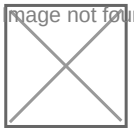
CoPro: Optimisation of the operation of heat exchangers

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



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

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Water

Summary:

The Problem

- Heat exchangers are crucial elements for the reduction of the energy demand of the processing industry.
- Heat exchangers often suffer from fouling, which decreases the heat transfer and thus the efficiency of the process.
- Cleaning is needed to recover nominal efficiencies.
- The optimal time for cleaning depends on the usage of the heat exchangers. Overall, these are many operation decisions difficult to take for the plant personnel.

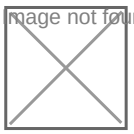
The Solution

- A methodology for monitoring the fouling of their heat exchangers was developed by Lenzing AG.
- Hybrid models for the heat transfer, the evolution of fouling and for the heat-recovery network layout in Lenzing were developed by UVa.
- Model-based real-time optimisation (RTO) tools were developed to support the operators in such complex decision problems.
- The developed decision-support systems enable a quick reaction to disturbances or load changes.

Theme:
Plant-wide monitoring - SPIRE02-2016
Keywords:
Optimal cleaning; Prescriptive maintenance; Network management; Real-time optimisation; Hybrid model; Decision support systems; Online fouling monitoring; Heat recovery; Heat exchangers network; Cleaning schedule; Food; Pulp and Paper
Type:
Case study
Software

Resources

Link:
Technology Short Description: Optimisation of the operation of heat exchangers



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