



Complete solution for vehicle assembly

Process data processing and visualization in fully automated production cells

In fully automated production cells in the automotive industry, high-performance and reliable hardware and software that can withstand a wide range of environmental conditions and global specifications is particularly important. When parts are assembled in production cells and components are screwed, welded or glued together fully automatically, reliable documentation of these activities is also necessary. Kontron contributed its technology and expertise in visualization and process data processing to a joint project with a system supplier to a major automotive manufacturer. Effective interaction between the implementation partners was crucial to success.

Automation is constantly being driven forward in the automotive industry, but the prerequisite for functioning solutions is the right, reliable hardware. In this specific case, the car manufacturer had developed its own interface for its assembly cells and sections, via which important operating data from the individual assembly steps is recorded and then fed into a central operating data recording system. The challenge was to record, process and bundle the work steps contained in the process, including the associated process data such as force-displacement diagrams. For this purpose, a Panel PC was required as an HMI (Human Machine Interface) for data processing and visualization, including a switch, bus coupler and integrated RFID reader in a control cabinet. This was to enable the transparent display of KPIs for each assembly section on site. It was also necessary to provide the work instructions for any changes to the process. Access to the system functions was controlled particularly easily and conveniently via an RFID reader.



A complete solution from a single source was particularly important to the car manufacturer. As the OEM had already had good experiences with Kontron, the car manufacturer initially approached Kontron as part of a tender. The ability to deliver the required hardware quickly despite supply bottlenecks on the market was rated particularly positively

Günter Deisenhofer, Product Manager HMI at Kontron



Professional collaboration - hand in hand

Due to the complex setting, it was clear that the challenge could be solved faster and more effectively in partnership than individually. As the automotive industry typically only works closely with system suppliers that are already listed, Kontron set out to find the right cooperation partner. The system supplier from the switchgear manufacturing sector had previously worked with the car manufacturer in a similar setting.

The system partner contributed its expertise in testing and integrating numerous components from different suppliers into a functioning complete system. Accordingly, it took over the integration of the technology on site, for example to meet the requirements for the fieldbus connection and to integrate additional components from third-party suppliers. Depending on the automotive OEM, the local conditions required appropriate system integration; for example, a special housing was necessary for mounting in the systems. The overall solution was therefore developed in close cooperation.

State-of-the-art security

Windows 10 IoT is used as the operating system (OS), which is maintained by Kontron, while the application software is installed and maintained by the OEM itself. As adaptations to the respective infrastructure are necessary in different plants, these are carried out by the user on site. The basis is the operating system image provided by Kontron, which was initially adapted by Kontron for the OEM. "We have carried out numerous security-related hardening measures: "For example, interfaces were deactivated and various settings cannot be changed or are protected against manipulation by a password. This also requires deep interventions in the system, such as changes to the BIOS," reports Günter Deisenhofer, Product Manager at Kontron.

In view of the general cybersecurity threat situation, the system in the field must always be kept up to date. The Panel PCs are completely maintenance-free, but they do require regular updates of software, drivers, BIOS and operating system. Due to the setting, however, this does not work with the usual automatic updates in IT: the risk of creating functional restrictions or instabilities in production due to an update and possible associated side effects would be too high. It was therefore particularly important to the car manufacturer that the provision of updates and maintenance of the driver packages and the operating system takes place at fixed intervals or specifically after coordination. The required release processes are adhered to.

Fit for different framework conditions worldwide

As the solution is used at production sites around the world in different climate zones, the Panel PC had to be suitable for industrial use and have a long life cycle for a wide range of environmental conditions. The hardware was selected in such a way that the entire setup is suitable for everyday industrial use in the long term. This includes resilience to high and low temperatures, humidity, soiling, shocks and vibrations. In addition, the display had to be easy to read in all lighting situations - regardless of whether the factory halls are artificially lit or whether light is coming in from outside or from spotlights. As the operation in the plant is preceded by extensive release processes for software and hardware, a stable setup with reliable revision management and long availability was extremely important for the OEM.

The joint project was implemented within a short period of time with very little frictional losses. Thanks to Kontron's high development depth, the entire technology know-how was also available in a concentrated form. This meant that the integration could be implemented particularly efficiently in collaboration with the end user: It only took just under three months for the solution, which was initially tested on release samples, to go into practical use with series devices.

No problem with delivery bottlenecks

The implementation phase took place at a time when there was a severe shortage of components. Normally, the system partner would have been faced with long delivery times for power supply units, RFID readers and other hardware. The shortage was particularly severe for CPUs, CPU boards and Ethernet controllers. As a manufacturer, Kontron had other options for flexibly providing the necessary resources. During the component crisis, the Kontron Group had reserved critical parts for projects in the development phase so that the release pattern could be set up quickly. Thanks to close coordination between all parties involved, it was also possible to procure materials at an early stage for rapid series delivery. "We have a high level of vertical integration, especially for the Panel PCs, all important components are developed, programmed and calibrated in-house," reports Deisenhofer. Typically, the components are procured from third-party manufacturers. This means that there is less scope for influence when changes are required, for example. The high level of vertical integration, which is otherwise not common on the market, proved to be an important criterion here. For example, changes to the BIOS and operating system were much easier to make due to specific customer requirements, as Kontron uses single board computers developed in-house. On this basis, for example, a change of CPU platform has already been implemented and Intel 11th Generation processors are currently being used to successfully increase the computing power for additional application software.



Fully automated vehicle assembly

Customized HMI for the production cell

Flexible maintenance

With a view to easy maintainability, Kontron has defined spare parts kits to enable defects to be easily rectified in the field. They can be used effectively by service technicians in the field. In turn, a high degree of flexibility was achieved in the face of practical challenges in the field: For example, it had only become apparent during the introduction that the service technicians on site did not always have the right tools available for installation and removal. "A short-term adjustment was able to solve the problem within days and enable approval and ordering. As Torx is not a standard maintenance tool at the OEM, the screws were changed to Allen keys accordingly," recalls Günter Deisenhofer.

To make maintenance even easier, the OEM also wanted to be able to save the operating data separately using an additional mass storage medium. This allows the historical operating data to be easily transferred to the new device when it is replaced.

Arriving in practice

Today, the system provides the interface between OT and IT. The Kontron HMIs document the activities that require documentation and also contribute significantly to efficient process control. The operating data is collected on site during the assembly step on vehicles in the assembly cell, processed, visualized and simultaneously made available to the higher-level company-wide control level of the ERP system. The OEM benefits from a ready-to-use complete solution and no longer has to deal with multiple suppliers. This has not only simplified procurement and warehousing, but also communication and support throughout the entire life cycle. Several hundred units are already successfully in use around the world, and the trend is rising.



“

Our standard HMI solutions are already suitable for many different applications. These are modular in design and form the basis for the scenarios in which adaptations are required. Established building blocks are already available for this purpose. This enables rapid implementation of customer-specific changes and modifications as well as adaptation to a wide range of industries directly in-house, thus significantly reducing the development effort, the risk of changes and ultimately the time-to-market. Our experts, who work in a specialized team to develop the adaptations and support the implementation, also make a significant contribution to this. Of course, fully customized solutions are also possible, which also benefit from our many years of experience in system design.”

Günter Deisenhofer, Product Manager HMI, Kontron

”



About Kontron

Die Kontron AG (www.kontron.com, ISIN AT0000A0E9W5, WKN A0X9EJ, KTN) ist ein führendes IoT-Technologieunternehmen. Seit mehr als 20 Jahren unterstützt Kontron Unternehmen aus den unterschiedlichsten Branchen dabei, mit intelligenten Lösungen wirtschaftliche Ziele zu erreichen. Von automatisierten industriellen Abläufen, intelligenterem und sicherem Transportwesen bis hin zu fortschrittlichen Kommunikations-, Konnektivitäts-, Medizin- und Energielösungen bietet das Unternehmen seinen Kunden wertschöpfende Technologien. Mit der Übernahme der Katek SE Anfang 2024 stärkt Kontron das Portfolio durch die neue Division GreenTec mit den Bereichen Solarenergie und eMobility maßgeblich und beschäftigt rund 7.000 Mitarbeiterinnen und Mitarbeiter in mehr als 20 Ländern weltweit. Kontron ist im SDAX® sowie TecDAX® der Deutschen Börse gelistet.

About the Intel® Partner Alliance

From modular components to market-ready systems, Intel and the over 1,000+ global member companies of the Intel® Partner Alliance provide scalable, interoperable solutions that accelerate deployment of intelligent devices and end-to-end analytics. Close collaboration with Intel and each other enables Alliance members to innovate with the latest IoT technologies, helping developers deliver first-in-market solutions.

Intel and Atom are registered trademarks of Intel Corporation in the U.S. and other countries.



Global Headquarters

Kontron Europe GmbH

Gutenbergstraße 2
85737 Ismaning, Germany
Tel.: +49 821 4086-0
info@kontron.com

www.kontron.com

