HEI MAKERS

Technical creativity in 3D printing module

WORKSHOP #3

Applying 3D printing process steps for manufacturing

HEI MAKERS

Co-funded by the
Erasmus+ Programme
of the European Union

2017-1-LT01-KA203-035231

APPLYING 3D PRINTING PROCESS STEPS FOR MANUFACTURING

- Aim of the workshop is equip makers with the practical knowledge needed to 3D print the components of their prototypes.

- Resources / Tools needed: STL file of the 3D model to be printed, 3D Slicer Software, FDM 3D printer, PLA filament, tools for part post-processing

- Safety first: observe all the safety rules applicable in the workshop; use safety glasses and gloves during post-processing; exercise caution when using cleaning tools; Never touch hot parts of the machine (extruders, motors and heated bed); Don't touch moving parts of the machine; Do not interact with turned on fans; Keep your loose hair and clothes out of reach of moving belts, screws and fan.

Duration	1 academic hrs
Author / Lecturer	Doru Cantemir, Ludor Engineering
Delivery methods	Individual
Evaluation methods	Evaluation of the completed 3D part

3D PRINTING A PART ON A FDM 3D PRINTER

- We will apply the workflow steps discussed in section 1.5, starting from the STL file, in order to 3D print the box shown in the picture.

FINAL PRODUCT

FINISH THE PART

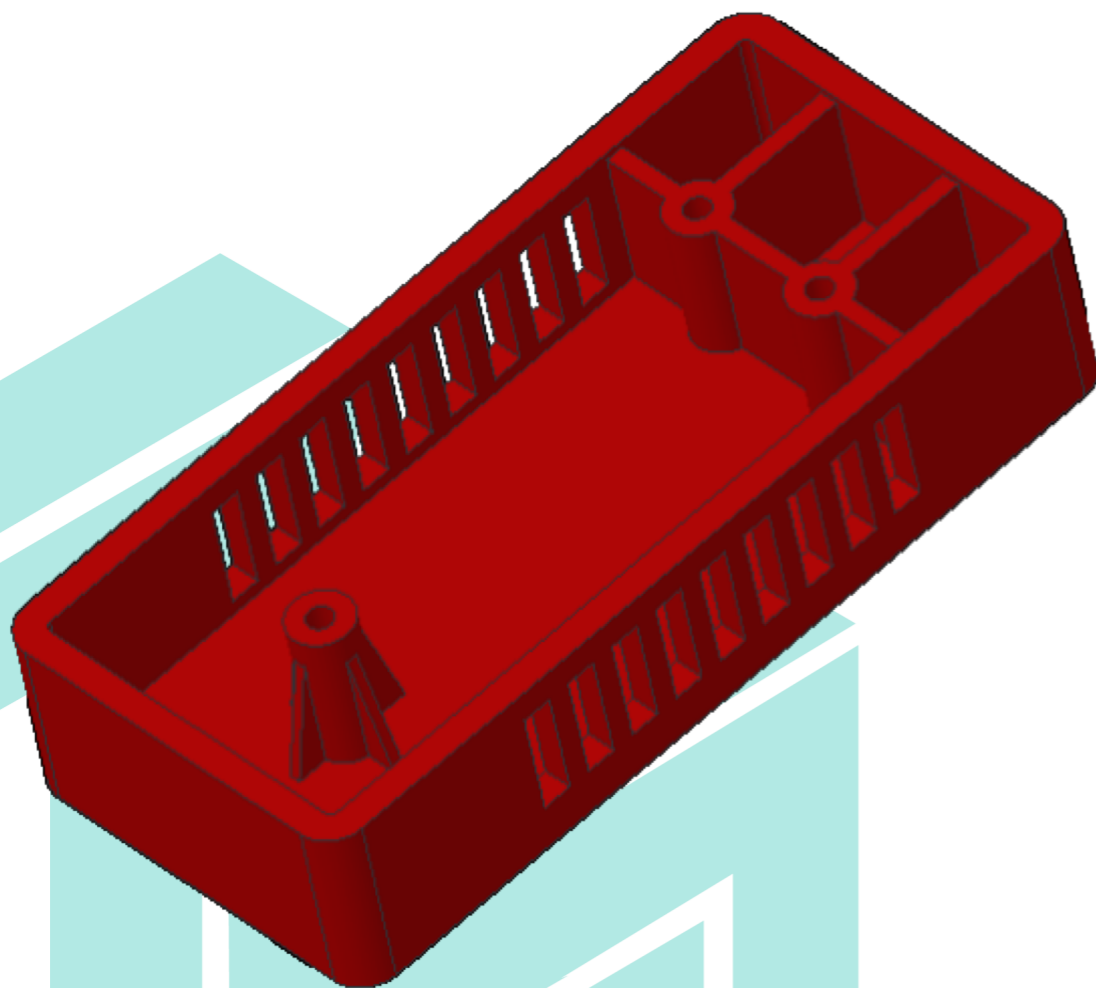**PRINT THE MODEL**

SLICE THE MODEL

STL FILE

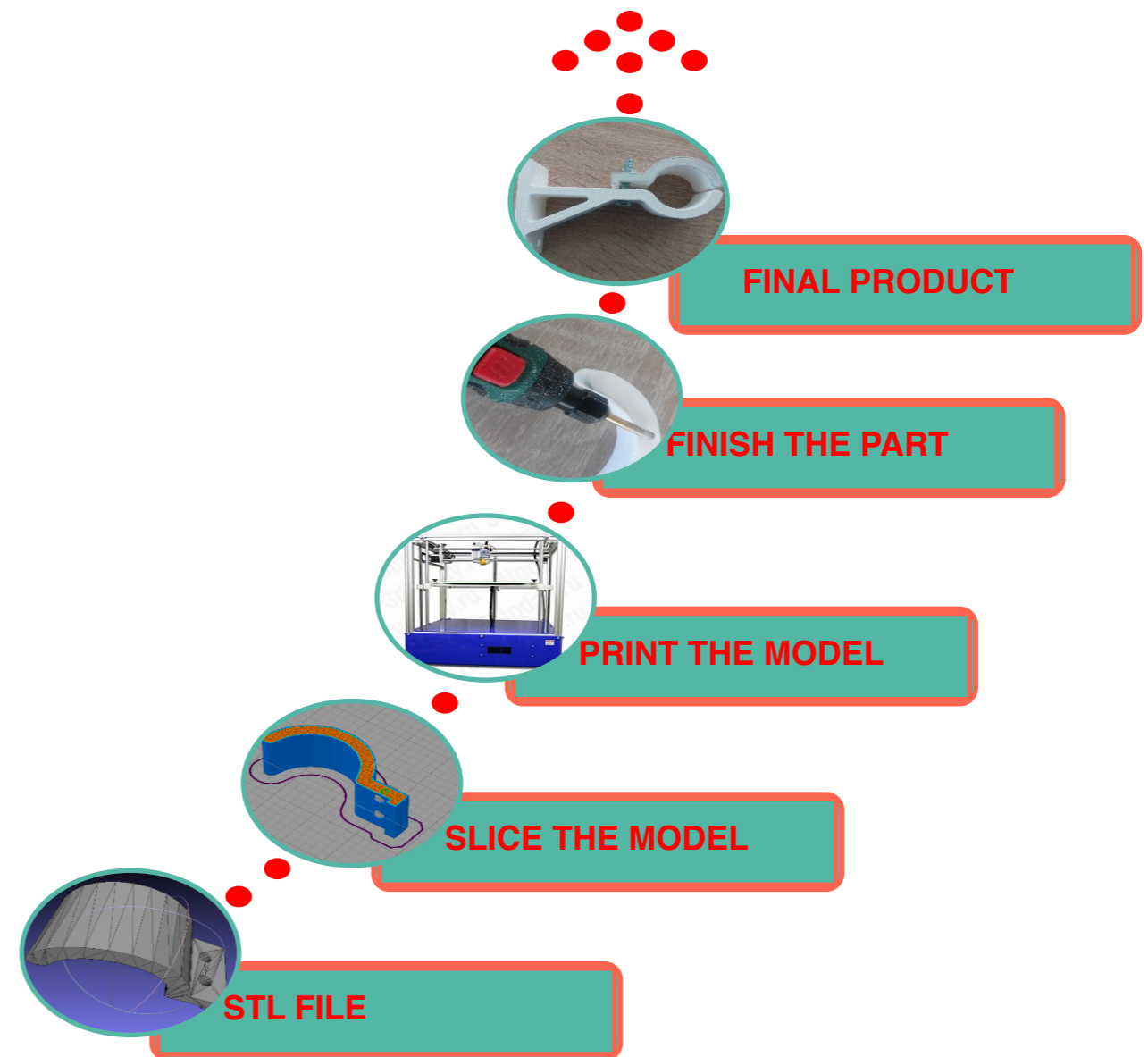Figure 10.1 Box to be 3D printed.
Source: UPB CAMIS

Figure 10.2. 3DP workflow. Source: Ludor Engineering

PREPARATION FOR 3D PRINTER

- The STL file will be imported in a slicer software and prepared for 3D printing.

- There are many slicer options available – see https://all3dp.com/1/best-3d-slicer-software-3d-printer/.

- In this material, Simplify3D will be used. However, same principles are also valid for any other software you may have access to in the makerspace.

3D PRINT USING SIMPLIFY3D

- Import the STL file in the slicing software
- Orient the model in the working space, taking into account criteria such as:
  - minimum support structure volume
  - the hole axes should be along building direction
  - the important surfaces should be placed in vertical or horizontal positions

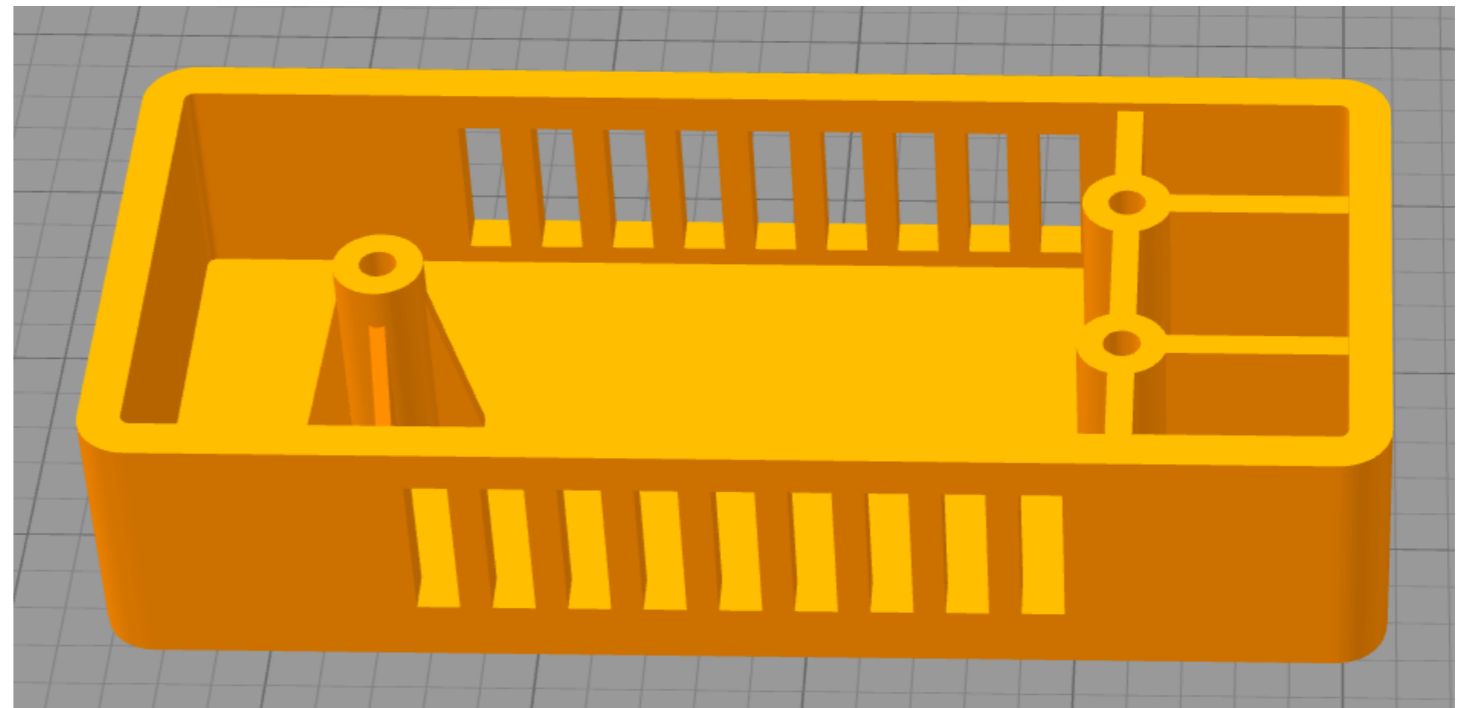- The position shown in the picture is the best for our model

Figure 10.3. Part positioning. Source: Ludor Engineering

3D PRINT USING SIMPLIFY3D

- Set process parameters:
  - material
  - infill parameters
  - layer height
  - top, bottom an outline layers
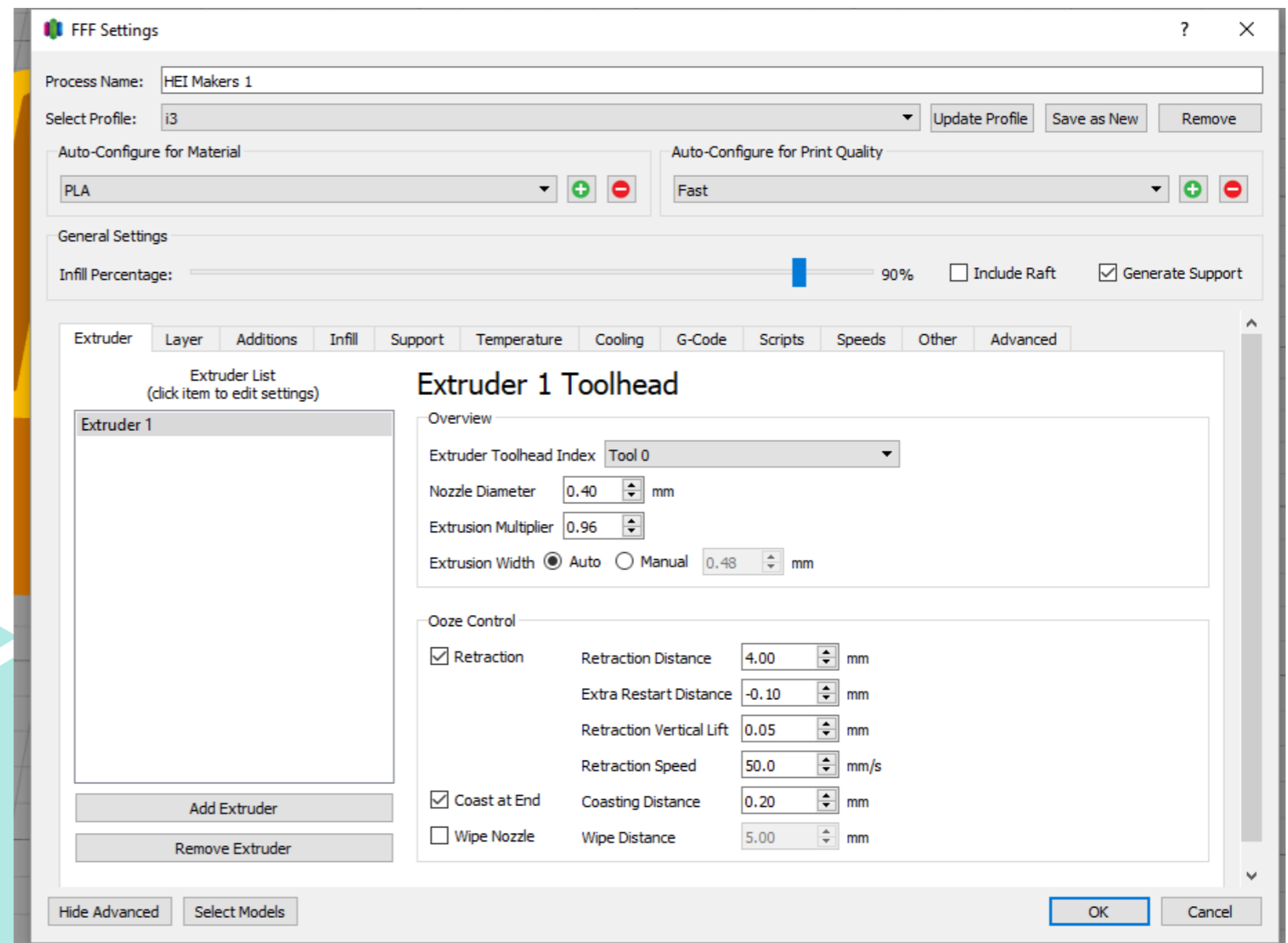 - support parameters
  - speed
  - temperatures
  - cooling
  - etc.

Figure 10.4. Process parameters settings. Source: Ludor Engineering

3D PRINT USING SIMPLIFY3D

- Start slicing (click "Prepare to Print!") – the g-code file is generated based on the set process parameters. Also, information about build time, filament length and weight are given.
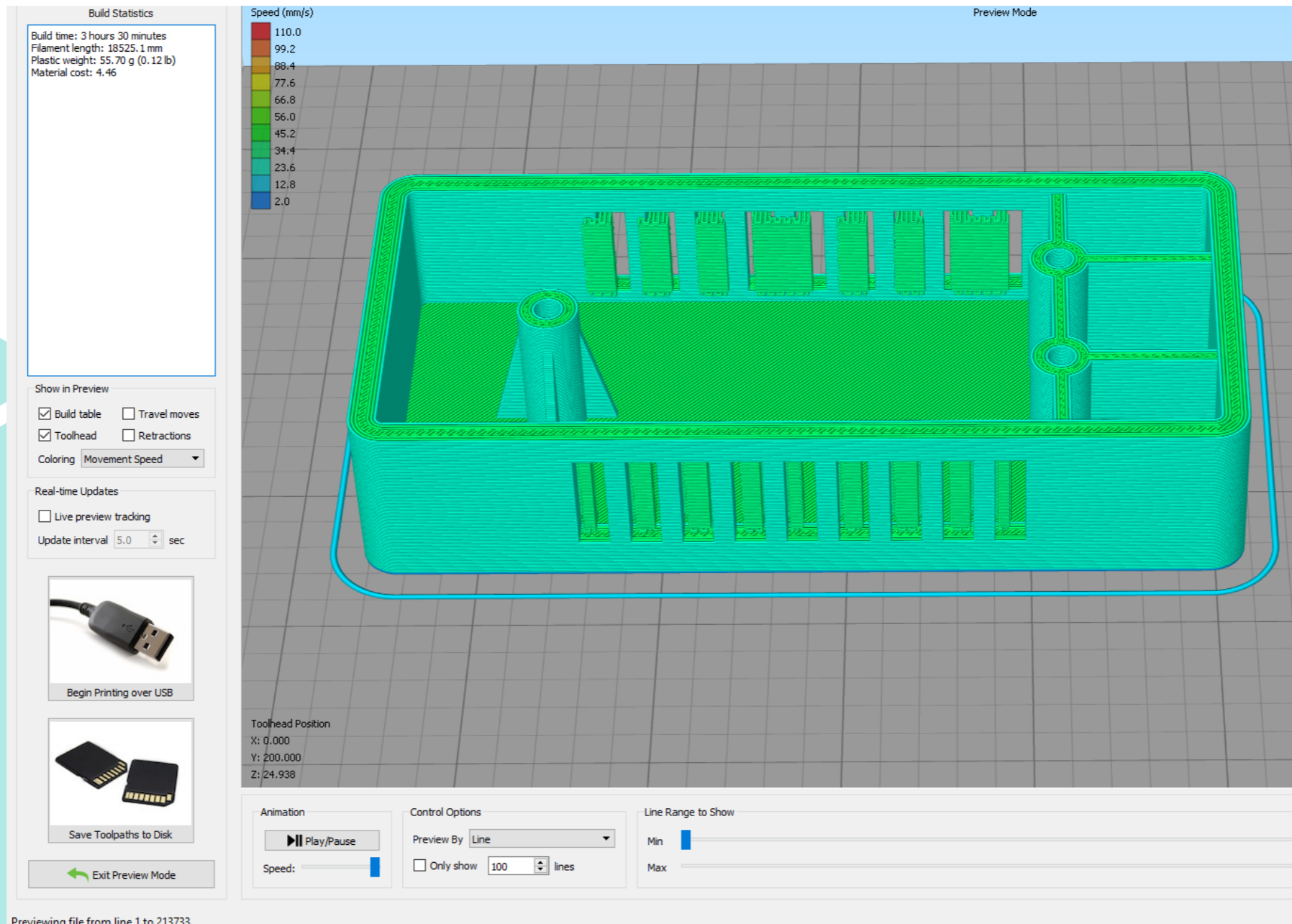

Figure 10.5. Sliced model. Source: Ludor Engineering

3D PRINT USING SIMPLIFY3D

- The sliced model can be visualized, layer by layer. An animation of the 3D printing process is also available.

- The g-code file can be send to 3D printer via USB or via a SD card and the 3D printing process can start.
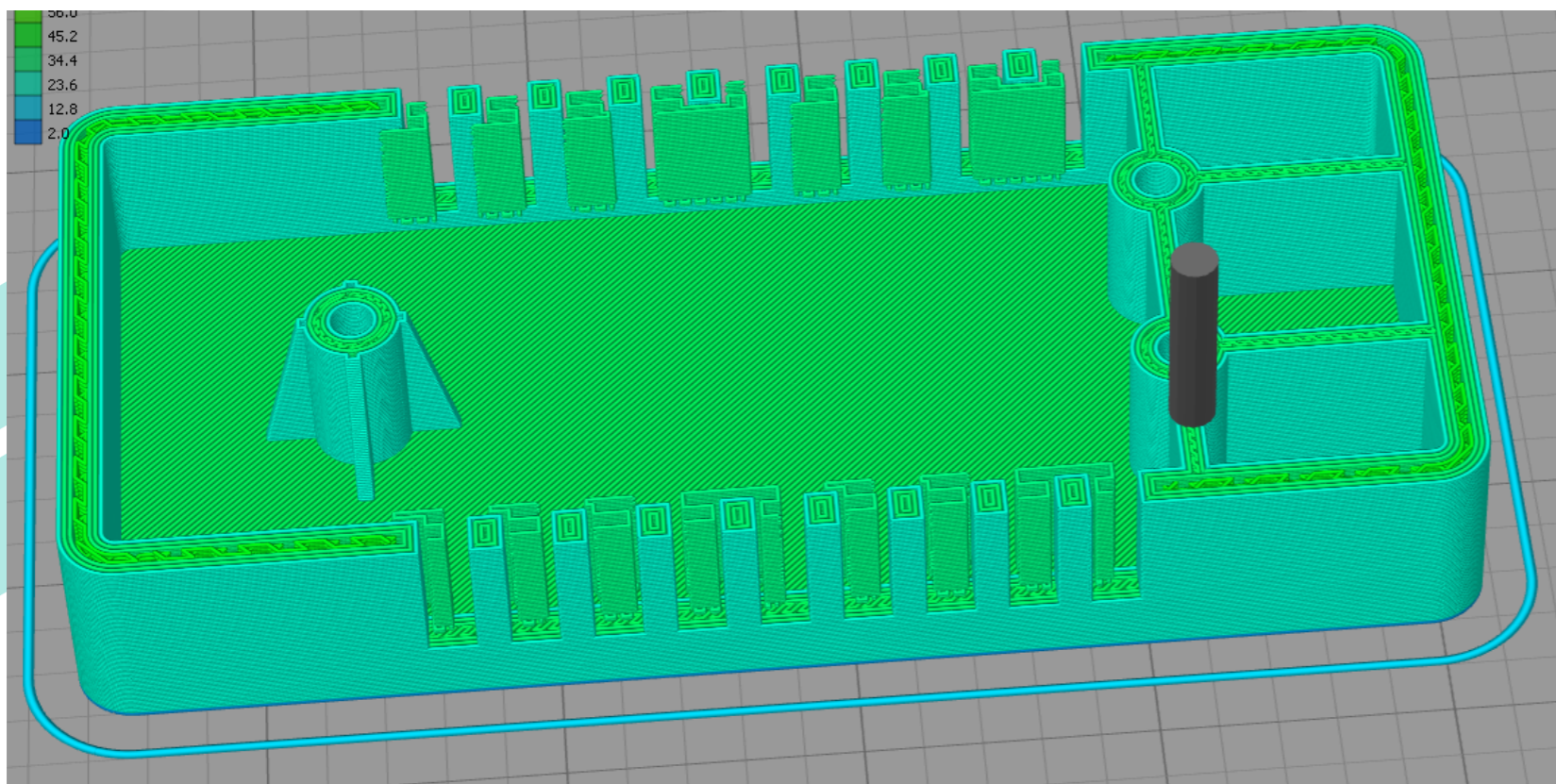

Figure 10.6. Layer-by-layer visualization. Source: Ludor Engineering
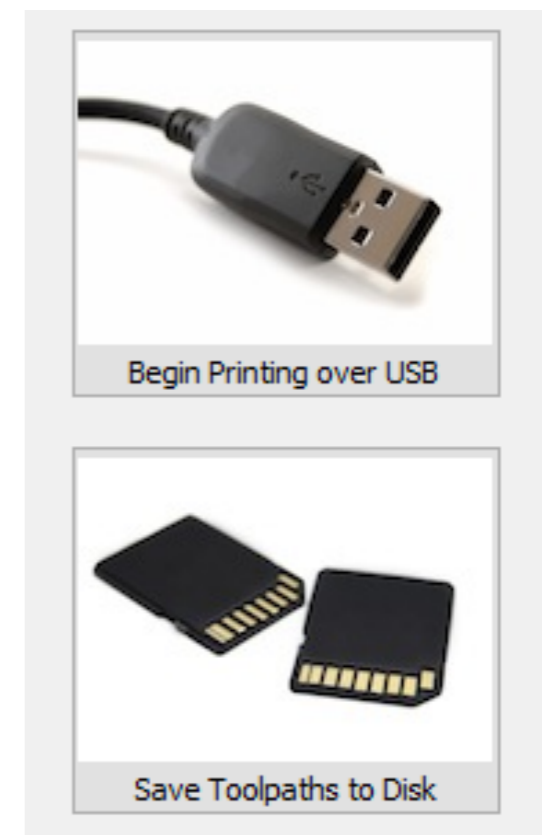

Begin Printing over USB

Save Toolpaths to Disk

Figure 10.7. File transfer to printer. Source: Ludor Engineering

PART POST-PROCESSING

- The post-processing of the 3D printed part shall include at least:

  - removal of support structures, using needle - nose pliers, knife, scrappers, sand paper, grinding tools etc.
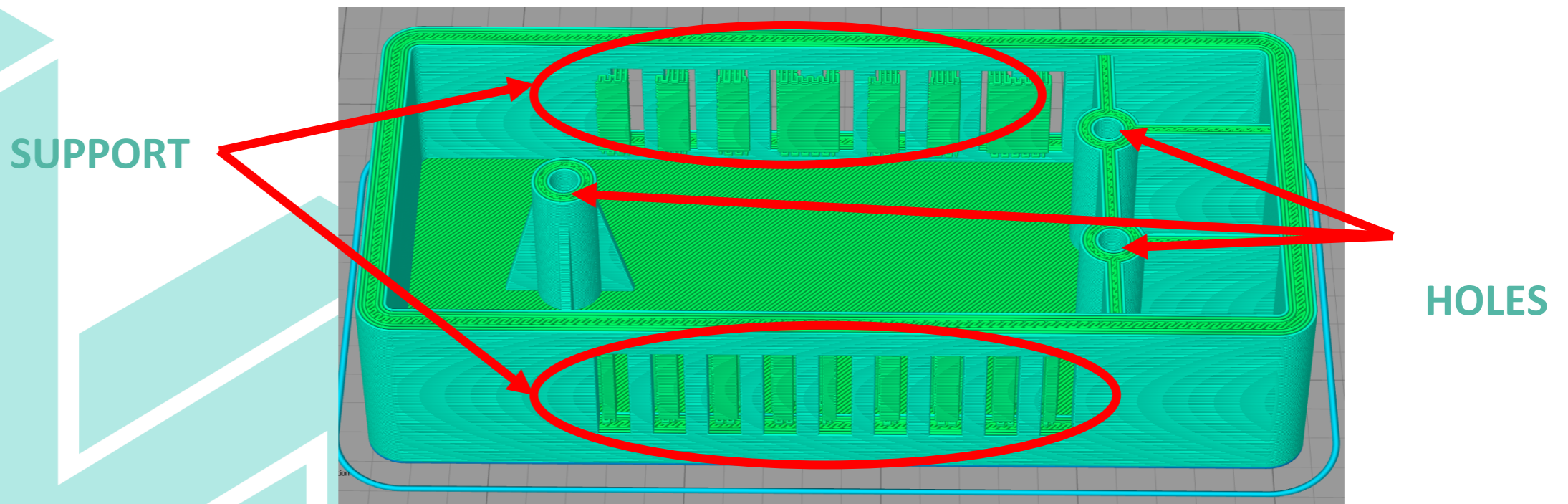
  - holes calibration, with a drill bit

SUPPORT

HOLES

Figure 10.8. Part post-processing. Source: Ludor Engineering

HEI MAKERS

www.heimakers.eu

HEI MAKERS

Let's make together!
www.heimakers.eu