



Car Body Shell Manufacturing

Location:

China

Segment:

Automobile

Problem:

To transfer car bodies to several welding stations, a conveying system had to be developed and integrated into the plant automation structure.

Solution:

PKZ motor-protective circuitbreakers, DIL contactors with SmartWire-DT

Results:

significantly reduce the installation time required, SmartWire-DT offered considerably more transparency with lower investment costs.

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Background

A German premium automobile manufacturer with international operations recently set up a new production line in China. To transfer car bodies to several welding stations, a conveying system had to be developed and integrated into the plant automation structure. Car body production requires the highest level of precision, both in the manufacture of car body parts as well as in the joining of parts at the relevant welding stations. An optimum solution was developed for the project in close collaboration with the Eaton Corporation in Shanghai.

Challenges

The extensive arrangement and number of signals to be processed from individual stations were a particular challenge to the automation of the car body production line. To ensure the optimum production process, all the motor drives of the conveying system, as well as all the sensors of the relevant welding stations have to be monitored

and controlled centrally. The conveying system also had to be tuned to the complex control algorithms of the quality control on the welding stations.

Other requirements: The motor starters had to be implemented as DOL or reversing starters with motor protection for overloads and short-circuits. Contactors and motor-protective circuit-breakers in the rating range from 0.55 -11 kW were required for controlling over 1200 different drive motors. All status information such as the feedback signalling of the contactors and tripped indication signals of motor-protective circuit-breakers had to be logged centrally. Conventional solutions were ultimately rejected since they required a large amount of installation effort and only offered a low level of flexibility for plant modifications. The project design, installation and commissioning would be too time consuming, even when using remote I/Os. The project therefore required a high-end innovative solution that fully met every customer requirement.



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Solution

Eaton DIL contactors and PKZ motor-protective circuit-breakers were therefore selected for the task. Since the application required auxiliary contacts with different contacts for interlocking or signalling tasks, the PKZ was ideal with its wide range of approved accessories for the safe and efficient creation of control systems from the xStart range. The motor starter assembly was implemented with tool-less plug connectors. This thus offered two separate contact systems including a visible isolating gap, as well as an unambiguous assignment of PKZ protective device and DIL switching device, which can also be later exchanged on an individual basis.

The innovative SmartWire-DT communication and connection system enabled the automation requirements, i.e. the connection of DOL and reversing starter combination to Profibus DP, to be met with a high level of efficiency.

The particular benefit of SmartWire-DT is the fact that conventional switchgear such as DIL contactors can be incorporated in the system, whilst the wiring effort on the other hand can be reduced by more than 60 percent. This

project used over 1600 motor starters, and the use of SmartWire-DT achieved a time saving of almost 180 hours compared to the conventional wiring method – corresponding to almost 22 working days.

No special devices are required to make motor starters system compatible. SmartWire-DT modules just have to be snap fitted onto standard motor starters. The SmartWire-DT cable provides both the communication and the power supply to the slaves. Besides motor starters, it is also possible to connect command and signalling devices, soft starters or circuit-breakers to SmartWire-DT. SmartWire-DT also does not require any additional I/O modules and thus saves space in the control cabinet.

The integration to the existing automation structure with S7-400 and Profibus DP could not have been easier: Each SmartWire-DT line starts with a gateway, in this case Profibus DP (alternatively CANopen, Ethernet IP and also other protocols can be implemented). Up to 99 slaves can be connected on a SmartWire-DT cable with a maximum length of 600 m. The number of connectable slaves is thus virtually unlimited. Slave

addressing is executed automatically simply by pressing a button on the gateway. In this case, the PLC program stays unchanged. A GSD or EDS file can also be imported without any problem. In all, 720 meters of SmartWire-DT cable were used in this project. Implementing the same project with conventional wiring would require approx. 12,600 m of control cable. Using SmartWire-DT therefore helps us to utilize resources efficiently, thus reducing the impact on the environment.

The local project manager responsible at the automobile manufacturing plant was delighted with Eaton's SmartWire-DT solution. On the one hand, the company was able to significantly reduce the installation time required, whilst SmartWire-DT offered on the other hand considerably more transparency with lower investment costs. Today the car manufacturer uses the SmartWire-DT to access the diagnostics data of every individual slave, thus significantly increasing plant availability. As a result of this entirely positive experience the automobile manufacturer is also considering the use of SmartWire-DT in the area of power management.

Results

The project design, installation and commissioning of the conveying system with SmartWire-DT proved to be highly successful so that car production in Changchun could already start at the end of 2010. In a further expansion stage, a power management concept with SmartWire-DT is being considered: Eaton circuit-breakers can also be connected to SmartWire-DT and status messages such as on/off signals, trip indications and load warnings logged centrally. Moreover circuit-breakers with remote operators in standby operation can reliably switch off any energy consumer that is not required. An Eaton XMC measuring module can also record essential energy consumption data and make it available via SmartWire-DT.