Flexible automation with PLCs and OPC UA

Is this the control technoloy of the future?

The tension in mechanical and plant engineering between the goals of constant cost and process optimization on the one hand and increasingly deep networking and digitization on the other hand creates major challenges for decision-makers. Costs, innovation and individualization - everything has to be reconciled in the best possible way.

Save costs, drive innovation, and do so while outdated programs and machine parts are still in use: Exploiting the full potential of already integrated controls requires in-depth know-how and a high time investment.

The task expansion of PLCs that goes beyond the mere collection, processing and output of data quickly reaches its limits. If modular, open and high-performance elements are being integrated An important keyword here is OPC UA. But with the multitude of connected components in an industrial automation system comes the diversity of integrated fieldbuses, communication interfaces and specifications.

The more connectors are subsequently added, the greater the challenge of creating uniformity. Particularly at OT level, the network protocols used are adapted to the application-specific task differentiation for machines and systems and are therefore diverse.

In order for production to become more intelligent, and thus for the full potential of machine data to be exploited for effective and efficient use, the data must be continuously available. In the next step, the collected and processed data can be used to plan and make reliable and meaningful assessments and thus improvements. This in turn improves processes and costs and helps to reduce maintenance efforts and downtimes.

OPC UA as enabler

Various vendor-neutral communication technologies can serve as platforms for smart plants. OPC UA as a platform-independent architecture fulfills the main prerequisite for the necessary interoperability in the IIoT: the semantic description of the information.

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It ensures continuous communication between the field devices and from them to the cloud. In this way, the connection between OT and IT can be established. Due to the highly modular and scalable structure of OPC UA, systems in the system can be made possible for the user. This goes hand in hand with the modularity of Sontheim controllers and software modules.

OPC UA allows device and function descriptions to be created as information models, whereby industry-specific models can be standardized and thus become Companion Specifications. These domain-specific specifications thus define the form in which machines provide data. They include, for example, specifications for programmable logic controllers, CNC systems or analysis devices. This means that new machines can be quickly configured and integrated into an existing plant, because the programmers of a controller no longer have to deal with its specific properties, but can rely on the functionality as stored in the Companion Specifications. The user can thus save the time of development work and be sure that the specifications are tested by OPC Foundation-approved Certification Test Labs and are generally compatible with other machines and components.

Examples of Companion Specifications:

- PLCOpen: Information model maps IEC61131-1 to OPC UA
- FDI (Field Device Integration): Specification for the integration of field devices
- umar (universal machine tool interface): information model as universal interface for machine tools, of the vDW and the VDMA
- AutomationML (Automation Markup Language)

IO-Link and Codesys as PLC components make sense for this. Codesys enables a PLC to be used in a very wide variety of automation applications. Adaptations to the most diverse system requirements and integrated functions for practical automation applications support this. A large number of available library modules, for example for I/O functions, make it easy to implement individual device properties. At the same time, the IO-Link communication standard enhances the end-to-end connection from the sensor to the cloud. In combination, the standards increase the potential for process optimization; for example, information can already be prefiltered decentrally and selectively forwarded to cloud services.

The range of applications is further supported by a large number of integrated interfaces on the controller. Special features such as motor interfaces for controlling stepper motors or classic interfaces such as Ethernet and CAN can be easily integrated. On top, WLAN and Bluetooth can be integrated for wireless data transmission. The interface package can be completed, for example, by USB, digital and analog inputs and outputs or temperature sensor interfaces for intelligent automation systems.

An important - possibly even decisive - factor is the provision of hardware and software in combination, as offered by Sontheim Industrie Elektronik. This provides the customer with a system solution that is consistent and offers data availability. The individuality can be seen, among other things, in different selectable housing variations - depending on the requirements. With white labeling, the product can be marketed with a customer-specific branding, which generates additional sales on the customer side. ■

What else is important

With platform-independent, state-of-the-art controls, a simple and flexible transition to intelligent automation systems can thus be created without having to uproot entire machine parks. In addition to the already mentioned integration of OPC UA,

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