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Research area: Process aims

Process measuring and control technology

Key words:

Data-based modeling, process optimization, online soft sensor, generic software platform

TITLE:**Generic platform to accelerate and formalize a continuous lifecycle support for online soft sensors****Background/Problem area**

The informative value of production data-based mathematical models should be used directly, i.e. online, in current complex procedural manufacturing processes. The immediate availability of production parameters that were extracted through online-capable model-based applications supports a detailed understanding of the process, helps to solve problems and opens up potentials for optimization of the production process. Product quality, throughput, material and energy efficiency can be shown to become improved.

Up to now, a large number of existing model applications have been offline simulations, i.e. simulations where the required relevant process data has been extracted, preprocessed and stored before model application. Thus, the simulation result is based on a snapshot of the past. Offline simulations are usually used in the process design-phase or for the planning of process modifications, but are of limited use in current manufacturing process.

From a technical point of view the development of online model applications is significantly more demanding compared to that of offline sensors:

- A continuous flow of data from control systems and related sensors must be ensured
- Processing of data must be performed automatically in real-time
- Model software must be implemented real-time capable
- A runtime system for the repetitive application of the simulations must be set up
- A high degree of flexibility to adapt to equipment or process changes must be provided

Until now these applications has been created in individual developments with considerable specific effort. Furthermore, experience shows that a sustainable industrial use of such applications requires a continuous methodological and technical support which goes far beyond the mere design process.

Objectives/Research results

The goal of the proposed project is therefore the development of a methodology and based on this development of a generic software platform to accelerate and formalize the lifecycle process for online-capable soft sensors. The platform includes all the essential phases of the life cycle of new models as well as the option to adapt existing models for variable process control and / or measurement systems. The systematic composition and variant maintenance of model libraries for the paper industry are supported. Specifically for this purpose, the following procedure shall be implemented:

- Formalization of the process data acquisition and processing
- Support for data acquisition libraries
- Development and support of generic interfaces to the models used
- Management of model libraries
- Formalization of soft sensor integration into control systems
- Continuous integration of the different functions in one tool / framework without a system changeover
- Design of an associated design flow for efficient creation and industrial use of soft sensors
- Provision of logic modules to facilitate the integration and changes of standard model applications to plant-specific features
- Startup and model validation support through integrated trend logging, trend analysis and trend data export to external databases or common export formats
- Support for remote monitoring of model-based applications in order to improve the use of expert knowledge to optimize or troubleshoot running applications

Application/Economic benefits

The development expense is difficult to calculate in advance and usually causes initial monetary effort, which can overburden small and medium businesses economically. Applicants believe that the use of a generic platform for soft sensors yields a potential savings of 15 to 20% of engineering overhead for soft sensors. The planned project effectively supports the real-time application of mathematical models in the process industry which can thus be a valuable tool to ensure product quality, to avoid process failures and to reduce raw material and energy use. The resulting efficiency increase of production processes implies a higher added value. These advantages make the use of soft sensors potentially attractive specifically for small and medium sized businesses.

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Remarks

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