

3D printing course

Book 1

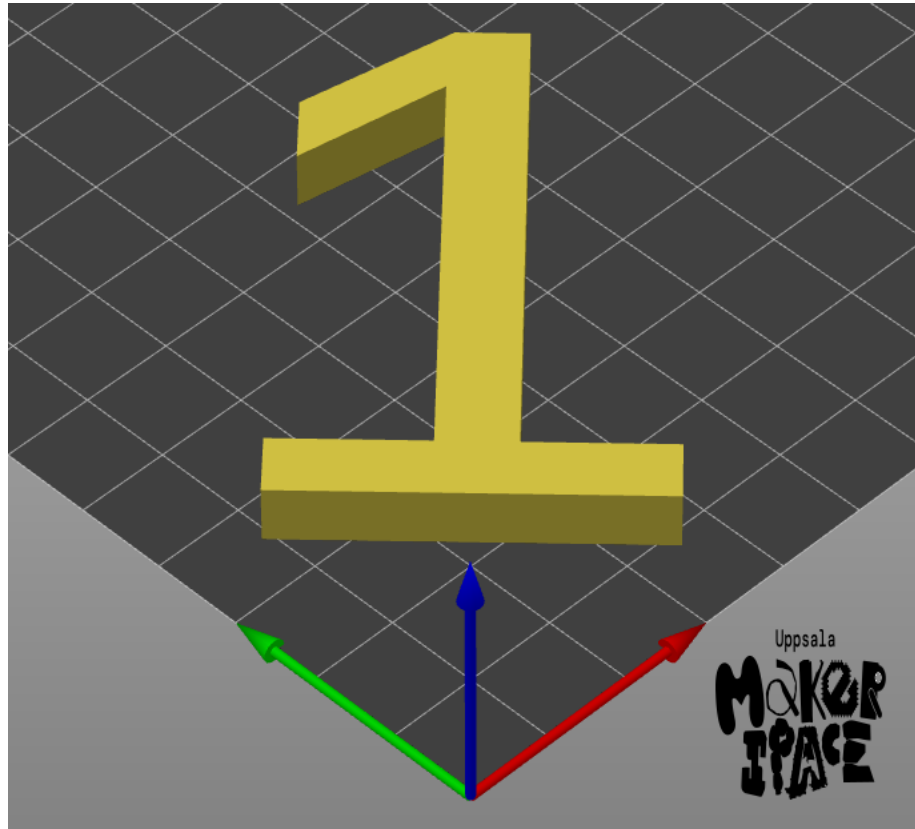


Figure 1: Bok 1

#	Beskriving
0	Installing and configuring PrusaSlicer
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Foreword

This is a book about 3D printing at Uppsala Makerspace. This book teaches you how to do it.

About this book

This book is licensed under CC-BY-SA.

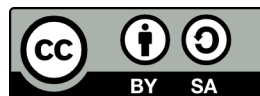


Figure 1: Licensen för denna bok

(C) Richèl Bilderbeek och alla lärare och alla elever

You can do whatever you want with this booklet, as long as you reference the original version on this website: https://uppsala-makerspace.github.io/3d_skrivningskurs/. This booklet will always remain free, open and free.

It is still a bit of a sloppy book. There is are zpelling errors and the *layout* is not **always beautiful**. Since this book is on a website anyone who thinks this book is too sloppy can make it less sloppy.

Installing and configuring PrusaSlicer

0.1. Installing PrusaSlicer

If you cannot start PrusaSlicer (see next step), you must install this program.

In a browser, search for ‘Download PrusaSlicer’ or go directly to <https://www.prusa3d.com/p/p>

There you can download the files for your favorite operating system.

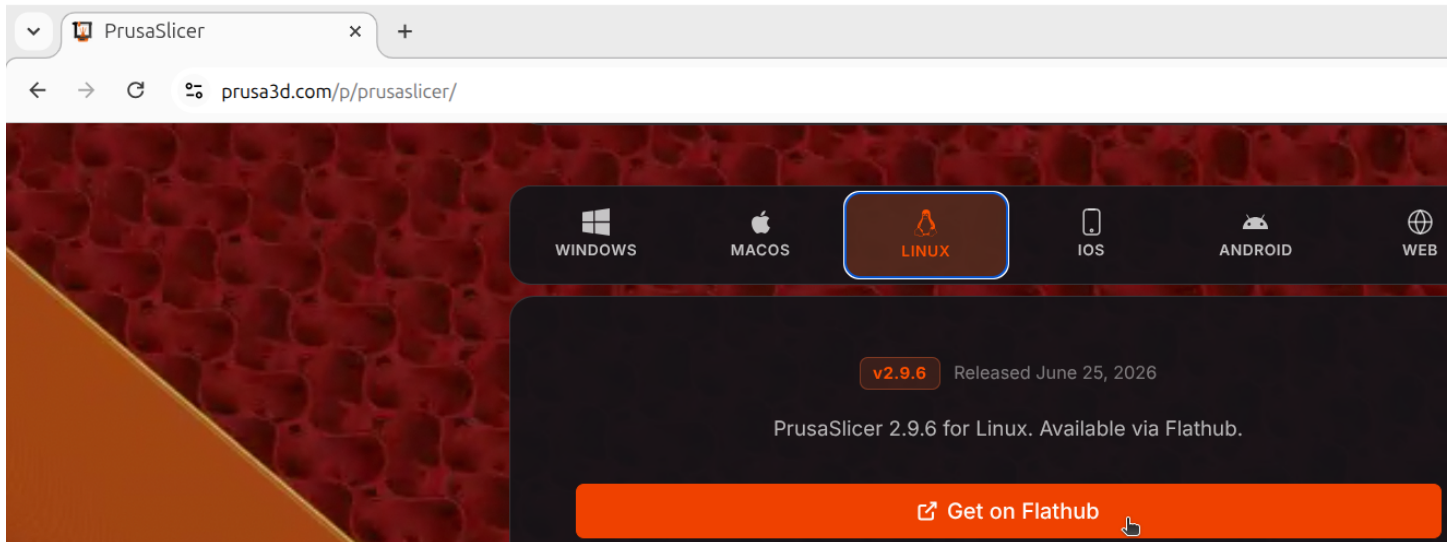


Figure 2: Download Linux Flatpak

Launch the file to install PrusaSlicer.

0.2. Starting PrusaSlicer

On your computer, start PrusaSlicer. On the computers in Uppsala Makerspace there is often an icon on the Desktop. Click on the PrusaSlicer icon.

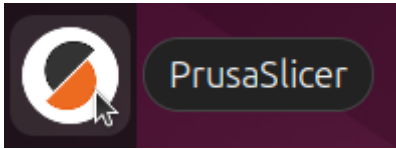


Figure 3: Klicka på PrusaSlicer ikonen

Now PrusaSlicer will start. If it displays the so-called ‘Configuration Wizard’, click ‘Finish’.

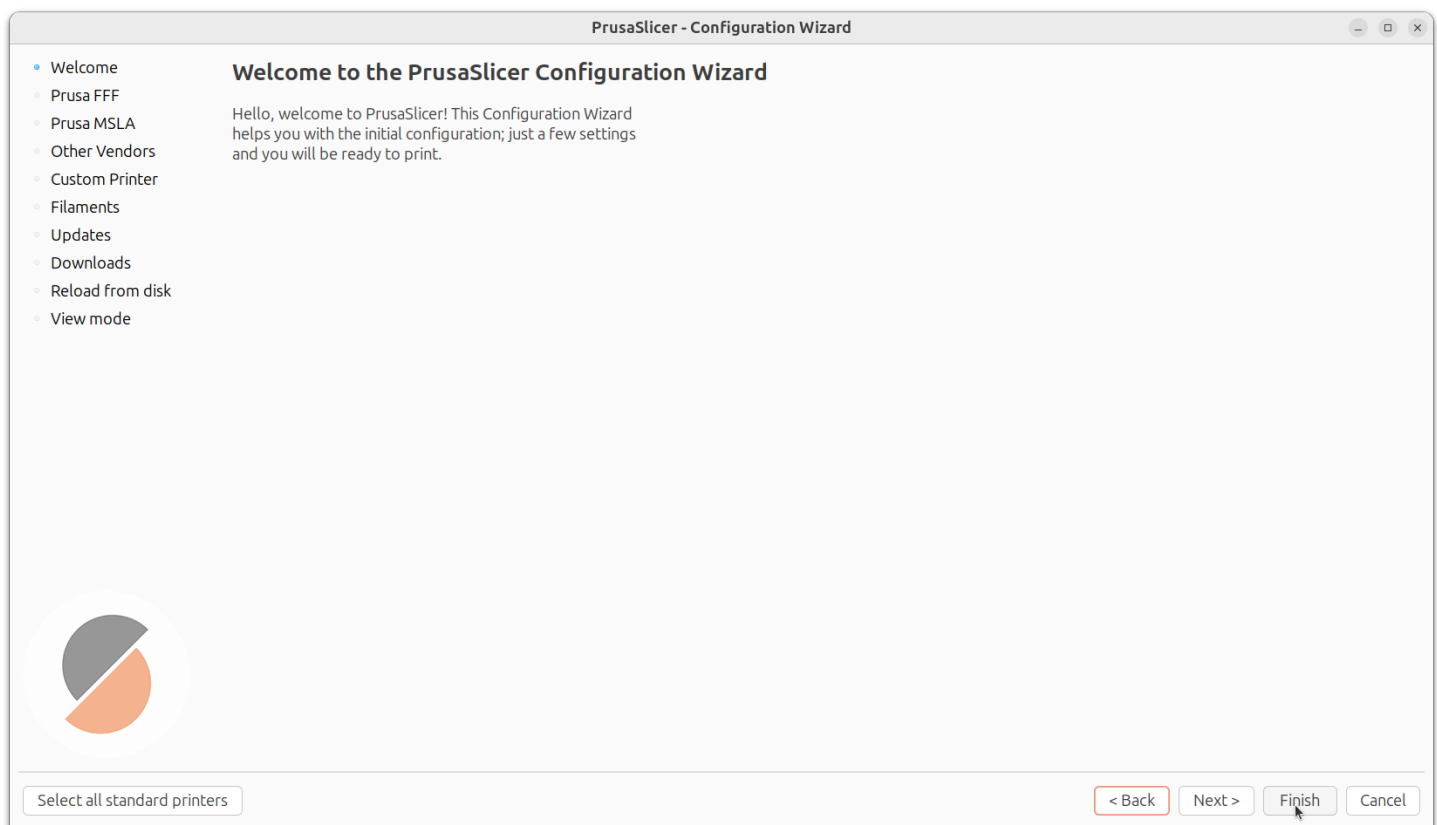


Figure 4: Klicka på ‘Finish’

0.3. Configuring PrusaSlicer

If PrusaSlicer doesn't show our 3D printers (they have names of planets), it's time to configure PrusaSlicer.

Here's what it looks like when PrusaSlicer doesn't show one of our 3D printers:

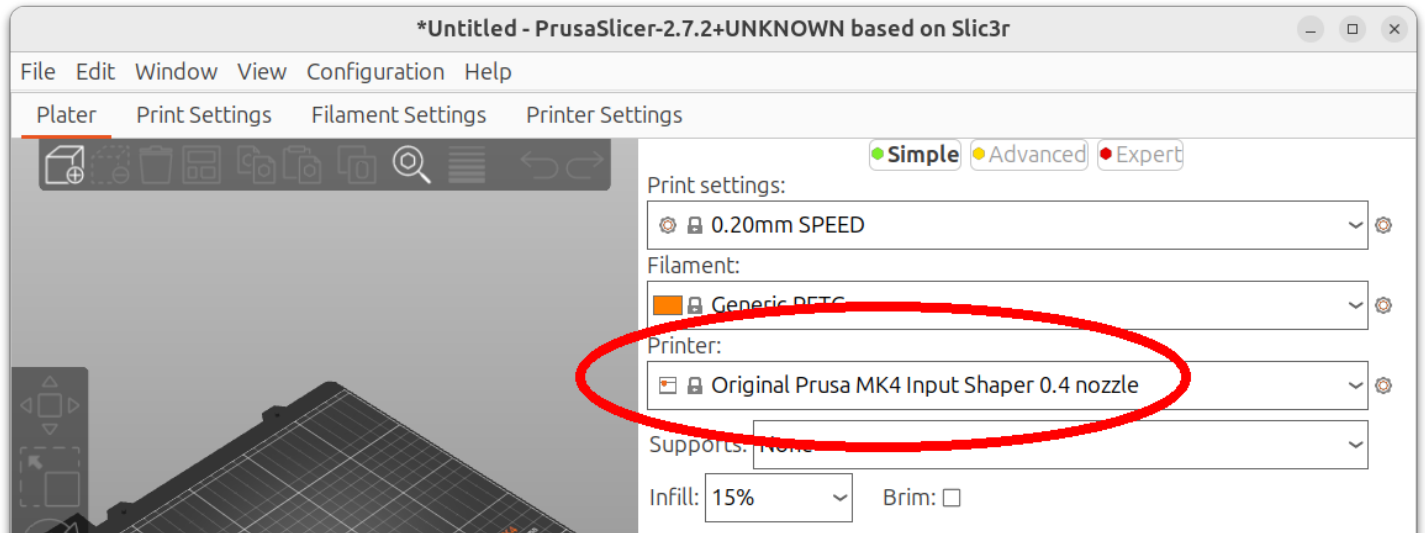


Figure 5: PrusaSlicer inte visar en av våra 3D skrivarna

Uppsala Makerspace has a configuration file for all of their 3D printers.

In a browser, search for 'Uppsala Makerspace wiki 3D printing' or go directly to <https://wiki.uppsalamakerspace.se/3D-printing>.

Download the latest configuration file.



Uppsala Makerspace

Sida Diskussion Läs Visa källa Visa historik Sök på Uppsala Makerspace

3D-printing

Utrustning

[Maskiner och inventarier](#) - En lista över våra 3D-skrivare och deras egna wiki-sidor finns även på sidan.

Utrustning

Följande videos är en inspelad kurs i 3D-printing som vi höll i början av 2021, som fortfarande är aktuell. Kolla gärna dessa! Vi brukar även hålla regelbundna introduktioner på plats i de praktiska momenten, men på grund av COVID-19 (uppdaterad 2021-04-12) är dessa dock inställda tills vidare, och vi hänvisar till dokument & videos för att komma igång på egen hand.

- [Makerspace - Introduktion till 3D-printing \(Del 1 av 2, Grunder\)](#)
- [Makerspace - Introduktion till 3D-printing \(Del 2 av 2, Praktisk Information\)](#)

För att sedan komma igång på plats med de praktiska detaljerna, läs följande dokument som beskriver grunderna och hur man använder en Slicer. Manualer för de olika skrivarna finns länkade inuti.

- <https://docs.google.com/document/d/19XWKK35NRPTLjWVb1oZWj3QDdvR7VoLGUCucDeBf9Bk/edit?usp=sharing>

Den senaste Prusa-slicerkonfigurationsfilen finns här: <https://drive.google.com/file/d/1IE-njnBclEBohLrUaUtRYYkeBWsxBRRo/view?usp=sharing>

Figure 6: Ladda ner den senaste konfigurationsfilen

In PrusaSlicer, click ‘File | Import | Import Config Bundle’.

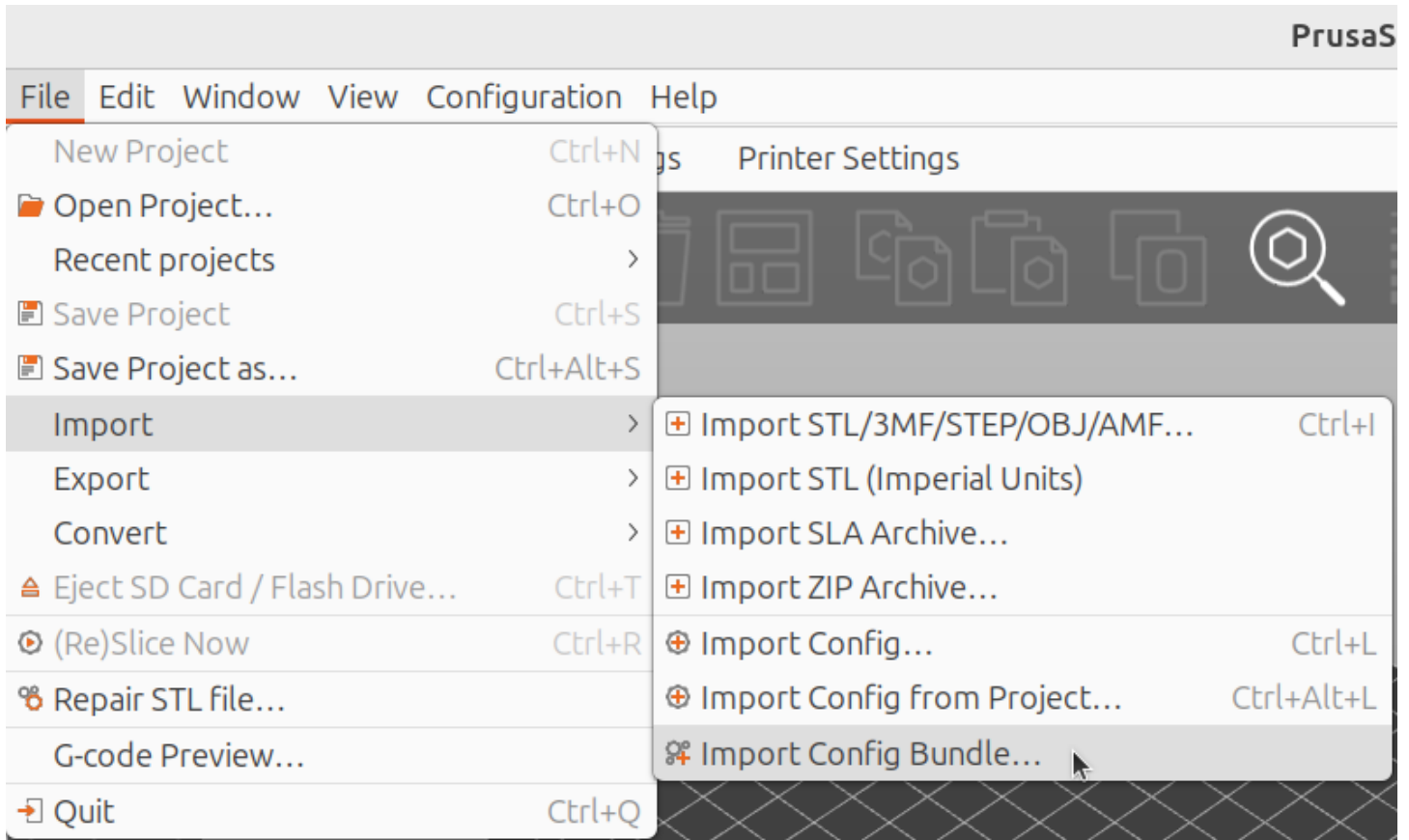


Figure 7: Klicka ‘File | Import | Import Config Bundle’

Search for the configuration file and click on ‘Open’ (‘Öppna’).

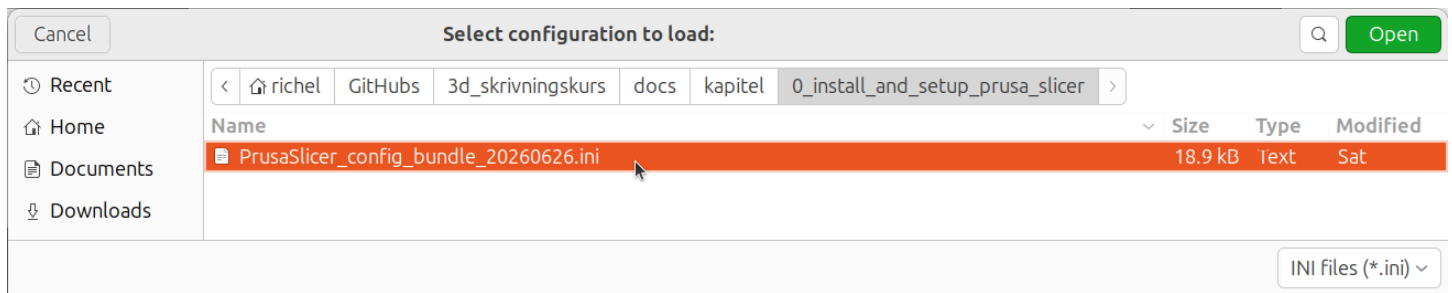


Figure 8: Leta efter konfigurationsfilen och klicka på ‘Open’

Click 'OK' if a window shows that everything was successful.

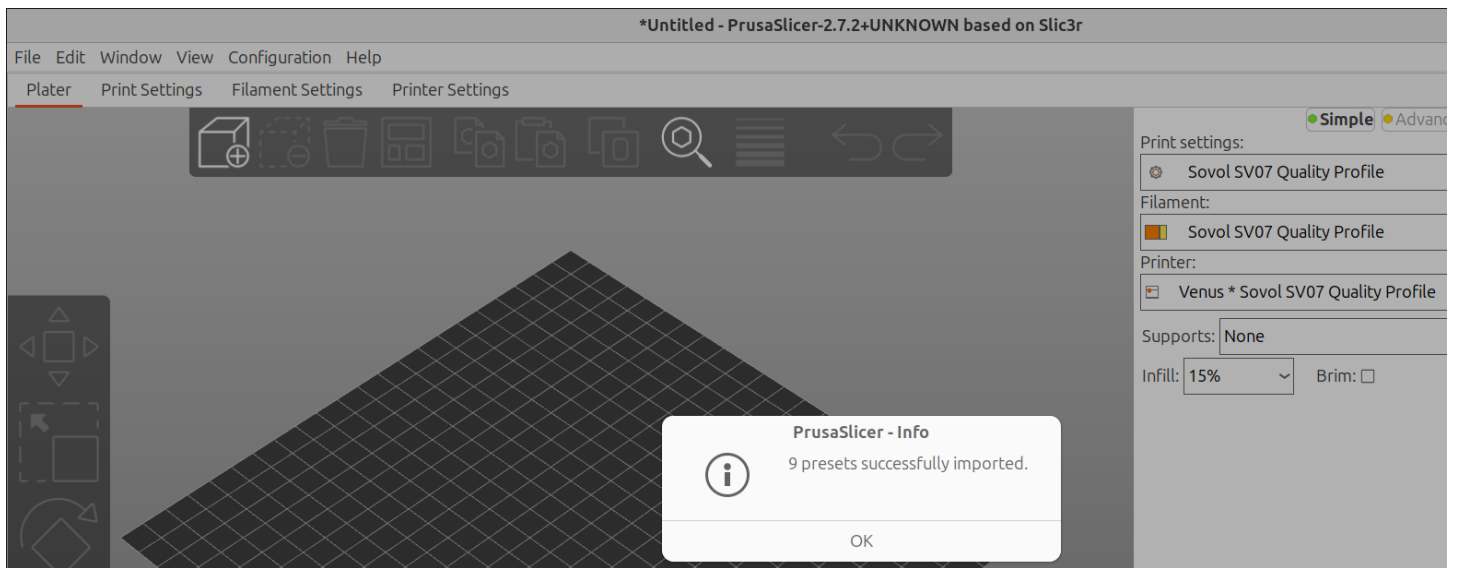


Figure 9: Clicka på 'OK'

Now PrusaSlicer shows that our 3D printer called 'Venus' is available.

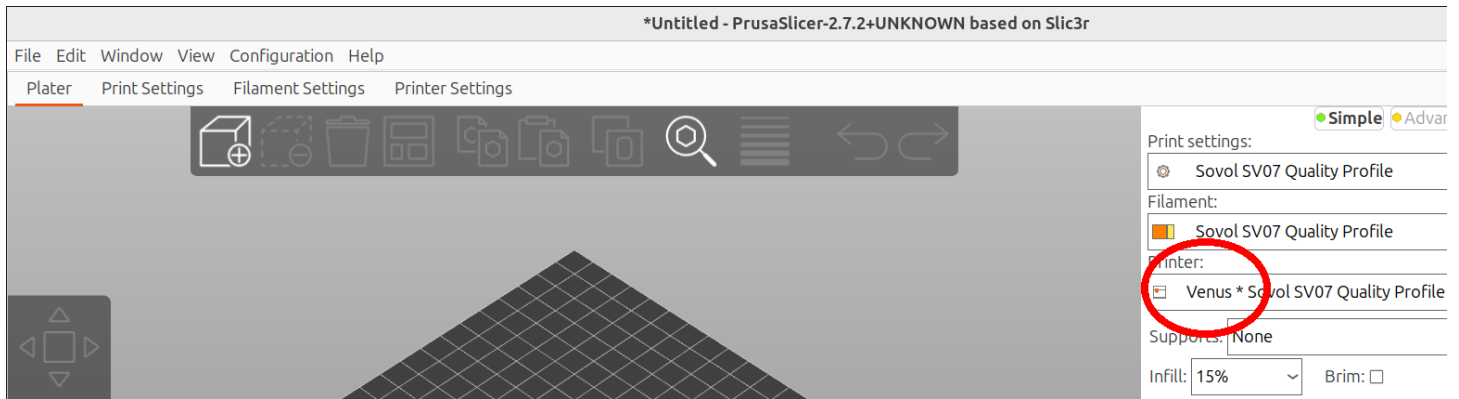


Figure 10: 'Venus' är tillgängligt

Congratulations! You can now 3D print!

1. To print

To print, you need an STL file of your drawing. In both Blender and OpenSCAD, you can export your drawing to STL.

In Blender, click ‘File | Export | Stl (.stl)’ to export your model to an STL file.

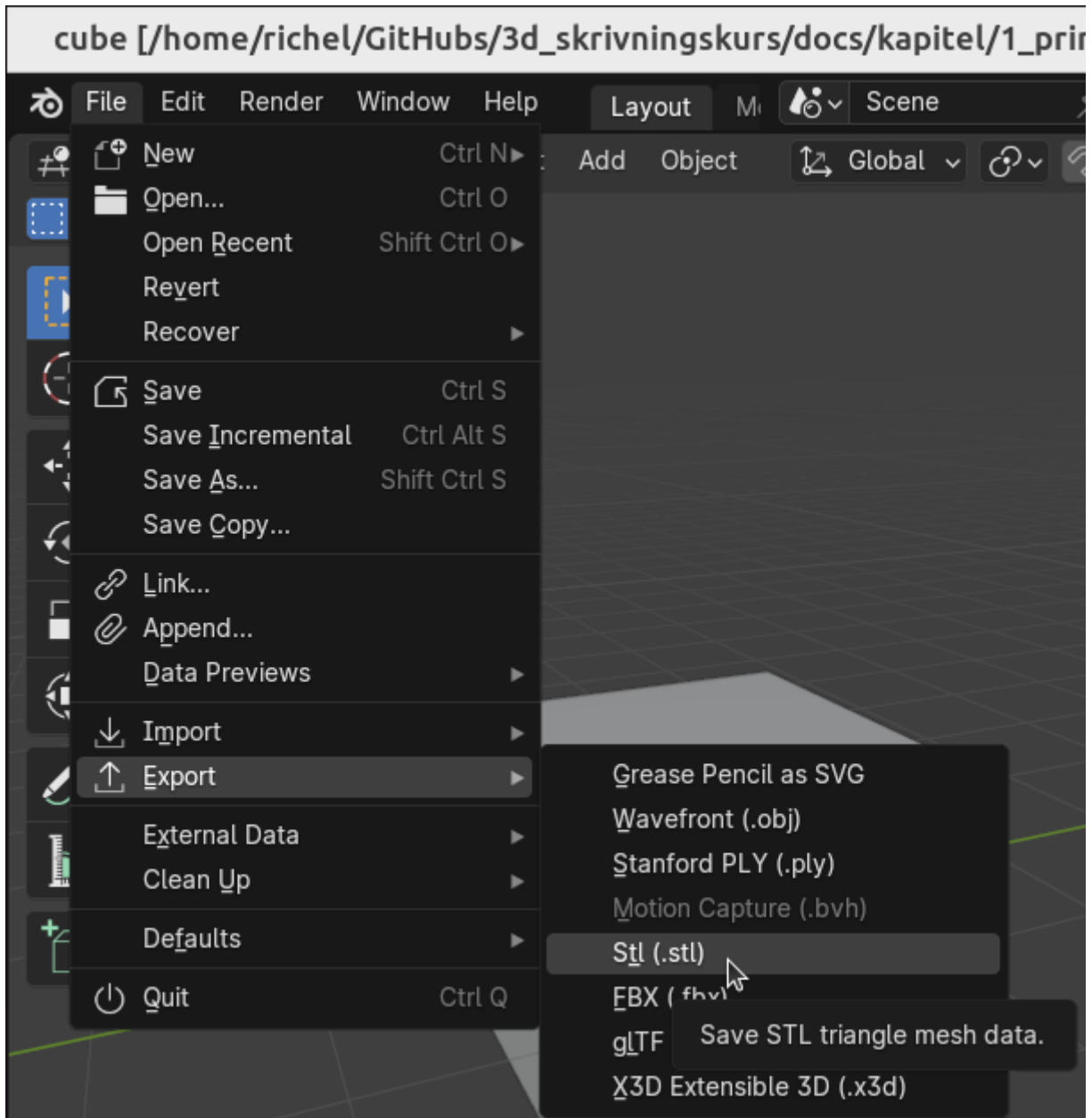


Figure 11: klicka ‘File | Export | Stl (.stl)’

In OpenSCAD, click 'File | Export | Export as STL' to export your model to an STL file.

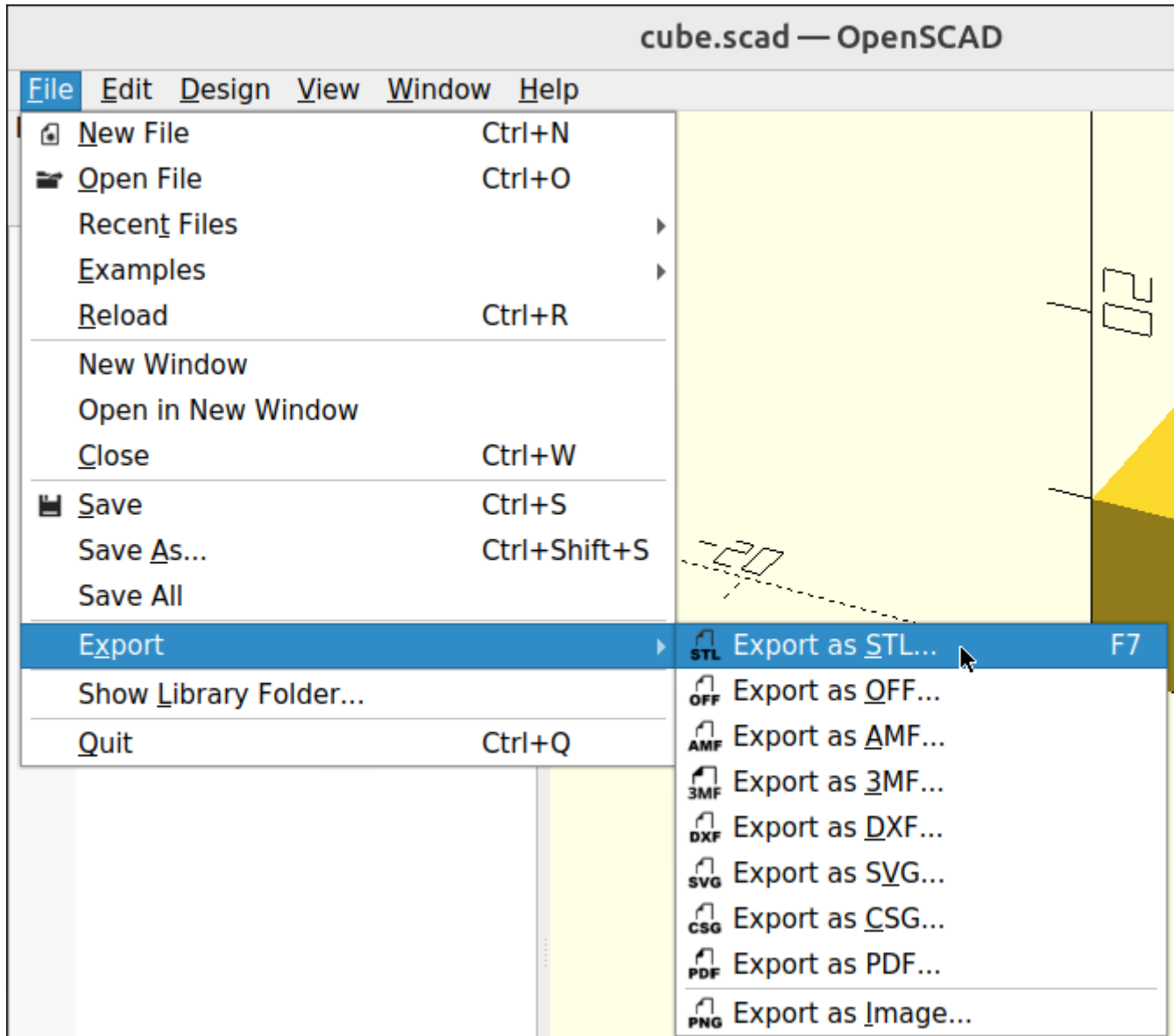


Figure 12: klicka 'File | Export | Export as STL'

1.1. To load an STL file into PrusaSlicer

Start the program called PrusaSlicer.

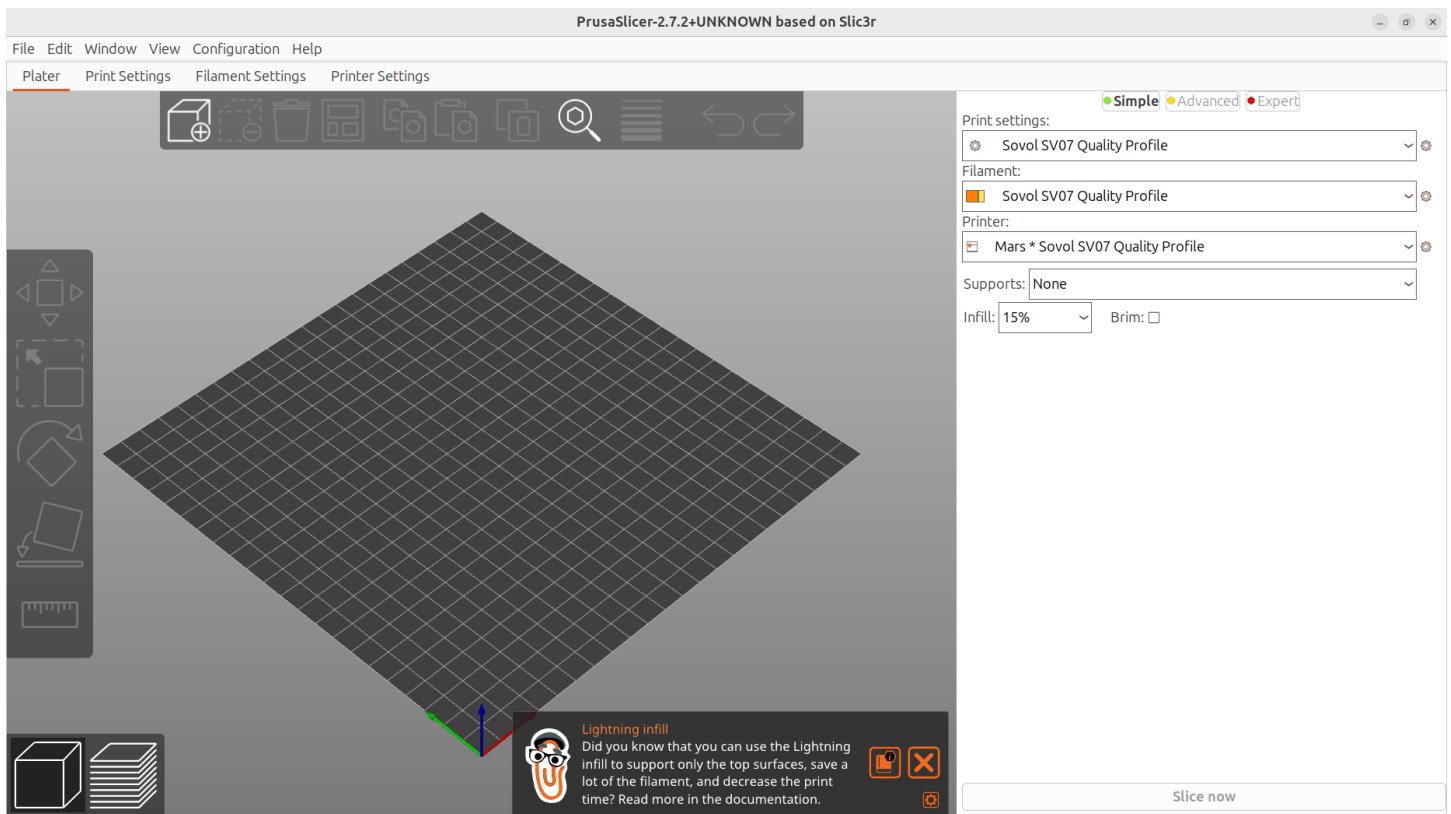


Figure 13: PrusaSlicer

Click on 'File | Import | Import STL'.

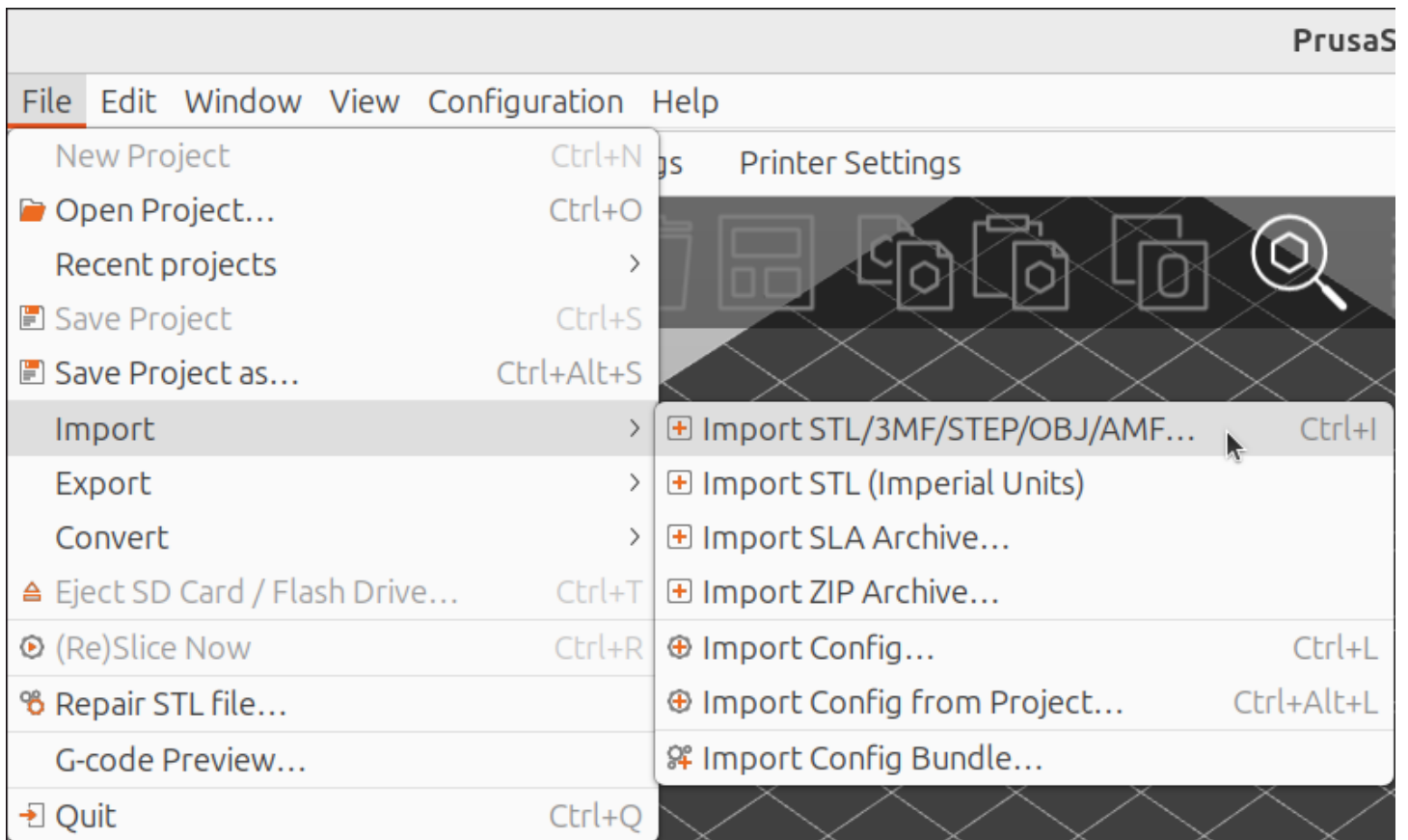


Figure 14: Klick på 'File | Import | Import STL'

Select an STL file and click on ‘Open’.



Figure 15: Välja en STL fil och klicka på ‘Open’

Now you have loaded a cube into PrusaSlicer. It looks something like this:

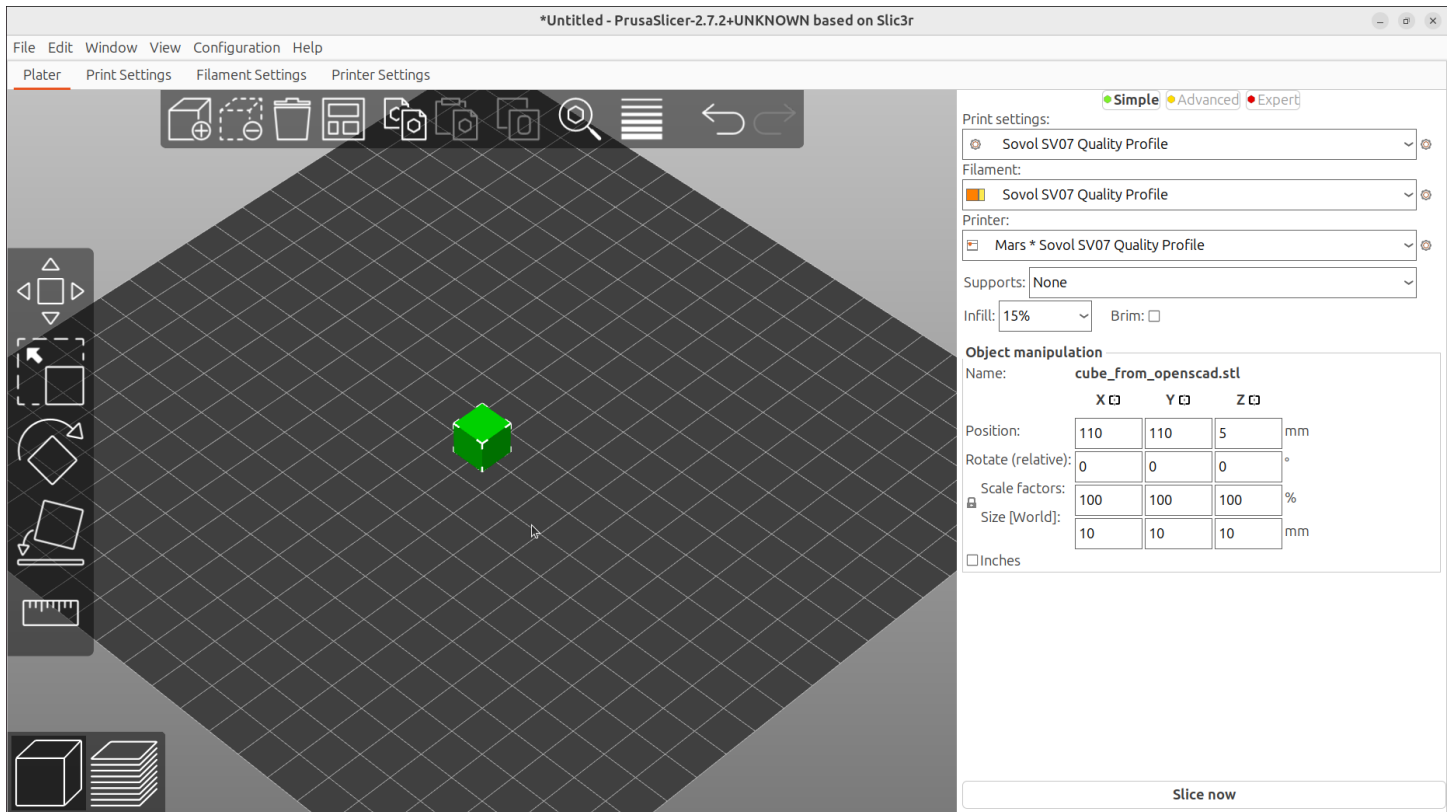


Figure 16: Kuben är laddat

1.2. Picking a 3D printer

In the Makerspace, look for a 3D printer that is available. Each 3D printer has a name. For example, this printer down here is called ‘Merkurius’.



Figure 17: Den här skrivare heter ‘Merkurius’

In PrusaSlicer, select the same 3D printer.

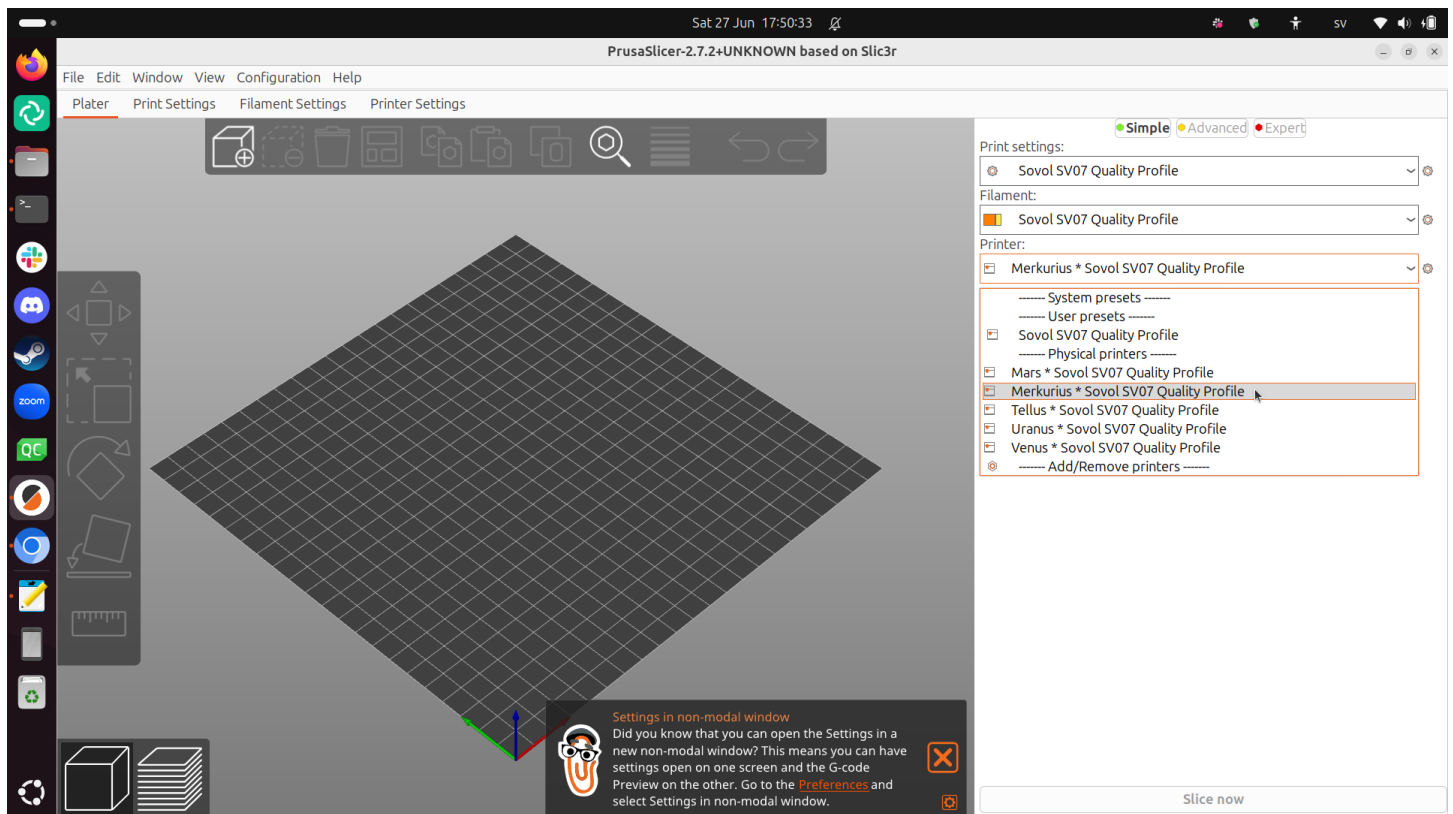


Figure 18: välja samma 3D skrivare

1.4. Slicing

Klicka på 'Slice now'.

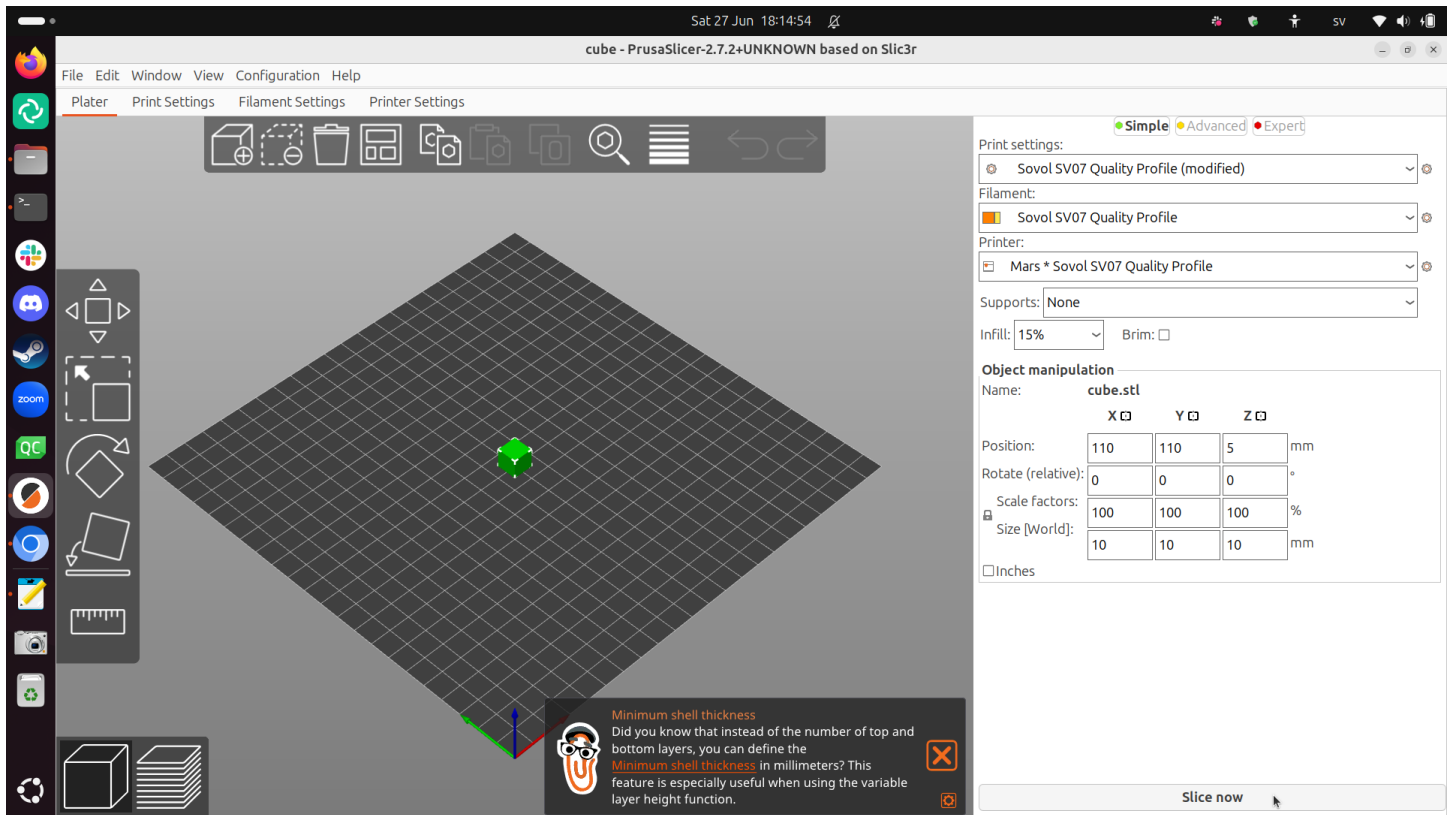


Figure 19: Klicka på 'Slice now'

Now the slicing is done.

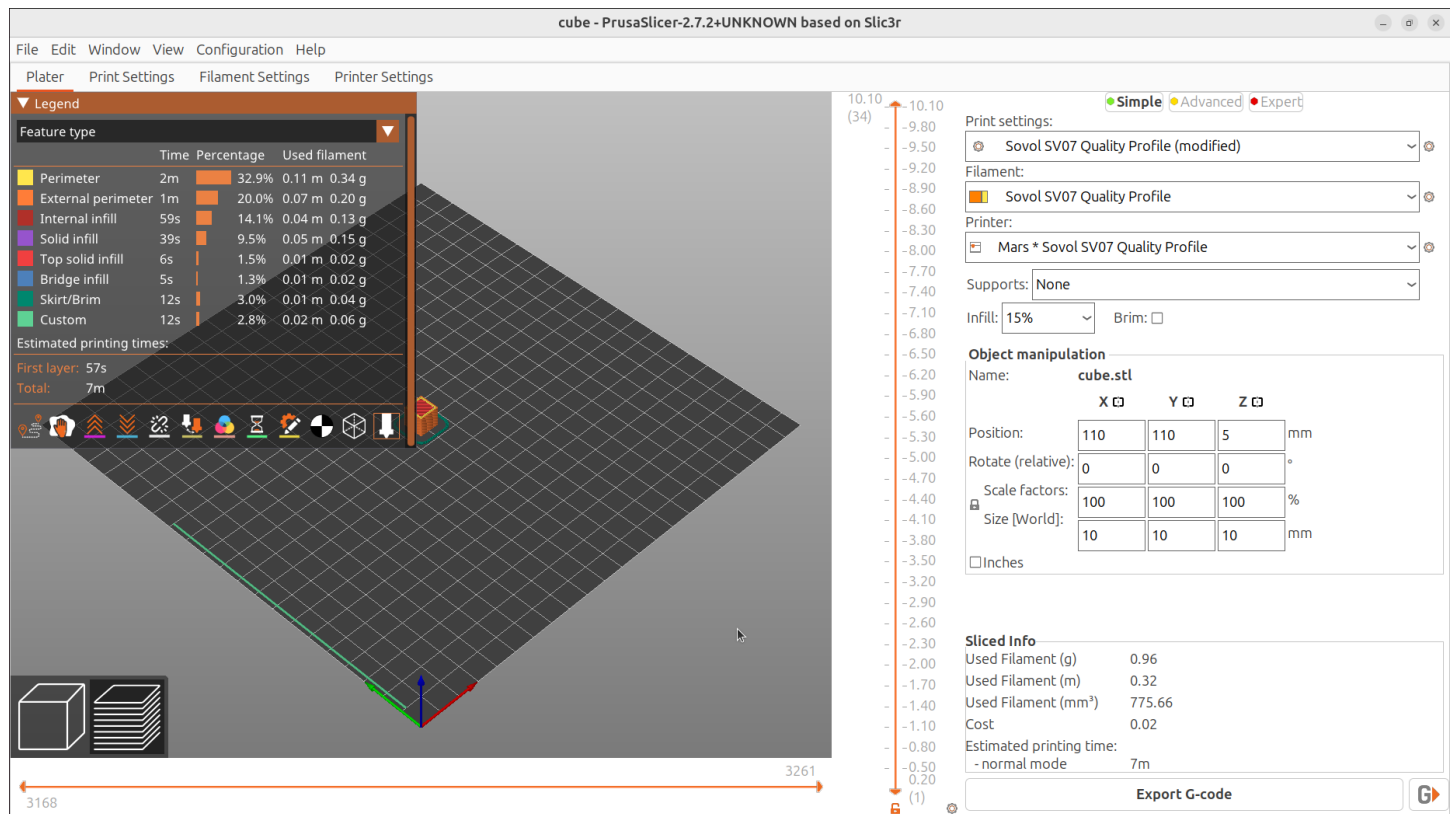


Figure 20: Slicingen är klart

1.4. Printing

At Uppsala Makerspace we have two rules about 3D printing:

- During your first print, you must look at the printer the whole time. The goal is that you see what a normal/successful print looks like
- During your later prints, you must be within earshot of the printer. The goal is that you can stop the printer when something goes wrong.

Your first print will take a little less than 10 minutes.

If you understand the rules, click ‘Send to print’ (‘Send to printer’) in the bottom-right corner:

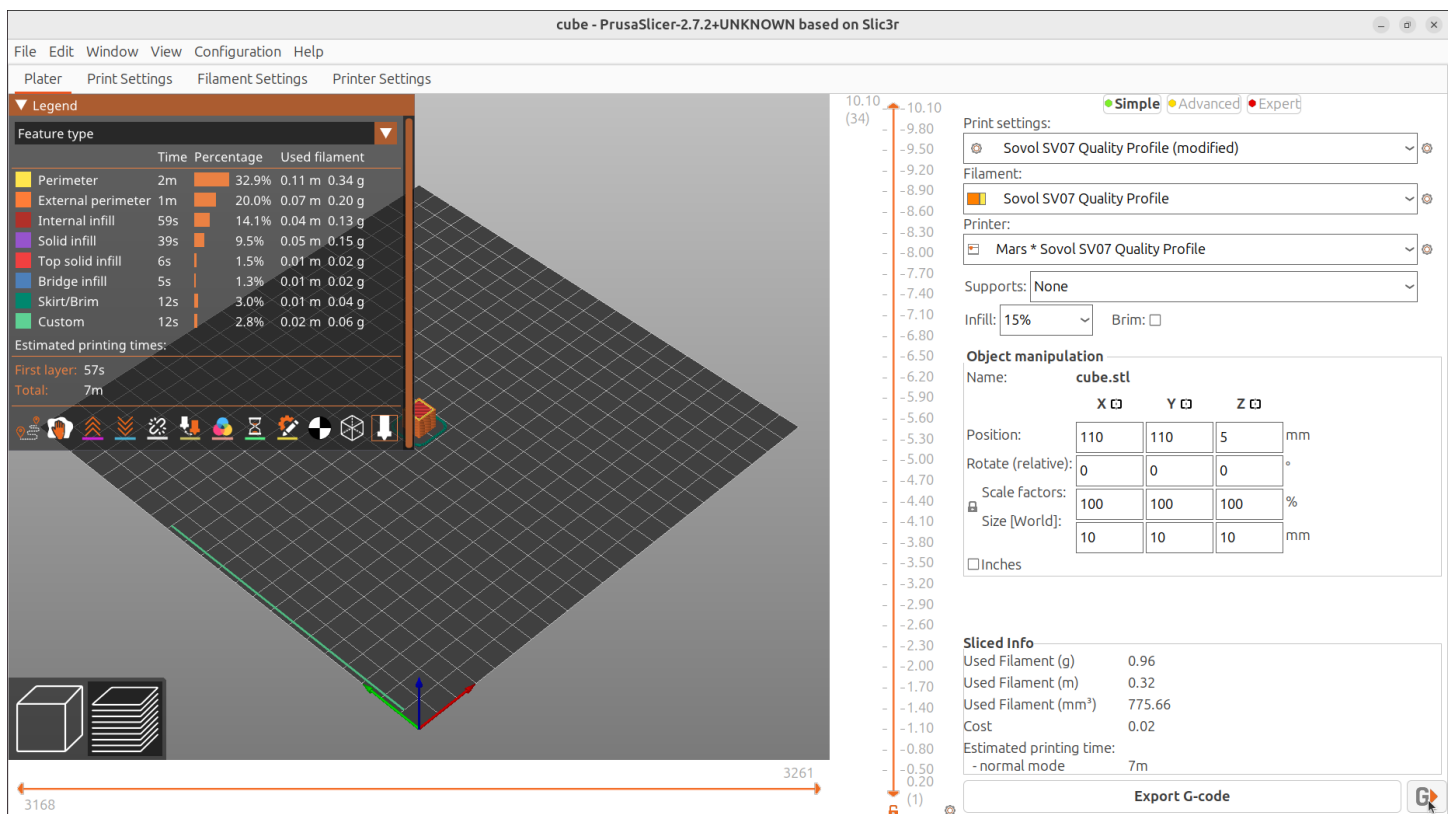


Figure 21: Klick på ‘Send to print’

You will be asked what the printer must be called for your 3D print.

Click ‘Upload and print’ (‘load up and print’).

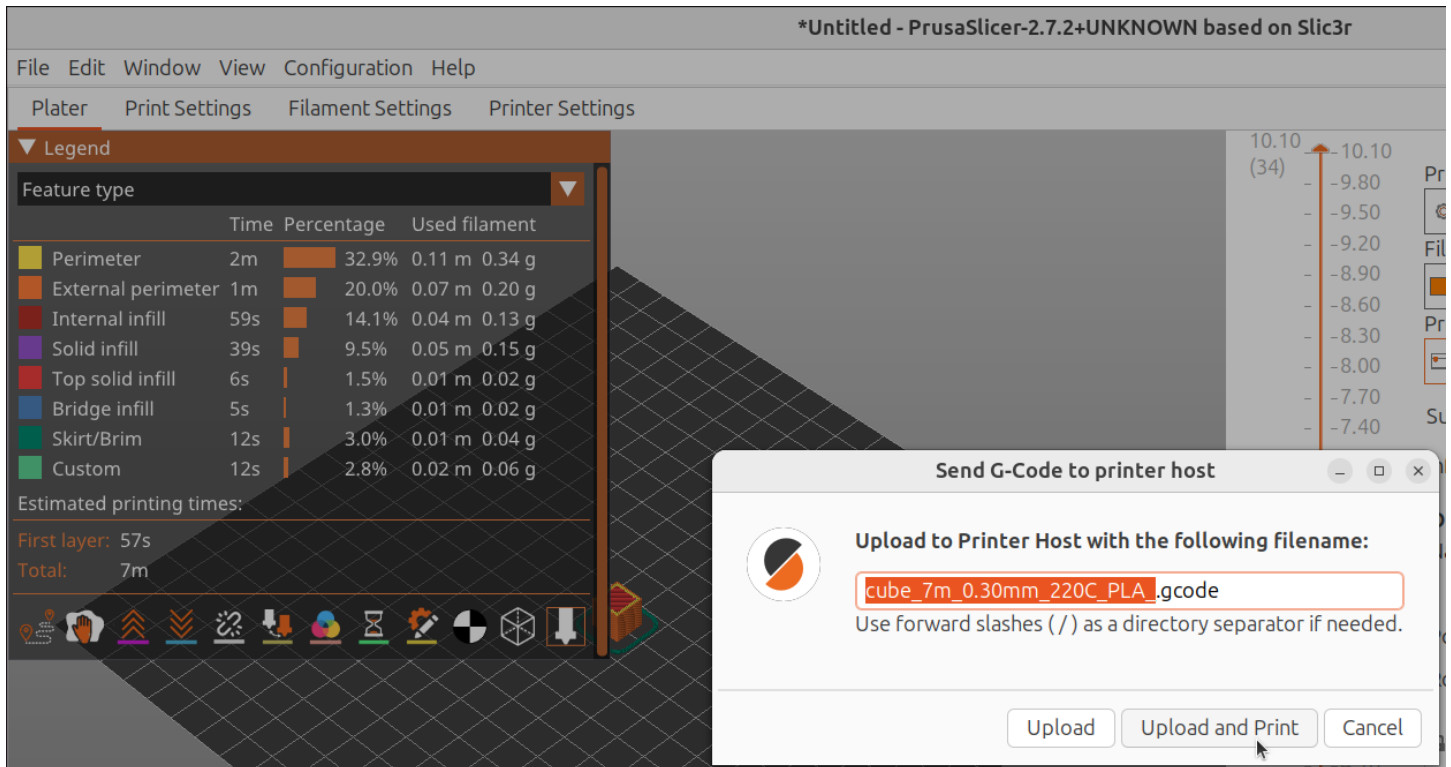


Figure 22: Klicka på ‘Upload and print’

The 3D printer should now start working.

Again, the rule is that, during your first print, you have to look at the printer all the time. The goal is that you see what a normal/successful print looks like.

So, what do you see the printer doing first?

Look at the screen of the 3D printer. How long should your 3D print take?



Figure 23: Skärm av skrivaren

On the heating bed (the plate where the printing takes place), on the front there is a symbol of a fingerprint. What do you think it means?

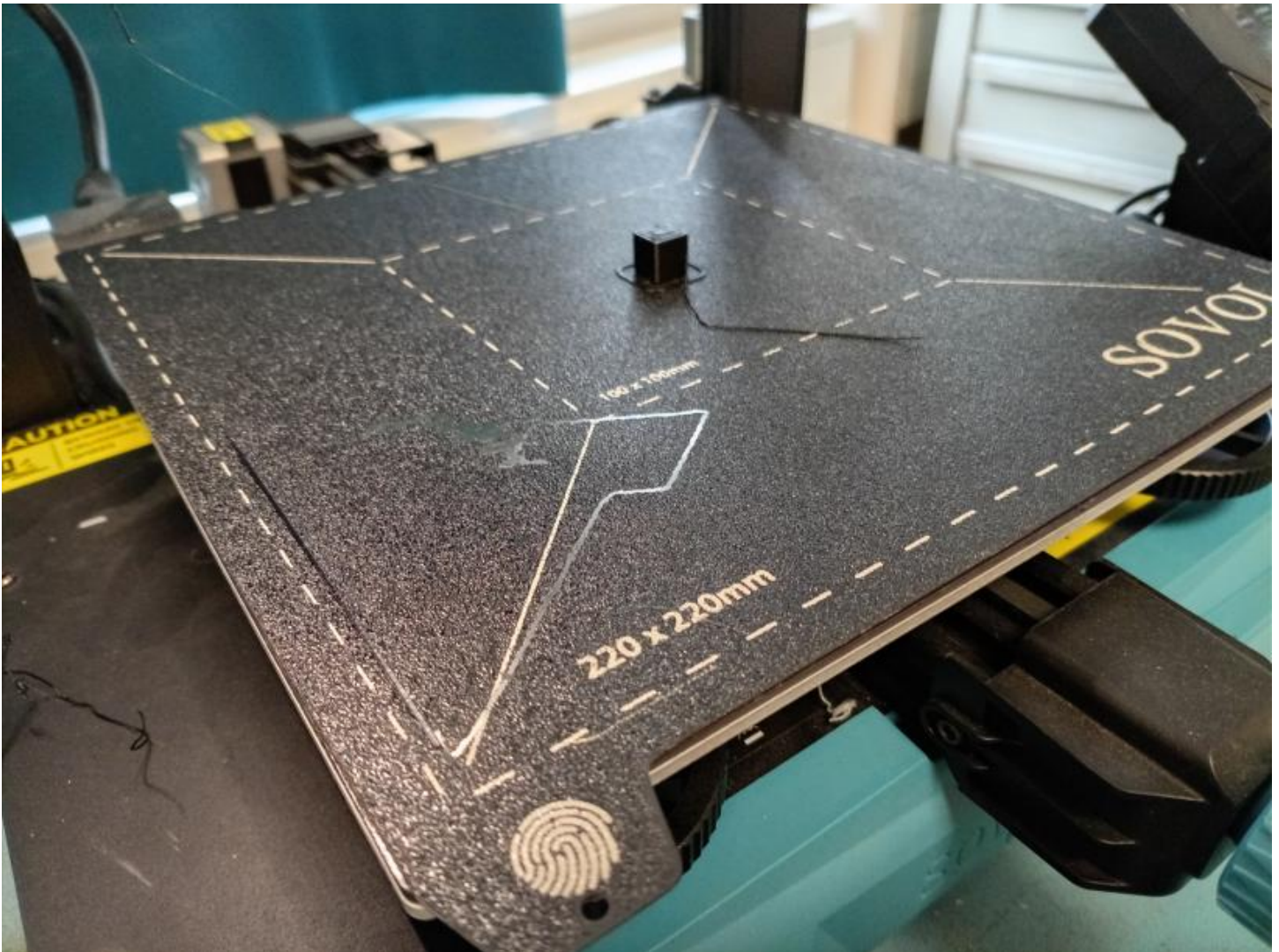


Figure 24: Värmebädden har symboler av fingeravtryckar

1.6. After printing

When the print is done, we do **not** remove it directly. Instead, we wait until the heating bed has cooled down to lower than 30 degrees Celsius.

We will use the websites of our 3D to determine this (and more).

Connect to the UMS WiFi. Then, in your webbrowser, type in the search bar the URL matching your printer.

Printer	URL
Merkurius	10.0.1.101
Venus	10.0.1.102
Tellus	10.0.1.103
Mars	10.0.1.104
Uranus	10.0.1.105

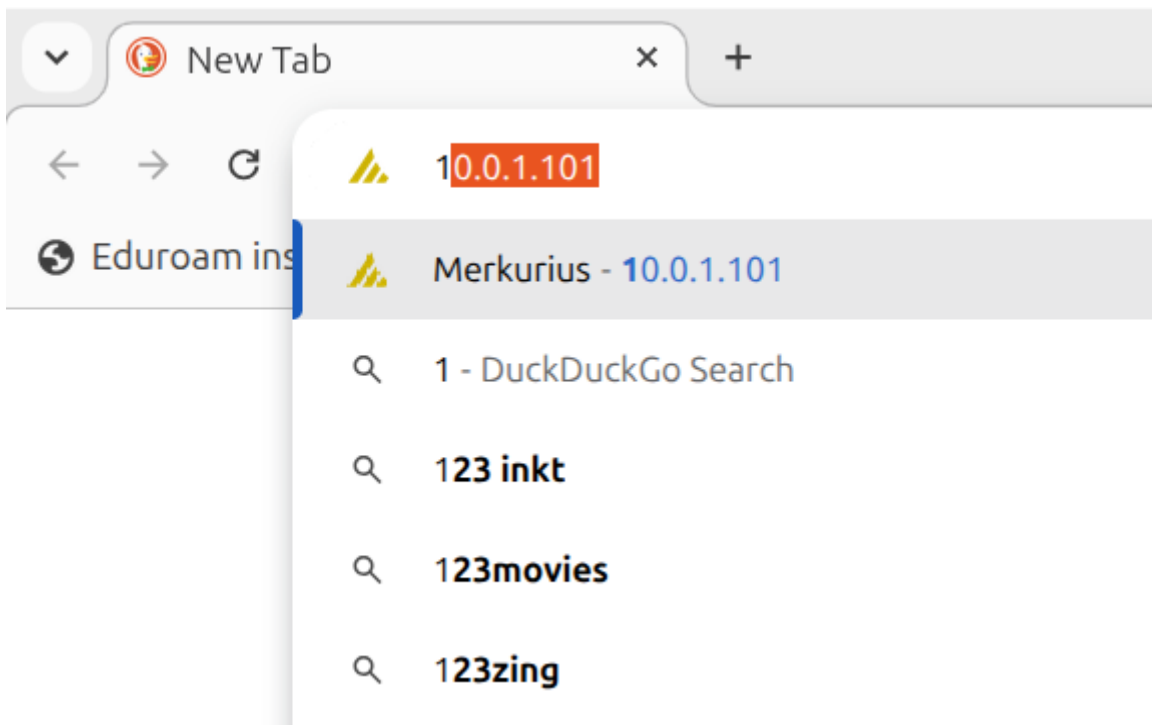


Figure 25: Type the URL of your printer in the browser

You will now see the website of your favorite 3D printer.

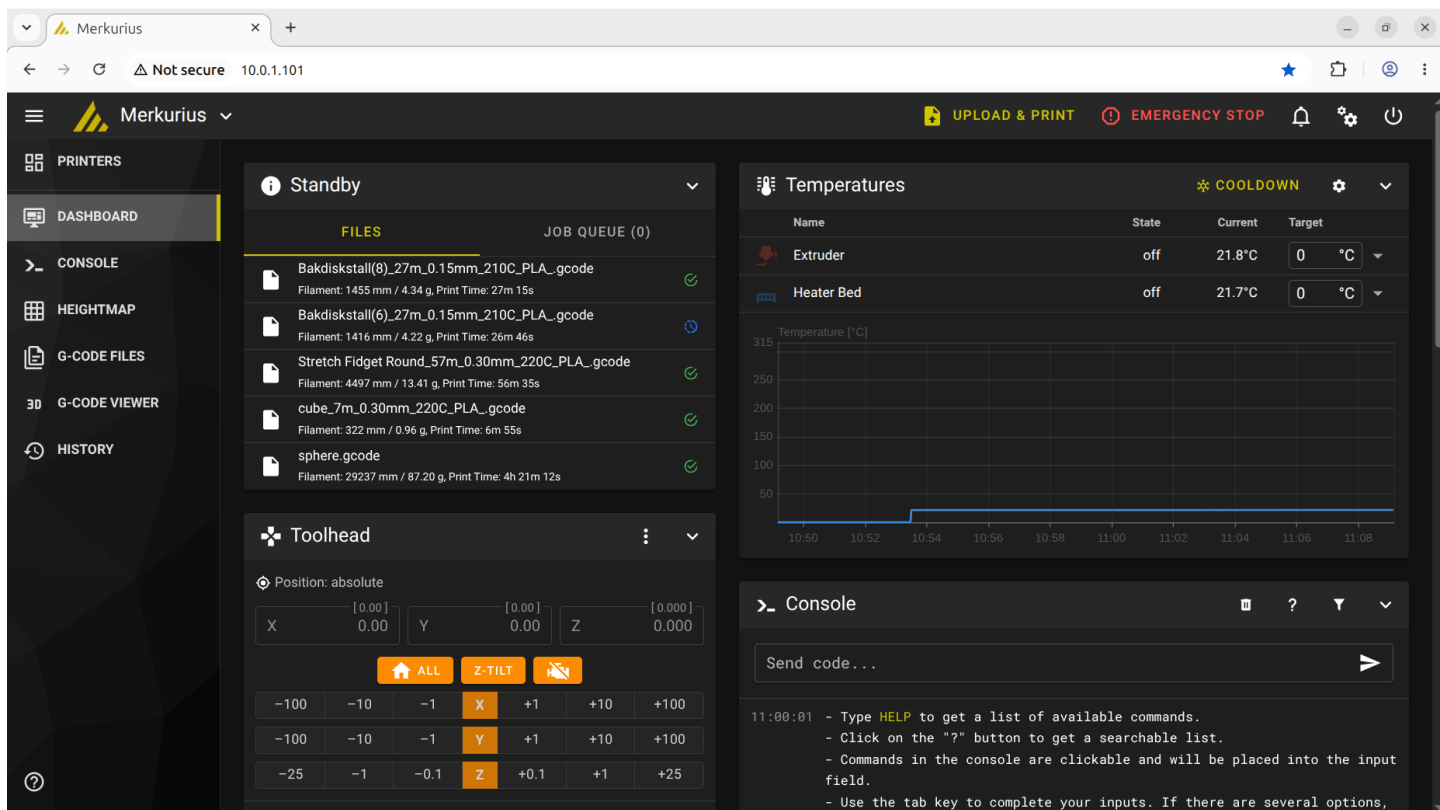


Figure 26: Merkurius homepage

At the website of your favorite 3D printer, you can see how long the print took.

The screenshot shows the Mainsail web interface in a browser. The browser's address bar shows the URL `10.0.1.101` and the status "Not secure". The Mainsail interface has a dark theme with a sidebar on the left containing menu items: PRINTERS, DASHBOARD (highlighted), CONSOLE, HEIGHTMAP, G-CODE FILES, G-CODE VIEWER, and HISTORY. The main content area displays a "Complete" job for the file `cube_from_openscad_7m_0.30mm_220C_PLA_.gcode`. Below the job name is a table with columns: STATUS, FILES, JOB QUEUE (0), and a fourth column. The table has one row with the following data: Filament (321.98 mm), Slicer (0:06:55), Print (0:06:51, circled in red), and Total (0:09:52). Below the table is a "Toolhead" section showing "Position: absolute" and a "default" grid. It displays coordinates for X (5.00), Y (176.00), and Z (150.000). At the bottom of the Toolhead section are buttons for "ALL", "Z-TILT", and a "Z-TILT" icon.

STATUS	FILES	JOB QUEUE (0)	
Filament 321.98 mm	Slicer 0:06:55	Print 0:06:51	Total 0:09:52

Figure 27: Mainsail shows the print time

We are interested in finding out when the heat bed has cooled down to less than 30 degrees celsius.

It is shown here:

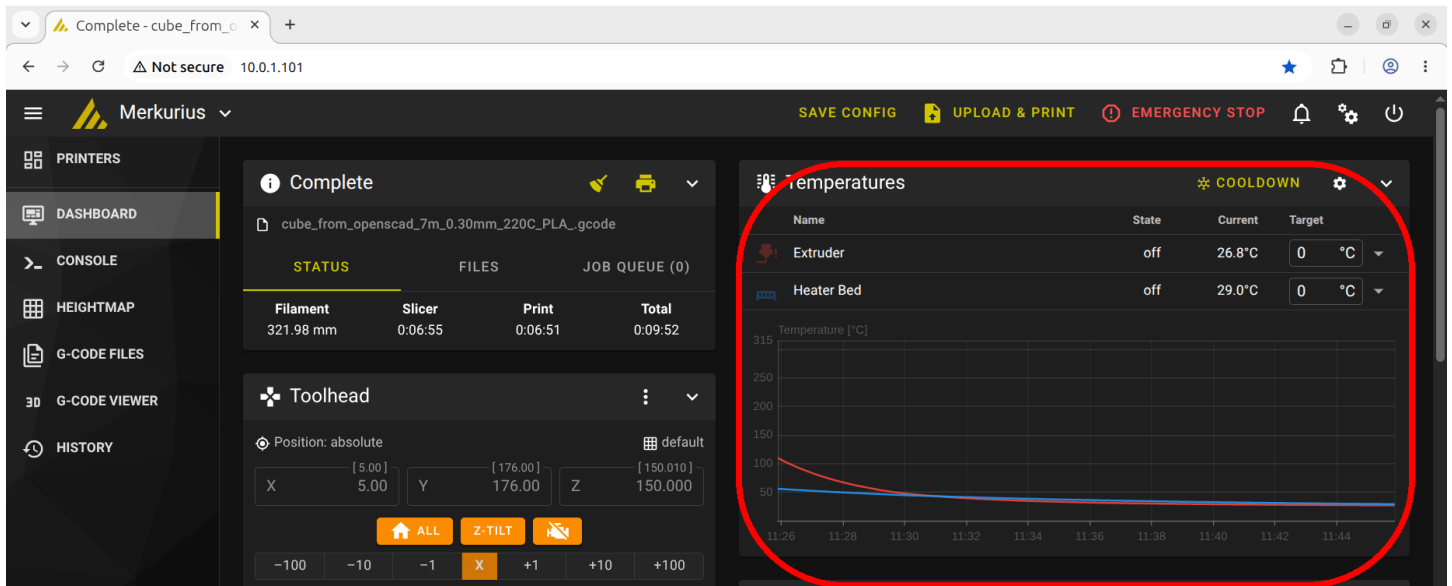


Figure 28: Mainsail shows the temperatures

When the heat bed is less than 30 degrees Celsius, you can remove your 3D print with **tools** (i.e. **not** your hands). Use a metal tool to poke at the bottom of your 3D print (this will not damage the heating bed).

When the 3D print is loose, use **a tool** to push it off the 3D printer (i.e. do **not** use your hands).

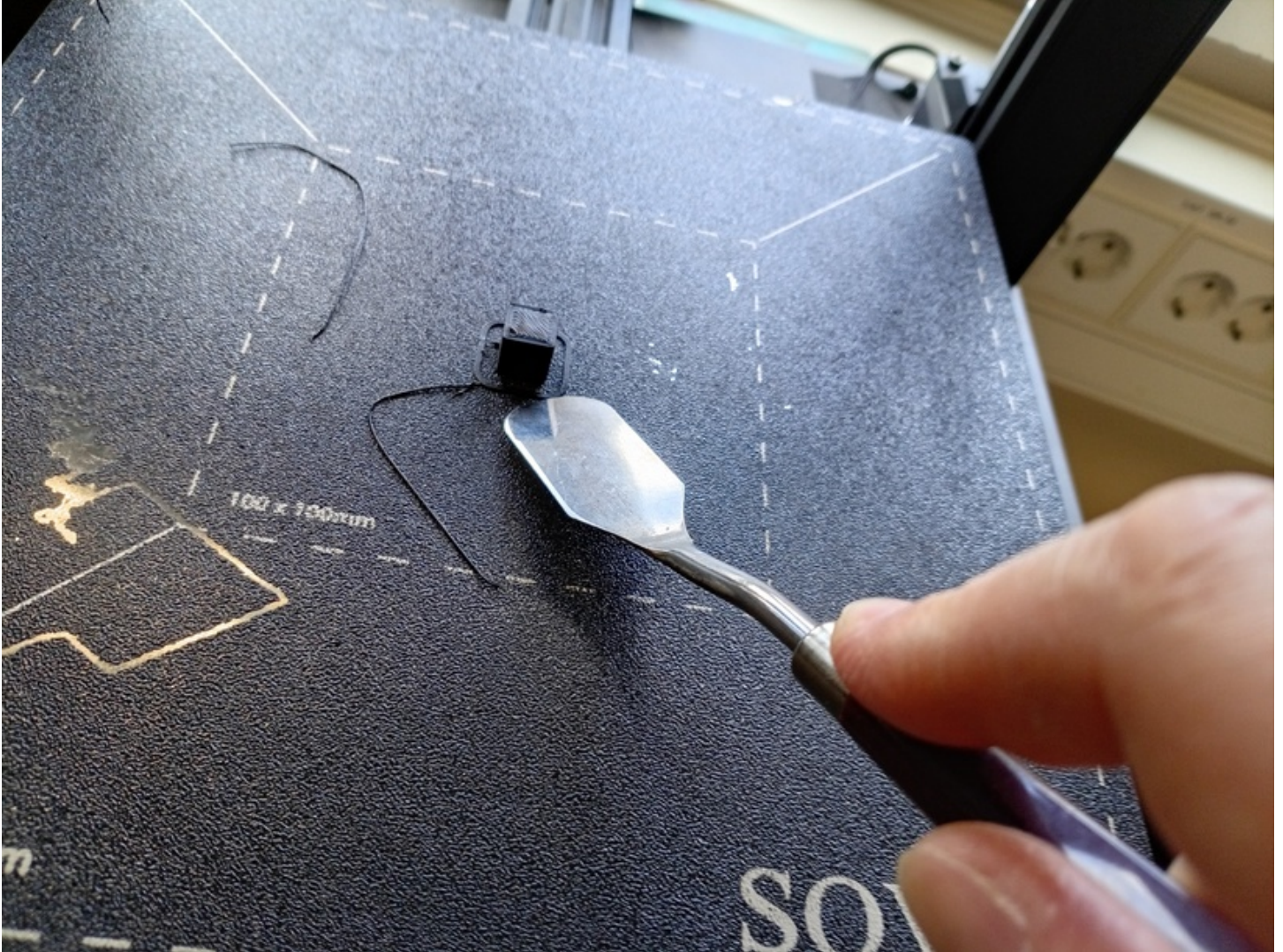


Figure 29: Scraping the cube from the heating bed

If everything was successful: congratulations, you have printed your first thing!



Figure 30: The printed cube