

Leading German automotive supplier, Hella, introduces WISA globally as a corporate standard

■ Main facts

Customer: Hella KGaA Hueck & Co

Industry: Automotive

ABB products: Wireless sensor/Actuators (WISA)

■ Customer need

- A method to eliminate the previous interruptions in production due to cable breakages
- Reliable communication for factory automation
- Easy commissioning

■ ABB response

- Provided a wear-free signal transfer with WISA

■ Customer benefits

- “The conversion to WISA technology soon paid for itself in the first months of fault-free operation”
- Received detailed inspection that ensures perfect quality of the headlamps as expected by the customers



■ The story

WISA achieves an important success: high availability through WISA wireless technology

Leading German automotive supplier, Hella, introduces WISA globally as a corporate standard

Wichita Falls, TX, September 29, 2008...Since June 2007 Hella KGaA Hueck & Co. in Lippstadt have been using ABB's wireless sensor/actuator distributors with WISA technology (Wireless Interface for Sensors and Actuators) for headlamp assembly. This method eliminates the previous interruptions in production due to cable breakages.

Robot cell: Assembly and inspection of high quality automotive headlamps

In a highly automated production shop in Lippstadt, Hella produces front headlamps for luxury vehicles. In the assembly cell under consideration here, the lamp housing is first placed on a transfer slide. Then the gear system for the headlamp beam adjustment comes into action. Before a robot mounts the front glass onto the housing in the next working step, twelve different sensors interrogate for the correct mounting of all the individual components. This detailed inspection is a measure to ensure perfect quality of the headlamps as expected by the customers, who are large automotive companies including Audi, BMW, Chrysler, and GM.

Sensor cables in trailing cable installations: a cause of common faults

Each individual sensor deemed necessary requires a signal cable, which is laid in a trailing cable system to the moving transfer slide. Despite careful installation, the rapid to and from movements of the transfer slide often lead to damage of the sensitive signal wires. "Hardly a week went by," recalls Andreas Niggenaber, responsible for the machine maintenance, "in which a defective signal cable did not lead to an interruption in production." The fault rectification usually began with complicated troubleshooting followed by a time consuming repair, which was additionally impaired by the tight spatial conditions.

Apart from damage to or breakage of the cables, other secondary effects also led to faults. "Quite often sensors were simply mechanically misadjusted, because the rapid movements led to high tensile forces on the connected cables," explains Niggenaber.

The solution: Wear-free signal transfer with WISA

At the beginning of June 2007, Hella replaced the previous I/O module on the transfer slide by a wireless I/O pad with WISA technology from ABB. This radio I/O module has a total of 16 data points so that in the application described there even remains some reserve for future expansion.

"For us it was decisive that the changeover to the new technology could be realized without long down times," remembers Niggenaber. Therefore, as a preparatory step the central input/output module, which forms the interface between the PLC (Programmable Logic Control) and up to 13 I/O pads, was mounted in the control cabinet and the corresponding pair of antennae directly on the top surface of the assembly cell. Additionally, the adaptation of the program for the machine controller could be prepared. The machine side of the PLC and the input/output module were connected together via a Profibus FieldBusPlug (FBP System from ABB). Finally, the IP67 module present on the transfer slide was replaced by the I/O pad and the final commissioning work was carried out. "Putting the WISA system into operation turned out to be so easy that production operation could be quickly restarted," says Niggenaber.

In this way the sensitive signal cables could be completely removed from the trailing cable system. Only two 800 FD cables had to be laid for the voltage supply of the transfer slide.

WISA: Reliable communication for factory automation

WISA is the radio technology in the 2.4 GHz band which has been specially developed by ABB for factory automation, and which through its real time capability is characterized by particularly high reliability and the possible coexistence of many systems in a single

factory shop. Through the choice of frequency band, it is ensured that communication takes place outside of the typical interference spectrum found in industrial environments.

In this respect there are many mechanisms for ensuring an interference-free, reliable operation which run automatically without the plant operator being involved. The input/output module and up to 13 wireless pads allocated to it change their communication frequency, for example, continuously according to a specified pattern. In this way they exploit the whole 2.4 GHz band. This technique avoids electromagnetic interference of signals from other communication systems leading to erroneous functions. Communication processes are only terminated when the opposite end confirms perfect reception. If required, the signal transmission is repeated with a radio transmission cycle lasting just 2.04 ms. With a fully expanded system this performance from a WISA system is just as high as with communication with only a few wireless I/O pads.

Wireless I/O pads signal to the central I/O module twice each second even without a change of status. If this signal is missing, the last status information is taken as “non-valid” and transferred to the controller from where the production process can be stopped or a warning signal triggered. In the machine, program specific reactions for fault signals can be individually programmed for each WISA device.

WISA: Easy commissioning

Machine commissioning with wireless pads is straightforward and easy. Once the input/output module has been switched into the “Config Mode”, the address selected is assigned there to a wireless I/O pad in a non-volatile manner by simply pressing its membrane button.

A so-called “sign function”, which can be triggered by key depression, provides unambiguous assignment of the issued addresses in operation. A green LED flashes in the selected pad, while simultaneously showing the address in the display of the central input/output module.

Of course, further devices can be added or deleted as described above. If the maximum number of 13 I/O pads per input/output module is not sufficient for the application, a further device is simply added including a pair of antennae.

Wireless pads: The essential features

Each I/O pad has eight M12 sockets, each doubly assigned. One half with two digital inputs, the remainder with two configurable I/Os each. The voltage supply is provided separately for inputs and outputs, each with a current rating of 0.5 A. The supply voltage can be looped through to the next I/O pad. This avoids additional cabling, particularly when several of these I/O pads are, for example, installed on one larger transfer slide or robot gripper.

Summary: Return on investment through fault-free operation

“The conversion to WISA technology soon paid for itself in the first months of fault-free operation,” says Niggenaber drawing a balance. “This is because each fault means that personnel have to wait for fault rectification and production shortfalls may possibly have to be recovered on a Saturday, incurring corresponding additional costs. Added to this are the actual service costs.”

The fault-free operation was so convincing that a wireless I/O pad has been put on the second transfer slide of this assembly cell instead of the conventional module. In the meantime WISA devices for the conversion of further assembly cells having the same function have been ordered from ABB. "We will also be specifying this technology in the future when planning this type of assembly equipment, for example for robot applications," Niggenaber concludes.

