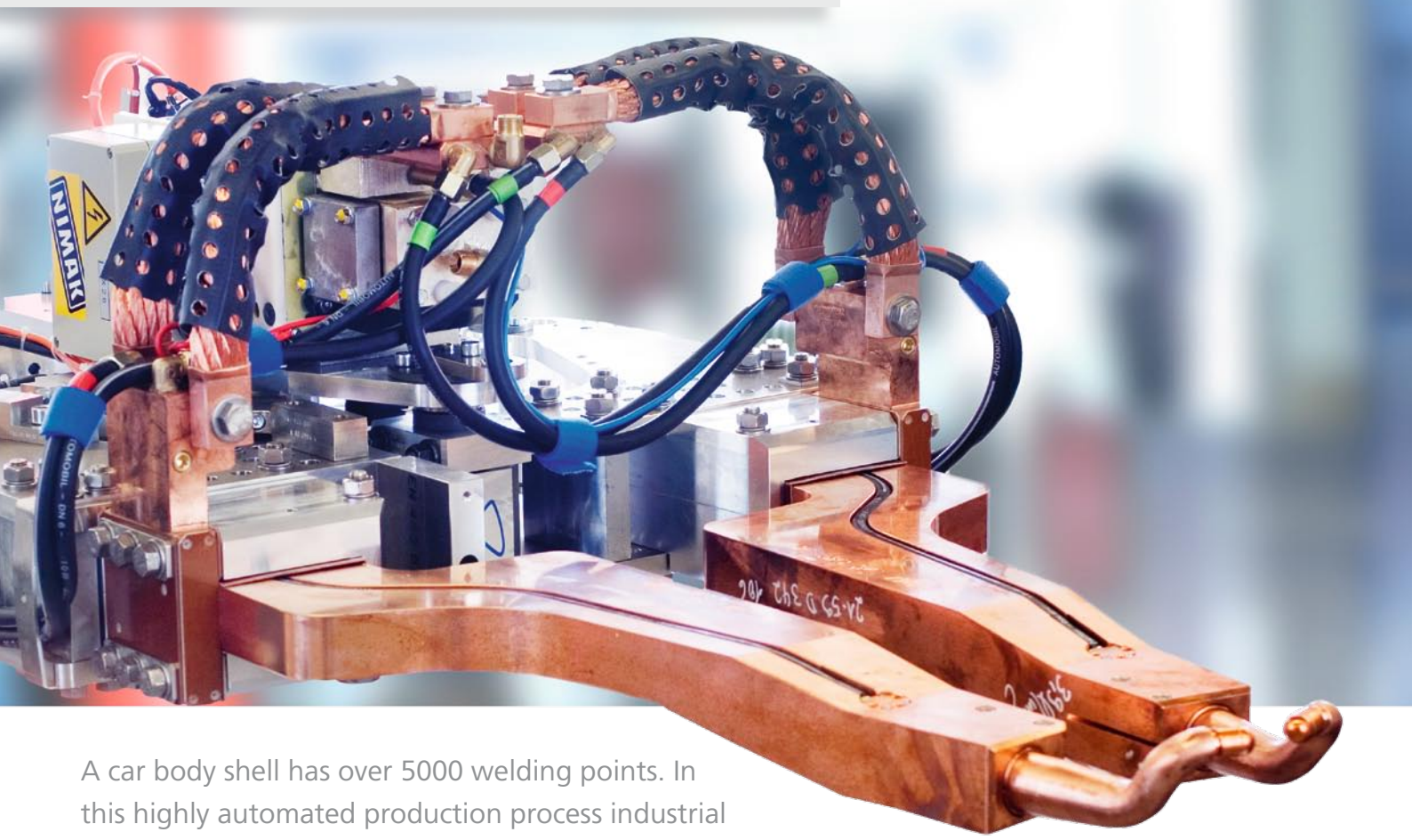
XC200 Controls Electrically Driven Welding Tongs



A car body shell has over 5000 welding points. In this highly automated production process industrial robots and welding tongs are used in combination. Whilst industrial robots have achieved a high degree of technological maturity, welding tongs are experiencing a technological breakthrough. Servo driven tongs are gradually replacing pneumatic drives. The optimum and flexible control of the welding tongs is handled by Moeller's XC200 modular PLCs.

Resistance welding with welding tongs is used for joining sheet steel parts in body shell construction. With spot welding the parameters for welding duration, current flow, pressure on the materials and the dimensions of the welding points usually have to be matched with each other. For a perfect control of the welding process whilst monitoring the quality of the welding point at the same time, servo driven welding tongs are being used more and more. With this technique, a servo motor is used to move the welding tongs. Rotating motion is converted to axial motion in the drive. This brings the benefits of programmable and infinitely variable positioning, bounce-free placing of the electrodes, fast generation of the electrode force, and a constant pressure during the welding process. High opening and closing speeds are also possible. This results in shorter process times required for body shell construction.

Impressive automation concept

A well-known German automotive manufacturer decided to fit a new body shell construction line with servo driven welding tongs. For this the selected supplier Nimak required a powerful and flexible controller for the new The control system for the welding tongs was required to work in combination with the

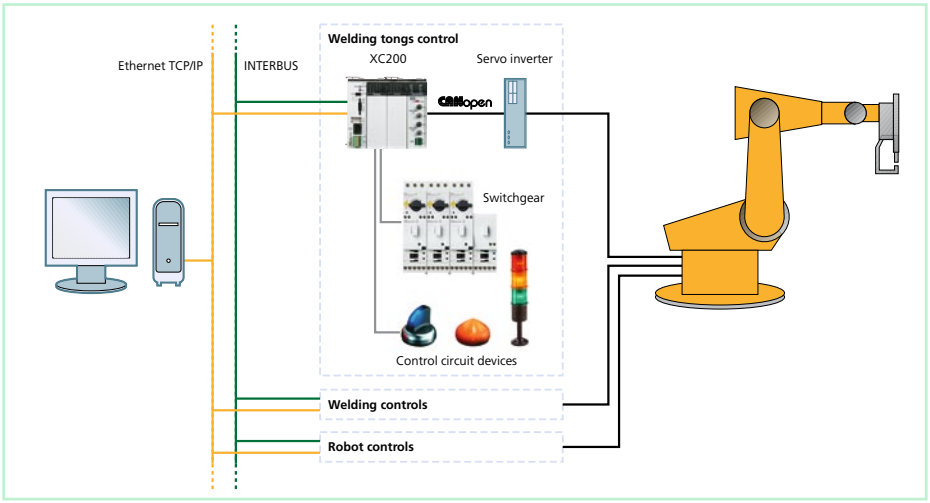
robot and welding controls since only this configuration allowed optimum control of the welding process. The special feature was the programming of the welding tongs, in which the welding specialists at Nimak were able to implement their extensive experience. Moeller's XC200 high-performance modular PLC is a flexible partner that proved to be the most optimum and economical solution.

The project required the connection of a PLC to the Interbus fieldbus system used in body shell construction, the establishment of communication with the higher-level Ethernet TCP/IP network and the addressing of the servo control via CANopen. A Moeller XC-CPU201 with a 256K memory was used as the basic unit. This comes with an onboard CANopen interface already integrated. The CANopen fieldbus master works at a transfer rate of 1 MBaud. The XC-CPU201 also integrates an Ethernet interface (10/100 Mbit), eight digital inputs and six digital outputs. Another digital input module with 16 inputs is used to integrate the Moeller switchgear in the welding tongs control system.

Another requirement of the German automotive manufacturer was implemented by Moeller's partner Harms & Wende: the development of the XIOC-NET-IB-SO Interbus card. This module connects the XC200 to the Interbus. Harms & Wende used Moeller's technology kit for the development of the card. For this Moeller provides all the necessary information for developing and producing custom modules that are compliant with the Moeller controller family. This ranges from a description of the hardware and software interfaces to the provision of specific components for production.

The XC200 uses MMC memory cards, a special feature that enables straightforward updates

The Moeller technology kit enables customers to integrate the specific hardware and software solution into Moeller XC100/200 controllers.



in the field or the updating of variables. The standard file system also enables data to be read and written on the memory card by the PLC and by any PC.

Optimum connection of the XC200 PLC to the welding plant via a local and customised Interbus module

Open automation software

The integration of the different interfaces and their integration on the software level was the challenge presented by this project. For this Moeller uses the vendor independent CoDeSys programming system (EN61131-3) for the modular PLCs. This widely used system offers outstanding features as well as simple handling. The hardware configurator shows all local I/Os and the remote periphery on one user interface. All inputs and outputs can be configured and parameterised directly. The integration of Interbus was also easy. The function blocks developed by Harms & Wende enabled a prototype of the servo driven welding tongs to be commissioned rapidly. Furthermore, end users do not require any knowledge of programming since the welding tongs control system is integrated into the overall system via standard interfaces.

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CONCLUSION

An open and flexible automation concept was a key criterion for all involved. Thanks to the XC200, different interfaces could be integrated quickly and highly efficiently in a welding tong control system. Moeller's XC-CPU201 is a PLC that comes with Ethernet and CANopen interfaces as standard features. Harms & Wende implemented an Interbus card for the XC200 series using Moeller's technology kit. The hardware, the CoDeSys programming system and the support from both Moeller Harms & Wende enabled Nimak to meet the requirements of end customers totally and on schedule.

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