Aerosint researches zero-waste SLS printing using PEEK

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Aerosint has developed a powder recoating system for additive manufacturing in powder bed technologies. This system can spread two or more powders in a single coating. The new technology allows for different approaches, such as multi-material printing, printing without a binding agent for indirect AM processes, and the option of zero-waste printing in the powder bed process (LBM, EBM, SLS, etc.), where the powder can also be used as support structure when manufacturing parts. The properties of the powder currently degrade during the process itself, decreasing the recyclability of the material. The use of a different powder to support the parts during the process will reduce the waste of quality base materials and therefore improve recyclability.

SLS with PEEK

Aerosint decided to address the issue of selective laser sintering (SLS) with PEEK (polyether ether ketone), one of the highest-performing plastics worldwide, with an aim of achieving zero-waste printing. Using PEEK on an SLS machine is currently very expensive and most of the PEEK powder used for support – approximately 75% of the powder used for each volume – cannot be recycled.

The Aerosint system would replace the support powder with a different one. This project will require effort because the SLS procedure is not self-evident. For example, the recoating system must be able to resist several hours in a hot oven set to 350 °C.

Numeric tool

Sirris is experienced with the SLS procedure, which was used to assist Aerosint with the development project. Experiments were required to validate the results for the development of a numeric model. Sirris assisted Aerosint by setting the main limits related to the SLS procedure, especially in terms of the high temperatures involved. Sirris developed a testbed to quantify the main parameters for the recoating system.

This project developed a numeric tool to contribute to the design of the recoating system for the PEEK-SLS procedure.

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