> Component-based automation makes it possible to set up modular plants and production lines with distributed intelligence and simple machine-to-machine communication

Users introduce component-automation

Component Based Automation (CBA), the decentralised approach to automation with distributed intelligence in technological modules, is picking up speed. This was emphasised by solutions presented by users at the CBA conference in Potsdam.

"Be ahead with modularity!" was the motto of the one-and-a-half day event at the Hotel Dorint in Potsdam. Around 100 project engineers, planners and decision-makers from leading OEMs in many different sectors and from all over the world, including China, Germany, Finland, France, Great Britain, Italy, Luxembourg, Austria, Switzerland, Spain and the US attended the conference. Among the participants were 10 selected speakers with a very substantial amount of practical experience in the conversion of modular automation solutions with Component Based Automation who reported on plants that had already been successfully implemented. The objective of the event was to highlight, in a series of short lectures, the many possibilities and advantages from the user's point of view as well as the range of the 'component approach' as it stands today. Simatic iMap, the CBA engineering tool, as well as a series of concrete examples for the creation of components, their use, online diagnostics, version management and project documentation, were presented in four ten-minute live shows entitled 'Using Simatic iMap' which were scattered throughout the lectures.

Helmut Gierse, President of the Siemens Automation and Drives Group, introduced the topic with his lecture on 'Innovations and trends in automation' and emphasised the importance of modularisation in automation. It soon became apparent that Siemens plans to continue the serious pursuit of this approach, and has already clearly

-based solutions

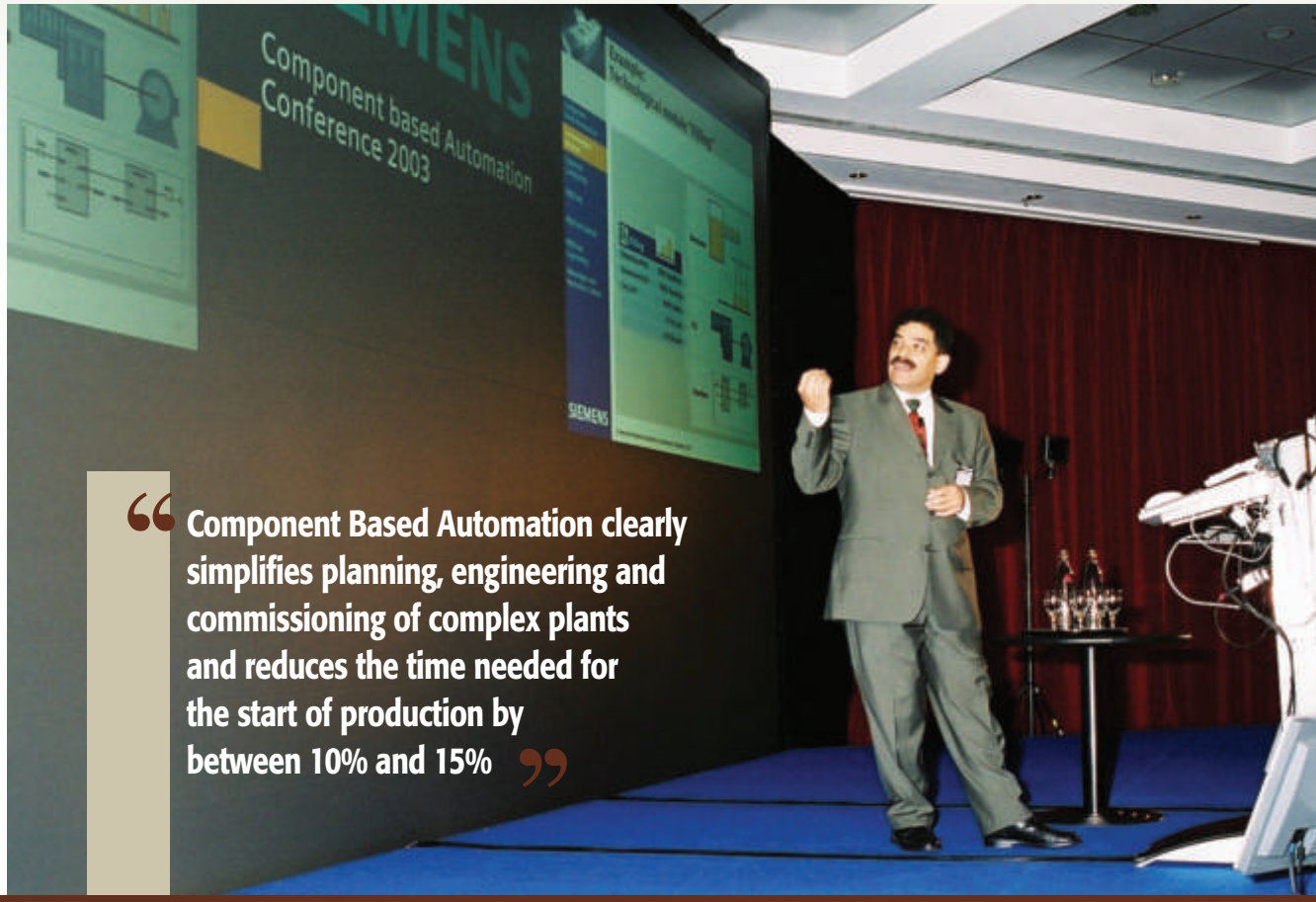
By Klaudija Trkaj

defined the next several developmental moves.

The first guest speaker also gave priority to the need for modularisation in his lecture 'Interoperative open modular architecture in packaging systems'. The manager of Global Automation and Control at the American subsidiary of one of the world's biggest suppliers of proprietary articles for the food, personal hygiene, perfume, cosmetics, detergents and cleaning products sectors is also a member of the Board of Directors of the OMAC (Open Modular Architecture Controls) Users Group. According to the strategists, it is still customary, particularly in the packaging industry, to purchase different plant sections from different providers and to combine them with one another. It is for this reason that the goal must be a uniform standard that is binding for all suppliers in order to be able to design clearly structured packaging lines with modular machines and precisely defined interfaces that would be suitable for use in all factories the world over. Accordingly, the next step on the roadmap of the OMAC Packaging Workgroup is 'Plug-and-Pack'-capable machine modules, that is to say, machine modules which can also be easily integrated into existing packaging lines.

FASTER TO PRODUCTION WITH CBA

Pablo Munoz, product manager at Siemens AG, then explained the new component-based automation approach, with which it is already now possible to easily set up modular plants and production lines with distributed intelligence and simple machine-to-machine communication. Intelligent modules form the basis of this, such as a robot, or an entire production line which integrates mechanical components, automation technology, and user programs. Their functionality is encapsulated in a software component, which is a reusable function →



> **Component Based Automation clearly simplifies planning, engineering and commissioning of complex plants and reduces the time needed for the start of production by between 10% and 15%**

Pablo Munoz, product manager at Siemens AG, explains the component-based automation approach.

with clearly defined interfaces.

The advantages of such modularisation are many. The overall functionality, for example, can be divided into manageable sub-applications with clearly defined interfaces. The technological modules can be fully pre-tested by the manufacturer and be put into parallel operation, that is to say, put into operation more quickly on site. Easily reusable standard libraries that are easy to maintain accelerate the planning and implementation of plants and also enhance their quality.

Munoz outlined the ensuing Siemens vision of 'Plug-and-Work' for future production lines: The vision consists of fully tested individual machines which configure themselves in the network automatically and communicate with one another autonomously over standardised CBA interfaces. Until that time has come, simplified graphical configuration of communication links between the modules simplifies engineering. Users require no detailed knowledge of communication functions, and need not concern themselves with protocols or transmission media. The backbone of industrial Ethernet communication in CBA applications is the Profinet standard defined by Profibus International, and the Profibus DP protocol is still the first choice on the Profibus. Simple IE/PB links (also referred to as proxies) serve as the bridge between the networks. Mr. Munoz also briefly presented the first controller CPU 317-2 PN/DP for the Simatic S7-300 series with integrated Profinet and Profibus interface. Another focal point was Version 2.0 of the Simatic iMap engineering tool, which enables plant-wide graphical convergence of distributed applications and is an integral component of the Simatic software landscape. His conclusion: Component Based Automation clearly simplifies planning, engineering and commissioning of complex plants and reduces the time needed for the start of production by between 10% and 15%.

> **The motivation behind the CBA approach is to increase reusability and noticeably reduce function tests during commissioning – that is to say, to get into production more quickly**

The subsequent lectures confirmed that this is also the case in everyday practice in many different sectors, and that the advantages of modularisation do not only apply to series production. Here are some examples:

PACKAGING SYSTEM

A project manager of the largest British manufacturer of personal hygiene products (and the world's biggest manufacturer of aerosols), who has concerned himself with automation for more than 30 years, introduced an existing production line for roll-on deodorants which had been 'refined' with CBA and Simatic iMap. With individual machines such as sorters, monoblocks, labelers, tray loaders, wrappers and case packers from vendors all over Europe, the plant was a likely candidate for the modular approach with CBA. The deciding factor for the company, which is located in Leeds, was to introduce new perspectives for simplified communication, particularly over Ethernet.

PAINTSHOP

In the automotive industry, a leading technology group in Stuttgart had an idea for a modular dip-coating plant. The group could look back on a great deal of experience with distributed solutions, and structured the paintshop into a number of (sub)plants – modules and function groups – which they then standardised. For example, a dryer consists of different CBA modules, such as air circulation unit or fresh air unit with a proprietary PLC, which are in part reused. In a plant with two dryer lines, it was possible to simply copy the entire line in the project and reuse it to save time.

TOBACCO TREATMENT PLANTS

From Neuchâtel in Switzerland came one of two CBA applications from the tobacco industry, which was presented jointly by representatives of the user and of the Italian equipment manufacturer. The presentation related to the automation of a mini-primary, a plant which is upstream of the actual cigarette production plant and which is used for developing new tobacco blends. Here again, Ethernet links the individual plant modules, in part via their own controllers, in part via IE/PB link and ET 200X peripheral I/O stations, with a central master controller as well as with the company network.

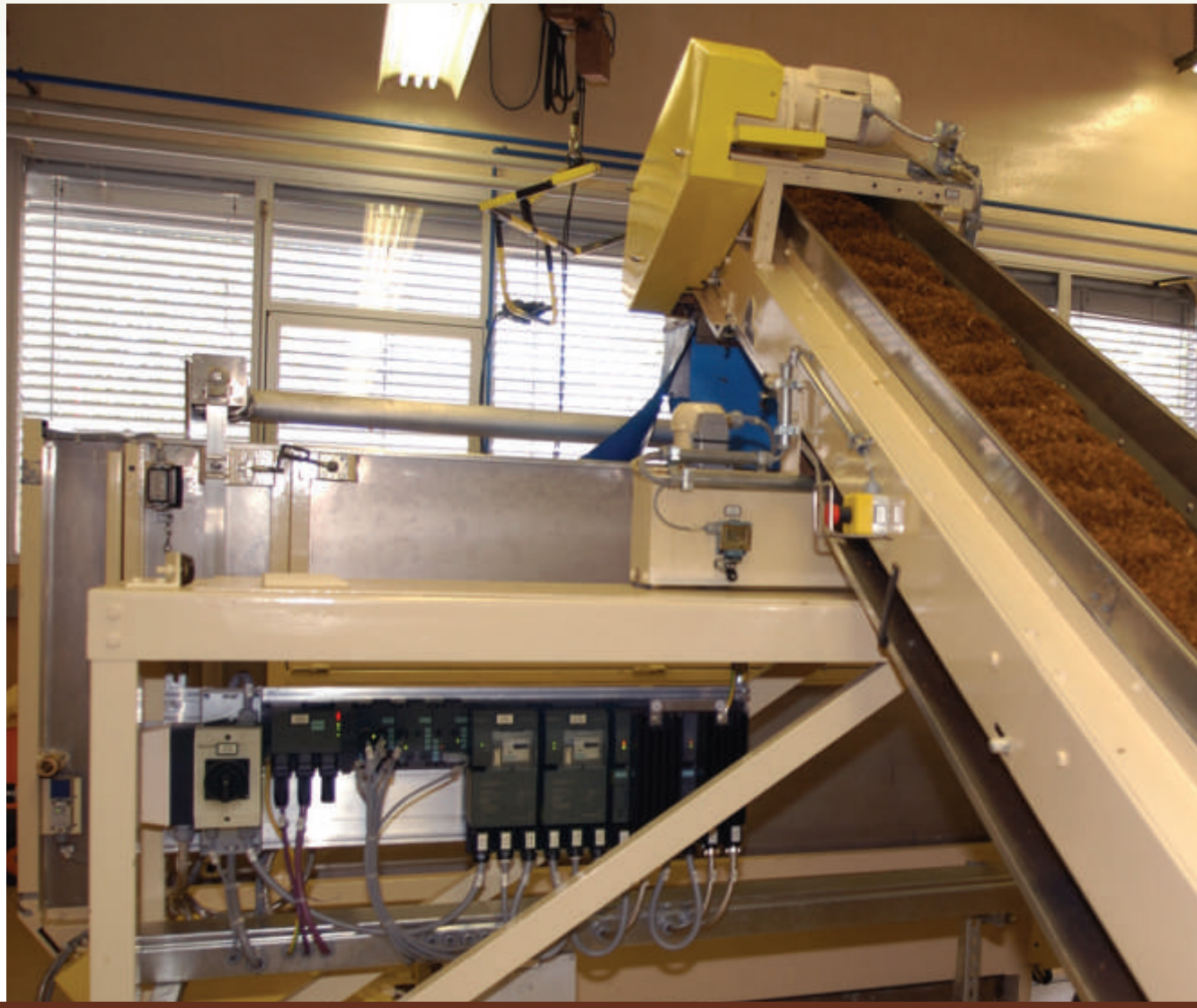
And here again, the fact that individual modules can be commissioned independently of all the other modules is a decisive advantage because it is often the case that new machine modules replace older ones or simply need to be tested. Plug and Play technology shortens downtimes considerably while increasing flexibility. Siemens still has some work to do on the memory capacity, according to the Swiss representative. For the equipment manufacturer it is important that the functionality of the modules can be clearly demarcated.

One of the most comprehensive CBA applications at the present time was presented by Da Han Yang of Product Management at Siemens AG in the People's Republic of China at the request of his customer, one of the country's biggest cigarette manufacturers. The cigarette manufacturer has an extremely large primary plant, for which CBA offers standard software for the various sub-plants. For example, configuration and software for all cutters in the plant are identical, allowing easy adaptation to different product requirements. The use of Profinet to link the monitoring stations to the distributed automation system lends the configurations more flexibility, reduces response times, and makes the project more manageable.

ASSEMBLY LINE

With "function-oriented modularisation in special machine construction", a leading German machine constructor is following a company-wide approach toward getting from task to product more efficiently. As is so often the case, the motivation behind this approach is to increase reusability and noticeably reduce function tests during commissioning – that is to say, to get into production more quickly. To make this possible, the machine constructor structures his →

Product manager Han Yang, Siemens AG, China reported on the successful conversion of a primary plant with CBA to China



> **“The future of automation will be characterised by further vertical integration with Profinet, further integration of functionalities in the hardware, and further integration along the engineering flow”**

complex assembly lines, such as those for the assembly of cylinder heads, into units, modules, process steps and stations. Control and diagnostic functionalities are contained in units and modules, and the application program can be developed through simple configuration of these units. The first Simatic SoftPLC with Profinet functionality, Simatic WinAC PN, has been short-listed for the central controller.

MATERIAL HANDLING SYSTEMS

The leading development engineer at one of the biggest suppliers of logistics systems provided insight into the ongoing development of small, intelligent mechatronic conveyor units, which would make it fast and easy – ‘Plug-n-Convey’ – to implement complex material handling systems with up to 2000 network nodes, for example for airports. He said his team relies on open global standards such as Profinet and on modularisation with Component Based Automation.

Tobacco industry primary plant: Plug and Play technology shortens downtimes considerably while increasing flexibility

CONTAINER TERMINAL

The operator of a container terminal automated with 'Component Based Automation' relies almost totally on Industrial Ethernet communication via Profinet. On two docks, large container vessels are loaded and unloaded via six crane bridges, the containers themselves are transported by a total of 40 internal transport vehicles (IMVs). In the warehousing area, 19 automated portal cranes load and unload the delivery and pick-up trucks, which are then piloted from the reception area to the correct transfer line by an automated traffic guidance system. Both the 19 portal cranes and the 40 IMVs are equipped with WLAN interfaces, over which they communicate with one another and with the traffic guidance system's controller, which also functions as data collector. Cranes and IMVs have identically designed control cabinets (CBA modules). The number of control cabinets can be easily increased, thus making it possible to expand the dock installations quickly and flexibly as needed. In the interim, the dock operator has also installed a CBA application for building access control.

POSITIVE BALANCE

At the end, all participants agreed that the conference had been a positive and worthwhile experience. Dr Horst-J. Kayser, President of the Industrial Automation Systems Division at Siemens AG, discussed prospects for the future of automation with Totally Integrated Automation. TIA will be characterised by further vertical integration with Profinet, further integration of functionalities in the hardware, and further integration along the engineering flow. With the advantages of time and cost reduction, Component Based Automation will enhance users' competitive capabilities in all sectors, thus offering a clear perspective for the automation of tomorrow. ■

For more information, readers are encouraged to visit www.siemens.com/profinet

Component based Automation in the automobile industry