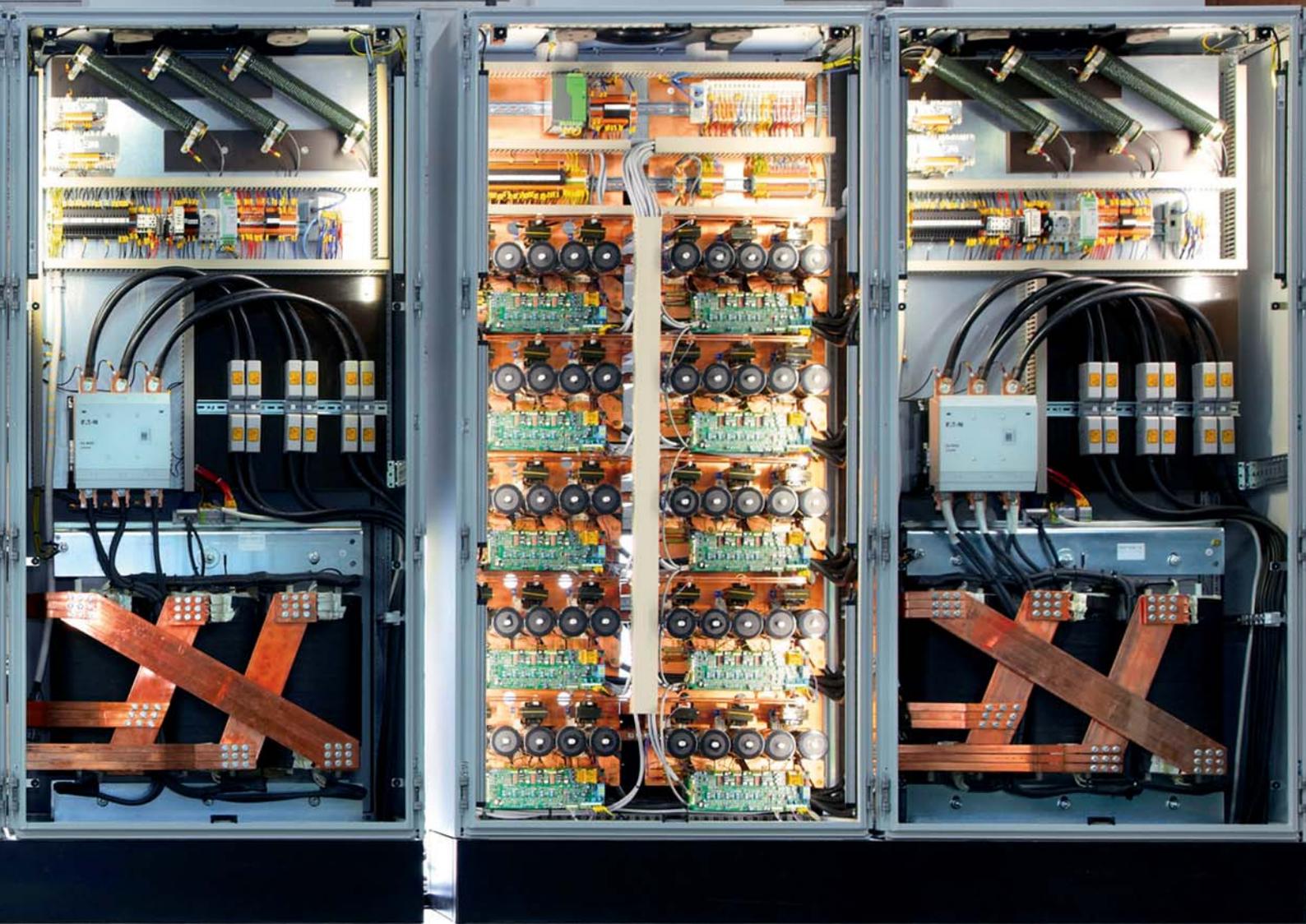


High-performance PC controllers and high-speed EtherCAT energize control and process engineering

High-performance 30,000 A power supply unit sets new performance and energy efficiency standards

Aixcon PowerSystems is renowned for specializing in control technology for power electronics. Since the company was established in 1994, Aixcon engineers have been developing high-performance power supply units for welding plants in metal working applications and for microwave equipment in the semiconductor industry. In addition to developing and producing power electronics, Aixcon also manufactures complete systems, e.g. for longitudinal seam welding of composite pipes.



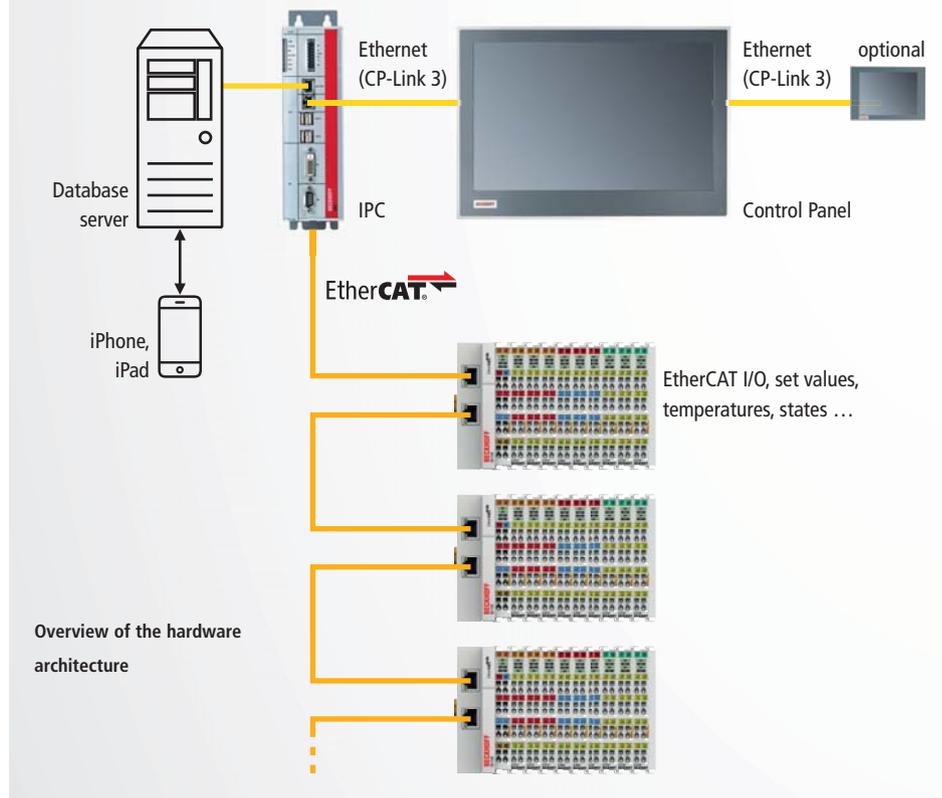
The dimensions of the "power supply unit" developed by Aixcon are impressive: Three control cabinet panels are capable of delivering a total of 30,000 A for the hot stretcher.

The company, which is based in Stolberg, Germany, has been using automation technology from Beckhoff right from the start. Initially, DOS-based IP 65 Panel PCs with S2000 software were used in conjunction with the Beckhoff Lightbus as the fieldbus system. After years of continuous innovation, these have long since been superseded by modern Industrial Control Cabinet PCs of the C69xx series, Control Panels with CP-Link 3 for the operator interface and TwinCAT as the PLC and motion control software platform. EtherCAT, which can integrate

all automation components including I/Os and Servo Drives, is used as the system-wide fieldbus.

Power supply for controlled heating of titanium sections

Aixcon is currently working on the development and production of a power supply system for a "hot stretcher," which has been a challenge in every respect. A hot stretcher is a type of plant in which titanium sections are machined and



“The wide range of available I/O interfaces makes the Beckhoff control system truly open. This has enabled us to develop a platform- and vendor-independent control system, to the delight of our end customers,” said Aixcon’s managing director Karl Swiontek in an interview with Ralf Stachelhaus, manager of the Beckhoff Rhine-Ruhr branch.



formed under the influence of heat, without impairing their material characteristics. To this end the sections are fixed in the hot stretcher, heated based on an exactly defined temperature curve, formed (turned and drawn) and then cooled. The specifications must be adhered to precisely; otherwise, the properties of titanium, such as strength, thickness and ductility, would be impaired.

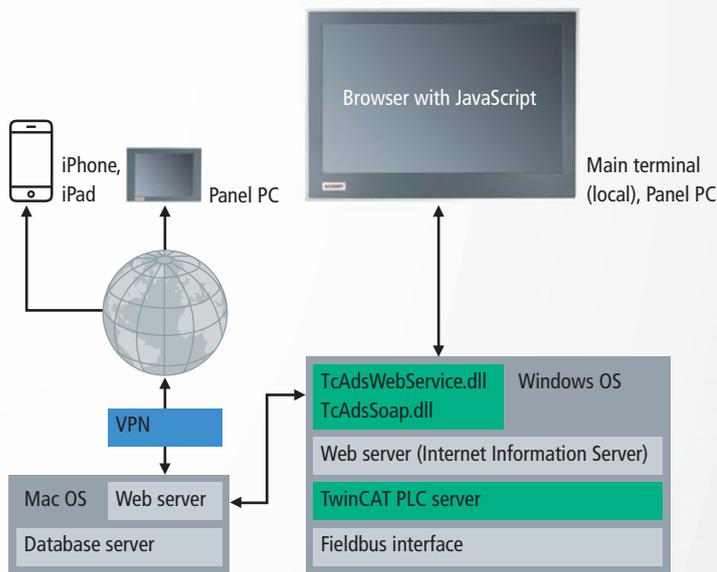
Electricity is used for heating the material in a hot stretcher based on defined temperature profiles. To heat a titanium section with a length of around 4 m and a cross-section of around 50 cm² to 620 °C in 60 seconds requires an electrical current of around 17,320 A. Aixcon’s task was to develop and produce such a powerful current source. The dimensions of this “power supply unit” are impressive: Three control cabinet panels are capable of delivering an impressive total of 30,000 A. Each panel has 10 power units, each with its own controller and rectifier for three power transistors with 333 A each. The system uses a 480 V/400 A 3-phase power supply.

Innovative automation and operating concept

- The specifications for automation and operation of this plant are demanding:
- Development, parameterization and archiving of the recipes (current curves) in a database
 - Archiving of the actual process data (quality verification)
 - Set value generation for the current source controllers
 - Real-time transfer of the set values from the PLC to the controllers
 - Fast online visualization of the process
 - Platform-independent visualization of the process and production data for iPad and iPhone

These requirements were solved and implemented with an innovative automation and operating concept, based on the following components:

- Database server
- TwinCAT PLC on a C6920 Industrial PC
- EtherCAT and EtherCAT I/O terminals for transferring the set values and remaining process data



The whole plant operation is web-based. This means it is totally platform-independent and can optionally be run via a Windows PC, Linux, Apple, iPad or iPhone.

The online visualization of the whole process takes place directly at the plant via a Beckhoff Control Panel with CP-Link 3.



- CP6202 Panel PC with CP-Link 3 for visualization of the online process information at the machine
- Web server for the database server and TwinCAT PLC server
- Web-based, platform-independent visualization created with Java Script

High-performance PC control, innovative visualization

The TwinCAT PLC generates the set values for the process based on the recipes stored on the database server. EtherCAT is used for transferring the values to the Aixcon controller boards and for logging the signals, temperatures and states that are relevant for system control and monitoring. Each panel has an EtherCAT I/O station. Online visualization of the whole process takes place directly at the plant via a CP-Link 3 client. This technology replaces the previous image transfer via DVI with an interference-free, simple to install and cost-effective Ethernet cable. In addition, this offers several optional features. For example, up to nine clients with different resolutions, display sizes and content can be connected. At the hot stretcher the CP-Link 3 technology is used, at the other end of the large machine a further panel can be positioned for special diagnostic purposes. The recipes for current and temperature curves, section types, etc. are managed on the database server. The database server also deals with archiving and processing of relevant process and production data. The whole plant operation is web-based. This means it is totally platform-independent and can be run via a Windows PC, Linux, Apple, iPad or iPhone.

The database and TwinCAT PLC form the centerpiece of the process control system

Like the visualization, this communication is also based on Java Script. The components required for this purpose are the respective web servers and the script DLLs. For the TwinCAT PLC these are Internet Information Server (IIS) integrated in Windows and the ADS script DLLs for accessing the TwinCAT PLC variables.

The main operator panel is a Windows-enabled CP6202 Panel PC that is installed directly at the plant. These days, all browsers support Java, which means

that no further software is required, and the browser integrated in the operating system can be used as a framework for visualization. The operator terminal is connected directly with the TwinCAT PLC via CP-Link 3 and Ethernet and is mainly used for fast online visualization of process data. In addition, authorized operators have access to the database and the recipes. Quality-relevant data can be archived and the diagnostic data can be accessed via the database server.

Mobile devices such as iPads, iPhones or remote client PCs are routed via the Internet through VPN. They can access the web server of the database computer directly via Java Script for displaying the required data. In the same way as the system control can access the database, the reverse route is also available: For example, the production manager can not only view the production data stored in the database, it is also possible to visualize current process values such as currents, temperatures or diagnostic plant data, e.g. on an iPad.

Increased efficiency results in improved savings potential

“The current source we developed sets new standards in terms of performance, controllability and energy efficiency,” said Aixcon’s Managing Director Karl Swiontek. “For example, the single-phase AC power source used in the past was only around 60% efficient. We were able to increase efficiency to an impressive 98%. This is not only better for the environment, it also offers real savings potential. For many years, PC-based control technology from Beckhoff has been helping us realize such projects with many individual requirements. High-performance controllers and high-speed EtherCAT enable us to develop and implement optimized control and process engineering. The wide range of available I/O interfaces make the Beckhoff system truly open and has enabled us to develop a platform- and vendor-independent control platform to the delight of our end customers.”

Further Information:

www.aixcon.de/en