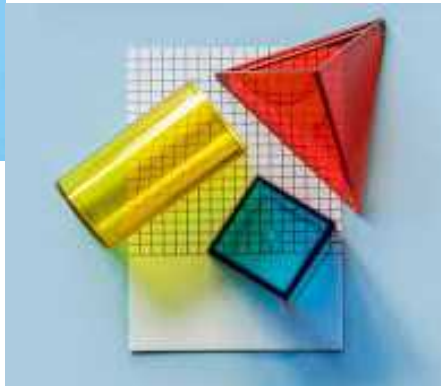




Project code:
2019-1-EL01-KA201-062914

Erasmus+ Call: 2019 - KA2 -



Erasmus+

This project is funded by the European Union.



3D printing technology aims students understanding maths and recycling procedure

*Curricula 1: 3D Printing Technology and Application
"3D Printing Post-Process"*

Output 3 (O3) - 3D Printing and Maths

Description



In this session, the Post-Processes of 3D printing will be presented. Specifically, it will be clarified in which cases these processes are needed, which kind of modifications could be applied. Additionally, some rules that protect the 3D objects will be given.



What is post-processing ?

- Parts manufactured with 3D printing technologies usually require some degree of post-production treatment
- Post-processing in 3D printing refers to any process or task that needs to be performed on a printed part, or any technique used to further enhance the object. Think of it as a finishing touch to treat and refine parts that come out of a 3D printer. The options for post-processing 3D printed parts include removing support or excess material, washing and curing, sanding or polishing a model to painting or colouring



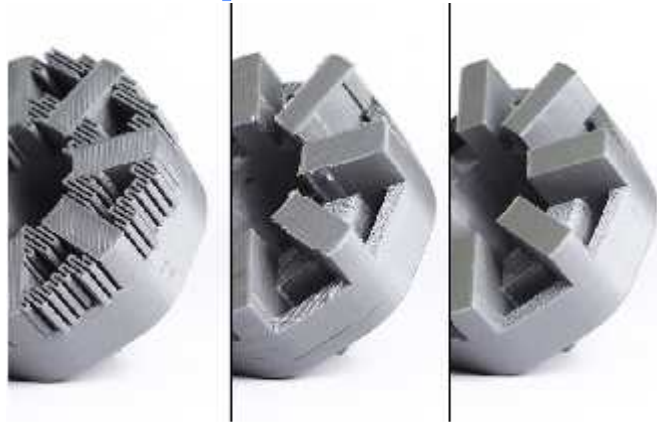
Various Post-processing Techniques

- Cleaning
- Metal plating
- Gluing and Welding
- Inserts
- Silicone Molding I
- Silicone Molding II
- Vacuum Forming
- Sanding
- Gap filling
- Polishing
- Priming & painting
- Vapor smoothing
- Dipping
- Epoxy coating

Post-processing Technique - Cleaning



- Removing support material
- Powder removal



- Washing



Post-processing Technique – Metal Plating



- A plated metal shell increases the strength of the plastic part, which greatly broadens potential applications and uses of the print. The outer metal coating is very thin, so tolerances can be tightly held if the plating is done properly. Produces a beautiful surface finish, which if done properly, will not look like a 3D printed object.



Post-processing Technique – Gluing and Welding



- In case of parts bigger than the build volume of the printer, the part is broken down into multiple pieces. At such times, the PLA parts can be easily glued together by bonding agents like Anabond, mostly used in industrial applications. ABS prints can be welded together. Welding here is by means of acetone. Light layers of acetone can be applied to the mating surfaces and held together under force or by clamping. This will cause the bond to be chemically glued together. Such bonds are pretty strong. More the surface area of the mating parts, more strong will be the bond.

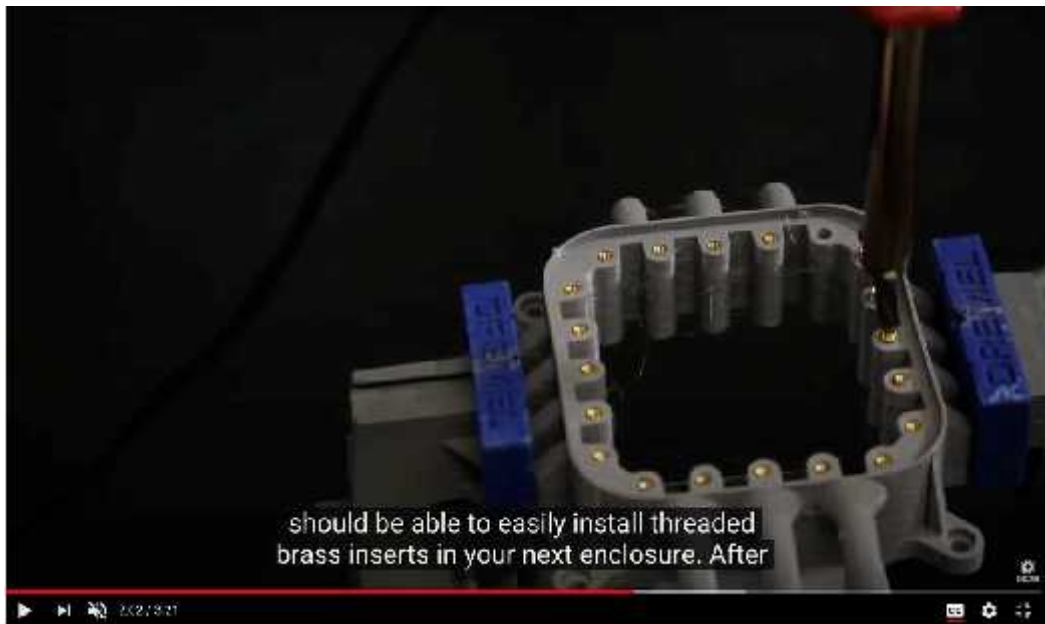


Youtube. Proto3000. "Finishing 3D Prints 101: How to Glue 3D Printed Parts Together". 2017



Post-processing Technique - Inserts

- Threaded brass inserts can be a great way to add longevity to 3D printed enclosures that need to accept screws.

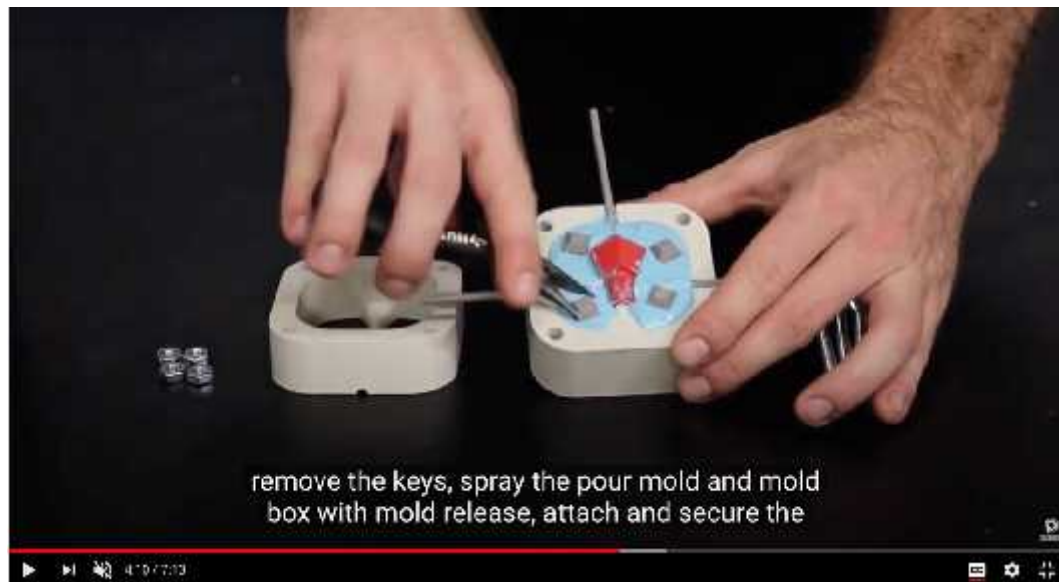


Youtube. Proto3000. "Finishing 3D Prints 101: How to Install Threaded Inserts in your 3D Prints". 2017

Post-processing Technique – Silicone Molding I



- Silicone molding is a powerful production method that, when combined with 3D printing, can allow you to make several copies of one product. You can also create a product in a material that is not supported by your 3D printer.

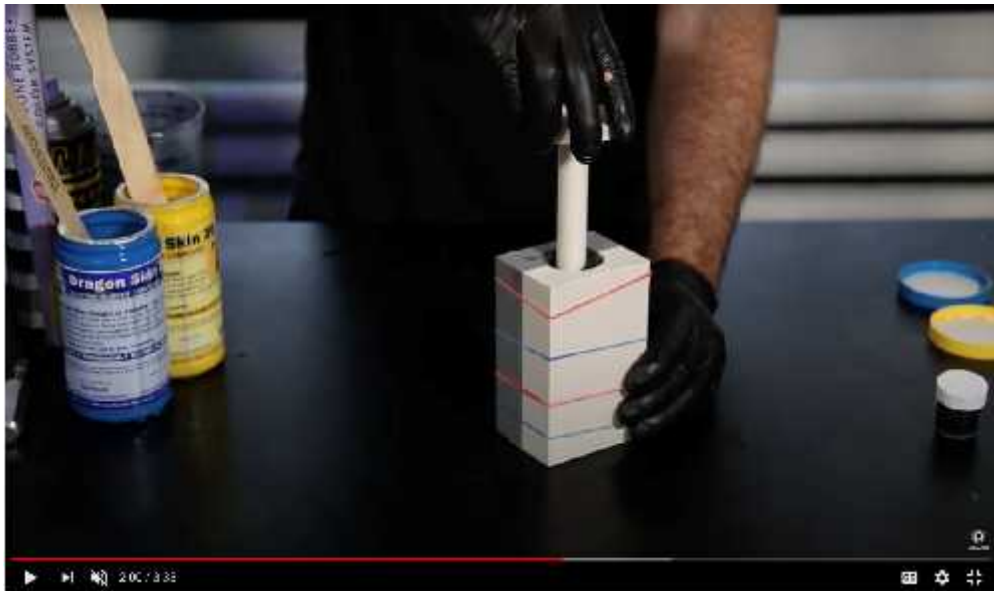


Youtube. Proto3000. "3D Printing 101: Silicone Molding with 3D Printed Masters (Part 1)". 2017

Post-processing Technique – Silicone Molding II



- Silicone molding is a powerful production method that when combined with 3D printing, can allow you to make several of one product, or create a product in a material that is not supported by your 3D printer.



Youtube. Proto3000. “3D Printing 101: Silicone Molding with 3D Printed Masters (Part 2)”. 2017

Post-processing Technique – Vacuum Forming



- Vacuum forming is a manufacturing process by which a sheet of plastic is heated and pressed over a form to create a part. This process is used to create many of the products in your home such as plastic containers, tubs, sink units, and electrical enclosures.



Youtube. Proto3000. “3D Printing 101: How to Vacuum Form Using 3D Printed Molds)”. 2017





Post-processing Technique - Sanding

- 3D printed models can be a great way to eliminate layer lines in preparation for painting, silicone molding, or vacuum forming.



Youtube. Proto3000. "Finishing 3D Prints 101: How to Sand 3D Printed Parts". 2017

Post-processing Technique - Gap filling



- Epoxies are easily sanded and primed, making an excellent painting surface. An ABS slurry will be the same color as the print as long as the same filament is used, so there will be no surface discolorations.





Post-processing Technique - Polishing

- Polishes the print without the use of any solvents that can warp the print and alter tolerances. Produces a mirror-like finish if properly sanded and polished, which mimics injection molded plastics. Plastic polish and cleaner is highly economical making this method very cost effective for the quality of the finish.



Post-processing Technique – Priming & painting



- Priming is the process of coating the part with primer. It mostly acts as a base for a further painting job. Priming and painting are one of the most popularly employed post-processing techniques for FDM 3D printed parts.



Youtube. Proto3000. "Finishing 3D Prints 101:
How to Paint 3D Printed Parts". 2017

Post-processing Technique – Vapor smoothing



- Smooths many small blemishes and diminishes the layer lines present in a print without any additional work. Produces a very smooth “shell” around the exterior of the print. Very quick, and can be done with commonly sourced materials.



Youtube. Make. “Vapor Smoothing 3D printed objects with acetone”. 2014

Post-processing Technique - Dipping



- Smooths the print surface much quicker than vapor polishing. Produces much less vapor than other methods of solvent polishing, which reduces the safety risks. It is also called Hydro Dipping, Immersion printing Water Transfer printing, water transfer imaging



Post-processing Technique – Epoxy coating



- Very thin layer of epoxy will not impact the tolerances of the print all that greatly (unless the print is sanded first). Provides an outer protective “shell” around the print.



Youtube. Smooth-on. “Smoothing the Surface of a 3D Printed Model Using XTC-3D Coating”. 2014

Post-processing Techniques - Materials



- Ceramics

After the part is printed using ceramics, it requires quite a job of post-processing. The parts are made solid inside a kiln. This is done to increase the strength of the printed material and to let the particles blend even better.

- Metal / Plastic Filament

The “metal” filament is thermoplastic that has been mixed with low amounts of metal. These 3D printing materials allow to 3D print components that have the optical properties of 3D printed metal. Popular composite 3D printing materials include bronze, copper, steel, and iron. The 3D printed parts will require post-processing to get the desired metal appearance.

- PVA

When using soluble support material, there is a lower risk of damaging the model. The support structures can be dissolved in water or with a chemical called Limonene. Examples of soluble materials are HIPS (used as a support with ABS material) and PVA (used as a support with PLA material) that will be removed from the object during a post process.



Thank you!!

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