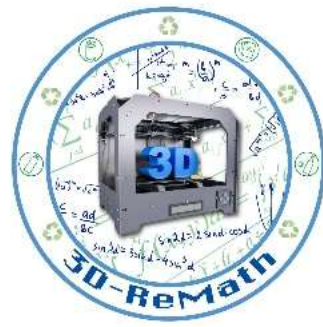# 3D printing technology aims students understanding maths and recycling procedure

Curricula 3: Open Source S/W for Digital Files "Introduction to Slicing Software"

Output 3 (O3) – 3D Printing and Maths

Overview (1/2)

In this lesson we learn what slicer software does and why it is necessary in order to 3D print a file. We also learn the process of generating G-Code from .STL files and what G-Code is.

Overview (2/2)

- 3D Slicing Software

- 3D Models Format

- Generating g-code

3D Slicing Software

- The slicer, also called slicing software, is computer software used in the majority of 3D printing processes for the conversion of a 3D object model to specific instructions for the printer.

3D MODEL FILE → SLICING → 3D PRINTING → FINAL PHYSICAL OBJECT

Introduction to Slicing

3D Models Format

- In particular, the conversion from a model in STL format to printer commands in g-code format in fused filament fabrication and other similar processes.
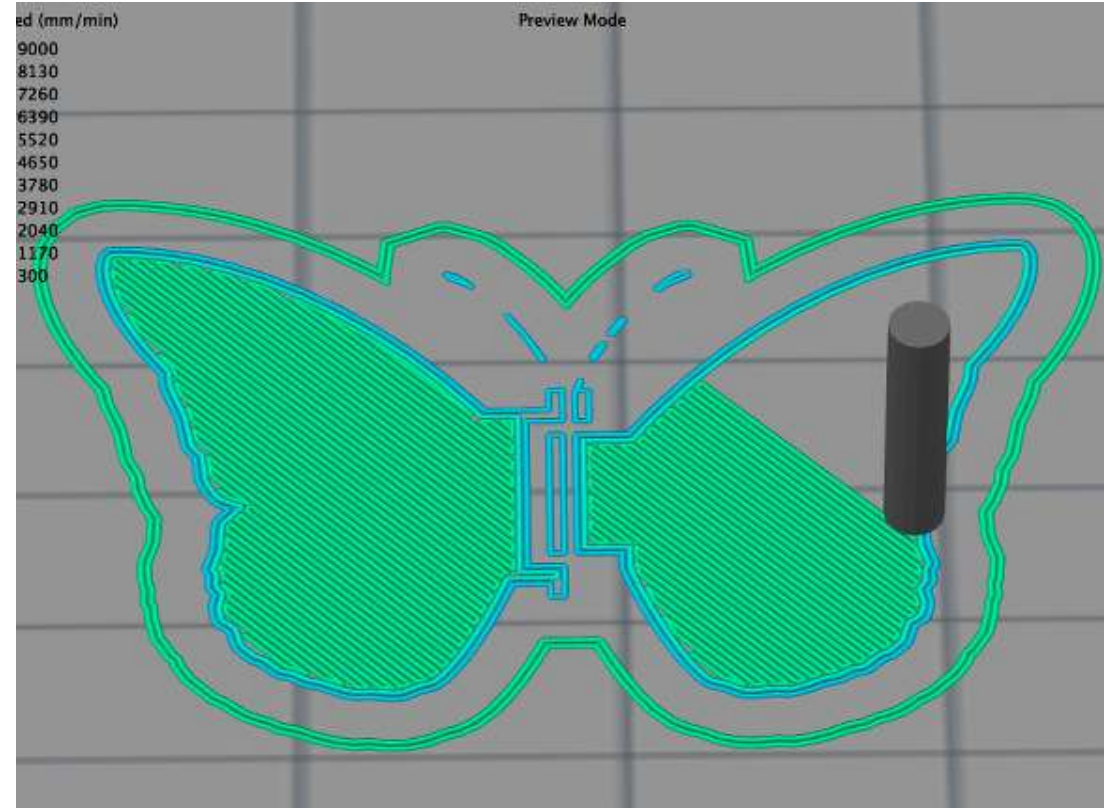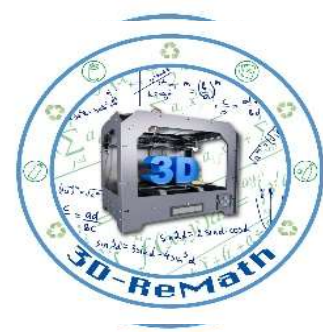

3D FILE → STL FILE → GCODE LAYERS
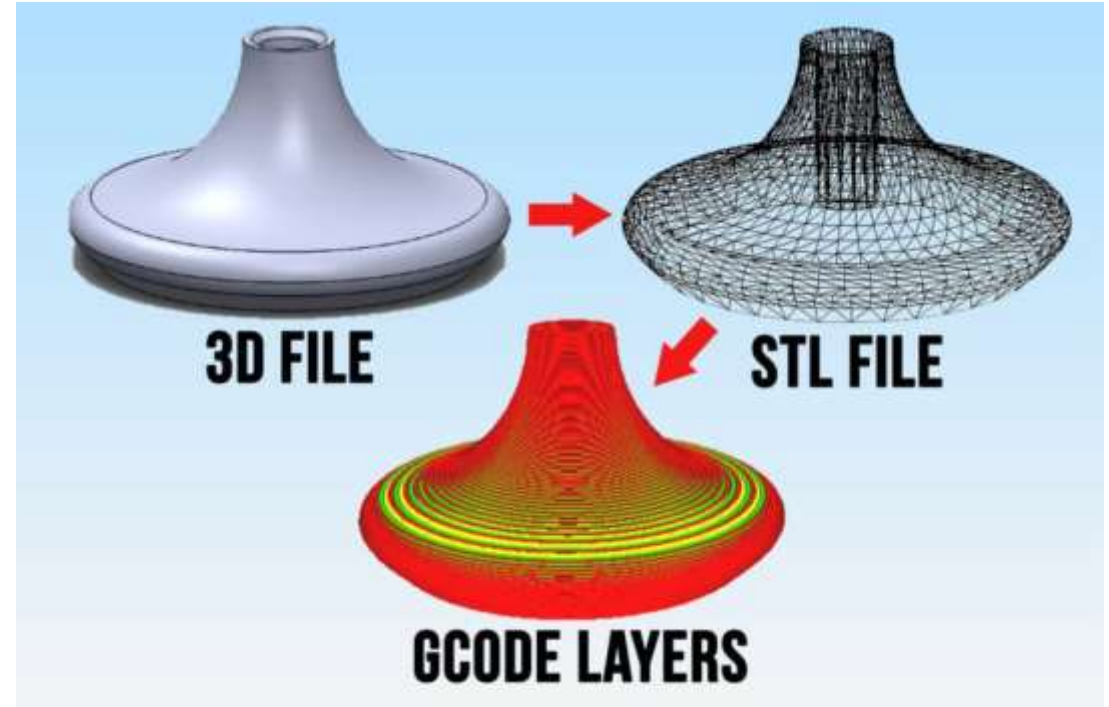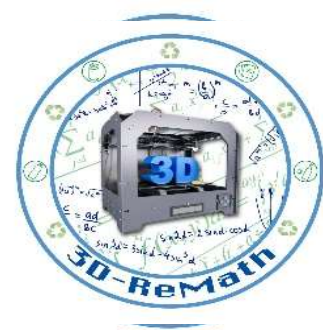
3D Slicing Process

- The slicer first divides the object as a stack of flat layers, followed by describing these layers as linear movements of the 3D printer extruder, fixation laser or equivalent.
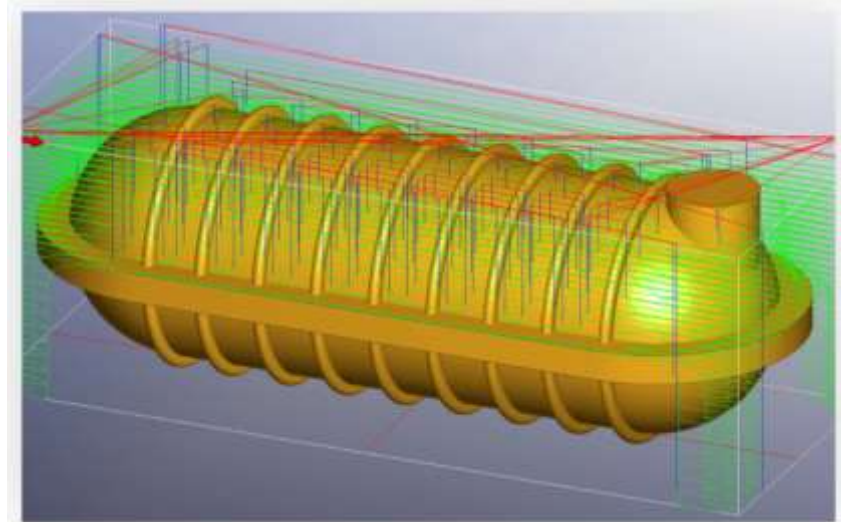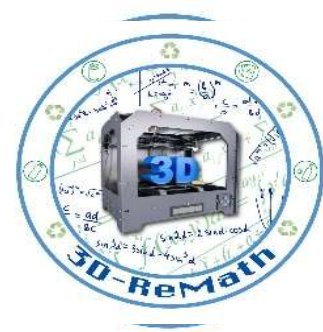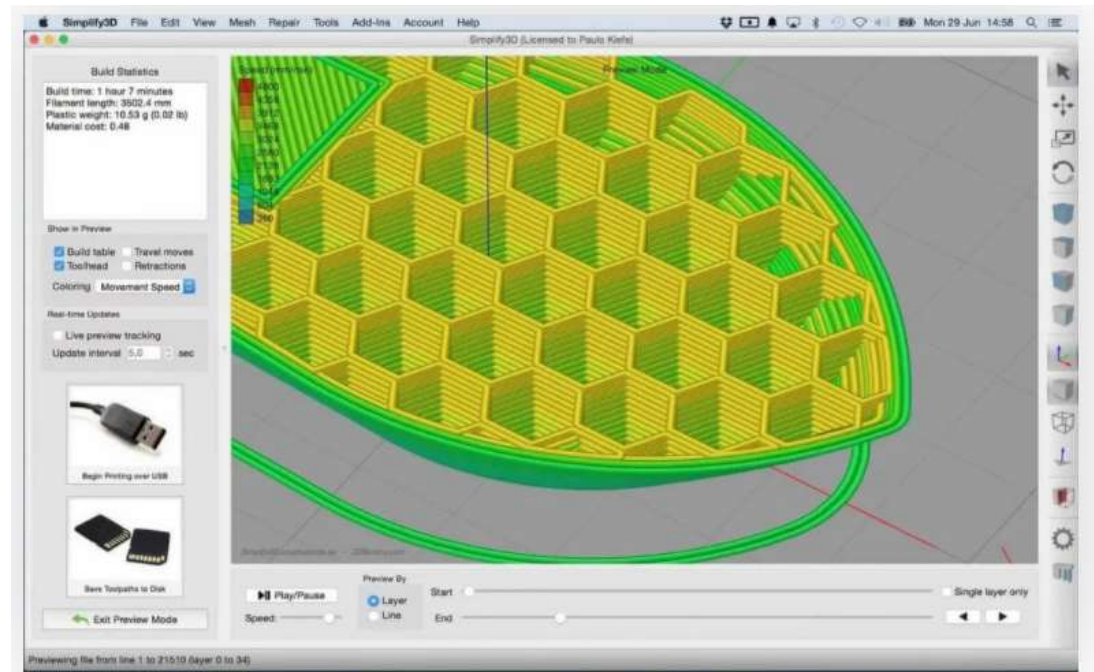
Generating G-Code (1/2)

- All these movements, together with some specific printer commands like the ones to control the extruder temperature or bed temperature, are finally written in the g-code file, that can afterwards be transferred to the printer.
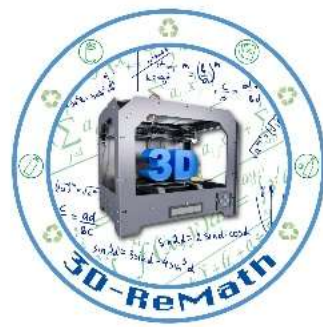
Generating G-Code (2/2)

- 3D printing creates smooth, attractive parts because it uses a small nozzle to extrude thin layers of plastic. Even a small printed part can have hundreds of layers, each with hundreds of small motions, meaning tens of thousands of lines of G-code.

The cycle for generating G-code

- The basic cycle for generating 3D printing G-code is as follows:
- Identify the outlines, both exterior and interior, in order to determine what's "inside" and "outside" the layer.
- Determine how infill will be laid within the interior of the layer.
- Create an optimized traversal of the layer's extrusion for outlines and infill.
- Set the speed, extrusion, temperatures, and fan speed.
- Create G and M codes for the start and end.
- Convert the full traversal path into GXX movements, adding extrusion E and feed rate F.
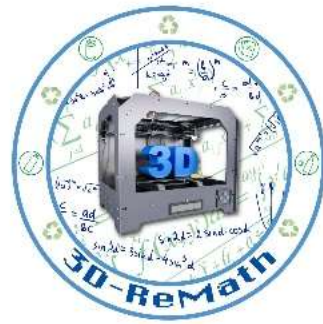
Examples of 3D Slicing Software

- Ultimaker Cura

- SuperSlicer

- PrusaSlicer

- Slic3r

- Eiger

- Simplify3D
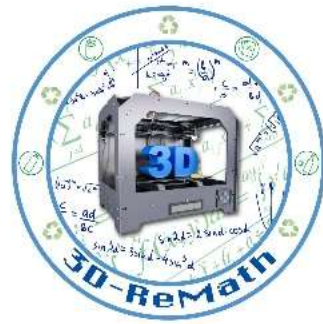
3D Printing Basics: The Slicer!

Thank you!!

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