

Greater Productivity at the Production Line

Touchless Vehicle Identification at the Assembly Line Production

Quality is not everything – at least not in the automobile industry – since without an efficient acquisition of relevant quality data everything is naught. Behind this are not just the legal regulations within the scope of product liability and the avoidance of product recalls – with all their economical consequences and image losses. As the following example of a leading German automaker proves, significant productivity gains can also be achieved through the use of mobile data storage units directly in the production.



At the Neckarsulm plant of the Audi AG approximately 800 vehicles of the type A6 – as station wagon (Avant) or sedan – roll off the line daily for the world market. In January 2004, a fully automated system was put into operation with which the quality data of each vehicle on the assembly line is acquired and centrally stored. At the heart of this solution lies the ultrahigh frequency identification system Moby U from Siemens, which touchlessly detects mobile data storage (MDS) units and reads their data records – of course while the line is moving.

Reliable and economical

At the start of the assembly line stands a rugged ES380 industrial terminal from Siemens that receives the production data from the preceding paint shop and analyzes it.

The data relevant for the assembly process is transmitted by the acquisition station to the Moby U system, where it is then automatically checked. This serves as an additional precaution, since the data media are supplied with power via an exchange battery. Although their service life is several years, a data loss at the line would be more expensive at any rate.

About 1700 mobile data storage units MDS U315 on the vehicles are under way at the assembly, which are detected and read by approximately 130 read/write devices SLG U92 installed above the line. Through that, the process data from the individual work steps – e.g. tightening torque rates of automatic screw-in stations or fill levels – can be assigned to a vehicle and made available to the central quality control systems.

At a total of nine stations, an identification computer Simatic Panel PC670 Touch each is provided for the visualization of the data. The inspection of the assembly steps is for the most part carried out at Ecos test stations (electronic check out system) from Siemens. Thus, even test results of complex modules or subassemblies as well as wheel alignment, brakes, fill levels, etc. can be automatically acquired and provided to the central quality control systems.

The actual reason for the use of the touchless identification system, however, was its economic efficiency. “Prior to the introduction of Moby U, the personnel had to over and over again scan a bar code, which concealed the vehicle identification number. This not only was time-consuming, but also potentially fraught with errors depending on the state or dirt contamination of the bar code label,” explains Frank Siefert of the operation management – team IT projects – at Audi.

That the automatic identification pays off is obvious. Even if each employee would only take ten seconds to scan, with the 250 production steps at the line this would result in more than 20 minutes of unproductive working time per vehicle. In Neckarsulm, approximately 800 vehicles roll off the line per day – Siefert is thus right in attributing a “considerable productivity increase” to the Moby system.

Quality Data in the Automobile Industry

Rising product expectations, tightened product liability also on an international scale and the increasing competition demand highly effective quality management systems (QM systems) in all areas of the automobile industry. The VDA (association of German automobile manufacturers) has therefore published policies pertaining to the structure and maintenance of QM systems (VDA volume 6, parts 1, 2 and 4, as well as VDA volume 1), which also contain details on the acquisition and archiving of quality data. How and to which extent this data is acquired and archived can be decided by the companies themselves – of course in doing so, the requirements of the ISO 9000 (certification), the customers (automobile manufacturers) and the respective legislators must be met.

Ready for the rough industrial Use

Audi deliberately chose Moby U, because this system was the only one to reliably handle all vehicle spacings occurring at the assembly line and to guarantee identification. Particularly at the preassembly, vehicle spacings only amount to 1.5 to 2 m – overreaches would thus hamper the identification of the individual vehicles. The read/write devices SLG U92 operate with a transmission frequency in the ISM band from 2.4 to 2.4835 GHz, which is used worldwide for the sectors industry, science and medicine. Using low transmitting power, it enables ranges from a few up to 300 centimeters and transfer rates as high as 8 KB/s. In connection with robust modulation methods and corresponding test mechanisms, this frequency band is ideal for blanking out electromagnetic interference sources, thus ensuring an error-free data transmission and data integrity. Moby U suppresses known noise concerns during UHF transmissions – such as reflections, interferences and overreaches – without complex shielding measures and antenna adjustments.

The mobile data media MDS U315 offer 2 KB of storage space. With the IP65 protection rating, they are optimally armed for the use in the rough production environment, and can be mounted directly onto metal. In cooperation with Audi, Siemens developed a special magnetic mount that is able to withstand speeds up to at least 140 km/h. While this speed is reached nowhere during the production, once the vehicles run on their own engine power, the mounting also has to resist higher acceleration forces than experienced at the assembly line.

The Best by far

Besides the vehicle data, the mobile data media also store processing instructions, which – on the basis of the vehicle identification number – trigger specific production steps at the line. This at the same time minimizes the possible errors.

The overall identification concept at the A6 assembly offers another advantage: since the production data is kept on the data medium, the failure of a central system or the network can be bridged by reading the data medium – the production can continue without restrictions. If there were only a vehicle identification or skid number at the respective vehicle, the needed data would have to be painstakingly looked up and entered or scanned by hand.

Moby U solves the problem of overreaches: during the configuration, three zones can be defined for each installation site, which – upon being entered – cause the mobile data storage unit to trigger different actions. Zone 3, for example, is more than six meters away from the read/write device. While in this zone, the MDS is “sleeping” and only listens for signs of life from a read/write device twice per second.



Should other UHF users with the same frequency be nearby, the MDS ignores these signals, since it requires a special code for “waking up”. If it receives this code close to an active read/write device, it will accept this read/write device and respond to it with its own identification upon entering zone 2. The read/write device will only process this identification once the MDS reaches zone 1: there it will be properly registered and the data exchange can start.

The boundaries of the zones are programmable in steps of 50 cm using an aperture angle of 70°. The maximum size of zone 1 is 3 m. “Especially the range delimitation fulfills all requirements resulting from the organization of our production line with its changing vehicle spacing, and worked well from the very beginning,” judges Frank Siefert the reliability of the system in operation.

Successful into the Future

Following the good experience with the touchless acquisition of the quality data via Moby U, Audi is considering the use of this system also at other assembly lines of the Neckarsulm plant.

Another goal would be the incorporation of quality data from system suppliers into the assembly line – in order to consolidate all relevant data for the nowadays common just-in-sequence production. Thanks to the compatibility, for example, with Moby I, the system proven in Neckarsulm offers the best qualifications for this – so to speak an even greater “Lead through Technology”.