Technical Paper

Special aspects of product development

Session 7-2

Design procedure for high-efficiency pumps

Author:

Professor Reijo Karvinen
Tampere University of Technology, Energy and Process Engineering
P.O. Box 589
33101 Tampere, Finland

Co-Author 1:

DTech Matti Koivikko
Manager Hydraulics and Analysis
Sulzer Pumps Finland Oy
P.O. Box 66
48601 Kotka, Finland

Co-Author 2:

Sami Virtanen
Research Engineer
Sulzer Pumps Finland Oy
P.O. Box 66
48601 Kotka, Finland

Copyright: Pumps + Systems Association within VDMA e. V.
Lyoner Straße 18, D – 60528 Frankfurt
Phone: +49 (0) 69/66 03-12 86, Email: friedrich.kluetsch@vdma.org

Summary

Traditionally the design of hydraulic machines is based mainly on experiments and on experience from actual practice. The reason is that other tools have not been available. This type of approach is very costly and time-consuming, and the effect of geometric details on the performance is difficult to identify. In order to understand the effect of geometry on pump performance, numerical modelling of the flow can be adopted. In the paper, the possibilities and requirements of the modelling are discussed when steady-state, quasi-state and transient treatments are used. On the basis of the modelling, a new slip factor formula, which is also validated with experimental data is given for a preliminary design. A design procedure based on the new slip factor and modelling is explained. The results for newly designed pumps, the efficiencies of which are clearly higher than those of older ones, are given.

Copyright: Pumps + Systems Association within VDMA e. V.
Lyoner Straße 18, D – 60528 Frankfurt
Phone: +49 (0) 69/66 03-12 86, Email: friedrich.kluetsch@vdma.org