



Telemark University College
Faculty of Technology

FMH606 Master's Thesis

Title: Model Predictive Control using DeltaV

TUC supervisor: Hans-Petter Halvorsen

External supervisor: Håvard Nilsen (Yara)

External partner: Yara, Emerson

Task description:

In this project we will explore the MPC features available in DeltaV. Some parts of the project will be fulfilled at Yara, while other parts of the project will be fulfilled at the DeltaV facilities available at Telemark University College.

The following topics should be investigated in this project:

TUC specific Tasks:

- Explore the Delta features available in DeltaV
- Implement MPC for existing DeltaV systems at Telemark University College.
- Create MPC Training material for use with the DeltaV systems available at Telemark University College. Use the small-scale lab equipment available at Telemark University College

Yara specific Tasks:

- Literature study where one seeks to find examples of implementations and evaluations of DeltaV MPC. Also explain how the module works, including:
- Model Identification
- Cost Function and Optimization
- Look for constraints, opportunities etc.
- Explain a pre-chosen Yara process section and describe the main bottlenecks, challenges, special phenomena, the current structure, etc. Include also established facts, especially about what limits the performance.
- Specify MV, CV and DV.
- Consider instrumentation and other special circumstances that may affect the results of model identification and the MPC controller.



- Use the established process section and get a representative dataset. Use DeltaV MPC and establish a process model. This must be evaluated. This can be done by:
- Comparison with historical data.
- Comparison with a possible step test that might be done.
- Qualitative validation using processing resources
- Experiments to test the module. If testing is promising and implementation is not too extensive, it would be interesting to run MPC in the process.

Task background:

Student category: The project is already assigned to a student

Practical arrangements:

Signatures:

Supervisor (date and signature):

Students (date and signature):