Nouveau matériau recyclé pour l’impression 3D chez BMW Group, une avancée vers une économie circulaire renforcée.

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+++ Nouveau matériau d'impression 3D à partir de poudre de déchets et de pièces usagées. +++ Le Campus de Fabrication Additive fournit aux sites BMW Group, du filament recyclé et un ensemble de consignes pour paramétrer les impressions 3D. +++

Technologie

Munich. The BMW Group uses plastic wire (filament) and granulate from waste 3D printing powder and used parts to produce new components using the 3D printing technology. Waste powder generated from production of thousands of components each year and previously been disposed of, along with shredded used parts, is now processed into new filament. The filament is rolled onto spools like wire, which can then be used to print new items, such as auxiliary production devices and tools. This filament is used at the Additive Manufacturing Campus in Oberschleißheim, as well as at various sites across the BMW Group's global production network. In addition to recycled filament for the Fused Filament Fabrication (FFF) process, the Campus also provides recycled granulate for use in Fused Granulate Fabrication (FGF) technology, thus enabling manufacturing of large tools.

“I’ve been involved with this project from the very beginning and I’m thrilled to see how far we’ve come – from our initial ideas and attempts at startup level to now being able to produce large quantities of highly robust components from recycled filament at any BMW Group production location. It’s incredibly exciting to continuously develop and test new processes. The use of waste powder and discarded 3D printing components is a key element of a functional and efficient circular economy,” says Paul Victor Osswald, project manager for Predevelopment Non-Metals, who has worked on this development since 2018.

First steps taken in 2018 with innovative “bottleUP” project

The foundation for today’s 3D printing loop at the BMW Group was first established in 2018. As part of the BMW Start-up Accelerator programme, the innovative “bottleUP” project focused on obtaining 3D printing material for various applications by recycling PET bottles. Just one year later, the first industrial waste was being used to produce recycled filament on a pilot basis. By 2021, Osswald’s team successfully printed the first holders and auxiliary production devices using their own recycled filament. Today, various locations across the BMW Group’s global production network are supplied with 3D-printed components from the Additive Manufacturing Campus in Oberschleißheim, where the company has consolidated its production, research and training activities in additive manufacturing under one roof. Each year, up to 12 tonnes of waste powder can

be recycled into filament and granulate and can then be reused for the manufacture of auxiliary production devices in the plants and for pre-development projects at the Additive Manufacturing Campus. The use of these components reduces costs, enhances process efficiency and product quality, and improves ergonomics for employees at the plants.

Additive Manufacturing Campus supports production sites with comprehensive package of recycled filament, printing parameters and expertise

As part of the BMW Group's centre of competence concept, the Additive Manufacturing Campus facilitates the ongoing rollout of its in-house developed recycling filament. It enables locations by sharing expertise and providing comprehensive solutions. In collaboration with established and experienced 3D printing facilities at BMW Group production plants, suitable 3D printers are tested, and optimised printing parameters for the recycled filament are developed and validated for the respective models. This package – consisting of printer recommendations, recycled filament and validated parameter settings – is then made available to other plants. This ensures that locations are efficiently enabled and can quickly achieve high-quality printing results on site. The Campus provides further support by building know-how at the plants through relevant skills development and training opportunities. This includes foundational courses in 3D printing, advanced training on the topic of design for additive manufacturing and application-focused sessions on integrating 3D printing into the production environment. A strong and constantly evolving network has developed across the sites, benefiting from knowledge-sharing and mutual support. The next 3D printing facility, which is currently under construction at Plant Debrecen in Hungary, will benefit from the network's experience and will support the new production plant for the Neue Klasse going forward.

3D printing at BMW Group production sites: proven driver of success

Installation and operation of 3D printers throughout the BMW Group's production network will ensure the successful implementation and continuous rollout of 3D printing technology. Thanks to rapid on-site response times, components can be available within just a few days – or even hours, in some cases. This enables short iteration loops and swift optimisations, helping prevent assembly line downtimes. The flexibility and design freedom of 3D printing spark creative ideas and solutions that can be developed and implemented directly by employees on the ground. Collaboration between the 3D printing facilities at the plants and the Additive Manufacturing Campus continuously drives further development of 3D printing and consistently leads to new applications and optimisations within the BMW Group's production system.

Printed components for diverse applications

The use of 3D printing at the BMW Group's production plants continues to expand.

Today, every BMW Group plant is equipped with a 3D printer, enabling local production of several hundred thousand components each year. The areas of application are highly diverse – ranging from ergonomic and occupational safety solutions for employees to scratch protection, fitting aids and special manufacturing equipment, up to and including gauges, templates, special tools and tool organisation. Mould cavities, pre-assembly mounts and even entire grippers can be produced with the help of 3D printing.

A wide variety of components are now being printed with recycled filament.

For instance, at BMW Group Plant Munich, a specific component used in the marriage of chassis and body is now being 3D-printed. This component temporarily secures the steering rod in a defined position, allowing it to be guided through the opening in the body without risk of collision. The reusable component is installed in the vehicle shortly before the marriage and then removed again afterwards.

At the BMW Motorrad plant in Berlin, 3D-printed support pedestals are used in applying decor to the motorcycles' trim panel. The pedestals, which are customised to fit the trim panel components precisely, also feature locking mechanisms. This ensures the components are held securely in place, preventing them from slipping while the decor is applied.

Solutions to optimise operations are often developed in response to acute workplace needs. For example, employees at BMW Group Plant Dingolfing have developed their own fitting aids to prevent screws from being lost during their assembly in the vehicles. Using 3D printing, a holder for magnetic screw attachment on various cordless screwdrivers has been developed which enables the screws to be carried safely.