

NextGenAM: Taking major steps into the next generation of industrial 3D printing

Partner project involving Premium AEROTEC, Daimler, and EOS for developing series additive manufacturing reaches new milestone

Augsburg/Varel, Krailling, Ulm, August 31, 2018 – One year ago, Premium AEROTEC, Daimler, and EOS jointly initiated the NextGenAM project to develop the basis of a future system for series production using 3D printing technologies. Now, the first pilot plant has been put into operation at Premium AEROTEC in Varel, northern Germany – a key milestone.

Additive manufacturing (AM) is becoming an increasingly important factor in the industry, also with regard to series production. Against this background, the aerostructures supplier Premium AEROTEC, the automotive manufacturer Daimler, and EOS, the leading technology supplier in the field of industrial 3D printing, have joined forces in the NextGenAM project to fundamentally develop the next generation of additive manufacturing. Since the project officially began in May 2017, the NextGenAM team has checked the entire AM process to assess its potential for automation. Now the first pilot plant has been put into operation at Premium AEROTEC's technology center in Varel.

Goal of the project is to develop a complete production cell capable of manufacturing aluminum components for the automotive and aerospace industries. The purpose-built pilot facility currently consists of various machines for additive manufacturing, post-processing, and quality assurance. The innovation about the production chain is that the individual steps and the interaction of all additive and conventional process steps are fully automated and integrated, and manual steps have been eliminated. As a result, complex, lightweight and at the same time robust components can be manufactured and the high level of automation forms the basis for profitable production going forward.

The pilot plant in detail

Center of the pilot production chain is the EOS M 400-4 four-laser system for industrial 3D printing with metal materials. The system is used in combination with the peripheral solutions of the EOS Shared-Modules concept. The EOS M 400-4 in Varel is therefore equipped with a powder station and connected to a stand-alone setup and unpacking station. As a result, filling and emptying the system with the aluminum material, setting up the system to prepare a new build job, and unpacking the built components from the powder bed can be carried out independently of and parallel to the actual AM build process. This significantly increases productivity. The additively manufactured components are transported between the individual stations fully automated and under protective gas in a container on an automated guided vehicle.

The downstream post-processing has also been extensively automated: A robot takes the build platform with the parts from the setup station and places it in a furnace for subsequent heat treatment. The same robot then removes the platform again and takes it to a three-dimensional optical measurement system for quality assurance purposes. Finally, the build platform is conveyed to a saw, which separates the parts from the platform, making the components ready for further use.

Working together to design the future of additive manufacturing in series

The successful development of the automated process chain is the result of fruitful cooperation between all the project partners, each contributing their various skills and experience: EOS is the global technology and quality leader for high-end solutions in the field of industrial 3D printing. Premium AEROTEC was the first manufacturer in the world to supply serial 3D-printed structural components for Airbus aircraft. Up to now, titanium powder has been used as material for this. However, one of the aims of the NextGenAM project is also to qualify aluminum for use. The automotive manufacturer Daimler contributes its experience in the field of mass production – an essential aspect if the pilot plant is to be used to manufacture parts on a large scale.

“In this project we have already succeeded in significantly reducing the production cost per part, thus creating an economic perspective for large-scale digital 3D printing factories,” says Dr. Thomas Ehm, CEO of Premium AEROTEC.

Dr. Tobias Abeln, Chief Technical Officer (CTO) at EOS, says: “The integration of the AM process in an automated production line is an important milestone for the broad application of our technology in series production scenarios.”

Jasmin Eichler, Daimler AG, Head of Research Future Technologies:

“3D printing is well on the way to establishing itself in the automotive sector as an additional manufacturing method with great versatility. With this collaborative pre-development project, we are taking a significant step towards achieving cost-effectiveness in metal 3D printing throughout the process chain. The project lays the cornerstone for the future realization of larger quantities in the automotive series production process – with the same reliability, functionality, longevity, and economy as for components from conventional production.”

Outlook

In the coming months, the pilot process chain will be further tested at the technology center in Varel and parts of the facility will be audited. In addition, production data will be collected and analyzed with the aim of collating precise data on process times, profitability, and cost optimization. The NextGenAM project is therefore moving continuously closer to its goal of producing highly complex aluminum components in series production in a particularly economical additive manufacturing process.

For further information, please go to: <https://www.eos.info/nextgenam>

Premium AEROTEC is a global player in the aerospace industry and generated revenues of 2 billion euros in 2017. The company's core business lies in the development and production of metal and carbon fibre composite aircraft structures. The company has sites in Augsburg, Bremen, Hamburg, Nordenham and Varel in Germany, as well as in Braşov in Romania. For further information see: www.premium-aerotec.com.

EOS is the world's leading technology supplier in the field of industrial 3D printing of metals and polymers. Formed in 1989, the independent company is pioneer and innovator for comprehensive solutions in additive manufacturing. Its product portfolio of EOS systems, materials, and process parameters gives customers crucial competitive advantages in terms of product quality and the long-term economic sustainability of their manufacturing processes. Furthermore customers benefit from deep technical expertise in global service, applications engineering and consultancy. www.eos.info

Daimler at a glance

Daimler AG is one of the world's most successful automotive companies. With its Mercedes-Benz Cars, Daimler Trucks, Mercedes-Benz Vans, Daimler Buses, and Daimler Financial Services divisions, the Group is one of the leading global suppliers of premium cars and is the world's largest manufacturer of commercial vehicles. Daimler Financial Services offers financing, leasing, fleet management, insurance, investments and credit cards as well as innovative mobility services. The company founders, Gottlieb Daimler and Carl Benz, made history by inventing the automobile in 1886. As a pioneer of automotive engineering, Daimler sees shaping the future of mobility in a safe and sustainable way as both motivation and obligation. The company's focus therefore remains on innovative and green technologies as well as on safe and superior vehicles that both captivate and inspire. Daimler continues to invest systematically in the development of efficient powertrains – from high-tech combustion engines and hybrid vehicles to all-electric powertrains with battery or fuel cell – with the goal of making locally emission-free driving possible in the long term. The company's efforts are also focused on the intelligent connectivity of its vehicles, autonomous driving and new mobility concepts. This is just one example of how Daimler willingly accepts the challenge of meeting its responsibility towards society and the environment. Daimler sells its vehicles and services in nearly every country of the world and has production facilities in Europe, North and South America, Asia and Africa. In addition to Mercedes-Benz, the world's most valuable premium automotive brand (source: Interbrand study "The Anatomy of Growth", 5.10.2016), as well as Mercedes-AMG, Mercedes-Maybach and Mercedes me, the brands smart, EQ, Freightliner, Western Star, BharatBenz, FUSO, Setra and Thomas Built Buses and the Daimler Financial Services brands: Mercedes-Benz Bank, Mercedes-Benz Financial Services, Daimler Truck Financial, moovel, car2go and mytaxi. The company is listed on the Frankfurt and Stuttgart stock exchanges (ticker symbol DAI). In 2017, the Group had a workforce of more than 289,300 and sold around 3.3 million vehicles. The application of IFRS 15 and IFRS 9 in the 2017 financial year would have produced corporate sales of 164.2 bill. € and a corporate EBIT of 14.3 bill. €. Before the change to IFRS 15 and 9, corporate sales for the 2017 financial year as reported were 164.3 bill. € with a corporate EBIT for the 2017 financial year of 14.7 bill. €.

Image and video material:

Video material: <https://www.eos.info/nextgenam>



The built-up pilot plant of the NextGenAM project for automated additive manufacturing in detail, from left to right: band saw, Kuka robot, background: three-dimensional optical measurement system, setup station, unpacking station, forefront: automated guided vehicle (AGV), EOS M 400-4, not pictured: IPM M Powder Station L from EOS (Source: EOS).



The IPM M Powder Station L feeds the EOS M 400-4 with powder material before and during building cycles and thus ensures sufficient powder at all times (Source: EOS).



The additively manufactured parts are transported to the next process station under protective gas in a container on an automated guided vehicle. (Source: EOS).



A robot removes the additively manufactured parts which are still on the build platform (Source: EOS).

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