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Hannover Messe 2018, Hall 9, Booth D35

Digital Enterprise Suite: The Digital Twin spurs productivity in aircraft manufacturing

Digital Enterprise Suite showcase uses example of the “Aerospace Industry”
on the Siemens booth at the Hannover Messe 2018



As one of the main drivers of digitalization, the aerospace industry has already made great progress in its digital transformation. Comprehensive digitalization along the entire value chain is also this sector's most powerful lever in terms of mastering present and future challenges. Only by significantly increasing productivity through higher levels of automation and end-to-end integration of digital tools and workflows will the industry succeed in meeting the high demand for its products. Ever more diverse model variants can now be efficiently built in smaller quantities due to greater flexibility. What's more, globalization of parts production requires a comprehensive database and places the most stringent demands on quality and precision. Digital Enterprise Suite, the unique solution portfolio for the manufacturing

industry, enables companies of any size to already meet these challenging demands. At the 2018 Hannover Messe, Siemens will be presenting specific examples of how customers are generating a digital copy of their entire value chain and transforming it into reality.

The virtual twin has three aspects which Siemens has been able to link in a unique way thanks to its comprehensive domain knowhow: The digital twin of the product itself, the production and performance of the real product in use, as well as the on-going production process. As early as the design phase for a new product, the NX CAD/CAM software from Siemens generates a digital model whose physical behavior can be realistically simulated using the Simcenter software. The electrical design is likewise engineered in a virtual environment using Mentor Capital. With the digital twin of the production process, Siemens software tools such as Tecnomatix Process Simulate, NX Plant Design, and NX Line Designer enable all procedural sequencing of robots and personnel, production lines, and resources to be optimized as early as the production planning phase.

In the next step, the virtual mechatronical model can be connected to the actual control program of the real plant in order to validate the entire automation task. Depending on the requirements, it is possible to use the real control hardware or a virtual controller. Combining both simulation models creates a digital twin of the real application that enables the machine to be simulated, validated, and optimized until it behaves as desired.

In this way, the Siemens showcase moves seamlessly from the digital to the real world. It is essential that future production operations be more flexible while still meeting the highest quality standards. This type of manufacturing is already being demonstrated today in collaboration with the German Fraunhofer Institute. For the assembly process, a robot from Mabi, mounted on an Automated Guided Vehicle (AGV), is driven towards the aircraft fuselage. Operation is controlled by Simatic controllers, navigation is aided by a laser and the robot's movements by means of a Sinumerik controller. The entire system moves with absolute precision to within a tolerance of just 0.3 millimeters, which is continuously checked by the Simatic QMS quality management solution. Visitors to the Siemens booth at the fair can

experience a real AGV in action as it performs typical work steps on an aircraft replica.

One part of the digital twin of performance is created in real production. This is completed in flight operation: Quantities of data from the aircraft are collected and transmitted to MindSphere, the cloud-based, open IoT operating system from Siemens. Analysis of this data reveals the condition of important aircraft systems such as the landing gear or engines, enabling the development of new services. Continuous condition monitoring and predictive maintenance prevent unnecessary work while also enhancing availability and safety. Feeding all these findings back to the entire value chain over MindSphere – right back as far as the product design – creates a fully closed decision cycle for continuous optimization. This completes all three aspects and allows the creation of the most holistic possible digital twin. This is only possible through use of the Digital Enterprise Suite from Siemens.

The benefits of the digital transformation for the manufacturing industry are clear – the time to act is now. To identify the optimum point of entry into the world of digitalization, Siemens offers a neutral, comprehensive consulting service taking into account the specific needs of every individual business enterprise. Working together with customers, Siemens develops a customized digitalization strategy and roadmap.

More information on Siemens at the Hannover Messe 2018 is available at www.siemens.com/press/hm18 and www.siemens.com/hannovermesse

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