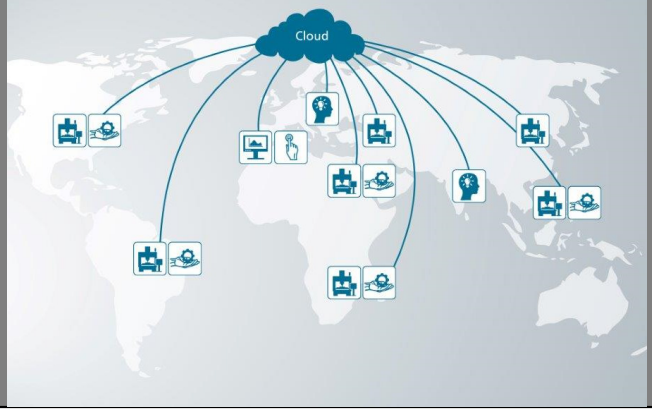

INDUSTRY 4.0
PREDICTIVE MAINTENANCE

iMAIN – A Cooperative Solution for Predictive Maintenance

Cooperative maintenance aims to identify failures of components, machines or plants as early as possible. With this knowledge companies could more effectively plan when maintenance activities are necessary or when components have to be replaced, by potentially linking maintenance activities with production schedules. Such forward planning however requires a large amount of information and expert knowledge which cannot be reasonably realized, technically or economically, using conventional remote desktop systems.

Cloud-based Maintenance Approach

A cloud-based maintenance approach that networks machines and plants offers a promising solution. Such an approach helps manufacturers offer enhanced maintenance services for their international customers who in turn will benefit from improved maintenance. Centralized data and information management enables new solutions for the generation of maintenance-relevant knowledge and services. For example, new quality metrics for remaining useful life prediction can be reached by merging data and information from different systems and co-simulation tools, allowing integration of even the most complex evaluation models. For this purpose, problem specific third-party expert knowledge systems can also be easily integrated and implemented as necessary.

In the EU FP7 project iMAIN (Intelligent Maintenance) eight partners from four European countries – coordinated by Fraunhofer IWU – are cooperating to develop the necessary IT infrastructure, specific sensors and embedded data processing units as well as special algorithms and models. Results and solutions have already been successfully demonstrated in sheet metal forming technologies.

Embedded Data Acquisition

The interdisciplinary approach for the achievement of enhanced knowledge of material behavior and component service life is reflected in a broad strategy for instrumentation and data acquisition. A "multi domain" approach has been developed to handle the different amounts and types of data. This "multi domain" approach also supports different interfaces necessary to include and handle different physical process parameters that are being monitored together with the integrated sensors and industrial communication protocols. Different sensor types (e.g. MEMS, wireless) can be connected and various condition parameters like press ram tilting, eccentricity of press forces, temperature changes of bearings or guidance systems, vibrations of motors or belts, oil quality as well as air and energy consumption can be monitored. A unique innovation is the first-time acquisition of the real load history of a complete frame structure to avoid cracks. Crack avoidance is made possible by supplementing the limited number of real strain gauges by virtual sensors – thus offering a model-based approach to increase significantly the number of monitored hot spots.

Service-oriented Business Models

Such a cooperative maintenance approach allows the establishment of new service-oriented business models for machine and plant manufacturers. Enhanced reliability can be guaranteed to the customers for the access to system data information based on "information-for-x" models that can be developed in the future. Furthermore, other product-service business approaches like "pay-for-use" or "pay-for-performance" can benefit from cloud-based maintenance. Enhanced reliability and reduced costs by predictive maintenance can help to reduce the economical risks for industrial system providers.

More information:

www.imain-project.eu.

contact@imain-project.eu

iMAIN intelligent MAINTENANCE