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3D PRINTING

UNFINISHED LECTURE NOTES

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These notes are, by their very nature, unfinished, and they improve with every reader. If you spot an error, disagree with a framing, or want to add a source, a question, or a position, open a pull request at https://github.com/Quillstacks/LectureMaterial/tree/main/lecturenotes/notes_3dprinting. Every contribution is welcome.



*"...SYNTHESES OF AUTOMATA CAN PROCEED IN SUCH A MANNER THAT
EACH AUTOMATON WILL PRODUCE OTHER AUTOMATA WHICH ARE MORE
COMPLEX AND OF HIGHER POTENTIALITIES THAN ITSELF."*

JOHN VON NEUMANN, THEORY OF SELF-REPRODUCING AUTOMATA

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Introduction

THIS IS A MANUAL. This aims at getting you onboarded on our Bambu Lab P1S with an AMS. Everything in it is written to be acted on while standing in front of the printer, so it is organised by what you might be trying to achieve. Or in other words, everything in here is something a fellow student or I have tried and done, and written down for you. Yes this should make you so grateful that you want to contribute to this document, in case you find that something is deprecated, you have a better way to do it, or you have tried something new or wandered into terra incognita.

THE OFFICIAL HANDBOOK. Bambu Lab's wiki for the P1 series carries the manuals, first print, firmware, and maintenance pages.



A frozen copy in case the wiki moves. Accessed 2026-09-02, Bambu Studio 02.08.02.61. in case this is older than a year, make it your task to update to the current version.



Quickstart

2026-09-02 · tender rosehip Maulwurf

Log In

BAMBU STUDIO IS THE COMPANION SOFTWARE. Download it and install it with the defaults. On first start, create a free Bambu Lab account or sign in with a preexisting one.

Bind the Printer

THE P1S IS BOUND TO EXACTLY ONE ACCOUNT AT A TIME. With your laptop on the same network as the printer, open the Device tab in Bambu Studio, pick the P1S from the list of nearby printers, and confirm the request on the printer screen, on first login usually via a code.

The Printing

A TEST PART FOR YOUR FIRST PRINT is provided to the right. Ours is a Schutera Lab keyring tag: $60 \times 20 \times 2.4$ mm, a 4.5 mm hole that takes a standard split ring, and lettering and a border rim raised 0.6 mm, which is three layers at the standard layer height. `testprint.stl` lives next to this PDF and in the course repository, and may be shared and used freely. If you want to pick your own first print, choose something small, flat, and simple.

SLICE. In the Prepare tab choose Bambu Lab P1S with the 0.4 nozzle profile. Drag `testprint.stl` onto the plate. Choose the AMS slot you intend to print from and confirm the plate type is Textured PEI Plate. Then press Slice and read the preview. This will tell you about grams and job duration and is a good means for a sanity check.

DOWNLOAD. <https://bambulab.com/en/download/studio>

IF THE PRINTER IS ALREADY BOUND TO SOMEONE ELSE, it will not offer itself for binding. Log the previous user out. On the printer screen open the gear ⚙️, then Account, and log out. Then bind it.



Figure 1: The test part. The flat base sanity checks the first layer, the hole checks dimensions, the letters and the rim check small features.

DOWNLOAD. https://github.com/Quillstacks/LectureMaterial/raw/main/lecturenotes/notes_3dprinting/testprint.stl

BRINGING YOUR OWN PARTS LATER? Prefer a .3mf over an .stl: it carries units, orientation, and settings with it.

NO OUTSIDE FILAMENT. Print only with material provided by the lab.

NOZZLE PROFILES CAN CHANGE. We feature the 0.4 nozzle here because it allows us to print TPU (see p. 11).

CHECK THE PHYSICAL PLATE BEFORE YOU SEND. Clean, dry, seated flat on the magnets, no fingerprints where the part will land. Then send the job. The machine spends a few minutes heating and leveling before the first line of plastic goes down.

LET THE PLATE COOL BEFORE YOU TOUCH THE PART. PLA releases its grip as the plate cools; then flex the plate rather than prying the part. The magnetic lock-on feature allows you to take the plate out of the printer. Put the plate back, and close the door.

LEAVE THE MACHINE THE WAY YOU FOUND IT. If you are done for the day, make sure the lamp is off, the surrounding of the machine and its inside are tidy and clean. It is okay to turn off the printer entirely.

WATCH THE FIRST LAYER FINISH. before you walk away. If it is not down cleanly, stop the job there. These printers get hot and need attendance, so never walk away too far anyways. Weekend and overnight jobs need to be permitted by Lab Staff aka a Professor.

Scan the code and send a mail stating your project, faculty and what filament you used up (in g).



TPU

2026-09-02 · *daring kiwi Kauz*

LOAD IT, PRINT IT, LOAD IT BACK.

TPU RUNS FROM THE EXTERNAL SPOOL HOLDER. TPU never goes through the AMS. The flexible filament coils inside the AMS hub instead of advancing down its Bowden path. You don't want to spend the time cleaning this. So this is a mishap to avoid and not to experience first-hand for a deeper learning experience. Because we can not use the AMS, we have to feed TPU directly into the extruder. This is a hands-on procedure that requires some care and attention.

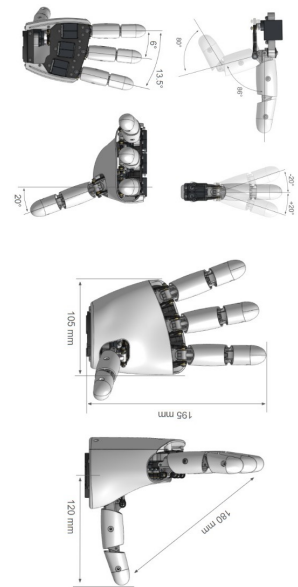
UNLOADING PLA

1. On the printer screen open the gear ⚙, then Filament, and unload whatever is currently sitting in the extruder.
2. Detach the tube on the back that runs from the AMS into the tool-head and park it clear of the feed path.

LOADING TPU

1. Hang the TPU spool on the external holder at the back of the printer (looks like a metal bar) and thread the loose end into the tube inlet the AMS tube used to occupy.
2. On the printer screen choose the nozzle 🖱 icon, then Feeding, choose Load. While the printer runs the load, push the filament slightly in by hand until the feed gears grab it and take over. Watch the nozzle purge until a clean strand of TPU comes out.
3. In Bambu Studio open the Device tab. Next to the four AMS slots sits an Ext slot for the external spool; select that one and set the filament type to TPU.

YOU ARE READY TO PRINT TPU.



WHY TPU? It is strong yet stays flexible after printing. We first used it for a robotic skin on the AmazingHand by Pollen Robotics, pictured above, making a gripper surface more adaptable and raising grip success rates.

ONE OBJECT PER PLATE FOR A NICER RESULT. TPU's elasticity stretches into a hair that drifts and tangles with movement between objects while printing. This messes up your surface and print quality.

UNLOADING TPU

1. On the printer screen choose the nozzle  icon, then Feeding, choose Unload. The printer heats the nozzle and retracts the filament.
2. Once the feed gears release it, pull the strand back out of the tube inlet by hand and wind it onto the spool. Stow away TPU in a sealed box immediately.

KEEP THE SPOOL DRY. TPU is hygroscopic. Off the holder, store the spool in a sealed box with desiccant. A spool left in open room air for a few days prints visibly worse.

LOADING PLA AGAIN

1. Reattach the AMS tube you parked earlier to the tube inlet on the toolhead and push it in until it seats.
2. On the printer screen open the gear , then Filament, select the AMS slot holding your PLA, and choose Load. The AMS feeds the filament down the Bowden path on its own; watch the nozzle purge until a clean strand of PLA comes out.
3. In Bambu Studio open the Device tab and select the AMS slot instead of the Ext slot, so the next job pulls from the AMS again.

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