SAP: Live demonstration of the Open Integrated Factory and OPC UA communication

SAP’s OPC UA-based Open Integrated Factory initiative, in progress for a number of years now, is an extensive and steadily expanding collaborative project involving several technology partners, which has been exhibited annually at the Hannover Messe industrial trade show since 2014. A working system that showcases the latest version of the Open Integrated Factory — Generation 2018 — is now also on display for visitors in the customer information area at SAP’s Campus in Walldorf, Germany. The system incorporates a wide array of drive and control equipment supplied by technology partner Beckhoff, including EtherCAT Terminals, Embedded PCs, Control Panels, XTS and TwinCAT 3 OPC UA.
A demo production system in building WDF21's elegant foyer offers visitors to SAP's headquarters in Walldorf a detailed look at the Open Integrated Factory’s capabilities.

The eXtended Transport System (XTS) from Beckhoff is at the center of the production showcase. It communicates via OPC UA with robots, a vision system and other parts of the demo plant, all of which are orchestrated by SAP’s software.
The Open Integrated Factory illustrates how a enterprise resource system and OPC UA communication can be combined to unite separate elements like an eXtended Transport System (XTS) from Beckhoff, a robot, a vision system and a driverless transportation system to create a highly flexible production solution. Tightly integrating manufacturing processes and business management processes, SAP Manufacturing Execution Suite uses standardized services to communicate directly with the XTS and other production resources. The TwinCAT software provides a so-called order-management language interface to connect the machinery with the SAP system. The communication required for order processing is based on a service-oriented architecture (SOA) that is implemented using OPC UA.

For anyone stepping into the foyer of building WDF21 at SAP’s headquarters in Walldorf, it is plain to see that the Open Integrated Factory has progressed beyond a mere vision to become a workable reality. Since 2016, scores of visitors have witnessed it operating up close, as Rüdiger Fritz, Product Management Digital Manufacturing & Industrie 4.0 at SAP, explains: “There are customer meetings in this building every day, and this means we can show large numbers of visitors our system operating live in the exhibit area. Besides representatives from politics and research, visitors include senior industry professionals such as directors of manufacturing from international corporations. For the latter, in particular, Industrie 4.0 is becoming increasingly important. With our Open Integrated Factory demonstration, we can show them first-
hand how SAP Manufacturing Suite, when combined with SOA, OPC UA and PC-based control, is perfectly capable of delivering digital transformation. SAP has relied on technology from Beckhoff from the outset, not least because XTS is ideal when it comes to showcasing rapid, high-precision sequences of production operations, and the Embedded PCs and TwinCAT 3 OPC UA allow us to implement a service-oriented manufacturing model of this kind perfectly. This partnership between two organizations – each eager to drive innovation – is an ideal fit. And one particularly exciting aspect of this collaboration is that our two companies both exemplify the added value that Industrie 4.0 strategies can deliver: Going forward, business management software and automation technology will interconnect much more tightly than in the past. The ideas and approaches being pioneered today will acquire huge importance for manufacturing businesses because they will allow them to adapt to constant change with much greater agility and responsiveness."

XTS was already at the core of Generation 2016 of the Open Integrated Factory, where it was used to transport the parts for a personalized key ring highly dynamically and separately through each of the manufacturing stages. In Generation 2018, the system plays a similar role, but this time with a bottling-system valve being fitted with either an electronic or a mechanical control head. Rüdiger Fritz explains: "The highlight here, once again, is that the IT and automation resources and the SAP system all talk to one another in an order-processing language via OPC UA on standardized SOA services. SAP's Plant Connectivity software orchestrates the various machine units, which all communicate via the vendor- and platform-independent OPC Unified Architecture protocol. Design-wise, though, Generation 2018 of the Open Integrated Factory takes things significantly further than its predecessors. By integrating a driverless transportation system controlled by Embedded PCs and Control Panels from Beckhoff, it implements so-called matrix production, which uses dynamic decision-making to balance production processes throughout the factory floor, and even incorporates after-sales service and digital twin technology. Just as with the prior generations we've implemented, this latest alternative to the conventional assembly line has benefited greatly from the exceptional ease with which TwinCAT 3 OPC UA allows communication via OPC UA."