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ADDITIVE MANUFACTURING ACADEMY
TO BOOST TRAINERS' COMPETENCES IN INDUSTRY

Summary

General post-processing techniques

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Course Content

This is an overview of the most common AM post-processing methods, explaining them with their pros and cons. PBF and Vat Photopolimerization parts receive a particular attention. Students will learn about the main methods of the AM post-processing in several technologies. Post-processing in Material Extrusion is studied in the unit 3.

Polymeric parts post processes

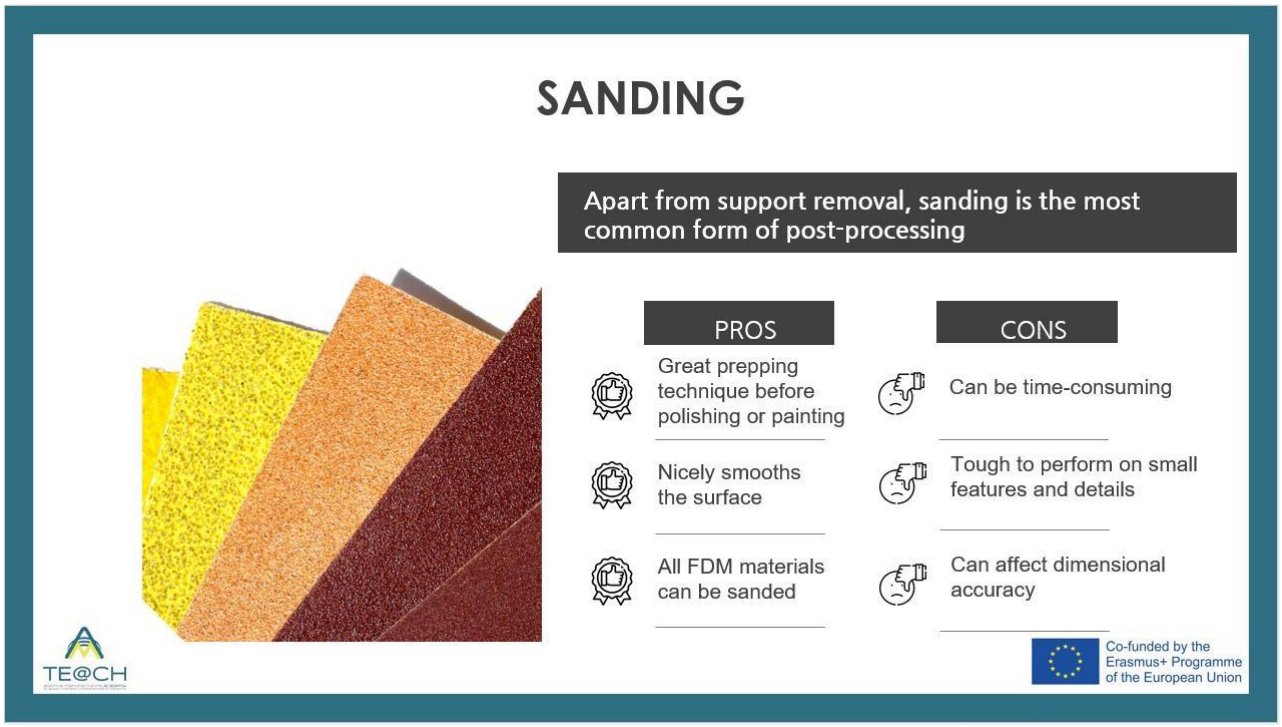
Basic support removal

The most basic form of post-processing is supports removal. Normally, too much effort isn't required unless there are supports in tight corners or hard-to-reach places. Supports can be insoluble or soluble depending on the material.

Sanding

After printing, a part might have a few blobs left on its surface or some nasty marks remaining after you've removed supports. The ideal way to remove such blemishes is by using sandpaper.

Polymeric parts post processes



Welding

In 3D printing, welding refers to joining ABS parts using acetone.

Gluing

Welding is only possible with parts printed in ABS. 3D printing parts with other materials can join by gluing.

Priming and painting

Priming prepares a surface for painting. It means coating the part with either primer paint or primer spray, which acts as a base layer for the paint that it will apply later. Once everything is dry, to paint the 3D print using a brush or spray.

Smoothing

Priming prepares a surface for painting. It means coating the part with either primer paint or primer spray, which acts as a base layer for the paint that it will apply later. Once everything is dry, to paint the 3D print using a brush or spray.

Polishing

Priming prepares a surface for painting. It means coating the part with either primer paint or primer spray, which acts as a base layer for the paint that it will apply later. Once everything is dry, to paint the 3D print using a brush or spray.

Hydro dipping

The process of applying printed graphic designs to solid objects using special water transfer paper is calling hydro dipping. The paper has one side from PVA, onto which graphics print with an inkjet printer

Epoxy coating

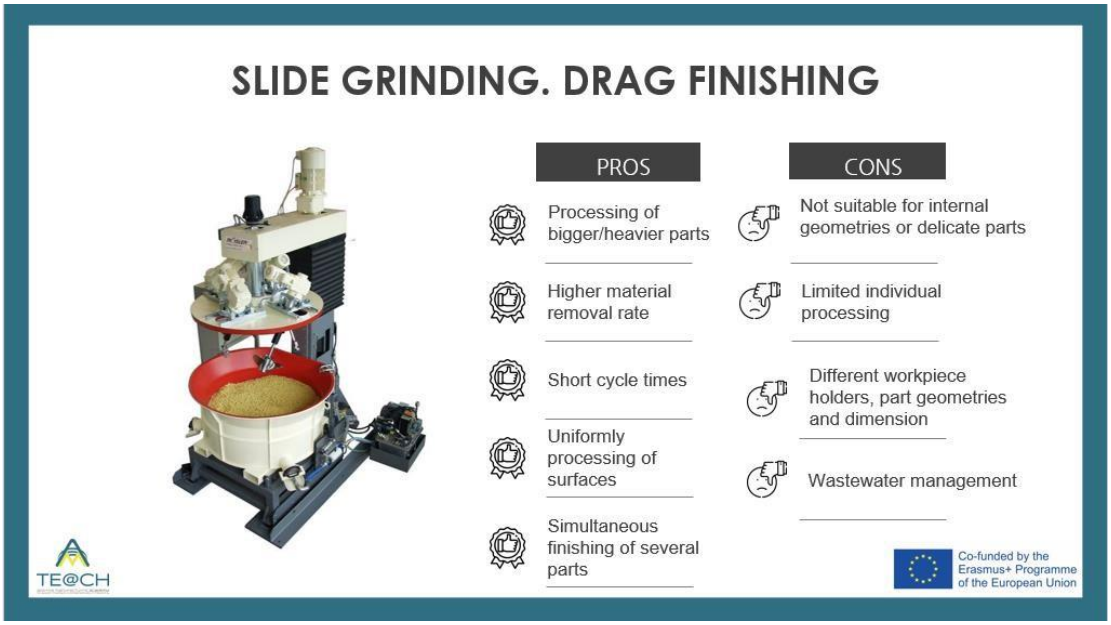
The epoxy coating includes the epoxy resin itself and a hardener.

Shoot peening

Shot peening leads to compression of surface, improvement of surface hardness and fatigue life as well as prevention of crack initiation.

Slide grinding

- Disc finishing.
- Drag finishing.
- Stream/surf finishing.
- Vibratory finishing


SLIDE GRINDING. DRAG FINISHING
PROS
Processing of bigger/heavier parts
Higher material removal rate
Short cycle times
Uniformly processing of surfaces
Simultaneous finishing of several parts
CONS
Not suitable for internal geometries or delicate parts
Limited individual processing
Different workpiece holders, part geometries and dimension
Wastewater management
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Notes

Metallic parts post-processes

Short description

The most common feedstocks for AM are aluminium, titanium, stainless steel, and nickel alloys. High reflectivity and thermal conductivity in aluminium alloys are the primary cause of defects. Typically, AM process's defects are pores, cracks, anisotropy, residual or thermal stresses, laser spattering, poor surface roughness, and shape distortion.

Laser post processing

Laser Shock peening (LP) is one of the most important post-processing methods for metal parts.

Laser polishing (LP) is a technique that re-melts to modify the surface morphology without affecting the bulk characteristics.

Mechanical treatment

Conventional machining processes:

- Machining and CNC machining
- Blasting.
- Anodizing
- Electroplating or Metal plating

Thermal post-processing

Thermal post-processing techniques have commonly been used to eliminate pores, enhance corrosion resistance, and improve mechanical properties.

There are various thermal post-processing techniques: Hot Isostatic Pressing (HIP) and annealing.

Metallic parts post-processes

Electro chemical polishing

Electro chemical polishing removes material with anodic dissolution. The parts are immersed in a liquid electrolyte and with the applied the different polarities of workpiece and cathode the material is removed.

CoolPulse technology

CoolPulse uses the principle of anodic metal dissolution.

Chemical polishing

Parts are immersed or flushed with a liquid solution, acids in many cases.

Notes

Post processes in PBF and VAT photopolimerization

Powder Bed Fusion

- Sanding of support nibs
- Wet sanding
- Mineral oil finish
- Spray paint (clear UV protective acrylic)
- UV post-curing

Vat Photopolimerization

- Dye
- Chemical vapor smoothing
- Vapor smoothing
- Vibro polishing
- Standard finish
- Spray paint or lacquering
- Metal coating
- Bead blasting

Notes

Avoiding post-processing

Orientation

Regarding the supports, the best way to avoid removing supports is to not use them altogether. The second option is to use as few of them as possible. The easiest way to do this is to modify the orientation of model in the 3D space to hopefully reduce the number of necessary supports.

Soluble filament

Simply submerging the finished print in the appropriate solvent is the easiest way to support removal. There are several conditions.

Infill density

This acts controlling just how much filament goes into the printing of the support

Optimal support structure

The typical support structure patterns are lines, grid, zigzag and triangle. The lines and zigzag have the lowest strength, but they are the easiest to remove.

Distance

The Z-distance is equivalent to the layer thickness of the print. It can be increased, only in increments that are multiples of the layer thickness value.

Notes

For further information please

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