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Research area: product aims

Manufacturing industry / Management systems

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Operator Decision Support System, Scenarios
Management, Optimization, Internal Sizing, Broke, Water
Reduction

Subject:**Flexible and Eco-Efficient Paper Production through Dynamic Optimisation of Operational Tasks and Scenarios (DOTS)****Background/Problem area**

The European paper industry plays a pioneering role in the application of efficient and environmentally friendly processes. It uses recycled fibres as raw material, continuously reduces its freshwater consumption and ensures the efficiency of its processes and microbial purity of its products by means of a complex chemical balance. This results in very complex processes whose dynamics are hard to handle. Moreover, the paper industry has changed from a producer of consumer goods to a flexible and customer oriented industry.

Being actively supported by the industry, the DOTS project generates methods and tools for Scenario Management, to be developed into a decision making system which can make production more environmentally friendly and efficient.

Objectives/Research results

The DOTS project aims at developing and testing a software-supported system for optimized decision making (Operator Decision Support System – ODSS) on the complex dynamic processes of paper production. The ODSS shall combine administration tools for the actual and potential trajectories of process and target variables, dynamic optimization tools and dynamic simulation tools to form one single software tool.

On this basis, the dynamic process conditions will be simulated to permit an optimal operation of the actual process.

The coordination between the ODSS and the plant's process control system and combination with simulator-based system modelling forms the basis for optimised control strategies in paper machines.

Within the scope of this research project, a system check was carried out in PM5 of the Drewsen Spezialpapiere mill. For this purpose, the data recorded in PaperMap was made available for further analysis by the installation of a DDE/OPC interface. By means of this data, the stock and mass flows of the machine can be simulated. To determine relevant dynamic process data, comprehensive experiments were carried out, varying important variables governing the resin sizing of papers. Simultaneously, paper samples were taken and their sizing degree estimated by the PDA method. The experimental data and several simulation tools were used to design models describing the sizing degrees (A60 value, W value und Max value). Besides the very complex Partial Least Squares (PLS) Regression Models designed by PCA (Principal Components Analysis), simplified polynomial (parametrical) and Regression Models are suitable for simulation. The simulation models will be integrated into the DOTS toolset in a simplified form first, and then in their complete form, after which the toolset will be tested in practice.

Application/Economic benefits

The **ODSS** software tool to be developed in international co-operation will initially be tested by the European paper mills participating in this project. In the course of the project, a commission will be established (Exploitation Management Committee, EMC) to market the software designed. The strong industrial support, broad project structure and efforts to win a provider of process control systems who is willing to integrate the system into its portfolio and install it as standard system in new plants are expected to ensure the long-term application and implementation of the software.

Because of its strong customer orientation and high flexibility, the paper industry must design its processes as effective and environmentally friendly as possible. The software to be developed will assist users in their decision-making processes, taking into account not only the dynamics of the process but direct economic aspects as well.

Project period: 01.10.2002 – 31.09.2004

Remarks

The DOTS project (G1RD-CT-2002-00955) is carried out in co-operation with KCL (Finland), CTP (France), STFI (Sweden), Societe des Papeteries de Lancey (France), Societe Condat (France), the Swedish Institute of Computer Science (Sweden), Tampere University (Finland), Mäddardalen Hogskolan (Sweden), UPM –Kymmene (Finland), and is sponsored by the European Commission.