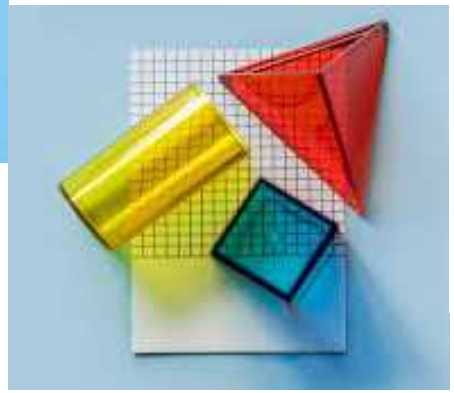
Project code:
2019-1-EL01-KA201-062914

Erasmus+ Call: 2019 - KA2 -



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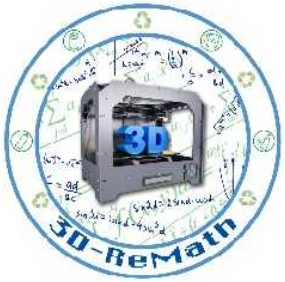
3D printing technology aims students understanding maths and recycling procedure

Curricula 1:3D Printing Technology and Application "3D Printing Generic Process"

Output 3 (O3) – 3D Printing and Maths

Description



The aim of this session is to train the audience on the process of printing, starting from the step of the appropriate 3D printing software and concluding with the printed object. The explanation of these steps supports the following sessions, as by delineating the whole flow of printing, the advanced information is possible to be comprehended.

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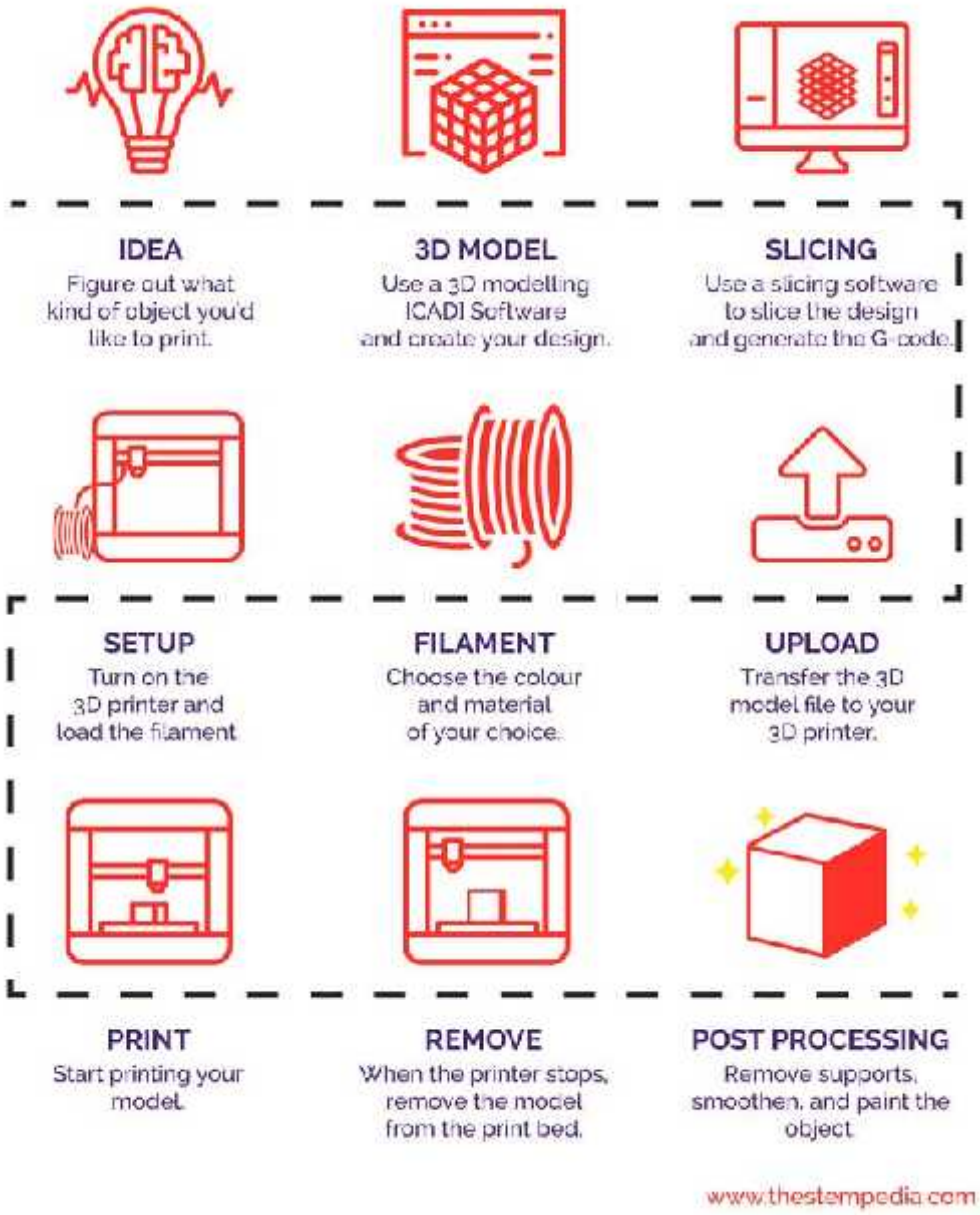

3D Printing Process – Steps (1/2)

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3D Printing Process – Steps (2/2)

Youtube. Vision Miner. “The 5 Steps to 3D Printing: from 3D Model to Full Production Manufacturing”. 2019

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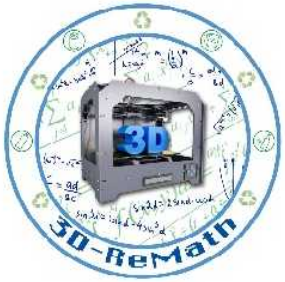
How Does 3D Printing Work?



- It all starts with a 3D model.
- You create one yourself or download it from a 3D repository.
- When creating it yourself you can choose to use a 3D scanner, app, haptic device, code or 3D modeling software

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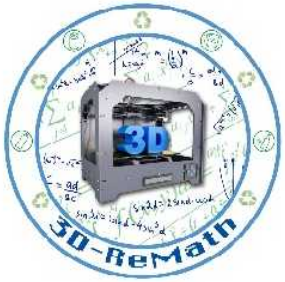
3D Modeling Software



- The first step of any 3D printing process is 3D modeling. To maximize precision, all objects have to be designed in a 3D modeling software. Some designs are too intricate and detailed for traditional manufacturing methods.
- There are many different 3D modeling software tools available. Industrial grade software can easily cost thousands a year per license, but there's also open source software you can get for free.
- Now that you have a 3D model, the next step is to prepare the file for your 3D printer. This is called slicing.

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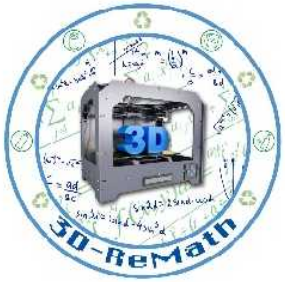
Slicing: From 3D Model to 3D Printer (1/2)



- Slicing is dividing a 3D model into hundreds or thousands of horizontal layers and is done with slicing software.
- Some 3D printers have a built-in slicer and let you feed the raw .stl, .obj or even CAD file.
- Once a model is created, it's time to "slice" it. Since 3D printers cannot conceptualize the concept of three dimensions, like humans, engineers need to slice the model into layers in order for the printer to create the final product.

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Slicing: From 3D Model to 3D Printer (2/2)

- Slicing software takes scans of each layer of a model and will tell the printer how to move in order to recreate that layer. Slicers also tell 3D printers where to “fill” a model. This fill gives a 3D printed object internal lattices and columns that help shape and strengthen the object.

- When your file is sliced, it’s ready to be fed to your 3D printer. This can be done via USB, SD or internet. Your sliced 3D model is now ready to be 3D printed layer by layer.

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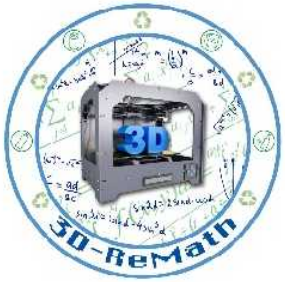
The 3D Printing Process – First steps



- When the modeling and slicing of a 3D object is completed, it's time for the 3D printer to finally take over.

- The printer acts generally the same as a traditional inkjet printer in the direct 3D printing process, where a nozzle moves back-and-forth while dispensing a wax or plastic-like polymer layer-by-layer, waiting for that layer to dry, then adding the next level.

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3D Printing Process – How it works

Start with a 3D CAD file either by creating the 3D model or scanned with a 3D scanner

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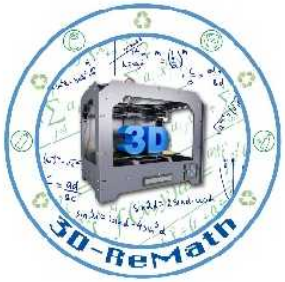
The 3D Printing Process (1/3)



- Essentially, the printer adds hundreds or thousands of 2D prints on top of one another to make a three-dimensional object.

- There are a variety of different materials that a printer uses in order to recreate an object to the best of its abilities.

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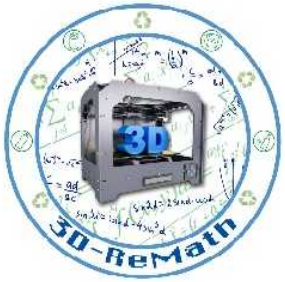
The 3D Printing Process (2/3)



- The 3D printing process takes anywhere from a few hours for really simple prints, like a box or a ball, to weeks for much larger detailed projects, like a full-sized home.

- There are also different types of 3D printing depending on the size, detail and scope of a project.

- Each different type of printer will vary slightly on how an object gets printed.

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The 3D Printing Process (3/3)

Youtube. Digital Trends. “How Does 3D Printing Work? | The Deets”. 2019

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3D Printing Process – Start to Finish

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3D Printing Post- Process

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3D Printed amazing objects (1/12)

The world's largest 3D printed boat

In October 2019, the University of Maine managed to set not one, not two, but three Guinness World Records for using the world's largest polymer 3D printer to print the largest boat ever printed.

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3D Printed amazing objects (2/12)

A cast that helps you heal

Medical uses for 3D printing might well be our favourite use of this tech. In 2014, designer Deniz Karasahin created this brilliant concept of a new cast for broken limbs that not only looks awesome but also helps the healing process.

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3D Printed amazing objects (3/12)

A reconstructed Toucan beak

3D printing certainly has plenty of awesome potential uses. This brilliant snap shows just how much difference this printing tech can make, not only to human lives but also to the animals that inhabit our world as well. Here, a Toucan has had its beak reconstructed with the power of a 3D printer.

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3D Printed amazing objects (4/12)

3D printed artwork for the blind

This brilliant use sees classic paintings and artwork being transformed into 3D printed sculptures. In this form, it is hoped that the visually impaired will have a chance to experience and appreciate the art in new and awesome ways like they couldn't before.

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3D Printed amazing objects (5/12)

A 3D printed electric violin

With humble beginnings in 2013, the 3Dvarius soon made a move to Kickstarter with the promise of an awesome looking 3D printed violin that was designed to create a symbiosis between itself and the musician. Precise machining, an innovative design and an eye-for-detail saw the 3Dvarius turn from a concept into a fully functioning musical instrument that really stands out from the crowd.

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3D Printed amazing objects (6/12)

Mobility for a puppy

This photo is proof from Reddit that 3D printed prosthetics and mobility aids aren't just for humans. This poor little dog has unfortunately lost the use of his legs, but now has some 3D printed wheels to help him zip about the place.

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3D Printed amazing objects (7/12)

A full-sized kayak

This amazing kayak was 3D printed from a home printer section by section over 42 days. It was lovingly crafted by Jim Smith, a 3D Systems engineer, who made the craft from around $500 worth of materials. Those materials included ABS plastic, machine screws, brass inserts and a healthy dose of silicone caulk to keep the canoe watertight. It took around 1,012 hours to print but it works!

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3D Printed amazing objects (8/12)

Edible printings

In 2015, 3D Systems announced the ChefJet Pro 3D. A 3D printing device that was able to 3D print sweets and candy treats. The result is some fairly awesome edible creations with flavours ranging from chocolate to vanilla, mint, sour apple, cherry and watermelon.

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3D Printed amazing objects (9/12)

Full-sized 3D printed Iron Man suit

A cosplayer going by the name Jayluvll really takes their hobby seriously. Employing a healthy dose of patience, over six months of effort and a multitude of 3D printed parts, they managed to craft this awesome looking full-sized Iron Man suit. Impressive!

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3D Printed amazing objects (10/12)

The world's first 3D printed house

Back in the hazy days of 2014, a private Chinese company known as WinSun crafted the first ever 3D printed house. Four large 3D printers were put to work to spray concrete layer-by-layer to construct the walls. This 3D printing method was said to be incredibly cheap and the lack of manpower involved meant costs could be kept even lower. At the time it was suggested that a house could be printed for less than $5,000.

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3D Printed amazing objects (11/12)

A 3D printed pinhole camera

Pinhole is a camera that can be 3D printed and loads 35mm film for shots. This device originally started life on Kickstarter before becoming a reality. It's designed to bring old-school photography to the modern age. The end result is pretty cool too as the 3D printed camera is strong, robust and durable - much more than modern digital cameras that could easily break if dropped.

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3D Printed amazing objects (12/12)

3D printed pizza

Foodini is a 3D food printer capable of printing an entire pizza in one. This printer, designed by Natural Machines doesn't just produce pizzas, it can manage other foodstuffs as well - burgers, spaghetti and more. Of course, a device like this is fairly high-end and in 2016 one of these printers would set you back around $2,000. But perhaps this sort of thing is a taste of the future?

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Thank you!!

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