CoPro: Data-driven and hybrid modelling tool

Project:
Improved energy and resource efficiency by better coordination of production in the process industries

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The goal of the CoPro project was to develop and to demonstrate methods and tools for process monitoring and optimal dynamic planning, scheduling and control of plants, industrial sites and clusters under dynamic market conditions, to provide decision support to operators and managers and to progress to automated closed-loop solutions to achieve an optimally energy and resource efficient production.

CoPro brought together 17 partners from 8 EU countries, including 5 industrial end users and 6 technology providing SMEs. The project developed solutions for the **plant-wide optimisation of large plants, for balancing production and consumption in industrial parks for industrial symbiosis**, and addressed **power plant scheduling** and **demand-side response**. It further developed online data analytics for **anomaly detection**, and **decision support** for plant operators and managers. The solutions can be integrated into the IT infrastructure of the plants via an **integration platform** that supports the connection to different IT systems. CoPro developed **model libraries** for the efficient development of advanced optimisation-based solutions and techniques and software for **hybrid modelling** and **model management**.

The developments of CoPro were motivated by and applied to challenging use cases from different sectors of the process industries:

- (Petro-)chemical production;
- Cellulose fiber production;
- Production, formulation and packaging of consumer goods;
- Sterilisation and packaging of food.

CoPro demonstrated that significant savings of energy and resources are possible by using advanced technologies for monitoring, decision support, optimisation, and planning and scheduling.

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Sector:

Chemicals

Summary:

The Problem

- Data-driven modelling is attractive to obtain models which can be used to improve plant operations with a relatively low effort.
- It is difficult to integrate data-driven modelling into traditional process simulation packages that rely on constructing flowsheet models from standard unit operation models.
- Process engineers who want to use data-driven modelling commonly have to rely on custom modelling packages or general mathematical packages. These require investment of time and a higher level of training.

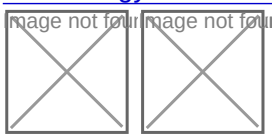
The Solution

- A hybrid modelling functionality was implemented as part of the gPROMS process simulation platform. This functionality allows engineering users to construct flowsheets with hybrid unit operation models. These models combine data-driven elements with first-principles modelling.
- The tool allows quicker integration of data-driven modelling with standard process modelling.
- The resulting flowsheet models can be used in the gPROMS platform (simulation, optimisation, experiment design).

Theme:
Plant-wide monitoring - SPIRE02-2016
Keywords:
Modelling, Optimisation, Machine learning, Simulation, Advanced control
Type:
Software
Poster

Resources

Link:
Technology Short Description: Data-driven and hybrid modelling tool



Complementary Material:

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