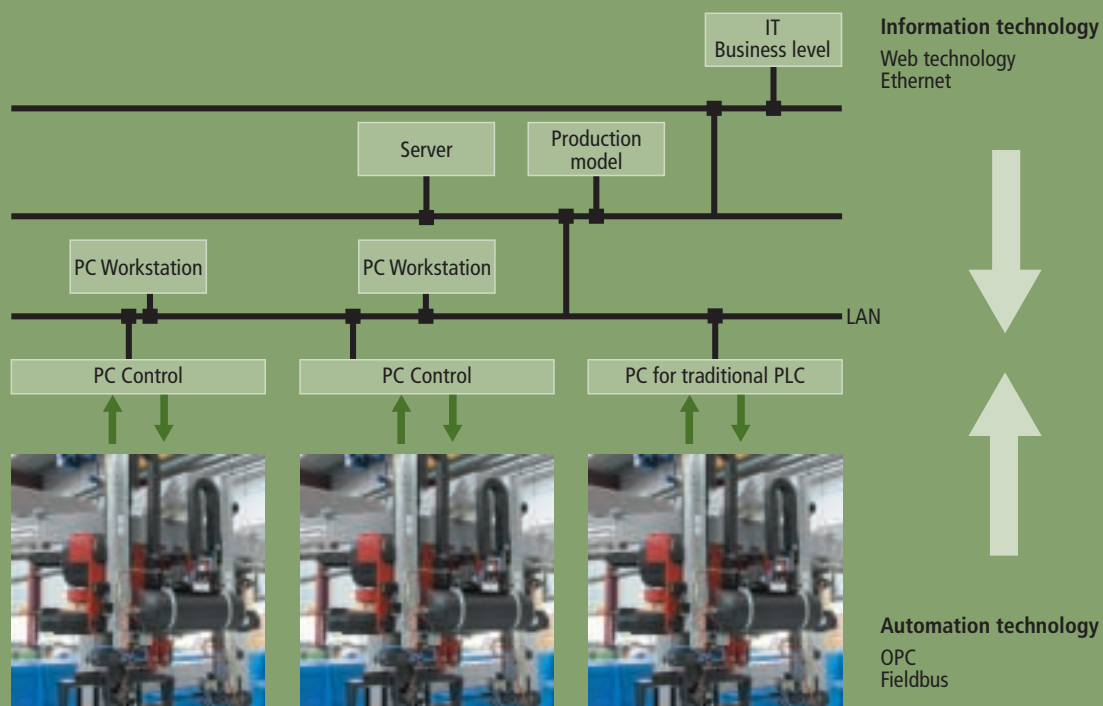


Automotive supplier Albert Weber delivers on the promise of integrated manufacturing

OPC connects PC-based controllers with SAP-R3



The German company Albert Weber GmbH is at its best when it comes to high end components and systems for the automotive industry: the product portfolio includes production of cylinder blocks, cylinder heads, crankshafts, chargers, gearbox housings and other cubic parts. Many of the largest and well known car manufacturers are customers of Albert Weber GmbH.



To change a crankshaft production to a fully automated three shift system, the company started a pilot project with the manufacturing system suppliers SAP, Güdel in Switzerland and Beckhoff. The partnerships goal was to achieve a tight integration between the SAP/R3-System with the Beckhoff cell controller automation system, on basis of standardized communication and computing technologies.

In case of the Albert Weber crankshaft production, seven cell computers control the manufacturing machines of the individual production cells with TwinCAT, the Beckhoff automation software for PLC and Motion tasks. Parts are transferred overhead via a transfer system – the primary loop – from machine to machine. Carrier robots travel autonomously on a rail system and communicate job orders via Wireless LAN (IEC802.11b). The Roboloop robots made by Güdel, are controlled by Beckhoff as well – in this case TwinCAT is used in an Industrial PC with Embedded NT operating system with a size of about 20 Mbyte on a flash drive media.

To exchange production data, a direct connection between the SAP/R3 system and the cell controller OPC servers was established, connecting about 3000 data

tags. A new feature of this pilot implementation was the introduction of the OPC-Alarm&Event-Client of SAP: for SAP, Beckhoff's Alarm&Event server builds the reference. With the help of this technology, finished production steps create an event driven communication directly to the PPS system to initiate the sequence of commands for the individual production steps.

The OPC server of the production cell controller communicates via TwinCAT ADS layer with the automation software system. The TwinCAT IEC 61131-3 PLC and the motion control software with PLCopen compatible command interface build software control modules on a PC platform without further hardware use for sequence or motion tasks. To create a highly deterministic real time tick, TwinCAT does not require any additional hardware other than a PC. Messages are exchanged between software servers (for PLC or NC) via a standardized ADS-interface (Automation Device Specification) and protocol by a message router. The TwinCAT message router distributes messages system wide based on TCP/IP. The advantage of ADS proves in its flexibility: ADS allows for horizontal and vertical application-to-application communication throughout various platforms (Windows NT/CE, TCP/IP, various fieldbusses).



ADS enables the OPC server to communicate locally, network wide, or via field-bus protocols to various automation software modules e.g. PLC, Motion Control. In this way, TwinCAT avoids the well-known OPC-DCOM problems: some platforms, e.g. Windows CE, do not support DCOM, additionally, timeout events for interrupted media are not handled by DCOM in a way that would be appropriate for automation tasks. With TwinCAT, the OPC-server has access to e.g. a Pocket PC like the IPAQ via a wireless LAN for diagnostic purposes. ADS allows a wider variety of data compared to OPC: next to the typical PLC variables, complex operating system commands can be issued as well.

In this pilot project SAP collects PLC variable data via the TwinCAT OPC server and a dedicated OPC client, both running on the cell controllers.

Status information of the assembly line, of individual manufacturing cells and machines as well as the E-Stop system status are communicated into the SAP PPS system. For material handling tasks, source and destination of product palettes cruising on the primary loop and the insertion of parts via the loop and cell interfaces are communicated by the PPS. Manufacturing and quality data, linked by serial number to each individual part, are documented and stored in the SAP-R3 system during the manufacturing process.

Without additional middleware software the complex interfacing task between the powerful SAP-R3 system and the manufacturing software TwinCAT could be accomplished by using standardized mainstream software technologies. The real time execution of automation tasks and the efficient ADS router guarantee fast data transmission without overhead and unnecessary load of threads to the Windows operating system. Interfacing problems are avoided by using the OPC standards for communication. The design of such a complex interface through a proprietary software driver would have resulted in a significantly longer implementation time.

PC based Control as an automation platform and the use of standardized communication technologies like OPC together with mainstream, powerful Industrial PC hardware with IEC 61131-3 automation software and Windows operating systems show their power and efficiency once it comes to deliver on the promise of integrated manufacturing.

- Albert Weber GmbH: www.a-weber.de
- Güdel AG: www.guedel.ch
- SAP AG: www.sap-ag.de