



Smart Tools Streamline Aircraft Assembly

Airbus uses 5G-connected tools to help workers efficiently complete complex assembly processes

AIRBUS

Summary

- Despite advances in automation, many manufacturers rely on workers for complex assembly processes
- Connected smart tools can help make semi-automated processes more straightforward and efficient
- At its Hamburg plant, Airbus is using 5G-connected tools to help prevent workers from making errors, and provide greater traceability and quality control.
- Airbus has found that 5G provides highly reliable connectivity across its aircraft hangars
- Airbus says the financial benefits easily outweigh the cost of the smart tools

Amid all the excitement about advances in robotics, it is easy to overlook the fact that human beings still play vital roles on the shopfloor in most industrial plants. This is especially true in the aeronautical manufacturing industry, where assembly lines are typically operating within complex environments and have significant space constraints.

“There are robots handling part of the automation, but certain elements cannot be replaced by autonomous or semi-autonomous robots,” explains Alejandro de la Mata Chico, Manufacturing Engineering, Assembly and Data capture Expert at

Airbus “These actions still need to be performed by trained individuals.” To support these staff, Airbus is employing digital tools to make assembly processes as straightforward as possible, by giving the worker as much relevant information as required. These tools are supplemented by semi-autonomous systems that help prevent workers from making errors, while providing additional traceability and quality control.

“The goal is also to provide additional safeguards to the worker to reduce and prevent human error as much as possible by locking the tool if it is in the wrong position or if the wrong programme has been

loaded,” adds Alejandro de la Mata Chico. “This is also enhanced by automatically uploading the correct programme based on the physical position and angle of the tool to optimise the tool lifetime and prevent errors of using the wrong programme in the wrong position.”

For example, in Airbus’ Hamburg plant, 5G-connected smart tools can automatically capture and store key metrics in the assembly process, such as the torque applied to tighten bolts, in the manufacturing execution system (MES), which is located on-site. The largest Airbus location in Germany with 12,500 staff, the Hamburg plant plays a central role in the development and manufacturing of Airbus jetliners.

Working with Orange Business and Ericsson, Airbus has also deployed private 5G networks at its plants in Toulouse and Montoir de Bretagne. Airbus is responsible for the network design, while Orange Business and Ericsson provide service support. The manufacturer is also bringing 5G connectivity to its facilities in Cadiz in Spain and Broughton in the UK.

While Airbus has also been using Wi-Fi to connect tools, 5G connectivity is robust enough to provide control functionality and geolocation information, as well as greater reliability and coverage through the plant. “Having smart tools connected with 5G gives us better coverage, reactivity and reliability with regards to the network connectivity in the hangars and the complex environments,” explains Hakim

Achouri, telecom expert for digital aviation at Airbus. “Using Wi-Fi with the current generation of tools is complicated due to the problems with coverage, due to the size and metal structures in the hangars.” When the plant relied on Wi-Fi, there were so-called white zones, where the connectivity was unreliable or non-existent. The introduction of 5G has solved that problem, meaning the smart tools deployed on the shopfloor are both more available and usable.

From the testing and initial deployments of the 5G tools, Airbus has noted an increase in reliable coverage and performance of the connection. As a result, staff are now able to remotely enable, disable and control tools by a specific geolocation system, and upload tool programmes in near real time. “This is done to help prevent non-conformities from human error in the sequence or the programme used in the wrong position,” says Alejandro de la Mata Chico. The related data is then stored and shared with quality control to provide traceability.

Greater quality control and proactive maintenance

By providing near real time feedback on the performance of each tool, Airbus is finding that 5G connectivity is giving it the reliable contextualised data it needs to inform quality control and maintenance.





Thanks to the improved visibility, Airbus says it has been able to improve the maintenance cycles of thousands of tools, resulting in “huge cost savings”.

With the 5G connectivity, Airbus is able to better monitor the actual status and potential deviance of each tool in near real time. If a tool is malfunctioning in some way, the system alerts engineers, meaning they can take the problematic tool out of circulation, preventing any resulting damage or part or assembly defects. Airbus staff now have full visibility of the status of the tools they are using and the lifetime remaining before they need to be taken into maintenance. That information helps the maintenance teams to better manage their workload and anticipate which tools will be required for each operation. “The ultimate goal is to provide one single, reliable, secure and harmonised way of providing data for any business unit requiring it for their processes,” says Bror Mikael Salmelin, IT in Operations Data Connectivity & Processing Specialist at Airbus.

At the same time, the connectivity supports the automatic traceability of actions performed and measurements taken, reducing the possibility of human error in tracking and logging data. The solution is also saving Airbus money by preventing accidental worker errors. Airbus says such errors can potentially cost hundreds of thousands of euros as imperfect parts have to be scrapped or re-made.

Although it is still evaluating the likely cost reductions and return on investment, Airbus is convinced that the financial benefits of improved maintenance traceability

and asset tracking, as well as the reduction in human errors, easily outweigh the cost of the smart tools.

Airbus has been careful to engage shopfloor staff in the deployment of smart tools and ensure they are comfortable with the new technology. “The factory level staff have provided us with positive feedback since we have been fully transparent on what we are doing and only providing tools to make their job easier without individual worker traceability,” adds Bror Mikael Salmelin. “In addition to this we have been able to provide a reliable system to prevent accidental errors in the assembly process by making their life less stressful.”

As it deploys smart tools across its assembly lines, Airbus stresses the importance of the underlying connectivity. “5G is the real enabler of all these innovations by providing a reliable and fast network with better coverage in complex environments,” concludes Hakim Achouri.

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Bror Mikael Salmelin - IT in Operations Data Connectivity & Processing Specialist at Airbus