

Optimization of Multi-Pump System

Cooperated with Grundfos A/S



Fig.1 The testing facility provided by Grundfos A/S for AUE Lab.

In pump applications a number of pumps is usually controlled by a central control unit, which runs some algorithm to determine when the pump has to start/stop to achieve a given reference pressure.

In huge system including a number of pumps will it be possible to achieve an optimization algorithm to control the start and stop of the pumps and pump speeds as well. Therefore, the objective of this project consists of two main parts:

- Modelling and feature analysis of multi-pump system. Single pump model has been popularly used in practice. However, how to obtain the model of a multi-pump system based on the single pump model is not quite clear, due to the mechanical and hydraulic coupling among different pumps. A simple but reasonably precise model is expected to be identified for multi-pump system, the validation and property analysis of the developed model are also expected.
- Optimal operation of multi-pump system. How to control the multi-pump system, including the selection of running pumps and the speed control of each running pump, so as to have a high system efficiency meanwhile keeping the system performance acceptable.

- The developed methods are expected to be tested on the practical benchmark provided by Grundfos A/S as shown in Fig.1.

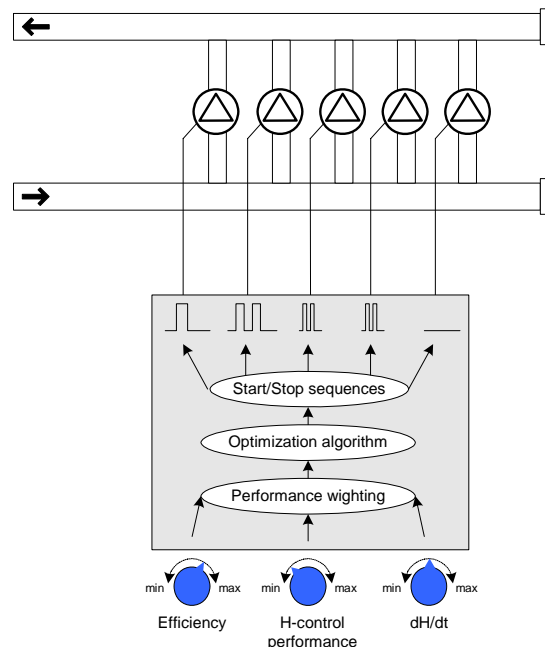


Fig.2 Scheme of optimal control framework

Project conditions

- This is the possibility to select some contents for a semester project, or for a long-term final project (combine the last two semesters), or two serial projects (e.g., one for the 9th semester, the other for 10th semester could base on the 9th project and go further)
- Once the group decides to do the project, a written contract among Grundfos, AUE and students will be signed. The group work is strictly required to be accordance with the contract.

Project Resources

- There will be one AUE supervisor and one industrial supervisor from Grundfos A/S
- Grundfos A/S has provided necessary information and testing facilities for the project work.
- Potential AUE Supervisors:**
 - Dr. Zhenyu Yang, FUV0.21, 7912 7608, yang@cs.aaue.dk
 - Dr. Gerulf Pedersen, FUV0.20, 7912 7709, gp@cs.aaue.dk
- Grundfos Supervisor:**
 - Dr. Hakon Børsting, Senior researcher, Grundfos A/S