

Worker Assistance

How Digital Assistants Are Changing Connection Technology

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In today's manufacturing landscape, not only automation and digitization set the pace but also the integration of humans into interconnected processes. In screw and connection technology, worker assistance systems bridge this gap.



With modern worker guidance, tools are available to prevent errors in screw connections from the outset. (Image: Stahlwille)

Even as manufacturing plants increasingly automate screwing and connection processes without manual intervention thanks to automation and robotics, humans remain indispensable in many areas. However, technicians and assemblers are increasingly being integrated into networked production. This is no longer limited to classical human-machine interfaces but can involve a range of interfaces. From digital display boards to mobile devices and up to virtual and augmented reality solutions, various assistance systems are available to ensure error-free screw connections.

Pioneers in this area are primarily industries where human errors can have serious and costly consequences. Thus, in the automotive industry, electronics manufacturing, or aerospace, worker guidance systems are usually taken for granted. This particular form of assistance provides employees with detailed instructions and enables them to reduce errors. This directly translates into higher quality end products.

"A worker assistance system works, simplified, like a digitized set of instructions for furniture assembly, guiding through the entire assembly process step by step," describes Alexander Grosser, project manager at Stahlwille.

Of course, working on assembly lines is often complex and must meet high-quality standards. Additionally, assembly workers are exposed to increasing process complexity leading to physical and cognitive workloads. Worker assistance systems are deployed to address this challenge by providing information on what needs to be done, how it should be done, and why it should be done.

"Worker guidance is the ideal tool to break down complex assembly processes into simple sub-steps. The software can ensure that each sub-step is performed correctly and each component meets the same quality standards. The great added value lies in relieving the worker of the burden of responsibility for complex assembly, allowing them to focus on the essentials. This demonstrably leads to fewer errors and higher satisfaction," explains Marian Kück, software product manager at [Desoutter](#).

Reduced error potential from the outset

Faulty connections, which only emerge in the field, can lead to costly and reputation-damaging recalls. Last year, for example, [Honda](#) had to recall 150,000 vehicles in the USA. The reason: the master brake cylinder was not properly attached to the brake booster assembly during production, resulting in loose or missing rod nuts. [Ford also made headlines](#) in 2023 because its Explorer SUVs could roll away while parked. Faulty axle bolts were cited as the cause here.

With modern worker guidance, tools are available to prevent such errors from the outset. This is possible through the networking of control levels, programs, and data collected at individual machines and workstations. The assistance systems process this experience and present it to users through various channels. The subsequent visualization plays a significant role. According to [nexonar](#) general manager Frank Honisch, the trend is moving away from rigid screens. Instead, workers are increasingly guided by tablets or smart glasses, expanding the workers' range of action. This allows data to be captured and shared directly at the point of use.

"By continuously storing important measurement data, trends in production can also be identified. Data can be captured and evaluated more quickly, making it easier to find sources of errors," says Frank Honisch.

Efficiency improvement through seamless data integration

Worker guidance systems serve as flexible communication interfaces between backend systems - such as ERP, MES, and PLC - with humans and machines. They go far beyond merely instructing workers by automatically configuring and controlling tools, integrating measuring devices, and using 2D and 3D positioning technologies for live measurements and inspections. These systems capture measurement data and store important information for production optimization in databases.

"Worker guidance systems with their connected sensors are data sources. Processes become more transparent and provide valuable data for determining and controlling process quality," explains Steven Geirnaert, Key Account Manager at nexonar. "Real-time feedback is also important when processes are not running correctly. These can be simple signals, such as audio feedback or visual messages through diodes, video, or laser projections."

Standardized interfaces and protocols are a prerequisite for smooth data transmission. They ensure seamless integration of systems, secure efficient and safe data communication, enhance the flexibility and scalability of production processes, and support real-time interaction between humans and machines.

"An essential part of our current technology landscape is OPC UA (Open Platform Communications Unified Architecture), an open protocol for industrial communication. This technology enables reliable and flexible connection between different machines and systems in the production environment," says Thomas Wree from CSP.

Artificial intelligence in process design

The treasure trove of data obtained at assembly stations is ideally suited for training artificial intelligence. Especially in process design, experts see promising approaches for the use of AI. *"We see great potential for the use of artificial intelligence in planning, evaluating, and interpreting screwing cases. The consistent application of AI systems in the development of complex screw sequences can enable faster and therefore more efficient manufacturing processes," predicts Alexander Grosser.*

Marian Kück even expects that worker guidance will generate itself, for example, by automatically extracting design data and translating it into assembly processes. It is becoming apparent that through the synergy of humans, machines, and artificial intelligence in the modern production environment, a new era of efficiency and quality is being ushered. Advanced worker guidance supported by AI, is a central pillar. This not only increases productivity but also promotes employee satisfaction through clear instructions and optimized workplace design.

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