3D Printing Ratings Explains How SLS 3D Printing Reduce Waste

Reduce Waste with 3D Printing

RED CREEK, NEW YORK, UNITED STATES, August 31, 2022 /EINPresswire.com/ -- The significant decrease in material waste generated during production is one of additive manufacturing techniques' key advantages over traditional machining. In addition to producing observable cost reductions, this strengthens the case for additive manufacturing as a truly sustainable, cost-effective technology. Selective Laser Sintering (SLS) processes are particularly alluring in this regard due to the potential for material reuse after a print run — a chance to significantly lower material costs; therefore, you will [reduce waste with SLS 3D Printing](). The powder bed can be easily collected and reused for the following project after printing is finished, which should theoretically eliminate all material waste. However, in reality, the "upcycling" procedure is not nearly so straightforward.

It is crucial to understand that with some materials, it is impossible to simply collect and reuse unused powder. For instance, the quality and purity of the wood-polymer composites that are now used in printing place restrictions on their suitability for recycling until technology for material separation are developed.

3D Printing Ratings

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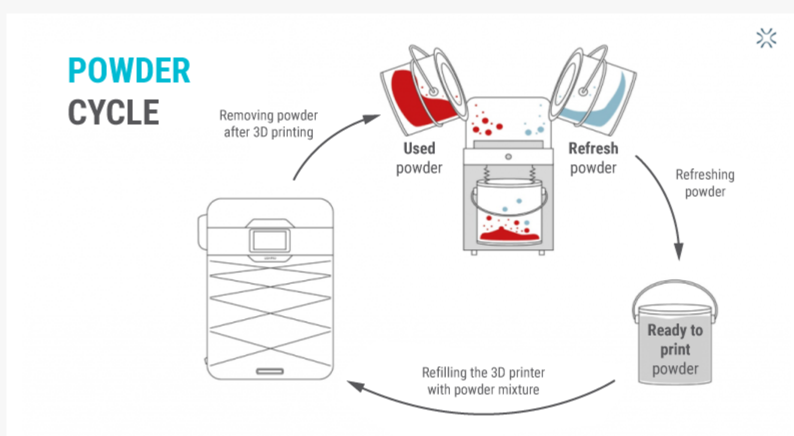

SLS 3D Printing

Similar problems occur with various frequently used metal powders, where the SLS process's byproducts might compromise the chemical integrity of any powder left behind. Additionally, even with the highest degree of accuracy during the sintering process, excess particles in the powder bed will unavoidably fuse without adhering to the part, altering the material's size distribution and resulting in inconsistencies if reused.

There are also questions regarding whether the recycling process can influence the mechanical characteristics of materials (both metals and plastics) and, therefore, affect their usability in future builds, especially when additive manufacturing (AM) is used for production rather than prototyping. The ability to recycle unused raw material without affecting its mechanical properties would significantly strengthen the business case for AM as a production tool, especially for industries like aerospace, where the raw materials used for additive manufacturing are quite expensive and printed parts must be delivered to the most exact specifications. Academic study into this topic and its possible effects on the costs of additive manufacturing and sustainability is continuing.

As a result, many companies have started looking at solutions to these issues for SLS and other processes to maximize the amount of remaining powder that may be recycled. For instance, the printer might add a gas flow to remove any byproducts made during the sintering procedure. After printing is completed, the residual material can be automatically sieved to eliminate any fused particles and maintain a constant particle size distribution.

SLS 3D Printing Workflow
This is where we learn about the step-to-step Guide to SLS 3D Printing

1. Design and Prepare the File
Design your model using any CAD software or 3D scan data, then export it as a 3D printable file (STL or OBJ). Each SLS printer comes with software that may be used to specify printing settings, orient and arrange models, predict print times, and slice digital models into layers for printing. Once everything is set up, the print preparation software uses a wireless or cable connection to provide the printer with the necessary instructions.

2. Prepared the Printer
The SLS workflow is reimagined for simplicity and efficiency with the Fuse Series printers, which have modular components to support continuous printing and full-circle powder management.

3. Print
The printer is prepared to print once all preprint checks have been completed. Before post-processing, the build chamber needs to cool down to ensure the best mechanical qualities and prevent warping of the part. After the print is complete, the build chamber must briefly cool inside the print enclosure before continuing. The build chamber can then be removed and a new one added to perform another print.

4. Part Recovery and Post-Processing
Compared to other 3D printing methods, SLS requires the least amount of time and effort for post-processing. The lack of support structures makes it easily scalable and produces consistent outcomes for batches of parts.

Remove the finished components from the build chamber once a print job is finished, separate them, and clean them of excess powder. This procedure is often carried out manually at a cleaning station, using pressurized air or a media blaster.

Following part recovery, any excess powder left over is filtered to eliminate large particles and can be recycled. The unfused powder should be replaced with fresh material for successive print jobs because it deteriorates significantly when exposed to high temperatures. SLS is one of the least wasteful manufacturing processes due to its ability to reuse material for subsequent projects.

SLS 3D Printing Materials:
Nylon, a highly capable engineering thermoplastic for both functional prototype and end-use manufacturing, is the most often used material for selective laser sintering. Nylon is perfect for durable parts with excellent environmental durability and complex assemblies.

SLS 3D-printed nylon parts are robust, stiff, sturdy, and long-lasting. The finished parts can withstand repeated wear and tear and are impact-resistant. UV, light, heat, moisture, chemicals, temperature, and water are all things that nylon is resistant to. Additionally, 3D-printed nylon components may be biocompatible and non-sensitizing, making them suitable for wear and safe for usage in various applications.

Nylon is a synthetic thermoplastic polymer that belongs to the family of polyamides. It is offered in a variety of variations, each suited to a particular application. While Nylon 12 GF Powder and Nylon 11 CF Powder are glass-filled composites and carbon fiber-reinforced composites, respectively, Nylon 12 and Nylon 11 Powder are single-component powders. These two-component powders only sinter the one with the lower glass transition point, fusing the two components together. These composite materials' development aims to enhance parts' strength, stiffness, or flexibility. Read more about Nylon Material reviews.

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