

Press Release
18 November 2015

25 years of 3D printing at the BMW Group: Pioneers in additive manufacturing methods

100,000 components annually on average

Major potential in future series production and for customized
vehicle parts

New CLIP technology already in use

Munich. The BMW Group is celebrating the 25th anniversary of the introduction of additive manufacturing at the company these days. The additive manufacturing methods, which are becoming more well known under the collective term of '3D printing', are among the key production methods of the future. Dr. Udo Haenle, Head of Production Strategy, Technical Integration and Pilot Plant: "The targeted use of innovative additive procedures at an early stage has made us one of the pioneers and leaders in 3D printing over the past years. At the BMW Group Technology Office in Mountain View, Silicon Valley/USA, we are now even conducting a first test run with the new CLIP (Continuous Liquid Interface Production) technology." As a beamer is used for the exposure of the surfaces, CLIP is considerably faster than previous methods.

Today 3D printing is applied in many different areas at the BMW Group. Dr. Haenle: "Components made with additive manufacturing give us a lot of freedom in the forming process; they can be produced both quickly and in high quality. We see major potential for the future application in series production as well as for new customer offerings, such as personalized vehicle parts, or the spare parts supply." In the long term, customers are to be provided with the option of having individual vehicle components made according to their personal preferences.

First application in concept vehicles and in prototyping

As early as 1990, the BMW Group's Rapid Technologies Center commissioned the development of the first facilities and from 1991 on, the first prototype parts were produced in-house on the company's own stereolithography machine. In the beginning, the additively produced parts were mostly used for concept cars but developed further for additional

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purposes over the years. Depending on the component specifications, the BMW Group applies different procedures and materials.

Today, additive manufacturing methods are most commonly applied in areas that frequently require small batches of customized and sometimes also very complex components, such as toolmaking, spare parts production, operating resources as well as pre-development, vehicle validation and testing, and concept or show cars.

A particular highlight for the technologies are completely new vehicles, such as the BMW i models, which come without predecessors. So initial prototypes need to be produced entirely with additive methods in order to be able to accommodate early modifications. Besides using additive manufacturing for trendsetting new vehicles, an especially charming area of application for the technology is in BMW classic cars. Especially when it comes to very old collector's vehicles, a component might be scanned and the generated digital data repaired in order to translate them into a CAD data set. Thanks to this reverse engineering method, it is possible to generate previously unavailable components for the spare parts production.

Wide range of possible applications

Thanks to the company's great expertise, the BMW Group can apply 3D printing in a great variety of areas. A particularly interesting example is what the Rapid Technologies Center produced for the British Paralympics basketball team in 2012: Based on 3D body scans of the team members, customized wheelchair seats for each player were made. Compared to conventionally made seats, the innovative seats were considerably lighter and also an ideal fit for the athletes, a major advantage for the players.

In mid-2014, the BMW Group introduced a 3D-printed ergonomic tool in the vehicle assembly that protects workers against excess strains on the thumb joints while carrying out certain assembly activities. Each of these flexible assembly devices is a single piece, customized to match the form and size of a specific worker's hand.

Another milestone has been the application of additive manufacturing methods for metal parts, which allows for new solutions and is already used in small series production. For several years now, BMW has equipped their DTM racecars with water pump wheels made with 3D printing. The 500th 3D-printed water pump wheel was fitted in April of this year. The

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high-precision component, which is subject to high stresses, consists of an aluminum alloy and has previously proven its worth in the tough environment of motorsports: Without exception, all pump gear works flawlessly, confirming BMW's leading role when it comes to additive production methods. Compared to 3D print methods in the consumer industries, which use plastic filaments, the additive manufacturing of metal parts requires considerably greater expertise in process engineering.

The team of the Rapid Technologies Center at the BMW Group's Research and Innovation Center (FIZ) in Munich works on close to 25,000 prototype requests annually, producing some 100,000 components a year for in-house customers. Parts range from small plastic carriers to design samples and chassis components for functional tests. Depending on the procedure and the size of the component, sample parts might be available within only a few days.

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The BMW Group

With its three brands BMW, MINI and Rolls-Royce, the BMW Group is the world's leading premium manufacturer of automobiles and motorcycles and also provides premium financial and mobility services. As a global company, the BMW Group operates 30 production and assembly facilities in 14 countries and has a global sales network in more than 140 countries.

In 2014, the BMW Group sold approximately 2.118 million cars and 123,000 motorcycles worldwide. The profit before tax was € 8.71 billion on revenues amounting to € 80.40 billion. As of 31 December 2014, the BMW Group had a workforce of 116,324 employees.

The success of the BMW Group has always been based on long-term thinking and responsible action. The company has therefore established ecological and social sustainability throughout the value chain, comprehensive product responsibility and a clear commitment to conserving resources as an integral part of its strategy.



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