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productronica 2021

Digital twin: The beating heart of Industry 4.0

As a digital image of machines, components and production simulations from engineering, the digital twin combines live data from production and optimization analyzes. From November 16 to 19, productronica 2021 in Munich will show what opportunities this will create for the electronics production industry.

With Industry 4.0, the purpose of the digital twin has expanded to include the manufacturing industry and, in particular, mechanical and plant engineering. The possibilities include, for example, verifying real machines, and predicting the service life and condition of the system (condition monitoring and predictive maintenance). The simulation models of virtual commissioning used to verify and validate a machine or system can be used as a partial model of a digital twin. The digital twin will be taken into account for new business models in order to enable the likes of individual trainings and illustrating data-driven optimizations. Because of this, the digital twin will be an important component of machine distribution in future. A fully integrated virtual commissioning can lead to the following service capacity: improved competitiveness due to shorter delivery times, cost savings and time reduction by doing away with physical test setups.

They do so by mapping processes, machines, systems, products or services over the entire life cycle – from design to decommissioning – in a virtual environment. A continual flow of real-time sensor data is aggregated in the digital twin. This way, product developers receive information about how the machine behaves in real operation and are able to incorporate the findings into new designs.

Sabine Wagner
PR Manager
Tel. +49 89 949-20802
sabine.wagner@messe-muenchen.de

Silvia Hendricks
PR Manager
Tel. +49 89 949-21483
silvia.hendricks@messe-muenchen.de

Messe München GmbH
Messegelände
81823 Munich
Germany
www.messe-muenchen.de

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Service technicians are able to minimize costly downtimes and failures through predictive maintenance using sensor data (temperature, torque, vibration, etc.) and artificial intelligence algorithms.

In addition, as an “after-market service” as well as “pay-per-use” or “machine as a service,” predictive maintenance is among the new data-driven business models that could open up new sources of revenue.

Virtual test runs

In combination with AI technologies, digital twins can simulate complete production lines or specific customer requirements before implementation. Mechanical and plant engineering in particular benefits from this, as mechatronic systems with an increasing proportion of software pose ever greater challenges for developers. Here, virtual test runs shorten the time to commissioning, reduce costs and increase customer satisfaction. These also allow development processes to be continued in times of restricted hardware supply chains. And last but not least, precise predictions of energy consumption reduce the ecological footprint.

Digital twins for Industry 4.0

Digital twins contain all the information that characterizes the features and behavior of an asset (object). The asset administration shell (AAS) designed by the IDTA (Industrial Digital Twin Association) implements the digital twin for Industry 4.0.

In order to establish this interoperable digital twin on the market and ensure international distribution, VDMA and ZVEI founded the Industrial Digital Twin Association e.V. in 2020. By setting up an international community, the association is focusing on an open approach (open source), which enables small and medium-sized companies to access the technology and thus to participate in the data-driven economy. VDMA Productronic is an ideal, specialist sponsor of productronica.

Digital twin and data protection

Last but not least, the installation of a digital twin requires willingness to make data from machines and systems available to suppliers and customers. This cannot be done without reservations, because ultimately one's added value depends primarily on the machinery. Therefore, when exchanging data, the question of data sovereignty and intended use always arises, but as does the matters of IT security, sabotage and espionage.

A [study](#) by msg systems ag and Fraunhofer IPK, which examined the degree of maturity of digital twins in the manufacturing industry, came to the conclusion that European companies that want to be competitive and future-oriented with their digital twins need to break up their internal data silos and allow the flow of information between users and suppliers.

productronica 2021 and the “digital twin”

The two trend topics of productronica 2019 were Smart Maintenance and Smart Factory. Even then it was clear that the use of digital twins is central to the implementation of these concepts. Both topics will play an important role at the world's leading trade fair for electronics development and production this year as well. This applies to the exhibition area as well as to the three forums: “productronica Forum” (Hall A1), “PCB & EMS Speakers Corner” (Hall B3) and “Innovation Forum” (Hall B2).

Exhibitors at productronica 2021

ASM Assembly Systems (Hall A3, Booth 377)

Simulations of new, virtually manufactured products on the digital twin of SMT lines in order to reliably define process and program parameters, create setup and material lists, precisely calculate throughput times and optimize production processes.

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Festo (Hall A3, Booth 343)

Participants in the BaSys 4.2 research project, which aims to make the digital twin usable in specific practical applications and thus achieve direct added value for production.

KUKA Deutschland GmbH (Hall A2, Booth 540)

The further developed Smart Factory links mechatronic components and digital solutions.

Manz (Hall B2, Booth 416)

A new generation of fully automated production lines for battery production using digital twins. Artificial intelligence (AI) enables an innovative type of machine control and production control, with the aim of self-optimizing production.

More information: www.productronica.com

productronica

productronica is the world's leading trade fair for electronics development and production and is supported from a conceptual and technical perspective by the Productronics Association of the VDMA (German Mechanical Engineering Industry Association). 1,544 exhibitors from 44 countries and 44,000 visitors from 96 countries took part in and attended productronica 2019. The trade fair has been held in Munich every two years since 1975 and the next productronica is due to take place from November 16 to 19, 2021. For more information, visit www.productronica.com

productronica worldwide

In addition to productronica, Messe München organizes productronica China, productronica South China and productronica India. The network of electronics trade fairs also includes electronica in Munich, electronica China, electronica South China, electronica India, SmartCards Expo, electronicAsia and LOPEC.

Messe München

Messe München is one of the leading exhibition organizers worldwide with more than 50 of its own trade shows for capital goods, consumer goods and new technologies. Every year, about 50,000 exhibitors and around 3 million visitors take part in more than 200 events at the exhibition center in Munich, at the ICM – Internationales Congress Center München, the Conference Center Nord and the MOC Veranstaltungszentrum München as well as abroad.

Together with its subsidiary companies, Messe München organizes trade fairs in China, India, Brazil, Russia, Africa, Turkey and Vietnam. With a network of associated companies in Europe, Asia and South America, and with around 70 representatives abroad for more than 100 countries, Messe München has a truly global presence.