efeu

Efficient Energy Use

Design of low specific speed pumps using CFD, 3D-printer and air as a fluid

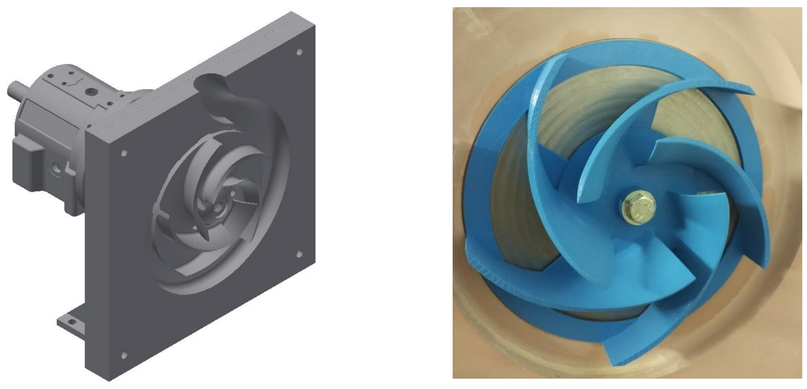
An air based measurement system is developed for R&D of low n_q centrifugal pumps. The new system is further used to measure the operation of an existing pump with improved impeller and volute designs.

Introduction

The efficiency demands for pumps are increasing. Pump research and development throughout the industry needs to react to the increasing demands and be able to offer high efficiency pumps for all operating conditions. The high costs of new pump design can be significantly reduced if air is used in measurements instead of liquid.

Air based measurement system

The modular construction of the system enables fast testing and changing of all parts of pump flow geometry. 3D-printing is used extensively in prototype manufacturing.



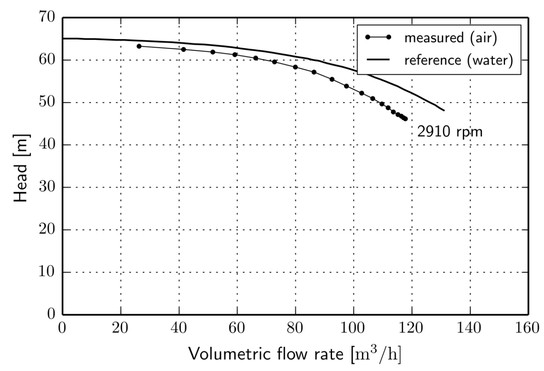
Test system illustration and a 3D-printed impeller

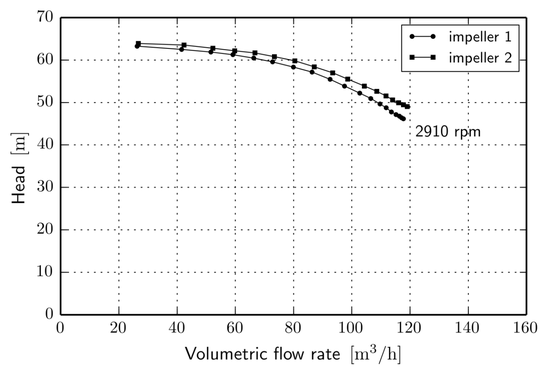
CFD simulations

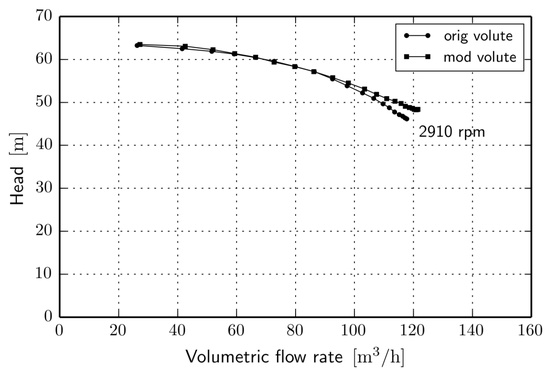
Flow simulations with OpenFOAM are used as a starting point for new designs. Turbulence modelling is done with kOmegaSST and MRF.

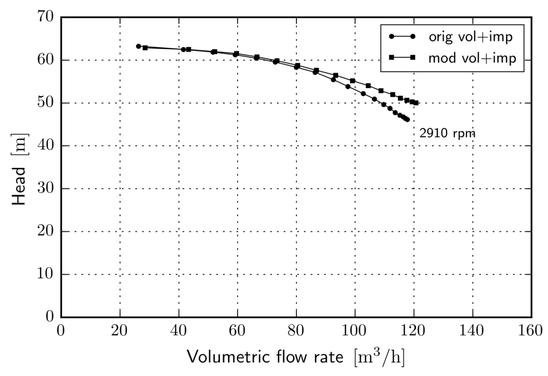
Simulated and measured impeller and volute designs

Air based measurement results









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