BMW GROUP

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Innovative “3D human simulation”: BMW Group Plant Regensburg uses virtual tools to plan assembly processes years ahead of NEUE KLASSE series launch

+++ Realistic simulations of future operations already possible in digital factory layout +++ Employees trained on “digital twin” using VR goggles +++

Regensburg. At BMW Group Plant Regensburg, it is already possible to experience in virtual form what the factory will look like a few years from now: Production of the NEUE KLASSE, BMW’s next model generation, will also ramp up in Regensburg in the second half of the decade. Plant Director Armin Ebner: “With the NEUE KLASSE, which is based on an entirely new vehicle architecture, our goal as a company is to set new standards for digitalisation, electrification and circularity. Today, many years before the official launch of series production, virtual planning of the new production lines is already well underway – even as we continue to build the current BMW X1 and BMW X2 models.”

Virtual image of new production lines years before series launch

As part of a pilot project implemented in vehicle assembly, BMW Group Regensburg is utilising “3D human simulation” for the first time company-wide. “This allows us to not only map future manufacturing structures virtually in a digital twin, but also simulate the employees who will work on our assembly lines in the future,” explains Sebastian Moser, an innovation and digitalisation specialist for the Regensburg production system. In practice, this means future workflows and individual operations on the Regensburg assembly line can be virtually mapped and tested long before the series launch of new models.

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"The project is a further step towards the digital and intelligently connected BMW iFACTORY," confirms Ebner. "Virtualisation, artificial intelligence and data science are accelerating and refining our planning. Digital factory planning enables us to reduce planning effort and realise more efficient, stable vehicle launches in the future." The BMW Group is adopting a digital-first approach to validate and optimise complex manufacturing systems throughout its production network, relying on NVIDIA Omniverse Enterprise, a platform for creating and operating 3D industrial metaverse applications, to run simulations with digital twins.

Human simulation already very close to future factory reality

To date, the "3D human simulation" at the BMW Group site in Regensburg encompasses a complete line section with 41 operating cycles, covering over 1,000 square metres of assembly space. Realistic simulation of operations in the future factory layout makes it possible to already develop effective cycle specifications and conduct health-friendly ergonomic analyses today.

"The 'model people' on our digital assembly line move and behave just like real people," explains Dominik Wottke, a production and quality expert in vehicle assembly at the Regensburg plant. "For example, if the software detects that a virtual employee needs to bend too low or lift a weight that is too heavy to be able to complete an operation, then that is also the case in the real world. We are therefore able to respond to this in a targeted manner and make improvements in the modelling."

VR goggles take employees on virtual journey into the future

The "3D human simulation" also serves as a training and information tool. "We can use video sequences from the digital twin to take our associates on a journey into the future and show them what their future workplace will look like," says Wottke. Project managers have set up a virtual room for this purpose, where employees from vehicle assembly in Regensburg can wear VR goggles to explore the future assembly line virtually and examine details up close, if needed. They can also practice specific operating cycles and enhance their skills, working alongside virtual "colleagues". The aim is to train these operations so well in advance that the learning phase on the actual assembly line can be shortened.

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BMW Group Plants Regensburg and Wackersdorf

The BMW Group has viewed itself for decades as the benchmark for production technology and operational excellence in vehicle construction – including at its locations in Regensburg and Wackersdorf. The BMW Group vehicle plant in Regensburg has been in operation since 1986 and is one of more than 30 BMW Group production locations worldwide. A total of up to 1,400 vehicles of the BMW X1 and BMW X2 models come off the production line at Plant Regensburg every workday – destined for customers all over the world. Different types of drive trains are flexibly manufactured on a single production line – from vehicles with internal combustion engines to plug-in hybrids, to fully-electric models.

High-voltage batteries for the electric models built in Regensburg are also produced locally, in direct proximity to the vehicle plant. They are assembled at the electric component production facility, which opened in 2021 at the Leibnizstrasse location.

BMW Innovation Park Wackersdorf also belongs to the Regensburg site. The 55-hectare campus built in the 1980s was originally intended as a nuclear reprocessing facility. The BMW Group has located its cockpit production there, as well as its parts supply for overseas plants. In addition to BMW as the largest employer, several other companies are also based at Innovation Park Wackersdorf. A total of around 2,500 employees work there.
The BMW Group core staff at the Regensburg and Wackersdorf locations in eastern Bavaria is made up of around 9,250 employees, including more than 300 apprentices.

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