Identification system MOBY in main assembly line and feeder conveyors

At the BMW engine plant in Steyr, Austria, PCs ensure distributed control and operation. WinAC and industrial PCs offer an integrated solution at more than 100 manual, semi-automated and fully automated workstations.

The largest engine plant in the BMW Group is situated at Steyr in Austria where, alongside the six-cylinder gasoline engines, BMW manufactures four- and six-cylinder diesel engines for BMW, Land Rover and MG Rover. The factory employs about 2500 people and in the past year they produced more than 600,000 engines in almost 400 different versions. Since September 2001 a new assembly line has been running at full capacity producing 400 units per shift, each automatic station having an average cycle time of 50 seconds.

In order to meet the consistently high demand for diesel vehicles, production in Steyr had to be stepped up with this new assembly line. The basic requirement was the maximum possible transparency for every employee – whether working at a manual station or a semi-automatic station. Every worker should have access via web pages to detailed working diagrams, parts lists, drawings and other necessary information on the Intranet. “As we already had the PC hardware necessary for this, the obvious thing to do was to also put the control technology on the same basis”, explains Joachim Gruber, Control Systems Planner in the assembly division. For this reason, BMW decided to rely on PC-based controllers for the automation of the engine production.
As a long-standing partner of BMW in the field of application-specific special machines and plants, the E. Schmid Maschinenbau company of Sonnenbühl-Willmandingen, Germany, took on the responsibility of general contractor. The company’s mechanical engineers chose the Transline 2000 distributed control and drive concept, whose standardized software and communication structures are assembled from components from the Simatic, Sinumerik and Simodrive series of products from Siemens.

Total integration with T.I.A.
The path from empty engine block to ready-to-fit engine is divided into basic and complete assembly stages, as well as several inspections and tests. In total there are 26 automated and five inspection stations, as well as 70 workplaces for manual and semi-automatic tasks. Each station has Simatic FI45 industrial PC with a touch-screen and integral direct key module for hardware control tasks. This includes a specially designed, externally accessible “push panel” for the basic operation. The precise motion control required when applying sealant or when transferring the block to the next conveyor is performed by Sinumerik 840D NC controllers in conjunction with Simodrive 611U drives. Siemens Moby I and Moby E identification systems are located on the main assembly line and the feeder conveyors. They make sure that all workpiece carriers and pallets carry all the necessary information with them. The station computers are connected to the SAP/R3 host computer by means of Ethernet and RFC (remote function call) connections.

Despite the traditionally high proportion of manual work, a comparatively high 44 percent of the engine assembly at Steyr is automated.

PC-based automation.
At all manual stations the automation engineers from Schmid selected the PC-based control solution that is fully compatible with the hardware version: Simatic WinAC Basis with the actual soft PLC, WinLC (Logic Controller). In this case, the WinAC Basic package contains the following components: WinAC Controlling with Software PLC WinLC and Profibus DP interface CP 5412 (A2), WinAC visualization with OPC and optimized interface for WinCC and Pro Tool/Pro, WinAC Computing for data exchange with Windows applications via ActiveX elements.

A typical application example for the soft PLC is the communication with manually guided bolt-tightening systems. It recognizes whether the correct socket has been picked up, then monitors and visualizes the torque and turning angle. In addition, it guarantees that the motor does not leave the station until all tasks have been completed according to plan. The soft PLC communicates with a system for preventive quality assurance.

According to Hans-Peter Walter, Manager of Electrical Engineering at Schmid, “the soft PLC was by far the most economical solution for these tasks. And due to the decision for integrated production, PLC programs, once created, could be directly transferred to other Simatic controllers without time-consuming reworking.” To the Simatic WinAC Slot, for
example. This package consists of the Slot 412/416 modules as well as up to five other core modules: WinAC Controlling for control tasks, WinAC Technology for time-critical technological tasks, WinAC Visualizing for data output on screen, WinAC Computing for the data exchange with Windows applications, and WinAC Networks for connecting the PC to office and industrial networks. The slot module has its own power supply which makes it independent from the operating system of the host PC, so that a fault in Windows NT has no effect on the controller.

In engine assembly, BMW uses the slot versions when it is a case of deterministics, availability and high operating reliability. This applies when bolting down the cylinder head covers or at test stations for recording the piston projection and coefficient of friction of the crank mechanism. The slot solution can be programmed optionally with an external programmer or PC via the MPI or Profibus DP interface, with the Step 7 package installed on the local PC, or via a TCP/IP link from a programmer or PC. Conventional hardware controllers are only to be found in a few places. Out of a total of seven Simatic S7 -318 DP controllers, only one controls the chaining of several turning stations. BMW project manager Gruber is very satisfied with the result: “The collaboration between all those involved went without a hitch.” According to Gruber, it has the character of a pilot project:

In the near future the cold tests on six-cylinder gasoline engines will be performed using the Siemens soft and slot PLCs.

Plan of the new assembly line

Quelle: A&D Internet
Automotive Production, Produkte & Lösungen
http://www.ad.siemens.de/cca/simatic/html_00/prod_loes/ref/refs/ref_08_d.html

More about MOBY: http://www.ad.siemens.de/moby
Electronic Commerce: http://mall.siemens.de