

TwinCAT OPC UA to Integrate the Shop Floor with the Top Floor SAP Manufacturing Demo



“SAP Manufacturing Execution demo” from SAP and Beckhoff is a real industry solution to demonstrate the connection between the Beckhoff PLC controllers in the manufacturing and the SAP enterprise world. In a perfect plant, the information on all processes is seamlessly integrated and consistent. This enables you to make the right business decisions in a timely fashion.

SAP solutions

SAP provides solutions to support this goal: SAP ERP, SAP Manufacturing Execution (ME), SAP Manufacturing Integration and Intelligence (MII), SAP Plant Connectivity (PCo), and SAP Crystal Solutions.

| SAP ERP application supports the essential business processes, operations functions and multi-industry value chains for 24 industries by providing specific solutions on a single platform.

| SAP ME plans, schedules and controls manufacturing across a manufacturing line, plant, or enterprise. SAP ME application manages production processes, staff deployment, and other resources while dispatching inventory and documenting processes along the entire production life cycle. Quality standards compliance is monitored and documented. SAP ME schedules assets maintenance and handles product safety and dangerous goods. Detailed product records, product yields, and quality data are maintained and real time made available to the entire organization.

| SAP MII solves the real time disconnect between the plant floor and the rest of the enterprise. SAP MII application provides a single connection between shop-floor activities and enterprise systems. The real-time analytics engine aggregates, calculates, and delivers a single view of relevant events, alerts, and key performance indicators (KPIs) through a role-based dashboard.

| SAP PCo provides connectivity functionality for many types of data sources (Historians, SCADA, OPC) to integrate data from the automation layer (shop floor) with different SAP business systems (top floor). It allows SAP systems to easily access shop floor data and enables the surveillance of events and conditions in a highly distributed fashion. Especially with the support of OPC UA, PCo provides access to information in a secured, reliable, and easily configurable way, from the smallest embedded controller up to the SAP enterprise systems.

| SAP Crystal Solutions provide powerful dashboarding and data presentations to deliver business intelligence to everyone in the organization.

Manufacturing Execution Demo

The Beckhoff Panel-PC CP6201 is the main controller managing the complete machine demo: Equipped with a Intel Core Duo 2.0GHz and 2GB RAM and running with Windows Embedded Standard 7 it provides enough power to do both on one single CPU: Providing a rich user experience with a User Interface (UI) implemented in Windows Presentation Foundation (WPF) to interact with the machine via local OPC UA communication but also controlling the machine in highest performance based on PLCopen IEC61131-3 standards.

The TwinCAT PLC drives a stepper motor based conveyor belt to transfer products in Batch from A to B. The process includes of two RFID readers. The



other UA servers – horizontal to other controllers or vertical to upper IT layers. Data can be sent to or requested from other devices on demand out of PLC cycle.

“OPC UA allows a platform independent, easy and secure connection between SAP business systems with distributed shop floor data even on smallest embedded devices”

Dr. Arne Manthey, Product Manager Plant Connectivity, SAP AG

About Beckhoff

Beckhoff implements open automation systems based on PC Control technology. The product range covers Industrial Motherboards, Industrial PCs, I/O and Fieldbus Components, Drive Technology and automation software. Products that can be used as separate components or integrated into a complete and seamless control system are available for all industries. The Beckhoff “New Automation Technology” philosophy represents universal and open control and automation solutions that are used worldwide in a wide variety of different applications, ranging from CNC-controlled machine tools to intelligent building automation.

About SAP

As market leader in enterprise application software, SAP helps companies of all sizes and industries run better. From back office to boardroom, warehouse to storefront, desktop to mobile device, SAP empowers people and organizations to work together more efficiently and use business insight more effectively. SAP Solutions cover Business Process, Business Analytics and Technology.

SAP Manufacturing solutions for discrete and process industries integrate manufacturing with the rest of the enterprise and resolve complex interdependencies to drive cost reduction, increased quality, and improved responsiveness.

Co-Innovation Lab

The Global SAP Co-Innovation Lab (COIL) Network facilitates project-based co-innovation with SAP Partners. COIL enhances the capabilities of SAP’s partner and customer ecosystem through an integrated network of worldwide expertise, and best-in-class technologies and platforms. Take a tour to explore what’s in it for you: <http://coil.sap.com>

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first RFID reader signalizes the detection of the Batch to the PLC and transmits the TagID of the Batch read from the transponder on it. The Batch proceeds on the conveyor belt to the processing phase. The processing unit can be any process – here it is assumed to be surface coating. The quality of the coating, thickness and temperature, is checked using sensors. The PLC signalizes the operation status to the SAP Manufacturing Execution (ME) and the machine UI as soon as the batch has passed the RFID reader. The emergency stop button in combination with Beckhoff Safety terminals ensures safe stop logic in case of emergency and hence a safe restart.

UA Server integrated into Embedded Controller

The TwinCAT OPC UA server is integrated into the embedded PLC controller – major benefits of integration are no configuration for UA server to save engineering time and data consistence between OPC server and PLC project: By just adding an additionally comment with variable declaration in the PLC this symbol is available to outside connectivity world via OPC UA server.

OPC UA Client IEC61131-3 Functionblocks

Beckhoff also provides UA client functionality inside the TwinCAT PLC: IEC61131-3 Functionblocks enable to establish a secured UA connection to