

"Just ask Factory Genius!": How AI helps maintain manufacturing equipment

- **AI maintenance assistant Factory Genius speeds up troubleshooting at BMW Group**
- **Pilot project at Plant Dingolfing forms basis of company-wide solution**
- **Methodology can be transferred to other areas**

Munich. Whenever vehicle production equipment fails at a BMW Group plant, every minute counts. The maintenance team must work quickly to identify and resolve the cause of the fault. Now, employees can ask the new digital AI assistant, "Factory Genius", for help: It can suggest solutions for the specific system problem within seconds, reducing the time required for error diagnosis to a minimum.

"AI applications have become an integral part of modern production systems and are a key element of the BMW Group's digital transformation. Factory Genius is an example of how generative AI, in particular, can streamline operations for everyone involved and enhance economic efficiency," says Michael Ströbel, head of Process Management and Digitalisation, Order to Delivery at the BMW Group. But how exactly does the digital assistant, recently launched in its initial development phase, support maintenance staff?

Knowledge discovery tool

The tool essentially works like a search engine, quickly filtering relevant answers to specific user queries from a vast amount of data and user reports. However, this search function does not draw content and information from the internet, but from equipment manuals, quality data, internal fault reports and planning documents it was previously trained on. To keep the data management system up to date, it is regularly fed with new knowledge – for example, in the form of daily-updated shift-log data.

By integrating a Large Language Model, similar to those used in chatbots like ChatGPT and Gemini, Factory Genius is also able to understand language: The software can search data for relevant content within the appropriate linguistic context, providing more accurate results than a conventional search engine. In addition to displaying the top matches with links to sources, the assistant can also summarise the maintenance instructions found through contextual search in just a few sentences, if preferred. The user can then ask questions in a chat.

Collaborative in-house development

A pilot project in the body shop at BMW Group Plant Dingolfing laid the groundwork for this in-house development. Alongside the tool developed in Dingolfing in spring 2024, other BMW Group locations, including the plants in Spartanburg, USA, and Rosslyn, South Africa, were working at the same time on similar solutions through a transparent process. All were pursuing the same goal: improving access to information when faults occur or during scheduled training and maintenance. AI experts at the company's Munich headquarters consolidated this expertise, integrating the plants' diverse requirements to create a company-wide "best of" application. This can now be used globally in its initial development phase through an internal platform.

In addition to search and chat functionality, Factory Genius also features a translation function, enabling it to switch languages at any time to overcome language barriers. This functionality has proven extremely useful while building the new plant in Debrecen, Hungary, for example, since manuals are often not available in Hungarian.

Transferable methodology

The technology behind Factory Genius has the potential to be applied to other production use cases as well. The general approach enables integration of a wide range of documents and development of assistants tailored to different user groups. Thanks to its cloud functionality, the tool will also be rapidly available worldwide.

The BMW Group

With its four brands BMW, MINI, Rolls-Royce and BMW Motorrad, the BMW Group is the world's leading premium manufacturer of automobiles and motorcycles and also provides premium financial services. The BMW Group production network comprises over 30 production sites worldwide; the company has a global sales network in more than 140 countries.

In 2024, the BMW Group sold over 2.45 million passenger vehicles and more than 210,000 motorcycles worldwide. The profit before tax in the financial year 2024 was € 11.0 billion on revenues amounting to € 142.4 billion. As of 31 December 2024, the BMW Group had a workforce of 159,104 employees.

The economic success of the BMW Group has always been based on long-term thinking and responsible action. Sustainability is a key element of the BMW Group's corporate strategy and covers all products from the supply chain and production to the end of their useful life.

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BMW Group Latin America

BMW Group is a leader in premium individual mobility technology products and services in Latin America, where it markets its three brands: BMW, MINI, and BMW Motorrad. BMW is the top-selling premium automotive brand in Latin America, with more than one in three vehicles sold in the region. In 2024, the brand has sold 42,886 units. MINI has sold 6,383 units in the same period. BMW Motorrad has sold 27,742 motorcycles in the region, setting a sales record. BMW is the best-selling premium

brand in Brazil, Mexico, and Importer Markets. BMW Motorrad has achieved record sales and now has three of its 15 main global markets in Latin America: Brazil, Mexico, and Importer Markets. BMW Group's Open Technology Approach enables a gradual transition to electromobility, offering customers the choice between battery-electric, plug-in hybrid, or combustion powertrains. More than 20% of BMW Group's sales in Latin America consist of electric or plug-in hybrid vehicles. BMW Group has delivered approximately 80,000 personal or corporate charging units across the region.

The Group has 5,000 employees in the Latin American region. Its sales offices are located in Argentina, Brazil, and Mexico (where the regional office is based). BMW Group's production plants in the region are located in Brazil and Mexico. Brazil operates two plants: one in Araquari, Santa Catarina, focused on automobile production, where BMW X5 PHEV production began in 2024. The other plant in Manaus, Amazonas, is the first facility to manufacture motorcycles outside of Germany. In Mexico, a one-billion-dollar investment was announced in July 2014 for the construction and operation of a BMW Group plant in San Luis Potosí. This production site began operations in 2019 with the production of the BMW 3 Series; in 2021, an expansion was announced to include the manufacturing of the BMW 2 Series Coupé, and in 2022, the BMW M2, both exported worldwide. Starting in 2027, the San Luis Potosí Plant will incorporate electric vehicle and battery production with an \$800 million investment.

As additional information, Brazil has an engineering team to support global developments, regional challenges, and customer support organization, providing consumer assistance.

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