

## Edge Cloud 4 Production: IT-based factory automation enters series production

- After successful testing, a local server cluster will partially take over worker support on the assembly line in the Böllinger Höfe starting in July.
- Small-scale series serves as a learning environment to test Edge Cloud 4 Production for its control capacity and large-scale manufacture.
- Board Member for Production and Logistics Gerd Walker: “This first application in series production is a crucial step toward IT-based production.”

Ingolstadt, July 13, 2023 – Audi has been testing the local server solution Edge Cloud 4 Production (EC4P), a new method of IT-based factory automation, at Böllinger Höfe since July 2022. Starting in July 2023, this paradigm shift in Audi’s shop floor IT will be used for the first time in series production. At Böllinger Höfe, a local server cluster will control the worker support systems for two production cycles of the Audi e-tron GT quattro\*, RS e-tron GT\*, and Audi R8 models. In the future, the software-controlled, flexible, and scalable server solution will replace the decentralized control system that relies on high-maintenance industrial PCs. EC4P allows Audi to redeploy the computing power the production line requires to local data processing centers. In addition to this first application in series production, Audi is simultaneously adapting EC4P for other use cases in the Audi Production Lab (P-Lab).

EC4P uses local servers that act as data processing centers. They can process extensive production-related data with low latency and distribute it to the worker support systems, which indicate to employees which vehicle part to install. This approach eliminates the need for expensive, high-maintenance industrial PCs.

“Our motto is software, not hardware,” said Sven Müller and Philip Saalman, Head and Co-head of the 20-member EC4P project team. “EC4P enables the quick integration of software and new tools, whether for worker support, bolt control, vehicle diagnostics, predictive maintenance, or energy savings,” explained Müller. Moreover, by eliminating industrial PCs on the line, EC4P mitigates the risk of malware attacks. Jörg Spindler, Head of Production Planning and Production Technology at Audi, emphasized the opportunities of EC4P: “We want to bring local cloud solutions to production at our plants to take advantage of advances in digital control systems.”

*The equipment, data and prices specified in this document refer to the model range offered in Germany. Subject to change without notice; errors and omissions excepted.*

*\*The collective fuel/electric power consumption and emissions values of all models named and available on the German market can be found in the list provided at the end of this text.*

The [server solution](#) makes it possible to level out spikes in demand across all virtualized clients, speeding application deployment and ensuring more efficient use of resources. Production will be economized, particularly where software rollouts, operating system changes, and IT-related expenses are concerned. The flexible cloud technology also scales to adapt to future tasks. “What we’re doing here is a revolution,” announced Gerd Walker, Member of the Board of Management of AUDI AG Production and Logistics, at the launch of the first test phase. “This first application in series production at Böllinger Höfe is a crucial step toward IT-based production.”

### **Series production launch in July 2023**

In July 2023, Audi will integrate EC4P into series production following a test run in operation and preliminary testing. “The small-scale series produced at Böllinger Höfe is ideal for testing ECP4’s capacity as a control system and its use in large-scale production,” said Saalman. Audi is the first car manufacturer in cycle-dependent production to use a centralized server solution that redeploys computing power. Production cycles 18 and 19 at Böllinger Höfe, during which interior panels are installed and work is done on the underbody, use thin clients capable of power-over-Ethernet. These terminal devices get electrical power via network cables and obtain data through local servers.

By the end of the year, Audi will switch the worker support systems for all 36 cycles to the server-based solution. The architecture of the server clusters is designed to enable rapid scaling of EC4P in large-scale production. “With EC4P, we are merging the fields of automation technology and IT to advance our practical use of the Internet of Things,” said project manager Müller. “This development will also create new employee roles at the interface of production and IT. For example, employees will use new applications to control automation technology. To this end, we are setting up a control team with overarching expertise to supervise and monitor the EC4P system around the clock.” The team will work closely with the line employees.

### **The digital factory transformation as a learning environment**

Audi is studying how digital innovations affect the working environment as part of its Automotive Initiative 2025 (AI25) in collaboration with partners, including the Fraunhofer Institute for Industrial Engineering. The AI25 takes a holistic approach, giving equal consideration to technology, people, and Audi’s mission of advancing the digitalization of its production activities.

“We work as a team to free up resources for new areas like battery and module production,” said Spindler. “New technologies and collaboration models will require our teams to acquire new skills. For that reason, our employees’ qualifications play an important role. With its longer cycle times, we view the Böllinger Höfe plant as a learning environment to roll out IT-based factory automation at larger sites such as Ingolstadt and Neckarsulm later.”

One of the first use cases is controlling electrical commissioning activities at Audi's German locations. After EC4P is proven in assembly, a further concrete step will be for the server solution to take over and monitor the programmable logic controller (PLC), which was previously hardware-based, in the automation cells in body construction. The project team is developing and testing the software alongside three manufacturers at the EC4P project house in Ingolstadt.

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The Audi Group is one of the most successful manufacturers of automobiles and motorcycles in the premium and luxury segment. The brands Audi, Bentley, Lamborghini, and Ducati produce at 21 locations in 12 countries. Audi and its partners are present in more than 100 markets worldwide.

In 2022, the Audi Group delivered 1.61 million Audi vehicles, 15,174 Bentley vehicles, 9,233 Lamborghini vehicles, and 61,562 Ducati motorcycles to customers. In the 2022 fiscal year, AUDI Group achieved a total revenue of €61.8 billion and an operating profit of €7.6 billion. Worldwide, more than 87,000 people worked for the Audi Group in 2022, over 54,000 of them at AUDI AG in Germany. With its attractive brands, new models, innovative mobility offerings and groundbreaking services, the group is systematically pursuing its path toward becoming a provider of sustainable, individual, premium mobility.

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**Fuel/electric power consumption and emissions values\*\* of the models named above:****Audi e-tron GT quattro**

Stromverbrauch kombiniert in kWh/100 km: 21,6 – 19,6 (WLTP);  
CO<sub>2</sub>-Emissionen kombiniert in g/km: 0

**Audi RS e-tron GT**

Stromverbrauch kombiniert in kWh/100 km: 22,1 – 19,8 (WLTP);  
CO<sub>2</sub>-Emissionen kombiniert in g/km: 0

*\*\*The indicated consumption and emissions values were determined according to the legally specified measuring methods. The WLTP test cycle completely replaced the NEDC on January 1, 2022, which means that no NEDC figures are available for vehicles with new type approvals from after this date.*

*The figures do not refer to a single, specific vehicle and are not part of the offering but are instead provided solely to allow comparisons of the different vehicle types. Additional equipment and accessories (add-on parts, different tire formats, etc.) may change relevant vehicle parameters, such as weight, rolling resistance and aerodynamics, and, in conjunction with weather and traffic conditions and individual driving style, may affect fuel consumption, electrical power consumption, CO<sub>2</sub> emissions and the performance figures for the vehicle.*

*Due to the more realistic test conditions, the consumption and CO<sub>2</sub> emission values measured are in many cases higher than the values measured according to the NEDC. This may result in corresponding changes in vehicle taxation since September 1, 2018. Additional information about the differences between WLTP and NEDC is available at [www.audi.de/wltp](http://www.audi.de/wltp)*

*Further information on official fuel consumption figures and the official specific CO<sub>2</sub> emissions of new passenger cars can be found in the “Guide on the fuel economy, CO<sub>2</sub> emissions and power consumption of all new passenger car models”, which is available free of charge at all sales dealerships and from DAT Deutsche Automobil Treuhand GmbH, Helmuth-Hirth-Str. 1, 73760 Ostfildern-Scharnhausen, Germany ([www.dat.de](http://www.dat.de)).*