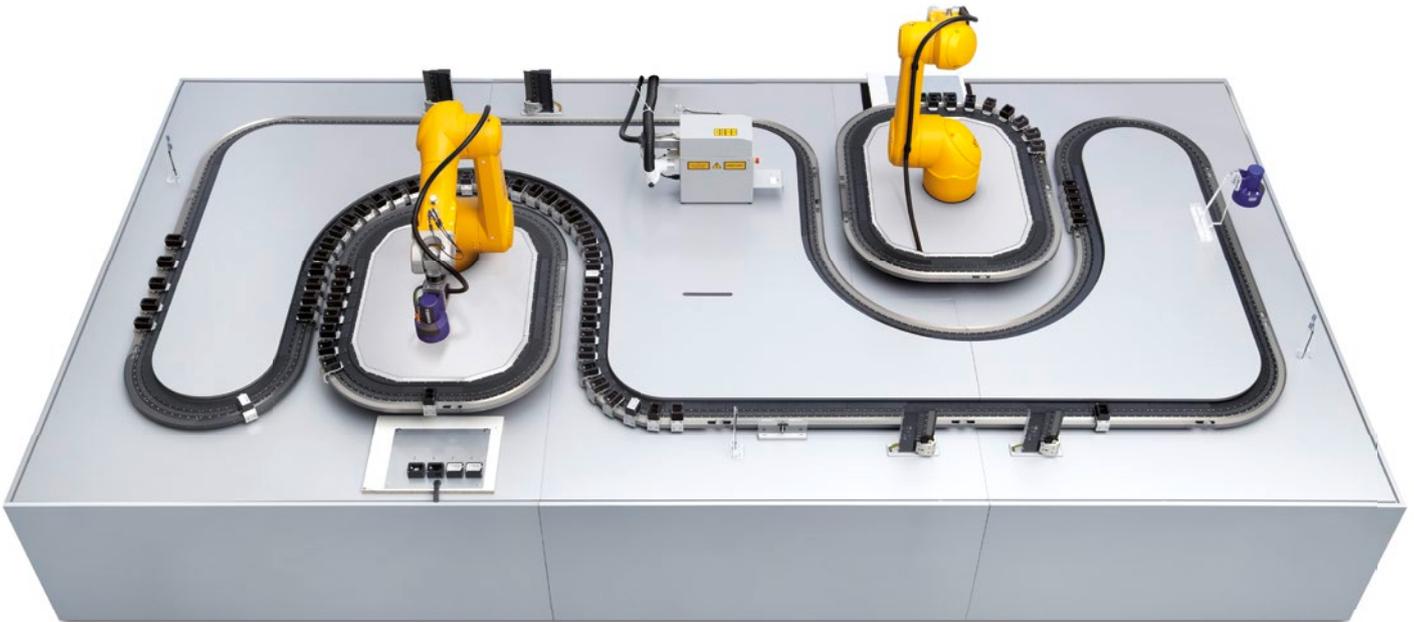Automatica 2016

PC-based Control: Global Standards for the Smart Factory

In a special exhibit at the SAP booth at the Automatica trade show, Beckhoff and other technology partners showcase the integration of manufacturing and administrative workflows with a production line that is based on the eXtended Transport System (XTS) from Beckhoff. It transports and positions the products individually and highly dynamically for the various process steps.

The highlight: The SAP Manufacturing Execution Suite communicates directly with the XTS and other production resources on the basis of standardised services acting as an interface between different "order processing languages". The TwinCAT software connects the machine and an SAP system. The order processing communication, which is based on the service-oriented architecture (SOA) concept, is realised with OPC UA.

Efficient manufacturing facilities for individualised products require highly flexible resources that can be easily integrated, from the IT system to the individual machine. In a smart factory, machines must be flexible in various ways: They must be able to rapidly adapt to changing production processes. They must also be able to flexibly integrate into various vertical, horizontal or service-oriented communication architectures. The TwinCAT automation platform, which implements the machine control system as well as various communication scenarios, provides this high level of flexibility. Supporting all common IT and automation protocols, TwinCAT makes conventional top-down communication as well as service-oriented architectures possible, and thus enables the convergence of "real" physical systems with "virtual" digital data models to form intelligent and self-organising manufacturing units.

The SOA PLC introduced by Beckhoff in 2014 is a TwinCAT 3 application scenario that combines logic functions with OPC UA services for data-consistent, secure and standardised communication. An Industrie 4.0 showcase at SAP demonstrates the benefits of this service-oriented architecture. Beckhoff and other partners show a line for "personalised production" with lot sizes as small as 1. The product and control parameters come directly from the SAP Manufacturing Execution Suite. The production line is based on the linear XTS transport system from Beckhoff as well as other automation components.

The highlight of the application is that all IT and automation resources and the SAP system communicate with each other via OPC UA standardised SOA services, i.e. in a single "order processing language". All components nevertheless function as separate machine units. The non-proprietary communication is based on OPC UA, which is recommended in the RAMI 4.0 architecture (Reference Architectural Model Industrie 4.0). The autonomous units act as both OPC UA servers and clients. The various machine units are "orchestrated" by SAP Plant Connectivity software, i.e. the services are individually combined for each job.

PC-based Control

- Beckhoff provides the foundational technologies and tools to implement Industrie 4.0 concepts and Internet of Things (IoT) connectivity.
- TwinCAT is available for the creation of applications such as Big Data, pattern recognition as well as condition or power monitoring, in addition to traditional control tasks – which can sustainably increase production and engineering efficiency as a result.

▶ **www.beckhoff.com/Industrie40**

eXtended Transport System XTS

- Linear motor on an endless path
- Replaces traditional mechanics with advanced mechatronic solutions
- Software-based functional changes
- Individual product transport with continuous material flow

▶ **www.beckhoff.com/XTS**

TwinCAT 3

- One software platform for engineering and runtime
- Integrated real-time support
- Software modules for PLC, NC, CNC, robotics, HMI, measurement technology, analytics, safety, IoT and Analytics
- Integration into Microsoft Visual Studio®
- Wide selection of programming languages: IEC 61131-3, C/C++, MATLAB®/Simulink®, Safety C/FBD

▶ **www.beckhoff.com/TwinCAT3**