Teamwork: How a material developer and a production partner for additive manufacturing use the 3D printing process as an economical alternative to classic tool/mold making

Just do it! Under this motto, the German material developer LEHVOSS and the additive manufacturing service provider Forster System-Montage-Technik (SMT), from Forst in Germany, are cooperating to produce laminating molds using the 3D printing process. The most recent case study: Molds for the production of plastic funnels made of glass fiber reinforced composites, which are used on Deutsche Bahn waste oil containers. A quick, cost-effective and, above all, fully recyclable solution that was ready for use within just over a week.

The background: The waste oil containers need funnels

In the past, railway mechanics were confronted with the situation of having to fill used oils directly into the disposal containers provided - without being guided through a funnel.

This circumstance resulted:

• in an “inefficient” workflow,

• in the desire on the part of the mechanics to make their work easier and

• in the potential danger of a dirty, polluted working environment, which in turn would result in extensive, time-consuming cleaning.

This is where the considerations for integrating 3D printing technology began. It has the optimal conditions for producing the molds necessary for molding the required funnels quickly, cost-effectively and precisely.

The challenge: complex

• The funnels required to be a) chemically resistant, b) as light as possible for ease of handling and c) economically responsible to produce with a required number of “only” around 30 pieces.

• The required 3D printing material had to be a) usable in a cold printing bed, b) practically distortion-free, c) mechanically post-processable, d) cost-effective and ultimately also recyclable.

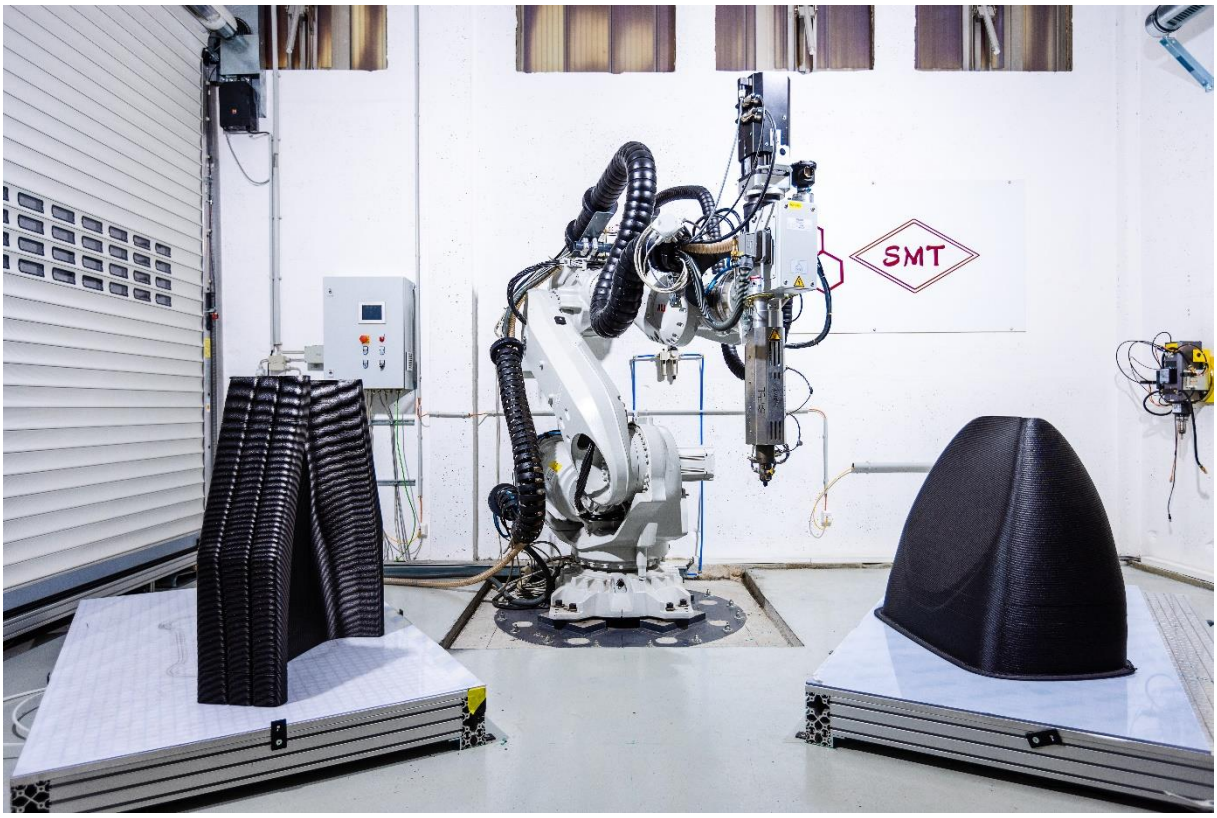
The solution approach: teamwork

The pivotal point for SMT is the industrial robot Gulliver3D® with plastic granulate extruder. Its strongest performance parameters include:

• the production of component sizes up to 1.2 x 2.0 x 1.4 meters,

• the feed rate of up to 180 m/min or 3 m/s as well

• the option for subsequent machining using a milling spindle.



Industrial robot Gulliver3D® with plastic granulate extruder for FGF 3D printing. Left component: Lamination matrix (raw state) for fiber composite component for a Shell Eco-Marathon vehicle from the Munich University of Applied Sciences made from LUVOTECH® 3F eco PC/ABS GF 1614 BK. Right component: Front nose for a Shell Eco-Marathon vehicle made of LUVOCOM 3F PAHT® CF 9743 BK, also for the Munich University of Applied Sciences.

On the material side, a LEHVOSS composite material mixture of polycarbonate (PC) and acrylonitrile butadiene styrene (ABS), PC/ABS for short, is used:

• Polycarbonate has high impact strength and heat resistance, while ABS is known for its good processability and chemical resistance, among other things.

• The combination combines the strengths of both materials and offers improved impact resistance, durability and, above all, high mechanical strength - the be-all and end-all for making rapid progress in tool making.

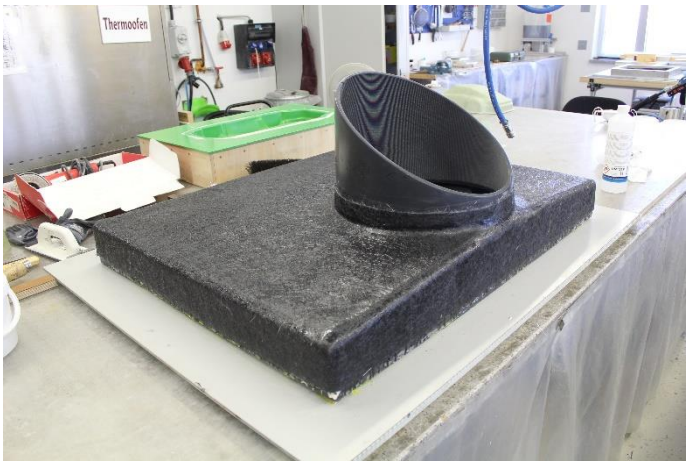
• The LEHVOSS PC/ABS used is also characterized by its complete recyclability.

Stage 1: The printed funnel in its raw state

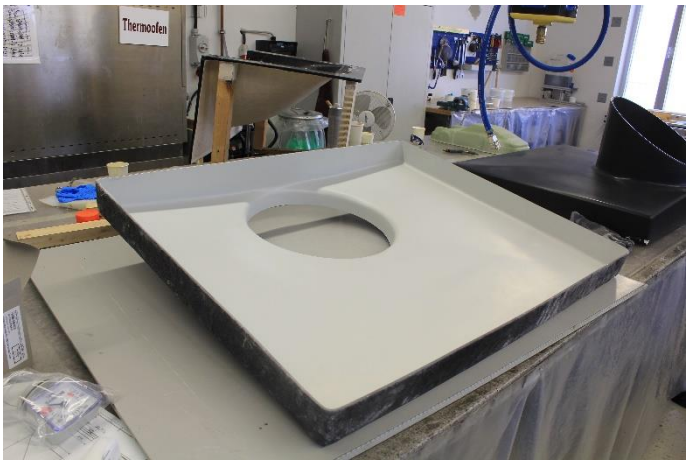
Stage 2: Condition after surface fillers were applied

The result: tailored to your needs

The teamwork between LEHVOSS and SMT in 3D printing resulted in a form that enabled the required component to be produced “in the blink of an eye”. Taking all technical and ergonomic parameters into account and especially with regard to financial feasibility: the costs were reduced by a factor of 3 compared to comparable alternative manufacturing processes.



Stage 3: Condition after laminating



Stage 4: Molded component

Using the printed funnel on a waste oil container

The conclusion: If you can, you can!

Contract manufacturer plus material developer plus 3D printing process: This can be a very fast, direct, cost-effective and sustainable combination/solution in mold or tool making. When all crucial parameters are carefully coordinated and the team functions well. Just like the Innovative Maker Team – consisting of LEHVOSS and SMT.

About Us:

SMT

Forster System-Montage-Technik (SMT) GmbH, based in Forst (Lausitz/Brandenburg), has established itself on the market as a supplier of lightweight, robust and fire-resistant fiber composite solutions. The service offered by SMT covers all important interfaces under one management – from conception to production to assembly. In addition, SMT has developed expertise in the refurbishment of system components, which proves to be a cost-effective solution, particularly in the transport sector. SMT has qualified engineering teams, a very well-equipped development department, state-of-the-art production facilities with skilled personnel and mobile assembly teams. SMT attaches great importance to quality, flexibility and reliability in projects.

LEHVOSS Group

The LEHVOSS Group develops, produces and sells specialty chemical and mineral products worldwide. Founded in 1894 as a trading company in Hamburg, the LEHVOSS Group has built an international reputation over its 130-year success story and operates production sites in Europe, the USA and Asia. www.lehvoss.de

From the initial idea to the finished product, the Customized Polymer Materials division has been setting outstanding records in the industry since 1983. The specialty of the agile unit is the development of specialized materials that perform well above market standards. The interdisciplinary development team uses a wide range of polymers, reinforcing materials and additives, state-of-the-art laboratory and application technology and a huge pool of experience, intuition and passion for the perfect solution. www.luvocom.de

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