tests according to IEC 60193 standards.
Our team has a high level of expertise and experience in scaled-model testing, allowing us to support our customers and be flexible in response to their needs. We provide real added value for our customers thanks to our unique means of visualising water flow in the turbine runners.

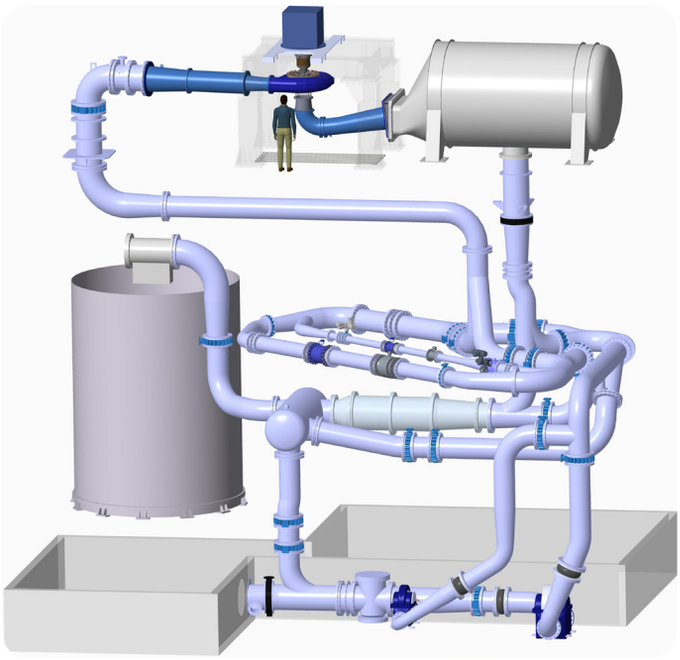
We use 3D unsteady Computational Fluid Dynamics simulation tools in addition to experimental results to provide an overall view of the tested machine.

What makes us unique?

- Ability to measure and visualise water flow in the turbine using minute tracing particles.
- Ability to visualise the cavitation in a turbine inlet (on pressure and suction sides).

AVAILABLE SERVICES

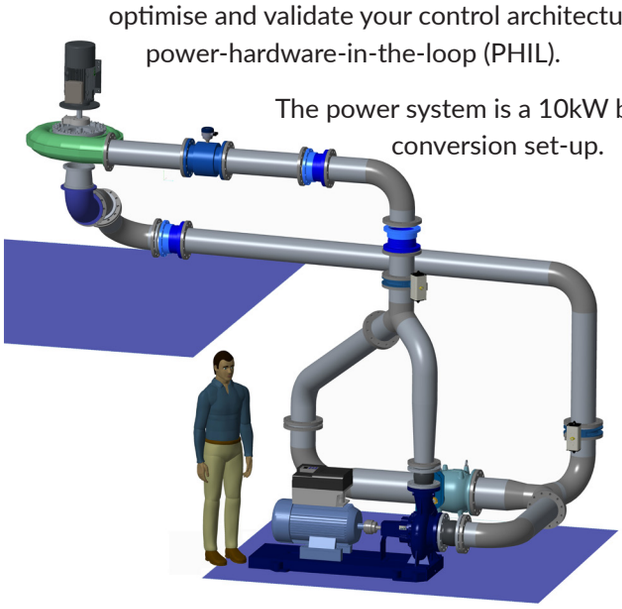
- Efficiency measurements
- Measuring and visualising cavitation limits
- Turbine runaway characterisation
- 4 quadrants characterisation
- Dynamic torque measurements
- Dynamic axial and radial thrust measurements
- Wicket gates torque measurements
- Dissolved oxygen measurements



HYDRO-PHIL: POWER HARDWARE-IN-THE-LOOP PLATFORM FOR HYDRAULIC TRANSIENTS

SuperGrid Institute has designed an innovative test platform capable of performing real-time simulations for hydro power storage technologies, the first of its kind. With this new platform it is finally possible to test different control strategies and measure ancillary services' performance in the laboratory, before testing on real industrial plants. We help our customers increase the plant's safety in transient operations.

Our new hydro real-time test rig combines a highly flexible power converter to simulate grid faults and a dynamic hydraulic loop to simulate hydraulic phenomena (water hammer, surge tanks, pipe sharing, etc.) in the penstock. Using our innovative platform, you can test, optimise and validate your control architecture using power-hardware-in-the-loop (PHIL).



The power system is a 10kW bidirectional conversion set-up.

HYDRAULIC TEST RIG DESCRIPTION

Our modern test rig offers flexibility and reduced down time. It can operate in all 4 quadrants with automated operational mode settings. We perform all test operations and mode changing from the control room with automated valves, allowing fast, repeatable tests. Our modular facility can accommodate different vertical shaft runners for various hydraulic models (Francis turbine or Pump-Turbine).

The platform is equipped with high-precision measuring instruments, suitable for both development and acceptance tests. Automated system and supervision software enable rapid performance assessment.

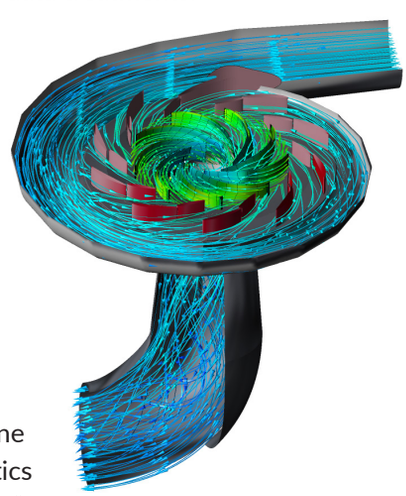
The main features of the platform are:

- Maximum Head: 100 mWC
- Maximum Discharge: 800 l/s
- Maximum Rotational Speed: 1800 rpm
- Output Generator Power: 330 kW
- Pumping group Power: 410 kW
- Efficiency accuracy: ≤ 0,3 % in accordance with IEC60193 standard

SIMULATIONS TOOLS

We have developed numerical tools to assist our clients and support our investigations on physical hydraulic phenomena, new runner designs, in-use runner efficiency improvements or experimental data treatments:

- Numeca Suite Software (AutoGrid, Fine Design 3D, FineTurbo): hydraulic design development and optimisation to fine-tune turbines and increase efficiency.
- Ansys Software (CFX, Fluent): an unsteady 3D computational fluid dynamics numerical method used to simulate water flow in a machine and determine the characteristics of a turbine, even in "Off design" regions.



We perform transient studies on hydraulic machines and circuits with SIMSEN or Matlab-Simulink.

CONTACT

For additionnal information or to ask for a quote, please contact: sales@supergrid-institute.com

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