

Pinpoint Optimization

Fast nominal-actual value comparison supports requirements-based process control.

Unforeseen disruptions to the production process can be costly, making it essential to continuously monitor production processes, identify weak points as early as possible, and take appropriate countermeasures. ifm consulting and Softing Industrial Automation have combined their products into an end-to-end solution comprising hardware and software modules for the continuous monitoring and control of production processes. A key component of this monitoring system is the centralized collection and logging of the relevant process data.

The ever growing cost pressure forces many companies to increase their competitiveness. In addition to direct cost cutting measures, this objective can also be reached by optimizing the production process. The required steps include, for example, increasing the plant utilization, avoiding downtime, improving the use of human and material resources, and avoiding costly “emergency measures” in maintenance. This involves identifying the concrete weak points in order to take the appropriate corrective action. An important prerequisite to achieve this goal is to continuously monitor the production process.

ifm consulting, a subsidiary of ifm electronic, is a system provider for the integration of real-time maintenance (RTM) systems in existing installations. The company’s consulting and service portfolio is focused on pinpointing weak points with the aim of fully exploiting the optimization potential of these systems.

RTM systems monitor plant availability and detect weak points in the production process by comparing the plant’s actual values with the defined nominal values. Depending on the plant status determined, the system can initiate preventive, condition-based or performance-based maintenance action before expensive downtimes occur. Access to process data from the RTM system at the time of generation is essential to ensure a reliable assessment of the current status of a production process. For this purpose, ifm consulting has developed a solution that integrates Softing’s echocollect product as a central component, allowing unlimited data collection and data logging. This data collector and logger is a top hat rail-mounted device featuring two Ethernet ports and optional serial interfaces. The two Ethernet ports can be used for connection to both, the production and office networks. If required, the serial interfaces can be used for integrating programmable logic controllers (PLCs) without Ether-

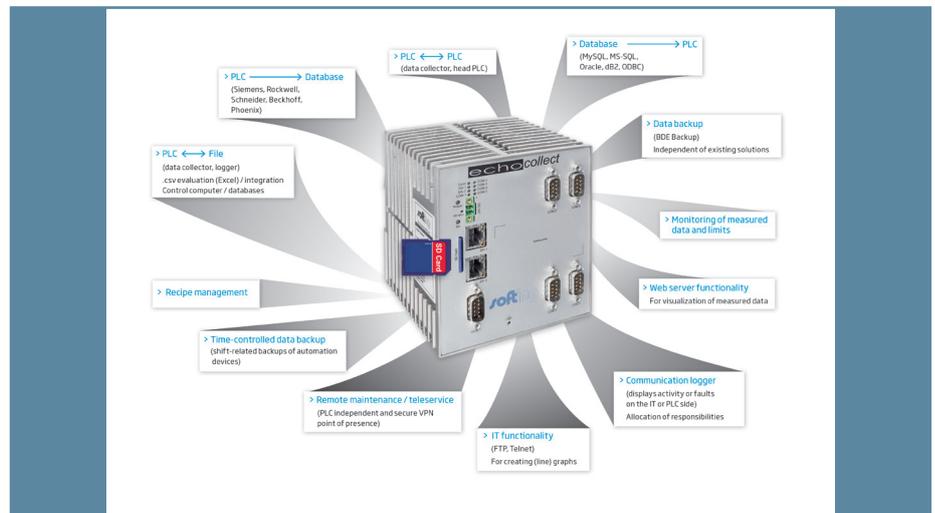


Figure 1: echocollect offers extensive functionality for collecting production data and for preparing this data for further processing

net port or other proprietary devices with Send/Receive interface. echocollect supports more than 50 PLC types and does not interfere with the equipment or programs of the running process controllers.

Comprehensive data collection functionality

echocollect collects the relevant data from all the PLCs and devices connected to its Ethernet and serial ports. It then stores the collected data in a process image and optionally logs the data in a database for further processing. Data storage in the Microsoft formats Excel or Access is also supported. To allow the forwarding of data to an OPC client, echocollect provides an integrated DCOM tunnel. In addition, echocollect can store the read data on a memory card to buffer this data in case of interruptions during data processing, and to ensure that none of the system’s process data is lost. echocollect also supports data transfer in the opposite direction, i.e. the writing of data packets to PLCs. This allows, for example, reading recipes from a database, extracting the relevant variables with echocollect, and distributing them

to the assigned PLCs.

The details of data collection and data processing with echocollect are defined in a configuration interface. This configuration includes settings for individual triggers and for adding timestamps to the collected data. To ensure proper entry of the data in a database, the required database commands can be specified in the configuration, and the PLC data can be mapped to the appropriate database fields. If required, automatic type conversion and normalization can be defined for the data. The configuration also supports heartbeat monitoring.

RTM system with three software modules

Based on the echocollect functionality, ifm consulting provides a comprehensive RTM system comprising three software modules. The first module consists of the OEEpro (Overall Equipment Effectiveness) software package. The software determines the overall equipment effectiveness from the plant and production availability data stored in a SQL database by echocollect. The performance data is

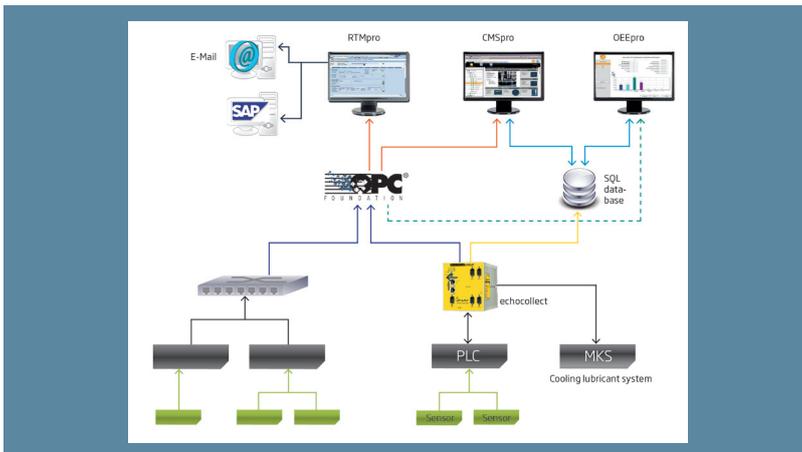


Figure 2:
echocollect's central functionality within
the overall RTM system

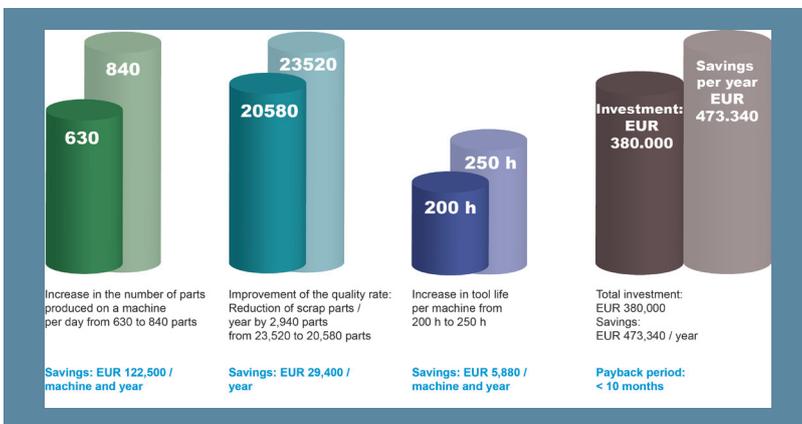


Figure 3:
The use of the RTM system delivers convincing results

automatically calculated from the controller information and represented according to VDI. The second module is the CMSpro (Condition Monitoring System) software package, which displays the machine status data. This module processes the process data provided by the OPC client interface and uses the SQL database entries made by echocollect. The third module comprises the RTMpro (Real-Time Maintenance) software, which obtains status monitoring data from the OPC interface and monitors the specified maintenance rules. If maintenance action is required, the software transmits maintenance notifications via text message or email, or creates maintenance jobs for the enterprise resource planning system (e.g. in the SAP-PM / ERP system).

The RTM system is marketed by ifm consulting as a complete solution comprising Softing's echocollect product and ifm consulting's software modules described above. This RTM system is already being successfully used by a number of companies. After integration with the relevant processes and the existing systems on site, the RTM system has effectively increased the energy efficiency, quality and productivity of the machinery and equipment at these companies.

Convincing results

The achievable benefit from the RTM system is illustrated, for example, by the optimization of the cooling and lubricating system of a multi-spindle automatic lathe with four lathe tools, implemented in a plant of the parent company, ifm electronic. With a machining time of 8 seconds per piece, two million pieces per year are produced. The optimization focused on the pressure-controlled cooling and lubricating system for internally cooled tools.

With the help of ifm consulting's RTM system, the cooling process was modified to control the flow rate of the cooling lubricant based on the actual amount required. The connection to the machine control allows optimally adapting the amount of cooling lubricant to the machining process. For this purpose, the RTM system precisely measures the mass flow rate of the cooling lubricant. In addition, the RTM system controls and minimizes power consumption, monitors leakage and filters, and acquires other operating and process data. Through the use of the ifm consulting RTM system, the modifications described above helped to reduce scrap costs by 90%, while increasing the quality by 75%. For the overall production plant, a total investment of EUR 380,000 has yielded savings of EUR 473,340 per year.

The investment thus paid for itself in less than ten months.

As a central component, Softing's echocollect data collector and data logger contributes significantly to the benefits of the RTM system. This is confirmed by the project managers at ifm consulting: "Without echocollect's unique data collection and logging functionality, the required integration with the production process would not be possible," Christoph Schneider summarizes the advantages of echocollect. And his colleague Ottmar Biebesheimer adds: "I was particularly amazed by the excellent interoperability with the ifm consulting systems. By allowing seamless data exchange, echocollect optimally complements our product range."

Author: Georg Suess (Dipl.-Inform.), Softing Industrial Automation GmbH

<http://industrial.softing.com>

German article published in:
elektrotechnik, ed. 11-2012
messtech, drives, Automation, ed. 5-2013