





Assembling flavors

Industry 4.0 based on IoTSP enables Automation Builder to rapidly virtualize discrete production processes and machinery in the food industry and beyond

SOENKE KOCK – Headlines are regularly generated by the latest leap forward in factory automation. What is often forgotten is that behind each of these stories lies a tale of complex automation of increasingly elaborate processes. In these processes, an array of engineering tools are employed for programming, configuration and commissioning equipment that is becoming ever more decentralized, independent and intelligent. This equipment often comes from a variety of vendors, which makes data exchange and testing difficult. On top of this comes a high software content – often leading to long development times, high risk and the inability to test at an early stage because the necessary hardware is not ready. The answer to this challenge comes in the form of virtualization. ABB's Automation Builder is a comprehensive, integrated software suite that enables machine builders and system integrators to virtualize and automate complex applications with a minimum of fuss. Automation Builder can be used to great effect not only in the food industry, but in any application requiring nontrivial automation.

Title picture

Automation projects are becoming extremely complex. Industry 4.0, based on IoTSP, and virtual commissioning hold the key to making them manageable – in terms of both time and cost.



Industrial automation has been around for decades and the food industry has been one notable beneficiary. However, many processes have now become so intricate that the job of automating them within the allotted time span has simply become too complex for traditional approaches → 1. This complexity also means that no one supplier can supply all the components of the production line so these will come from different vendors, raising potential incompatibility issues.

Industry 4.0

To address this and other, related issues, the United States and Germany started the Smart Manufacturing and Industry 4.0 initiatives, respectively. These initiatives use, as a foundation, the Industrial Internet of Things (IIoT), which links machines, sensors and actuators via Internet protocols. These two initiatives have one important common denominator: they allow the easy connection and interaction of all the components – sensors, actuators, controllers, production equipment, etc. – in a plant.

It is necessary to fulfill two key engineering conditions to ensure efficient and effective execution of automation projects in this new, connected world with an

ever increasing demand for shorter project execution times:

- Development work in the relevant disciplines – eg., mechanical engineering, electronics and software – needs to be more parallelized. This requires, among other things, that the overall conceptual design covers all disciplines and that interdependencies between disciplines are described explicitly.

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- Virtual prototypes have to be available in all phases of the engineering process so that the required functionality can be tested as soon as it is developed. Also, due to the trend toward increasingly decentralized control functionality, it must be possible to test the distributed control logic design without real control hardware.

The second point predicates the development of a virtual model of the process with all its actuators and sensors, or of the control system, or both. ABB's Automation Builder helps do this.

Automation Builder

ABB Automation Builder is an integrated software suite for machine builders and system integrators who want to automate their machines and systems in a productive way → 2.

Automation Builder combines the tools required for configuring, programming, debugging and maintaining automation projects under a common intuitive interface. Automation Builder can integrate AC500 programmable logic controllers, programmable drives, control panels and robots into one coherent automation solution. This includes data management as well as the exchange of data with the mechanical and electrical elements of the system. By linking these data sets, virtual models for commissioning or prototype testing can be generated and processed faster. Automation Builder is capable of virtualizing machines or whole production lines and it addresses the largest single cost element in most of today's industrial automation projects: software.



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Automation Builder is available for download and in various editions suitable for different scales of project. A convenient setup helps to configure the installation and handle license registration, maintenance and software updates.

All relevant data from Automation Builder are transferred into a model of the system. Data from ABB's offline robot programming and simulation tool, RobotStudio®, is also included. RobotStudio, which is included in the Automation Builder distribution, serves as a 3-D simulation engine where virtual controllers, HMI and drives meet the virtual mechanical prototypes and interact with each other and with the virtual world. To allow for scalability without needing ultrafast computers, the concept of virtual time is introduced. Using virtual as opposed to real time enables the execution speed of the simulation to be reduced when

the performance limits of the PC are reached.

Automation Builder is an open software: Missing components for system simulation of any complexity can be created by the user or downloaded from the online RobotStudio community; software libraries are available, as are PowerPac add-ins; and various interfaces are available for device and signal data exchange – eg, Microsoft Excel, various CAD formats like for EPLAN Electric P8 or Zuken E3, and MATLAB/Simulink.

Industry 4.0 facilitates the implementation of Automation Builder in several ways. For example, it enables devices and tools from different vendors to communicate certain sets of standardized data. Further, the wider bandwidth of the Ethernet-based communication used by Industry 4.0 allows large quantities of data to be transferred easily.

Where mutual-help organizations have sprung up in social networking communities for a whole range of other activities, so too are they expected to appear to assist those engaged in automating factories. Indeed, ABB has already gone some way down this road with RobotApps™, which offers a whole range of useful apps for robot developers.

Virtualization opens up completely new horizons for businesses. For example, resource-intensive simulations of process scenarios can be outsourced to the cloud, obviating the need for the user to have his own computing power. Or the current production setup can be virtualized and then played with to see what the effects are of changing various parameters or pieces of equipment. In this way, energy usage could be optimized, throughput maximized or the total cost of production minimized. Even operator training can be performed on virtual equipment.

ABB Review will return to Automation Builder in a future issue for a more detailed look at the capabilities of this automation software suite that allows the possibility of engineering in the virtual world in virtual time.

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