3D PELLET PRINTING

A cost-effective addition to traditional manufacturing

3D pellet printers are emerging as a complementary technology to traditional injection moulding, utilising standard pellets instead of filaments. This approach offers potential cost advantages in material use and improved process stability.

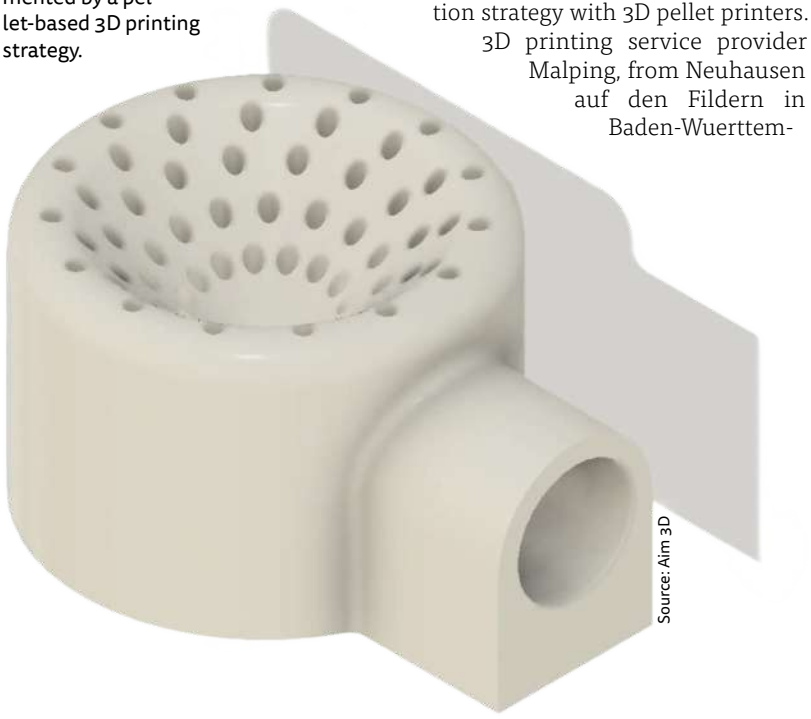
ETMM-TIP
Further insights into 3D pellet printing are available at www.aim3d.de

With their toolless additive manufacturing strategy 3D pellet printers now supplement traditional injection moulding technology. In contrast to FDM printers, they do not use polymers in the form of filaments, but standard pellets with enormous price advantages in terms of material input, but also significantly improved process capability. Part price calculations have therefore reached a new level. Depending on the application and batch size, 3D pellet printers enable a new level of cost-effectiveness. We spoke to Dr.-Ing. Bastian Gaedike, CEO of the printing service provider Malping, about why he will be relying on 3D pellet printing in the future.

Since 2017, system manufacturer Aim 3D has been consistently focusing on 3D pellet printers, which, as opposed to FDM 3D printers, process pellets instead of filaments. The significantly lower material purchase costs for pellets, alongside the use of reclaimed material directly from the mill, form the basis for the high cost-effectiveness of this AM production strategy with 3D pellet printers. 3D printing service provider Malping, from Neuhausen auf den Fildern in Baden-Wuerttemberg, is now using an Exam 510 from Aim 3D for its customer orders. Dr.-Ing. Bastian Gaedike, CEO of Malping: "3D pellet printers finally offer us the unique opportunity of mapping the properties of conventionally manufactured components in a very cost-effective manner with an additive manufacturing strategy. Tool-based injection moulding technology is now being supplemented by a pellet-based 3D printing strategy. I also see further potential for the future: with the newly introduced Voxelfill strategy, 3D printing is now able to reach the strengths of conventional injection moulding."

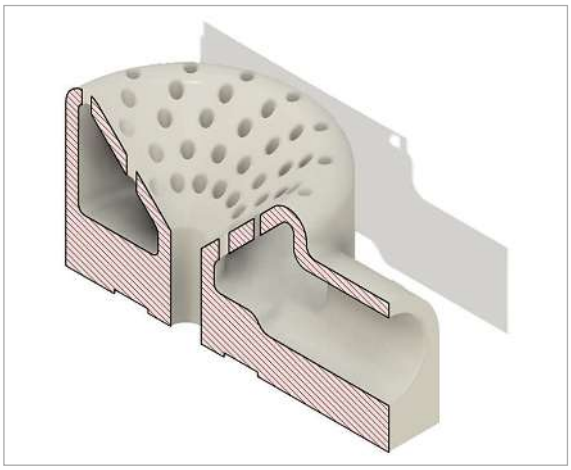
Malping as a 3D printing service provider

For customers with an additive manufacturing strategy, it is important that the 3D printing service provider offers holistic engineering. Malping supports customers from the product idea through the construction and design process to re-engineering. Simulations, validations or refinements right up to the final component are also part of the all-round services. Additive manufacturing can be combined with machining and other manufacturing strategies to produce finished components or component groups for customers. Malping also supports its customers in logistics, for example when it comes to



Tool-based injection moulding technology is now being supplemented by a pellet-based 3D printing strategy.

Source: Aim 3D



Source: Aim 3D

Design illustration of a suction ring for the food industry.

drop shipments where Malping directly supplies their customers' users. The target industries are extremely diverse: the spectrum ranges from the machine industry, the chemical industry and the food industry to transportation and defense technology applications. Dr.-Ing. Bastian Gaedike, CEO of Malping: "Malping is a service provider for the additive manufacturing of high-performance thermoplastics. These include PEEK or PEI, known as Ultem. This market segment is predestined for an additive manufacturing strategy."

Reference example of a suction ring

Malping designed and manufactured a suction ring for the food industry. Suction rings are used to aspirate liquid media. Thanks to the high thermal and chemical resistance of the glass fibre reinforced PPS material, cleaning the filling unit or the suction ring with chemicals can be easily accomplished. In order for a sealing ring to be mounted later, tight tolerances are required. These were met by additionally machining the underside of the ring. Dr.-Ing. Bastian Gaedike, CEO of Malping: "The advantages of an additive solution are obvious in this application: rapid availability of the component starting from component number 1, no tools, possible rapid modification of the component for specific applications on different filling systems. The system operator benefits from a high system availability."

Improvement in the reproducibility of Ultem applications

Aim 3D's Exam 510 system is predestined for use in industrial production. The Exam 510 system, which was launched in 2022, currently operates at a maximum build rate of 150 cm³/h. According to the manufacturer, the aim is to eventually achieve build rates of 300 to 600 cm³/h. With this, processing volumes of 1,000 to 4,000 kg per year could be reached (all data refer to components with a maximum layer thickness of 150 µm and the use of a 0.4 mm nozzle in the 3D printer and are therefore comparable to 3D components from fused deposition modeling (FDM)). Above all, the decisive factor for the construction of a 3D component is the reproducibility, that is, the repeatability of the process. For a user, this is a key point to ensure a consistent quality of the component, especially in the series production of small and medium-sized batches. Injection moulding components and 3D-printed components exhibit comparable material homogeneities when using granulate Ultem 9085. This is shown in the latest tensile tests in accordance with DIN EN ISO 527-2 Type 1A, which confirm low standard deviations and thus a high process stability. This is primarily achieved by the patented pellet extruder technology, which ensures a gentle processing of the material and minimises the degradation of the polymers in the extruder.

3D pellet printing opens up to the versatile material PEI

The Exam 255 and Exam 510 3D pellet printers from Aim 3D enable the use of standard pellets with or without fillers to generate resilient 3D components. PEI is flame retardant according to UL 94-VO. PEI is suitable for high application temperatures, that is, permanently 180 °C (217 °C up to glass transition). With the PEI material Sabic Ultem 9085, 3D pellet printing now reaches component properties that come close to the classic injection moulding process. A 100 percent higher elongation at break is achieved compared to FDM printers. This therefore opens up the possibility to use PEI, for example, in application areas in the automotive industry, aerospace, machine industry, rail vehicles and defense technology. *(ast)*

Source: Aim 3D/ Irnis Kubat

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Source: Aim 3D

3D pellet printer Exam 510 with a current build rate of 150 cm³/h.