



DiTwin – Digital Twin for VET school

DiTwin Modules

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Project website: <https://www.ditwin.eu/>

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Module - Additive Manufacturing technician

Lesson 2 - Optimization of basic tasks in 3D Printing Systems

Setup

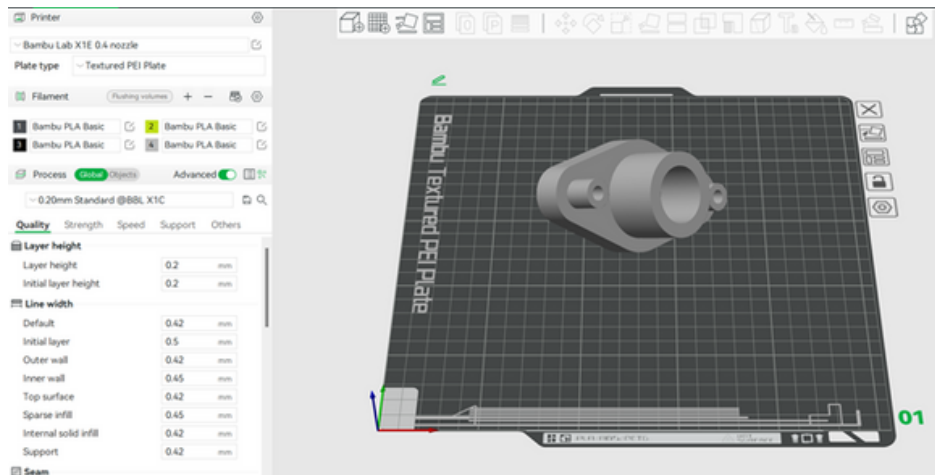


Figure 1.5. Uploading part 2 in Bambu Studio software

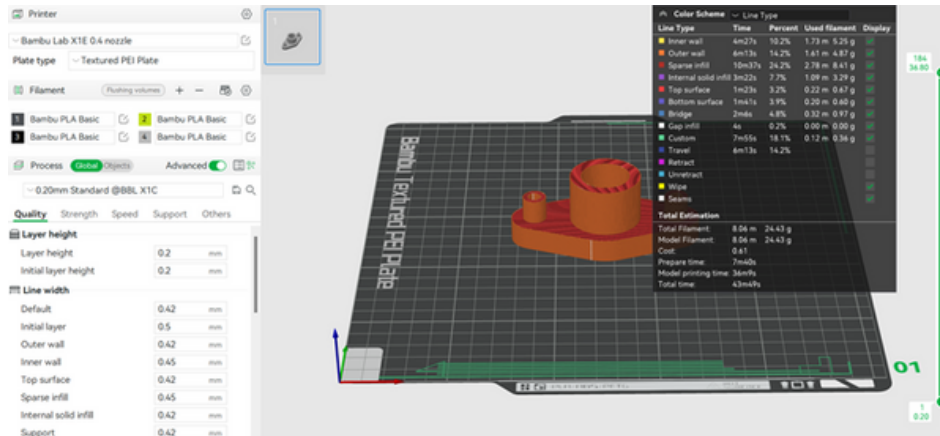


Figure 1.6. Simulation result of part 2

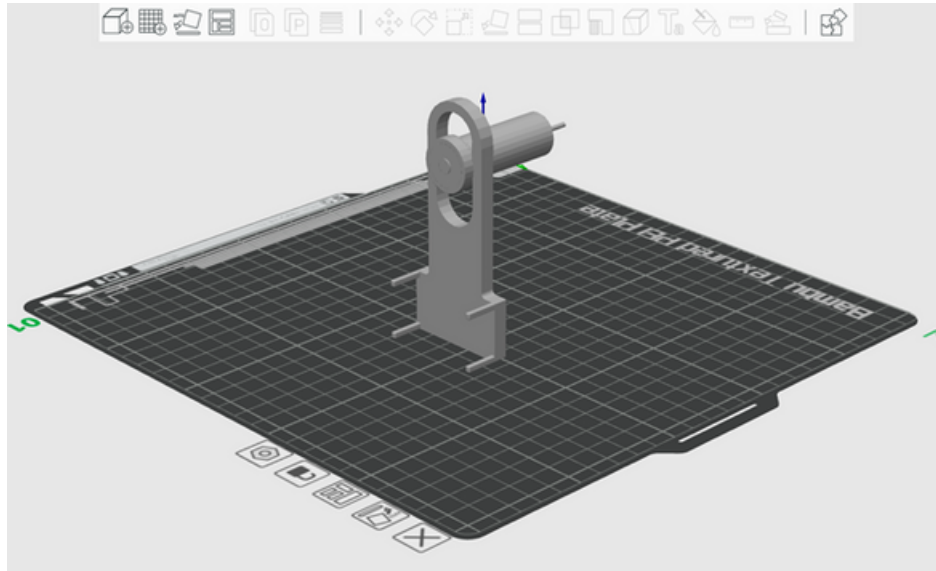


Figure 1.7. Scale factor applied to the distance sensor

Requirements

Handling geometries and scales, and basic knowledge of slicer software.

Learning Outcomes acquired

S1.2 To properly prepare and set up at least 1 additive manufacturing system.

S1.3 To properly operate basic tasks using at least 1 additive manufacturing system.

Duration of the lesson

8 hours

Activities and steps to be implemented

Through the use of the Bambu Studio slicer application, various methods of optimization in time and material for 3D printing will be explored, as well as the correct orientation of pieces and the use of scale factors to achieve the required size. In summary, the concepts covered in this lesson are:

- Optimization of printing parameters.
- Use of support types for printing based on piece geometry.
- Orientation and positioning of pieces for better support with the bed.
- Change scale factors.

Figure 1.5 shows one of the provided parts converted to STL format and uploaded into the Bambu Studio slicer application. The objective of this lesson is to simulate different impressions of the part, focusing on the stability of the part according to the base support and optimizing the time. Several techniques will be used in order to finally obtain the simulation of the part shown in Figure 1.6. For this purpose, the following activities will be carried out:

1. Add and test the different types of parts supports. Load part 2 into the Bambu Studio software. When slicing the part, it is observed that it does not have enough contact with the heated bed (base) to provide stability. A normal manual support or tree-type support will be added, and by slicing the part again, the time spent in the printing simulation will be observed.

2. Optimization of the printing through rotations. The goal of this activity is to place part 2 in an orientation that provides the best possible stability with the printer's base by rotating it. For this purpose, the rotate tool in the prepare section must be used. A significant reduction in printing time and material usage will be appreciated compared to the previous activity, as seen in Figure 1.6.

3. Adjustment of printing parameters. Slice the part with different layer height values (0.1, 0.2, and 0.4 mm) and line width (0.3, 0.42, and 0.7 mm) and deduce the relationship between printing time and detail quality in the part when increasing and decreasing these values. To do this, enable the advanced option in the prepare section of Bambu Studio.

4. Perform the previous activities with part number 3.

Scale change. Load design numbers 4 and 5, consisting of a distance sensor and a holder for that sensor. The scale factor applied to the distance sensor will be obtained so that the sensor fits into the holder, considering the width of holder cavity. To find the scale factor use the measure tool. This factor will then be entered into the scale tool, keeping the uniform scale option active, resulting in Figure 1.7

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