

Media Information

24 May 2022

Successful industrialisation and digitalisation of additive manufacturing

+++ Standard production of metal 3D printing enters final straight
+++ BMBF-funded project successfully implemented +++ Fully auto-
mated production ensures maximum productivity +++

Munich/Oberschleissheim. The industrialisation and digitalisation of additive manufacturing (AM) for automotive series processes has been successful. A project consortium funded by the German Federal Ministry of Education and Research (BMBF) and led by the BMW Group was launched three years ago, with small and mid-sized enterprises, large companies and research institutes. The common goal was to revolutionise metal 3D printing in standard production of cars.

The 12 members of the consortium presented the successful implementation of the IDAM (Industrialisation and Digitalisation of Additive Manufacturing) project at the BMW Group Additive Manufacturing Campus in Oberschleissheim, where a digitally connected, fully automated 3D printing production line has been set up and prepared for automotive standard production. An additional line is located at the firm GKN Powder Metallurgy in Bonn.

Around 50,000 components per year can be manufactured cost-effectively in common part production, as well as more than 10,000 individual and new parts, by means of 3D printing using Laser Powder Bed Fusion (LPBF): The starting material, metal powder, is remelted with a laser, layer by layer, at the site where the solid component needs to be created at each level. Using this 3D printing process means certain tools are no longer required and new design possibilities can be realised – which greatly increases flexibility.

Having started out from a concept outline in 2019, fully automated driverless transport systems (FTS) now carry the 3D printers' mobile build chambers between modules in the IDAM production lines. The machines are orchestrated



by a central control unit that consolidates all production data from individual line modules to ensure maximum productivity and quality.

Over the course of the project, innovative concepts were developed for automated generation of 3D printing construction data. Fully automated modules now transport the processed metal powder to workstations where they prepare the material independently. Post-processing of the manufactured components takes place at specially designed stations that are also fully automated. The quality of the components is top priority. Quality assurance of the finished parts takes place in-line, during the laser melting process, using sensors. This includes checking emissions from the molten pool with a CMOS camera and pyrometer. AI algorithms are used to correlate the data collected with actual component quality. This means process deviations can already be identified during production and component quality evaluated.

Successful implementation of the project called upon the expertise of all project partners. This was the only way to achieve digitalisation and automation in mechanical and plant engineering, in component design and in the area of metal 3D printing.

"From the very first day of the project, you could feel the team spirit among the partners. Learning from one another, developing innovative solutions together and making the best use of each partner's individual strengths – those were key to successful industrialisation and digitalisation of additive manufacturing," according to Felix Haeckel, consortium leader and BMW Group project manager.

Corporate Communications**Media Information**

Date 24 May 2022

Subject Successful industrialisation and digitalisation of additive manufacturing

Page 3

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The BMW Group has regarded itself for decades as the benchmark for production technology and operational excellence in vehicle construction. BMW iFACTORY. LEAN. GREEN. DIGITAL. represents the strategic vision of the worldwide production network. It provides answers to the challenges of the transformation towards e-mobility, with a global approach.

Lean stands for efficiency, precision and the highest level of flexibility, as well as outstanding integration capability. Green means using state-of-the-art technologies to establish production with minimal use of resources. The aim is to reduce CO2 emissions per vehicle from production by 80% from 2019 levels by 2030. Digital focuses on data science, artificial intelligence and virtual planning and development. In this way, BMW Group production is able to make a decisive contribution to the company's profitability.

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 and mobility services. The BMW Group production network comprises 31 production and assembly facilities in 15 countries; the company has a global sales network in more than 140 countries.

Date 24 May 2022

Subject Successful industrialisation and digitalisation of additive manufacturing

Page 4



In 2021, the BMW Group sold over 2.5 million passenger vehicles and more than 194,000 motorcycles worldwide. The profit before tax in the financial year 2021 was € 16.1 billion on revenues amounting to € 111.2 billion. As of 31 December 2021, the BMW Group had a workforce of 118,909 employees.

The success of the BMW Group has always been based on long-term thinking and responsible action. The company set its course for the future early on and is making sustainability and resource efficiency the focus of the company's strategic direction – from the supply chain, through production, to the end of the use phase, for all its products.

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