Energy-SmartOps

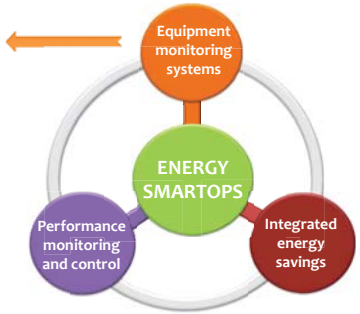
Integrated Control and Operation of Process, Rotating Machinery and Electrical Equipment

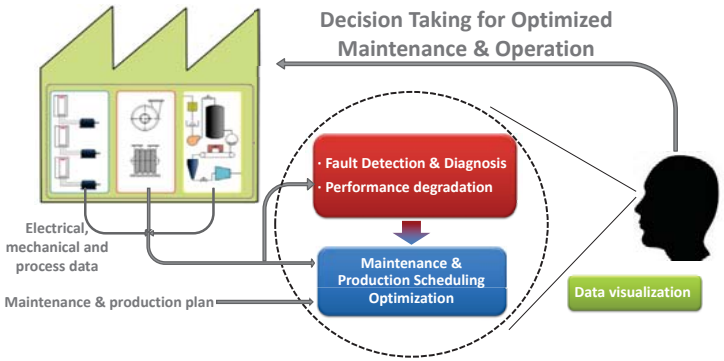
Maintenance and Diagnosis - Work Package 3

Cranfield University, ABB OGP Technology & Innovation, ABB Corporate Research Germany

Work Package 3 in Energy-Smartops

- Take account of multiple measurements (process, mechanical and electrical)
- Development of diagnostic algorithms that can reduce the failure risk
- Development of hardware and software solutions





Researchers Involved and Outcomes

Cranfield University	ABB OGP	ABB Corporate Research
Cristóbal Ruiz	David Dorantes	Matteo Biondi
		
Multivariate statistical process predictive monitoring using operational data	Visualization of plant connectivity (process, electrical and mechanical)	Short term maintenance and production scheduling for process plants

Publications: Seven publication in scientific journal and around ten contribution to international conferences were produced by the work-package members during the project

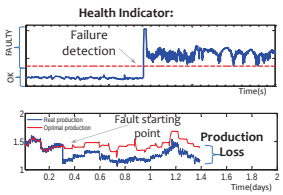
Outcome: Condition monitoring information can be used to update maintenance and production plans according to the system condition. This lead to more energy effective and profitable industrial processes by avoiding the inefficient operation of faulty equipment.

Mulivariate Statistical Process Monitoring

Objective: To develop and optimize new methodologies for predictive equipment condition monitoring (CM) through statistical process monitoring of multi-variant data.

Summary of Results:

- Detection and diagnosis of faults in a large-scale experimental multiphase flow facility through canonical variate analysis
- Combination of process, electrical and vibration measurements for improved condition monitoring of a compressor test rig working under varying operational conditions (in collaboration with ABB-PL)
- Prediction of performance degradation in a large-scale experimental multiphase flow facility



Visualization of Connectivity

Objectives: To create tools for capturing and visualizing information about plant-wide dependencies that can be used by domain experts from mechanical, process, and electrical disciplines.

Summary of Results:

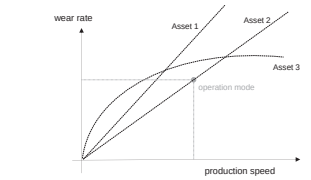
- Ethnographic studies over a targeted user population from Statoil in two large-scale facilities.
- Generation of low and mid-fidelity prototypes for extraction, visualization and analysis of connectivity.
- Development of connectivity models based on graph-theory
- Implementation of a functional .NET prototype.
- User evaluations

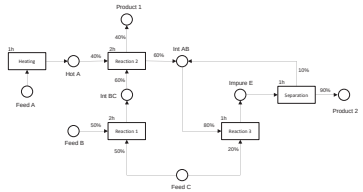
Maintenance and Production Scheduling

Objective: To investigate on the integration of maintenance and production scheduling and to develop optimization based models to determine the joint schedule

Methodology:

- Explicitly account for units degradation while generating the production and maintenance schedule
- Account for various unit operating modes with different performance and impact on units health
- Develop a generic optimization based approach applicable to different production processes





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Energy-SmartOps consortium investigates equipment and process monitoring, integrated automation and optimization for energy savings.

http://www.energy-smartops.eu/