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Flow Model Tests

Optimization of Power Plant Components and Processes

Fluid dynamic and thermal-hydraulic tests provided for all power generation fields

Challenge

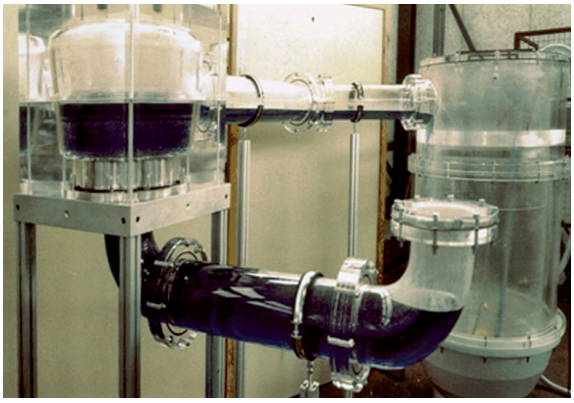
Whether power plants run on nuclear or fossil fuels or on renewable energy sources, the complex plant systems and individual components must be capable of performing their designated functions under normal and accidental operating conditions.

Solution

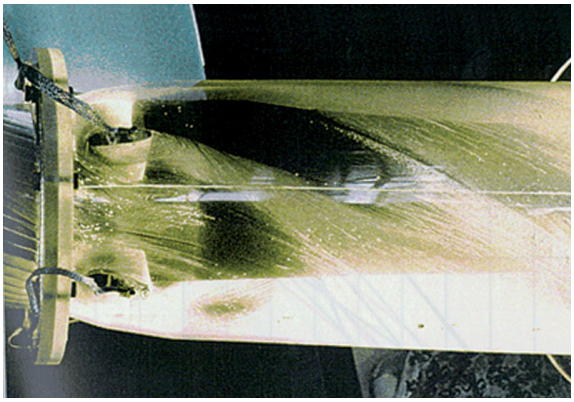
We propose flow model tests to support the design process, design validation and optimization using experimental test rigs based on similarity laws for the following tests:

- Reduced-scale models for systems and components testing, during the design phase for example
- Experimental validation of results from flow simulation models generated with computational fluid dynamics.

Our experimental setups guarantee the physical similarity of the modeled flow phenomena to the real flow conditions in the actual plant equipment. To this end, fluids used for experiments are chosen with simplicity and practical economics in mind, such as water and air. Applying appropriate similarity laws makes it possible to apply the experimental results to actual in-plant flow conditions, even when the actual fluids in the plant are flue gas, steam or oil.



Investigation of thermal mixing in a pressurized water reactor



Simulation of swirling gas turbine exit flow for studies related to heat recovery steam generators

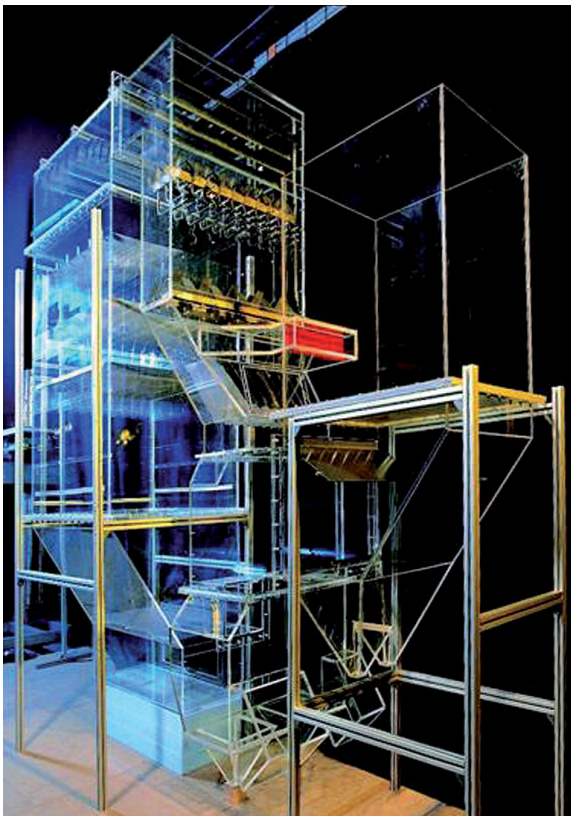
Customer benefits

- Comprehensive and cost-reduced testing by use of similarity laws
- Reliable test results through well-equipped laboratory using sophisticated measurement systems
- Accredited test laboratory and inspection body according to ISO 17025 and 17020 for highest test quality
- Wide range of application such as nuclear, fossil and renewable energy projects
- Extended possibilities with access to the Framatome thermal-hydraulic worldwide platform

Your performance
is **our** everyday **commitment**

Technical information

- Fans providing air flows of up to 50,000 Nm^3/h at 0.2 bar
- Compressor providing air flows of up to 2,000 Nm^3/h and 7 bar
- Pumps providing liquid flows of up to 1,000 m^3/h and 10 bar
- Design and construction of flow models
- State-of-the-art instruments for measuring pressure, velocity (LDA, hot wire probes), component vibration (LDV), concentrations (LIF, FID), temperatures and heat transfer
- Powerful data acquisition and process control systems (MERSY, LabVIEW)
- Flow visualization using laser light-sheet techniques



Model used for optimizing a DeNOx reactor for a coal-fired power plant

References

- KERENA (boiling water reactor) safety concept
  - Water/air experiments simulating the cooling of the exterior reactor pressure vessel for postulated core-melt accidents
  - Experiments investigating boron dilution in the reactor core
- Experiments for nuclear power plants in Brazil and Germany
- Experiments for fossil-fired power plants in Great Britain and the USA
- SCR (selective catalytic reduction) plants with PARMIX and TURBOMIX static mixers in Germany and the USA
- Process engineering experiments
  - Explosive limits of fuels for combined-cycle power plants (natural gas and coal gas)
  - Explosive limits of natural gas for gas distribution networks

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