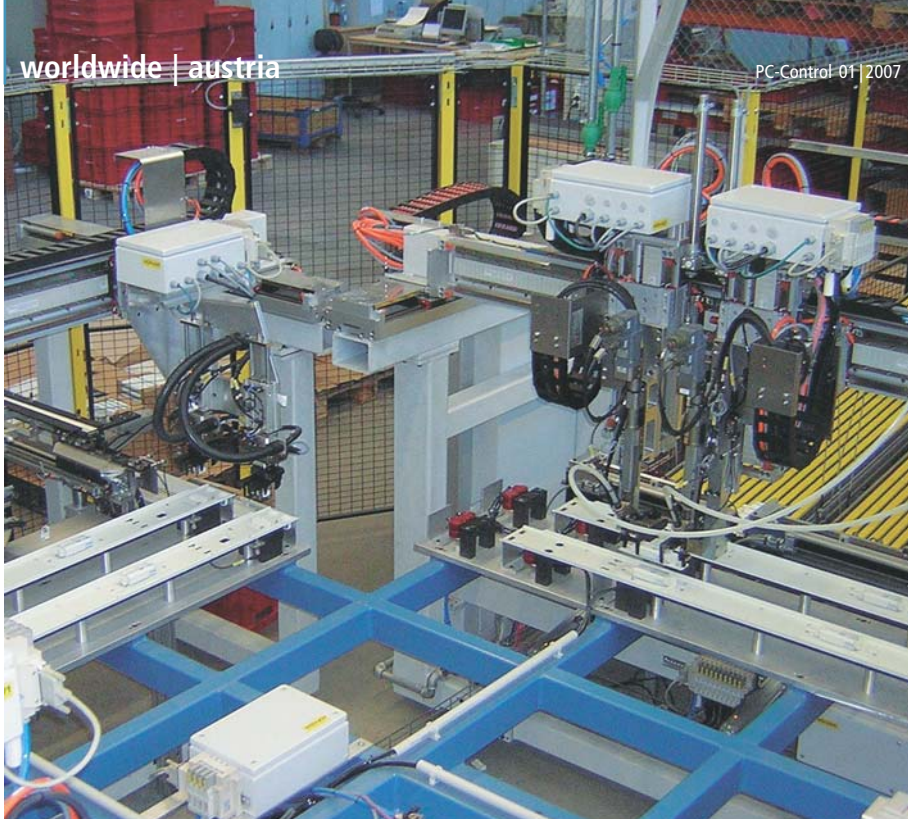


Integrated system for Zumtobel production plant



Partial view of luminaire assembly: The load-bearing crossbars are driven by two synchronized linear motors.

→ Zumtobel Lighting GmbH has developed a new generation of moisture-proof luminaires called SCUBAs. The company's Dornbirn facility in Austria was chosen as the production site for these luminaires due to the high degree of automation offered by the plant. The control system was based on an unconventional, yet highly innovative concept developed by Stauss Mechatronic using Beckhoff PC technology.

The term SCUBA (Self-Contained Underwater Breathing Apparatus) is usually associated with the name for the compressed air breathing apparatus used by divers. This association is, in fact, quite appropriate considering the IP 65 protection class and field of application for these moisture-proof luminaires – with their aerodynamic, oval shape designed by Massimo Iosa Ghini. The SCUBA's extended name says it all: Shock-resistant, Chemically resistant, UV-resistant, Built-in user-friendliness and Application-orientated.

Designed for illuminating previously impersonal spaces, the oval luminaire shape is no design gimmick. The special prism shape offers excellent illumination with high efficiency. It enhances safety and visual acuity and reduces energy consumption. In addition, the shape and surface finish prevent dirt deposits. Different lamp covers enable optimal adaptation to the respective application. Compatibility with the product's predecessor model is ensured through identical mounting springs and distances.

New production line for the SCUBA platform

The design isn't the only new feature of the moisture-proof SCUBA luminaire: the whole production process is in fact new. The project was started in 2004 under the leadership of Ing. Johann Preißegger, director of Zumtobel's technical office for luminaires at Dornbirn.

Reflecting the great variety of required tasks, the recently commissioned SCUBA production plant is a conglomeration of various standard and special machines, plus handling equipment and robots. The special automation challenge was to accommodate all process steps within a homogeneous control system. The plant is designed for a capacity of 1.4 million lamps in a 3-shift production operation. Changeovers between the different models, which differ in terms of length and design, can take place without having to stop the machine. Another criteria was that small volume production should be possible economically – and, of course, around the clock operation that is failure- and maintenance-free.

Unconventional control concept

After the decision in favor of the Dornbirn facility, Zumtobel obtained quotations for the control system. The contract was awarded to Stauss Mechatronic from Dornbirn. The company had submitted a completely different and highly innovative concept, in which all main parts of the control logic are software-based and centralized on an Industrial PC. In addition, the PC-based control concept offered cost-effectiveness and flexibility to a degree that larger suppliers were unable to match.

However, the decisive factor was the integrated approach of the solution. While the predecessor line, installed only four years ago, was based on hardware PLC systems under a master computer. In the new solution, the PC handles the control functions as well as the function of the master computer. In addition to cost benefits, this enables integration of the complete plant and offers significant operational benefits.

Linear motor technology is used for controlling 28 servo axes, most of them synchronized in groups. In this kind of situation a software-based control system is particularly advantageous compared with traditional PLC technology. While a PLC-system requires additional synchronization, a software control system almost runs independently. The task load is distributed: Position control is handled via the software, while AX2006 Servo Drives from Beckhoff connected via EtherCAT deal with torque control.

Qualification and user-friendliness

Three operating terminals, which are programmed in Windows C#, meet stringent requirements and reduce operator intervention to a minimum. In the event of a fault, the system offers troubleshooting support through error messages displayed in plain text. Manual intervention is simplified through opening machine components, for example. The absence of auxiliary mechanical tasks means that the user can fully concentrate on problem solving.

In environments affected by moisture, dust and chemicals, SCUBA offers light yield and efficiency far beyond conventional moisture-proof luminaires.



The oval and aerodynamic shape of the moisture-proof SCUBA luminaire family from Zumtobel breaks the linear monotony of conventional strip lighting.

Ing. Johann Preißegger, director of Zumtobel's technical office at Dornbirn (left), and Thomas Stauss are pleased with the trouble-free commissioning process.



Zumtobel uses a 19" C5102 Industrial PC as the central component. The control PC is equipped with TwinCAT NC PTP software from Beckhoff. The decisive factor was the outstanding robustness of the PC and its excellent price-to-performance ratio. For Stauss, particularly useful features of the efficient and flexible software are extensive libraries and simple handling, especially when it comes to positioning of single axes or coupled axis systems. AX2006 Servo Drives are used at machine level. Bus Terminals, which are characterized by small housing dimensions and high connection density, ensure reliable connections.

Consistent transparency with EtherCAT

The whole plant is networked with EtherCAT, which offers flexible topology and simple configuration. "Three factors have enabled us to complete such a large project successfully", Thomas Stauss said: "An unconventional approach that enabled stringent economic specifications to be met without compromise; a customer who left nothing to chance, including integration of operating staff right from the design phase; and Beckhoff as a partner in the background, providing valuable support wherever required."

A 19" C5102 Industrial PC deals with the control functions as well as the function of the master computer. All machine-level components are connected via the TwinCAT NC PTP software.



AX2006 Servo Drives connected via EtherCAT deal with torque control.



EtherCAT wiring on the Servo Drives

- Zumtobel Lighting GmbH www.zumtobel.com
- Stauss Mechatronic Dornbirn www.stauss.at
- Beckhoff Automation GmbH www.beckhoff.at