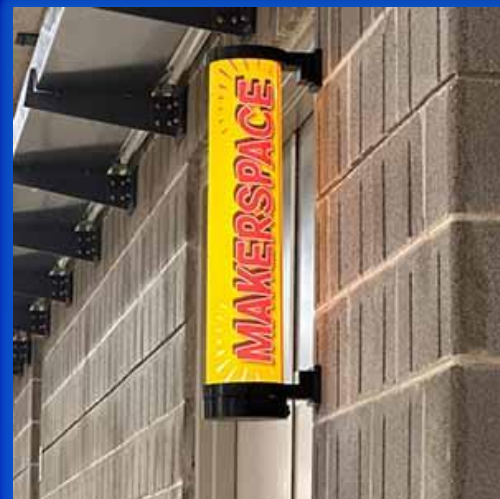




UTRGV™



3D PRINTING - OX TRAINING MANUAL

Prepared by: Alvaro Silvestre (MECE Student)

Revision: Dr. Noe Vargas in 09/18/2025



[Click para Espanol](#)

START

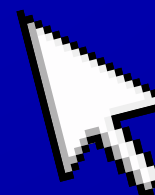


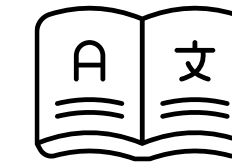
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Part 1: Background

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2. [Slicing](#)
3. [Printing](#)



[Click para Espanol](#)

02

Part 2: Training

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[Already Experienced?](#)

[Skip to Final Checklist & Print Guidelines](#)



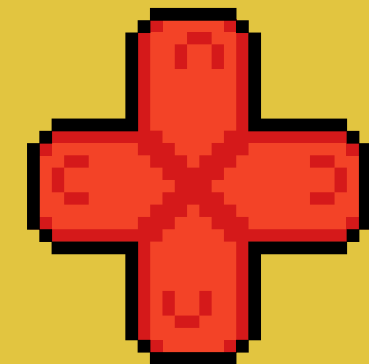
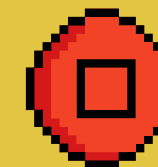
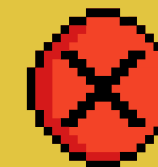
PURPOSE

—O×

This manual prepared by the Makerspace Staff will teach you how to 3D print using the Bambu Labs X1 Carbon printer.

It covers slicing and printing, not CAD.

If you ever need help, don't hesitate to ask a staff member! 💬



—Ox

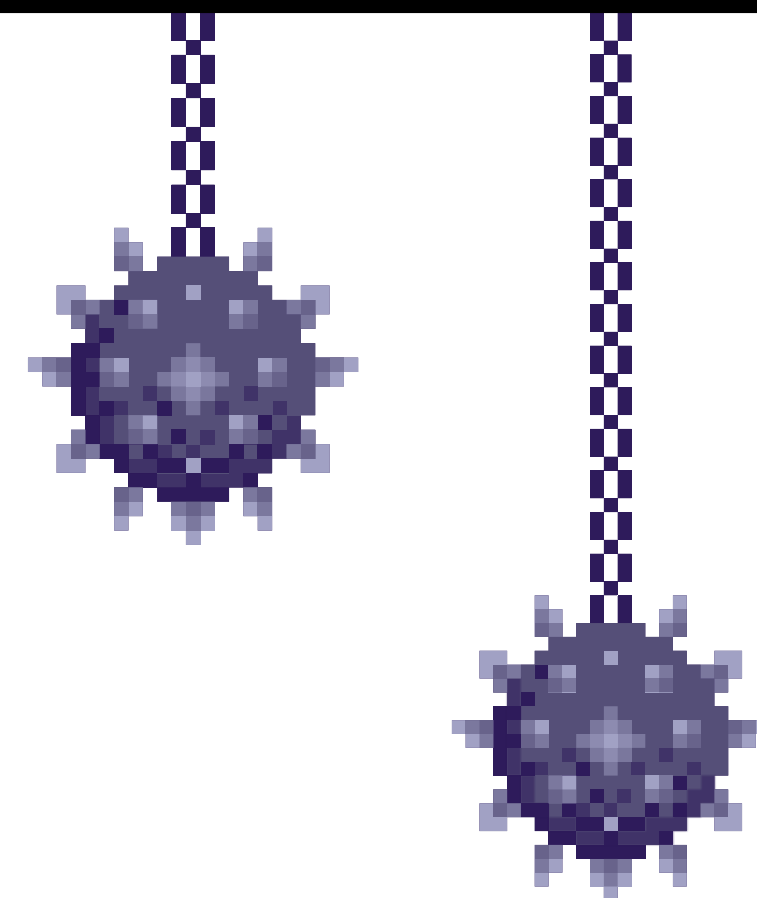
IMPORTANT NOTES

⚠ Mandatory Training

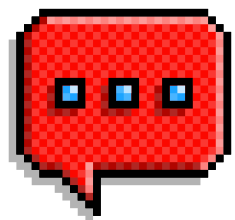
All users must complete this training before using the printers, even if you've 3D printed before.

⚠ Not a full course

This guide introduces the process, not advanced techniques.



FILAMENT USE RULES



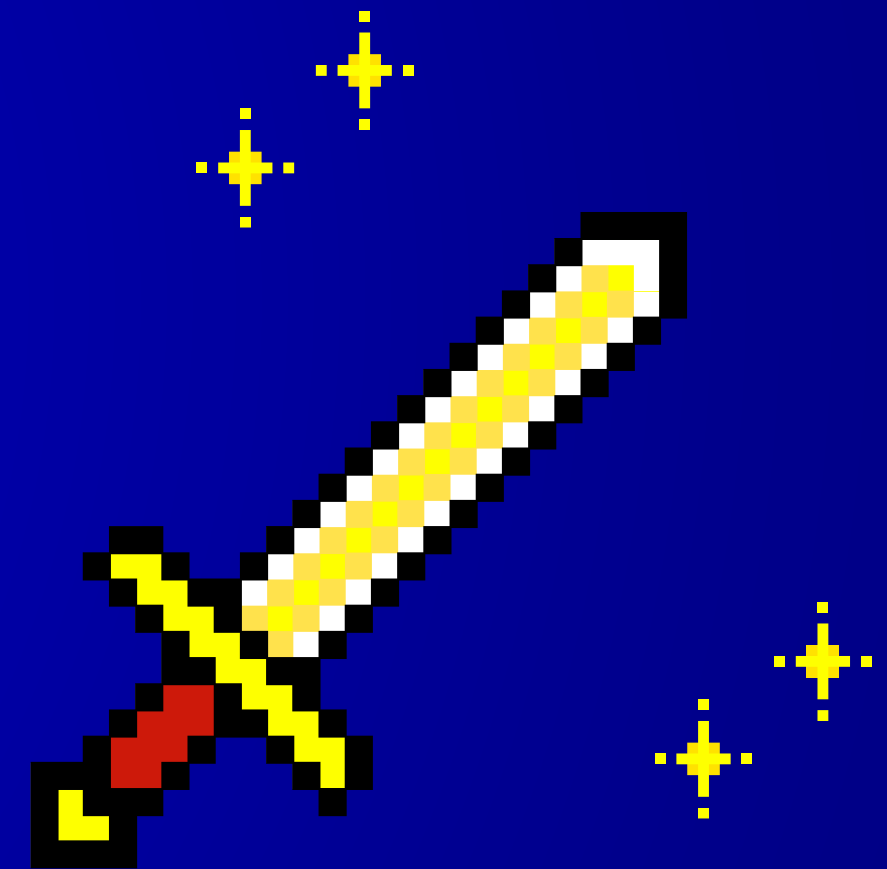
Limit: One print = **max 150g** of filament
(Unless approved by Dr. Vargas or using your own filament)

—OX



After use:
Tape filament tip to the wheel or loop it through the side holes to avoid tangling.

—OX



OVERVIEW

—O×

The Bambu Lab X1 Carbon



- Fast, reliable, high-end consumer 3D printer
- Built-in sensors & auto-calibration
- More info: [Printer Page](#)



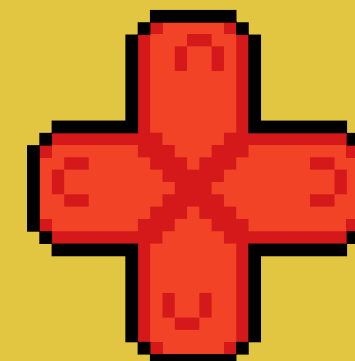
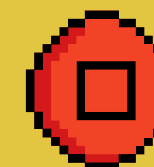
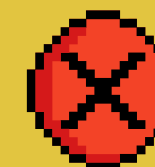
 This file is used for training:



Cali Cat - The Calibration Cat

Cali Cat is designed to be the purrfect initial calibration and benchmarking print. It is a simple, standard test to ensure you have the basics down before proceeding to advanced prints. Cali Cat is the alternative to boring calibration cubes. It's a test...

 Thingiverse / \$0.00



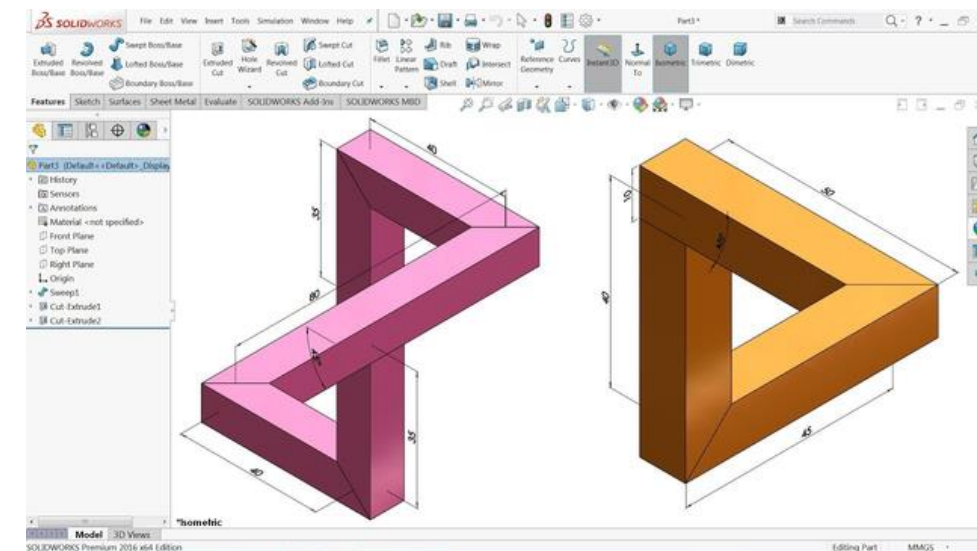


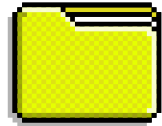
-OX

PART 1 - BACKGROUND: GEOMETRY

 3D Geometry = The digital shape
You need a 3D model made in CAD
software like:

- Fusion 360
- SolidWorks
- Maya
- Blender
- Inventor

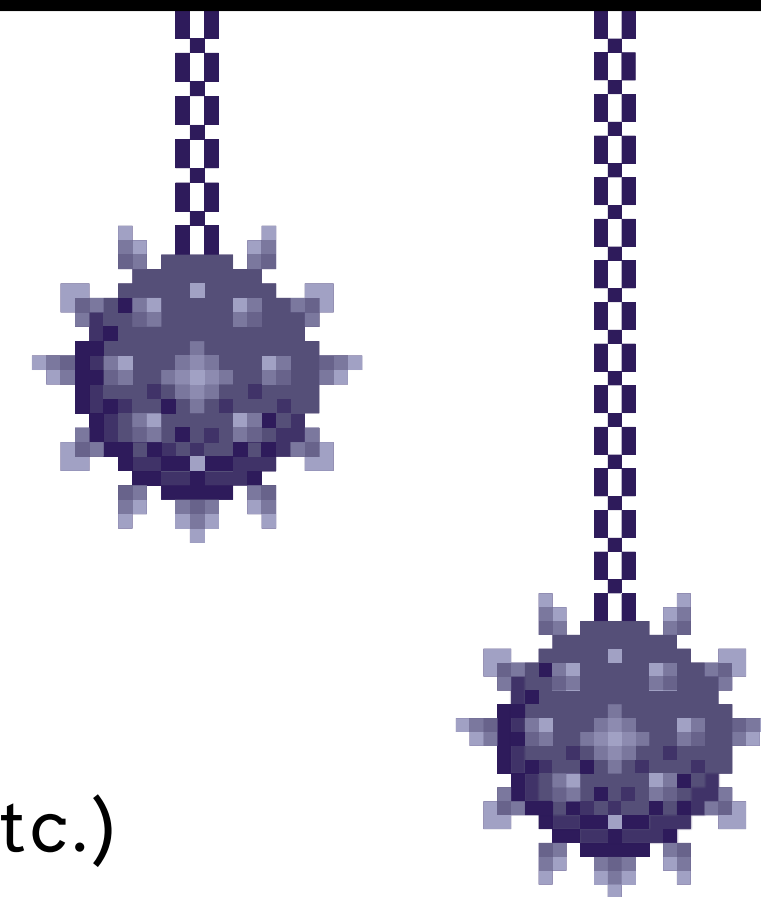
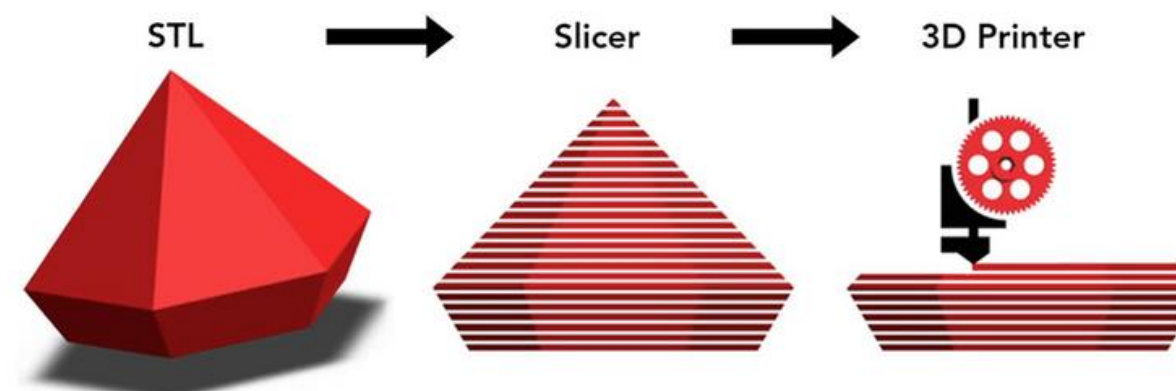
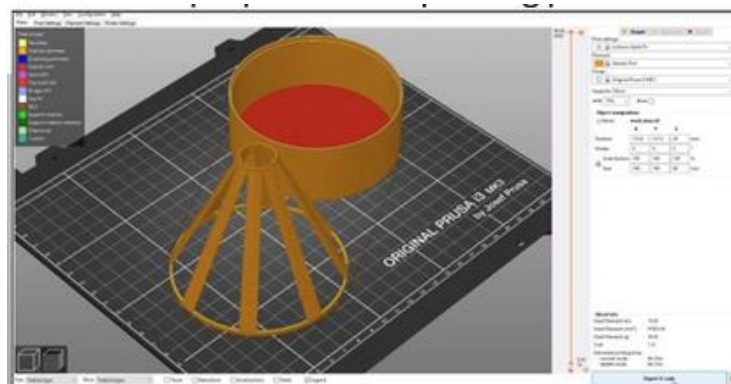




-0x

PART 1 - BACKGROUND: SLICING

✂ Slicing = Converting your model into layers



- Output: GCODE
- GCODE = Printer instructions (movement, heat, etc.)
- Software: Bambu Studio, Cura, etc.



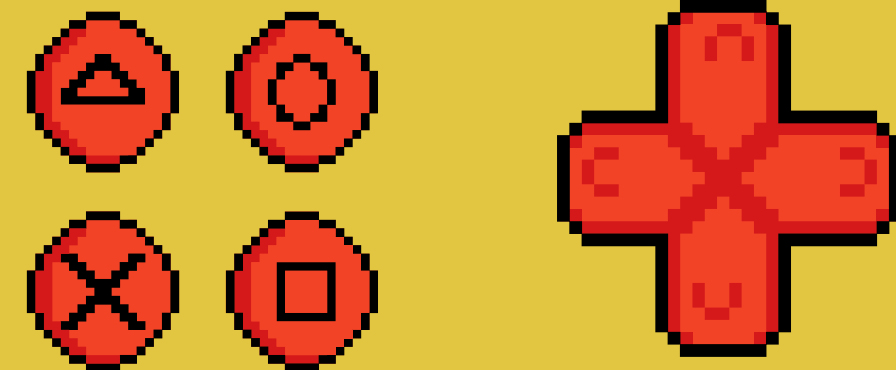
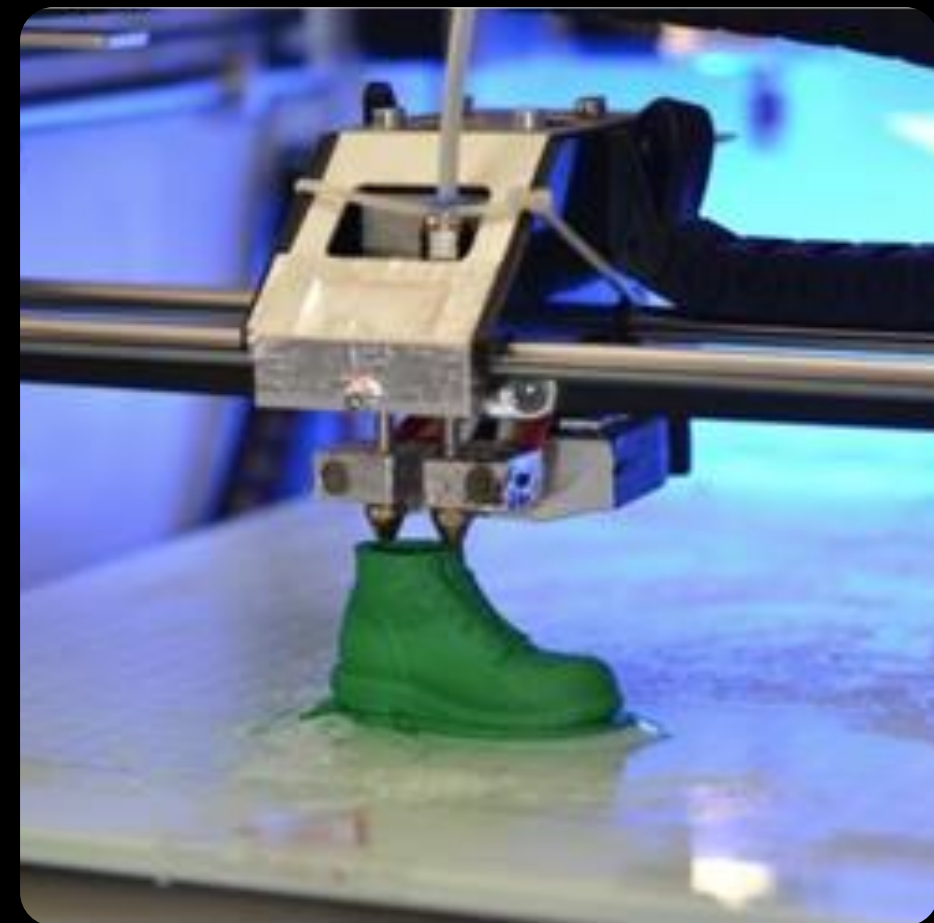
PART 1 - BACKGROUND: PRINTING - O X

🖨️ The 3D printer pushes melted filament through a heated nozzle

- The nozzle follows GCODE to build your model
- Your model becomes real!

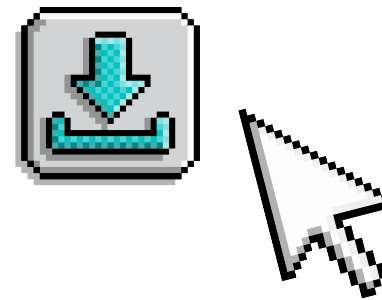


```
jiggershelltophalf.gc...  
G1 X163.344 Y83.040 E0.1090  
G1 X166.530 Y87.946 E0.1683  
G1 X167.185 Y92.941 E0.1696  
G1 X167.525 Y98.425 E0.1851  
G1 X167.538 Y98.625 F2400  
; outer perimeter  
G1 X167.961 Y98.175 F4800  
G1 X184.357 Y98.175 E0.5521  
F2400  
G1 X184.357 Y99.525 E0.0455  
G1 X166.566 Y99.525 E0.5991  
G1 X166.383 Y94.728 E0.1617  
G1 X165.844 Y89.732 E0.1692  
G1 X164.985 Y84.898 E0.1654  
G1 X163.737 Y79.913 E0.1731  
G1 X162.222 Y75.242 E0.1654  
G1 X160.345 Y70.581 E0.1692  
G1 X158.202 Y66.163 E0.1654  
G1 X155.648 Y61.704 E0.1731  
G1 X152.917 Y57.623 E0.1654  
G1 X149.844 Y53.648 E0.1692  
G1 X146.503 Y49.894 E0.1692  
G1 X142.911 Y46.382 E0.1692  
G1 X139.083 Y43.126 E0.1692  
G1 X135.040 Y40.144 E0.1692  
G1 X130.899 Y37.505 E0.1654  
G1 X126.486 Y35.101 E0.1692  
G1 X121.918 Y33.009 E0.1692  
G1 X117.216 Y31.238 E0.1692  
G1 X112.402 Y29.796 E0.1692  
G1 X107.613 Y28.713 E0.1654
```



PART 2 - TRAINING: GEOMETRY

Step 1: Download the Cali-Cat file



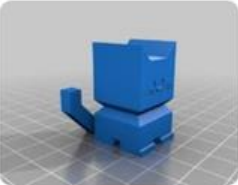
This is the model you will print:

Thing details Files **1** Comments 192 Makes **647** Remixes 141 Apps 4

License CC BY-NC-SA 

Cali Cat - The Calibration Cat
by Dezi9n is licensed under the [Creative Commons - Attribution - Non-Commercial - Share Alike](#) license.

Take advantage of extra features by downloading [UltiMaker Cura](#)



calicat.stl

Size	Updated	Downloads
42 kb	05-09-2016	591K

[Open in Cura](#) [...](#) [↓](#)

Download all files 



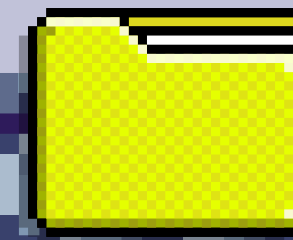
—OX

STEP-BY-STEP: BAMBU STUDIO

▶ Watch this tutorial:

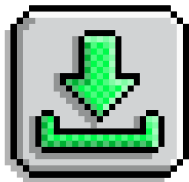


🎯 Goal: Learn the slicer interface



PART 2 - TRAINING: SLICING SOFTWARE

Step 2: Install Bambu Studio

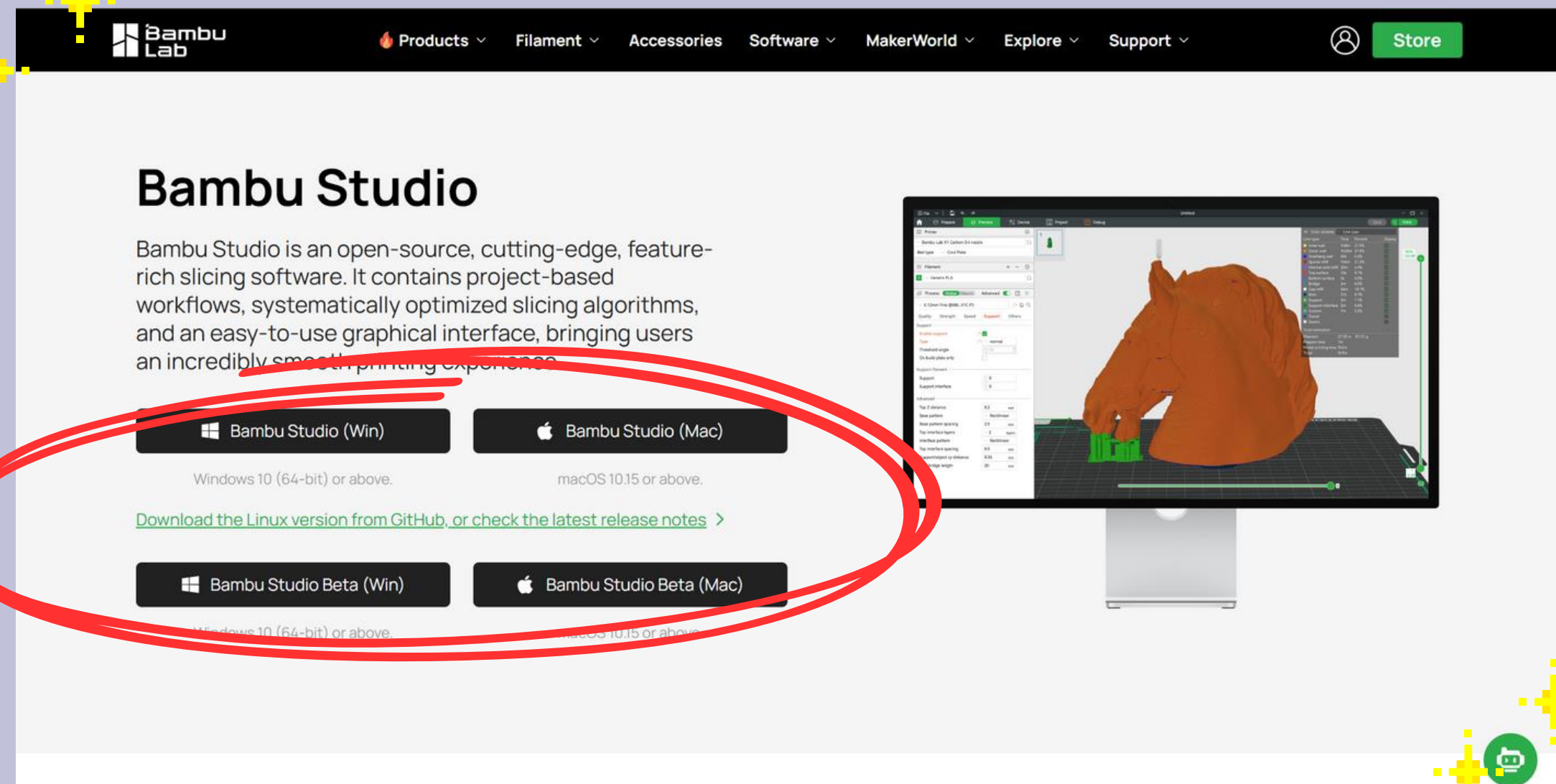


<https://bambulab.com/en/download/studio>

? Need help? Ask a staff member!



Click to go to the Makerspace Team Slide



Bambu Studio

Bambu Studio is an open-source, cutting-edge, feature-rich slicing software. It contains project-based workflows, systematically optimized slicing algorithms, and an easy-to-use graphical interface, bringing users an incredibly smooth printing experience.

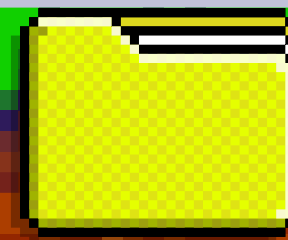
[Download the Linux version from GitHub, or check the latest release notes >](#)

Bambu Studio (Win) **Bambu Studio (Mac)**

Windows 10 (64-bit) or above. macOS 10.15 or above.

Bambu Studio Beta (Win) **Bambu Studio Beta (Mac)**

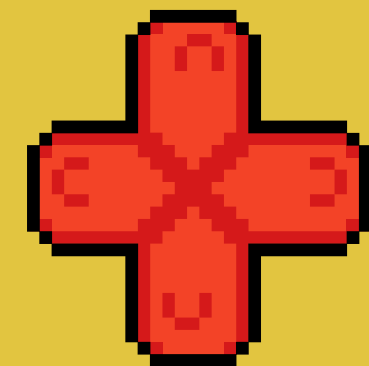
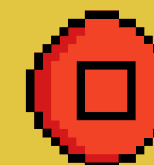
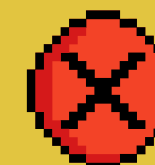
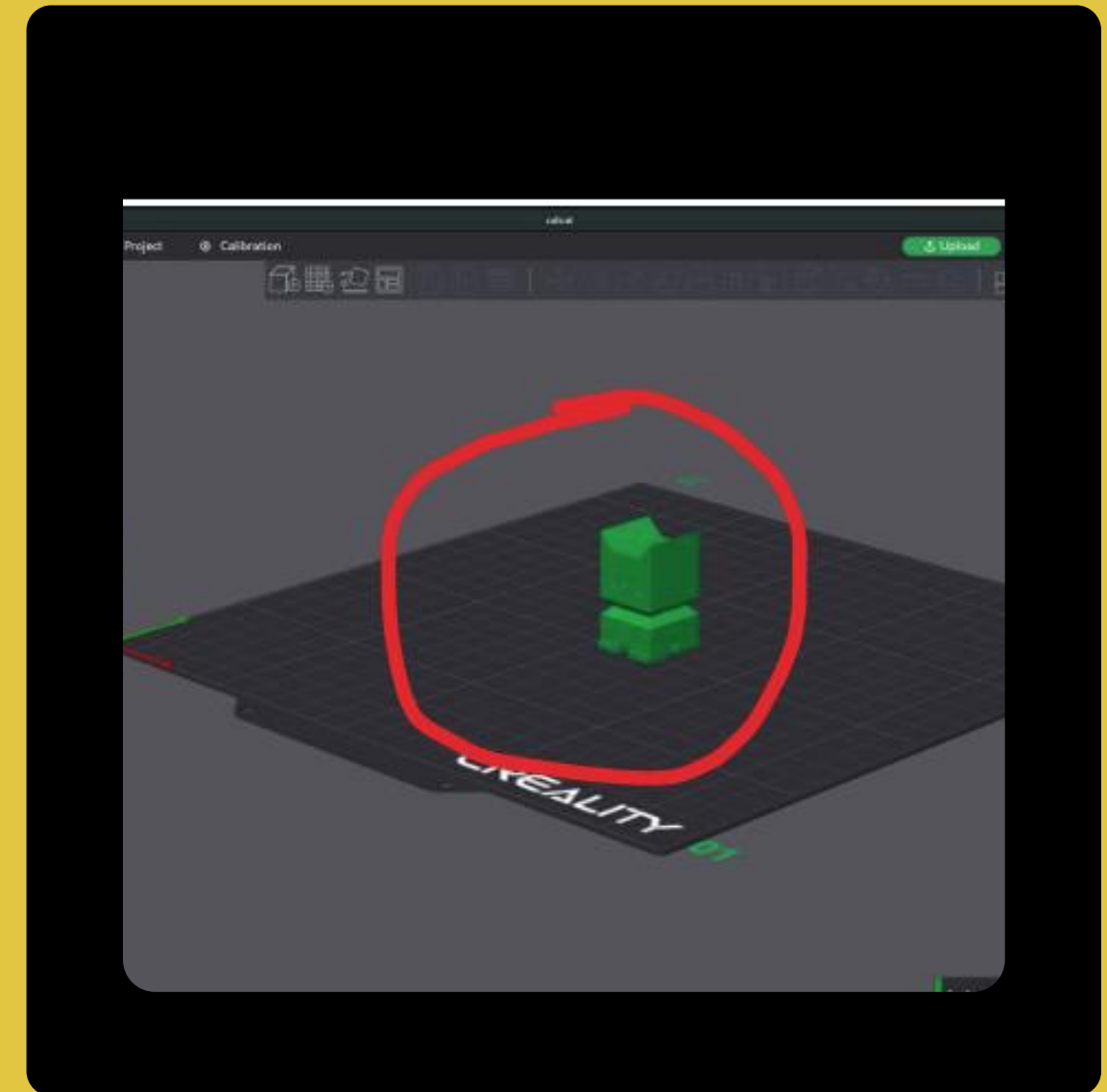
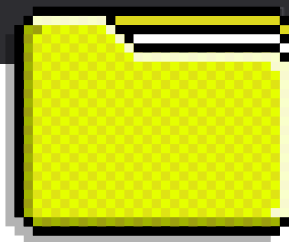
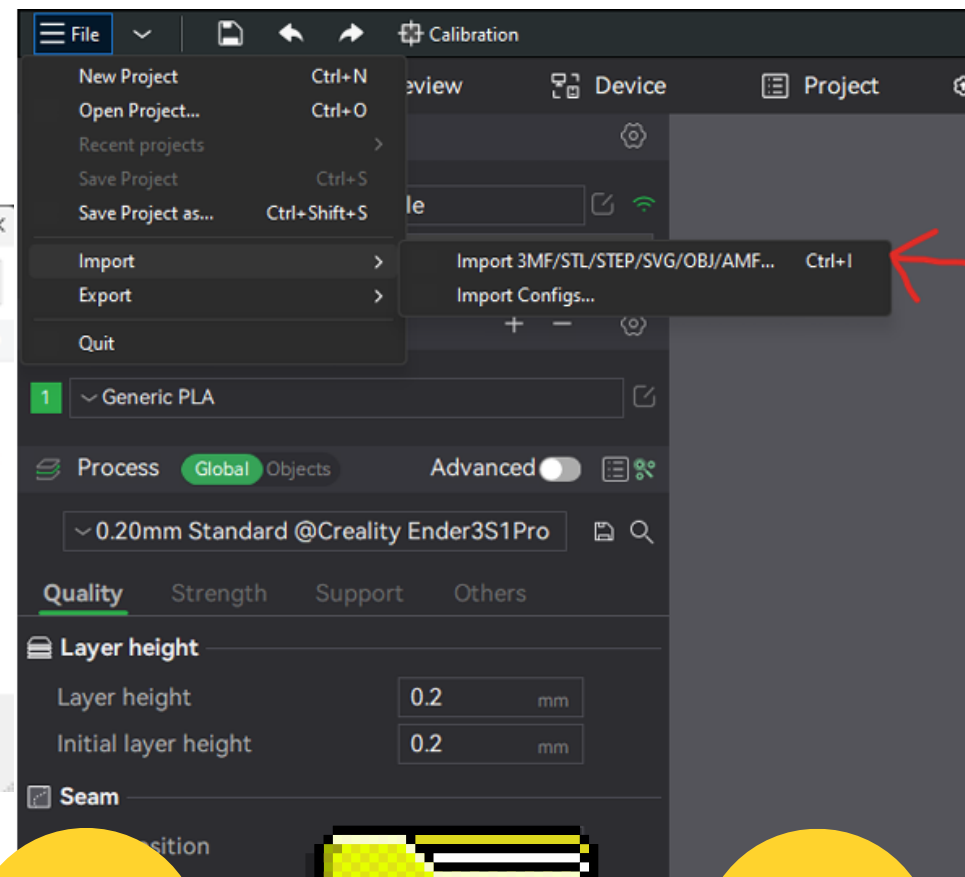
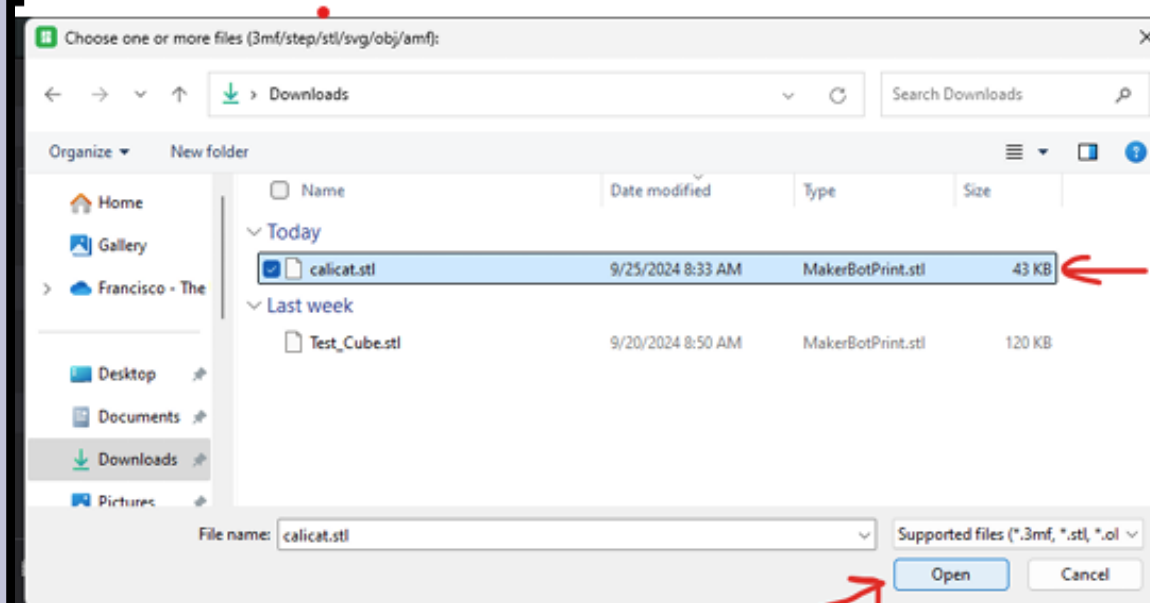
Windows 10 (64-bit) or above. macOS 10.15 or above.



LOAD THE MODEL -OX

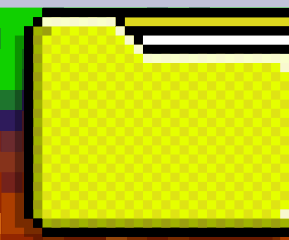
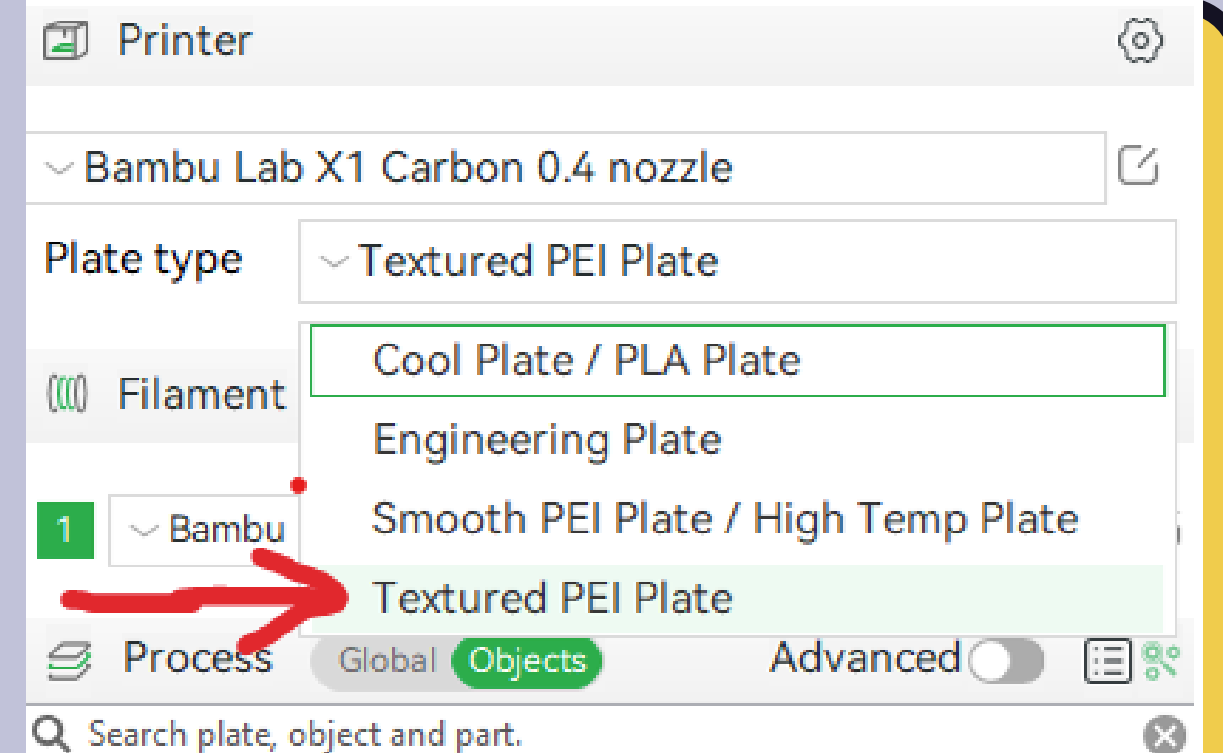
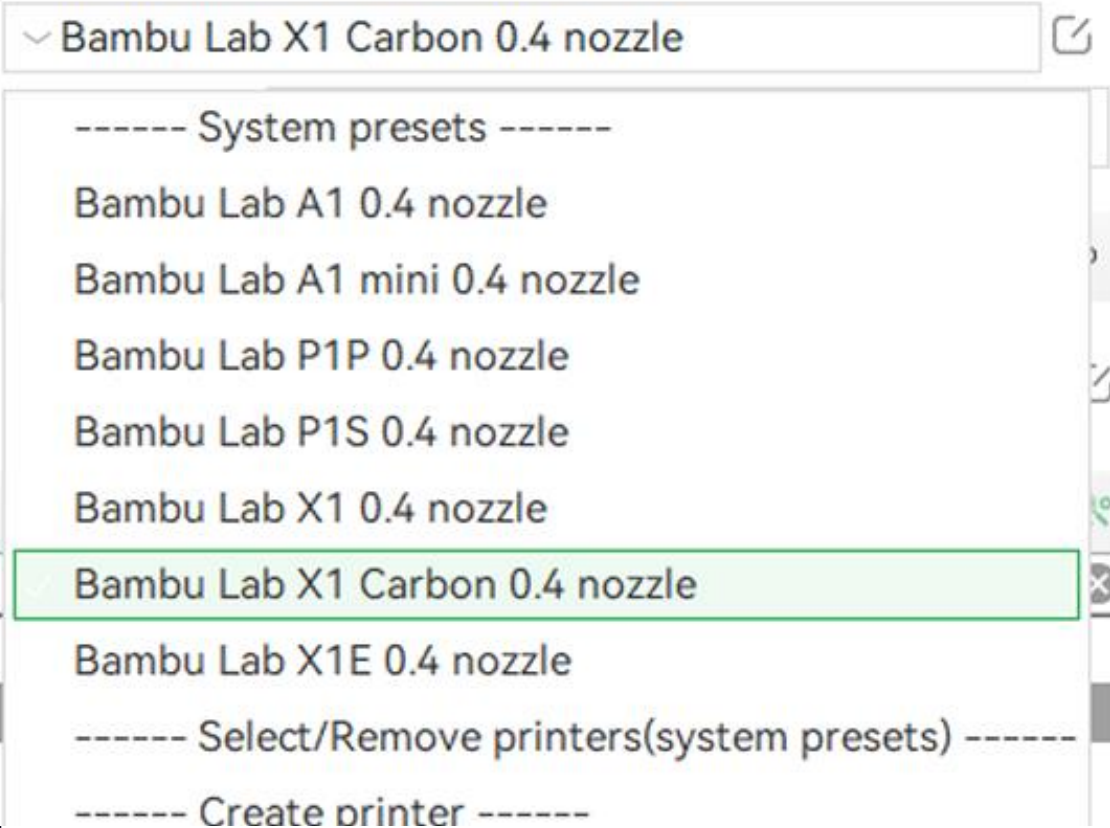
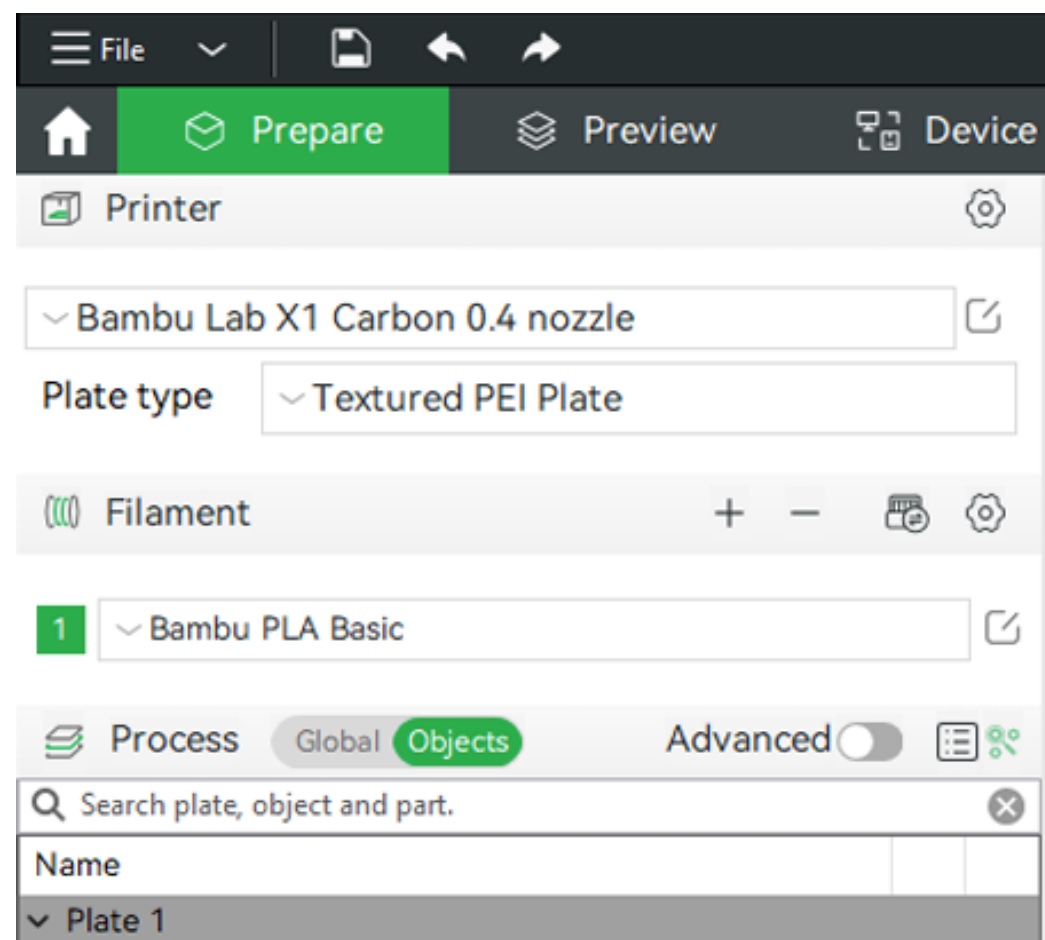
🐱 Open the Cali-Cat file inside Bambu Studio

Use the import function



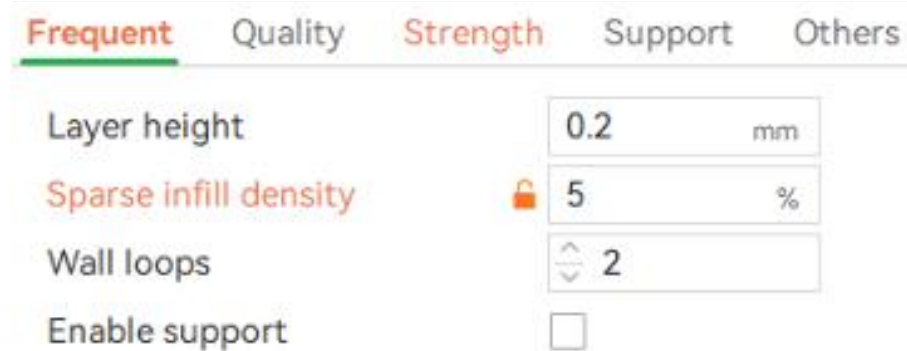
PRINTER SETTINGS

Match exactly as shown:

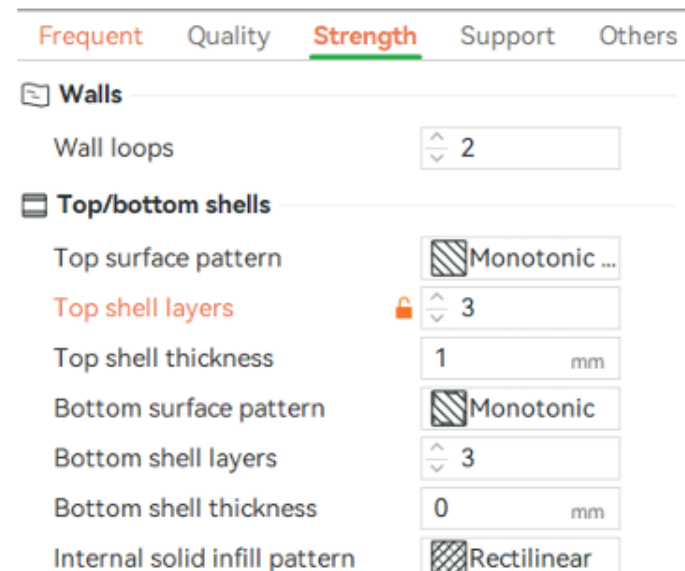


PRINT SETTINGS

- Layer Height: 0.1–0.3mm
(lower values will take longer)
- Infill: 5%



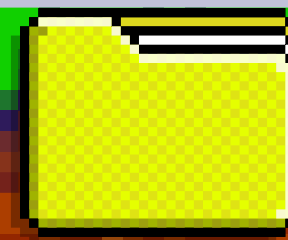
- Top Shell layers: 3



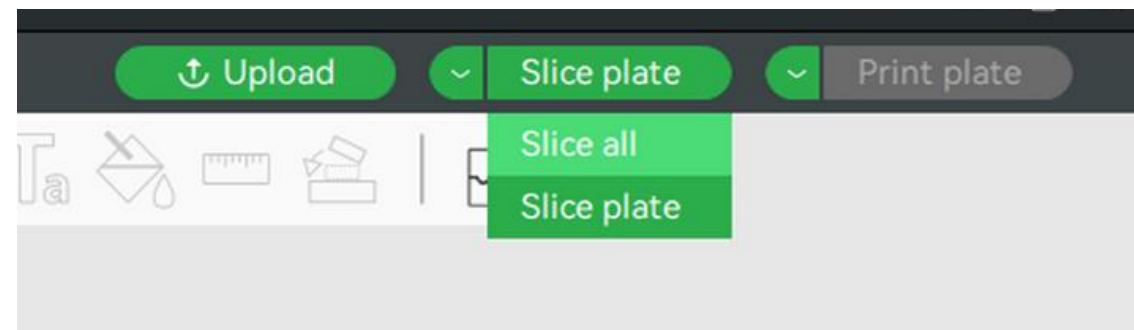
- Material: BambuLab PLA Basic
(ask a staff member when on this setting)



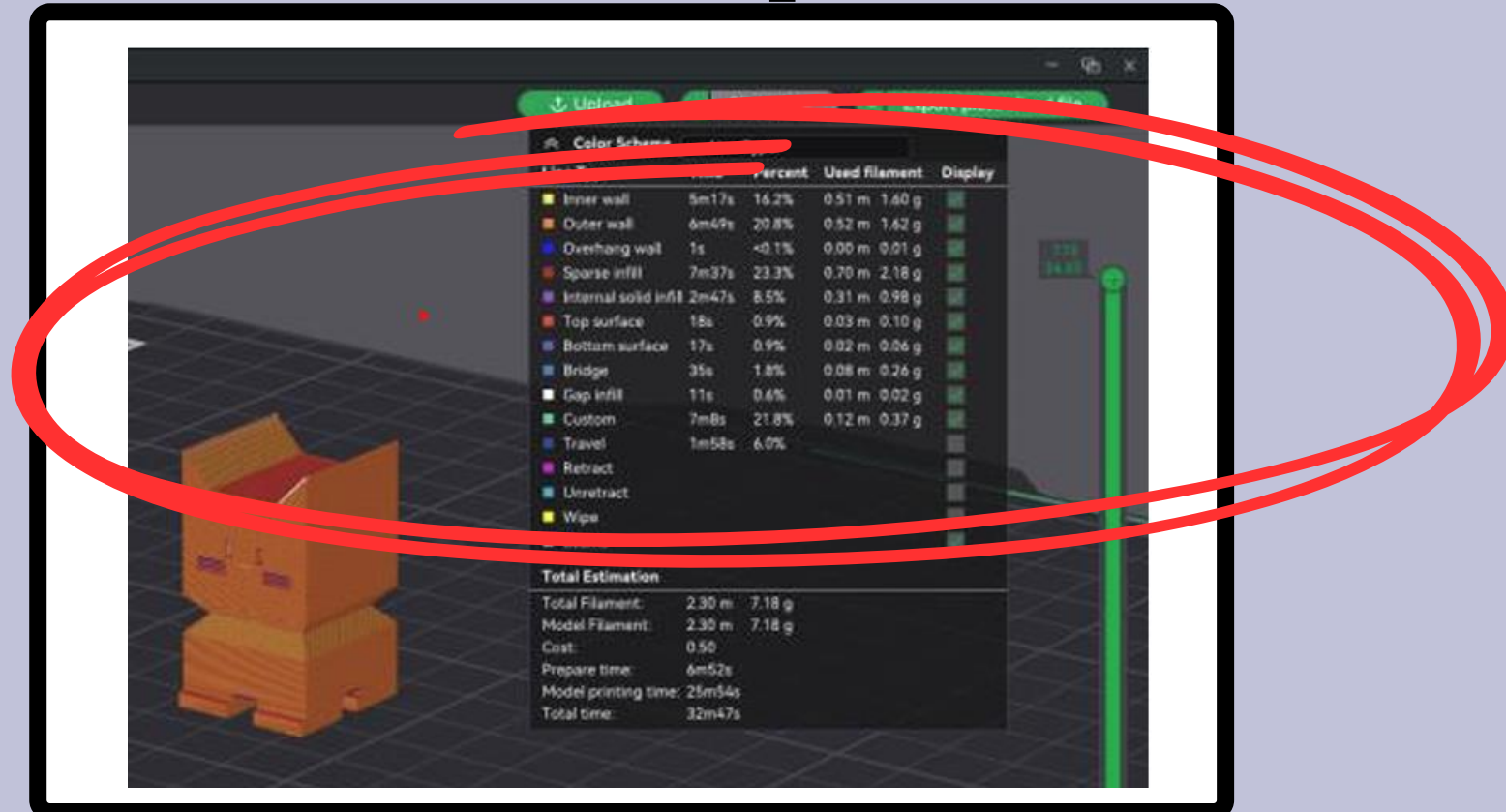
Ask for staff approval



SAVE THE FILE



 **Slice & Save your file**



Upload Slice all Print plate

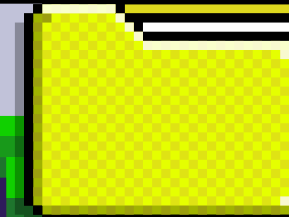
Color Scheme Line Type

Line Type	Time	Percent	Used filament
Inner wall	18m26s	15.3%	5.94 m 17.99 g
Outer wall	27m4s	22.4%	5.49 m 16.65 g
Sparse infill	18m22s	15.2%	5.72 m 17.32 g
Internal solid infill	24m35s	20.3%	5.45 m 16.58 g
Top surface	1m38s	1.4%	0.12 m 0.37 g
Bottom surface	5m21s	4.4%	0.99 m 2.99 g
Bridge	4m26s	3.7%	0.69 m 2.09 g
Gap infill	12s	0.2%	0.01 m 0.04 g
Custom	7m0s	5.8%	0.12 m 0.36 g
Travel	14m4s	11.6%	
Retract			
Unretract			
Wipe			
Seams			

Total Estimation

Total Filament:	24.53 m	74.33 g
Model Filament:	24.53 m	74.33 g
Cost:	1.86	
Prepare time:	6m45s	
Model printing time:	1h54m	
Total time:	2h1m	

Print plate Print all Send Send all Export plate sliced file Export all sliced file



PART 2 - TRAINING: PRINTING

Staff supervision required

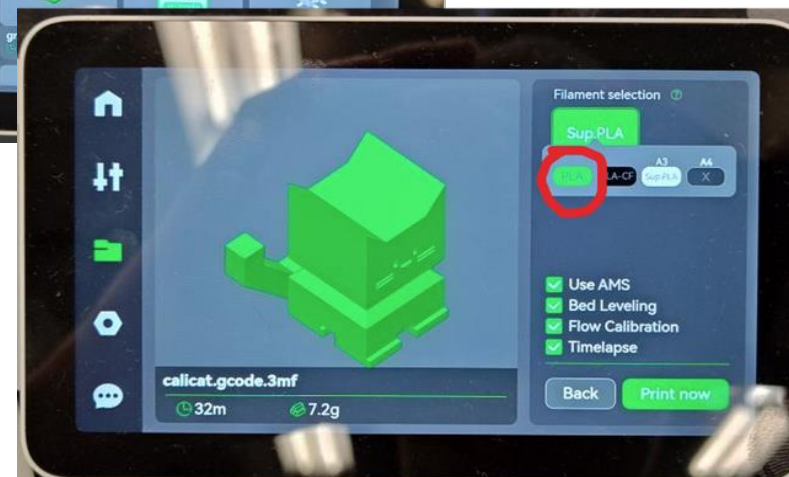
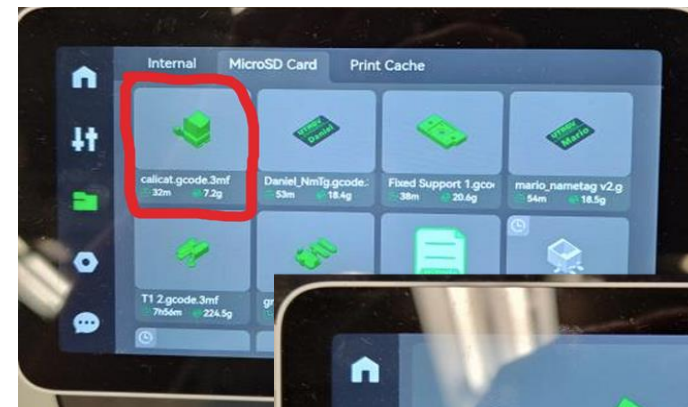
Once you finish PART 1 of the training, you need to come to the Makerspace and talk to the staff to complete PART 2.

- First, the staff will review your slicing file with you.
- Once reviewed, the file will be transferred to an SD card.
- The SD card will be inserted in the bottom-right of touchscreen.



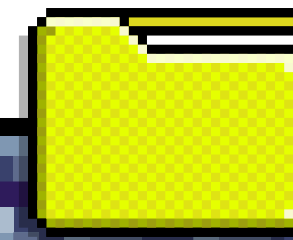
On the touchscreen:

- Go to "Print" tab
- Select your file
- Select your material
(if material is not set, select the filament you selected when slicing).



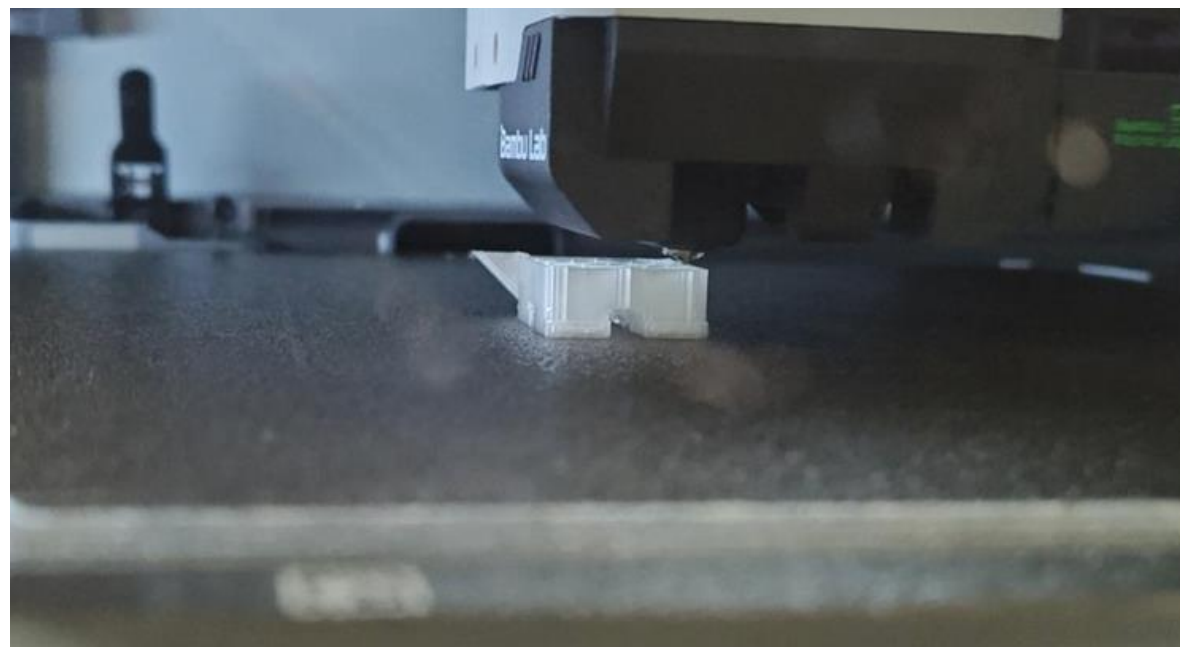
- Hit print
- Printer will calibrate automatically

Then printing begins! 🎉



PART 2 - TRAINING: WATCH & PICK UP

Wait while the printer makes your part.



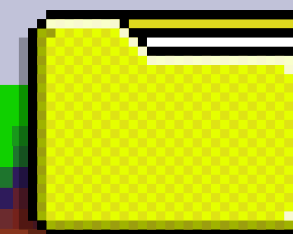
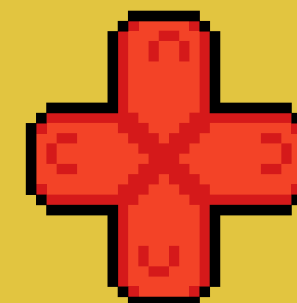
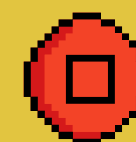
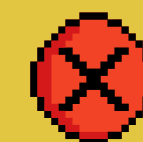
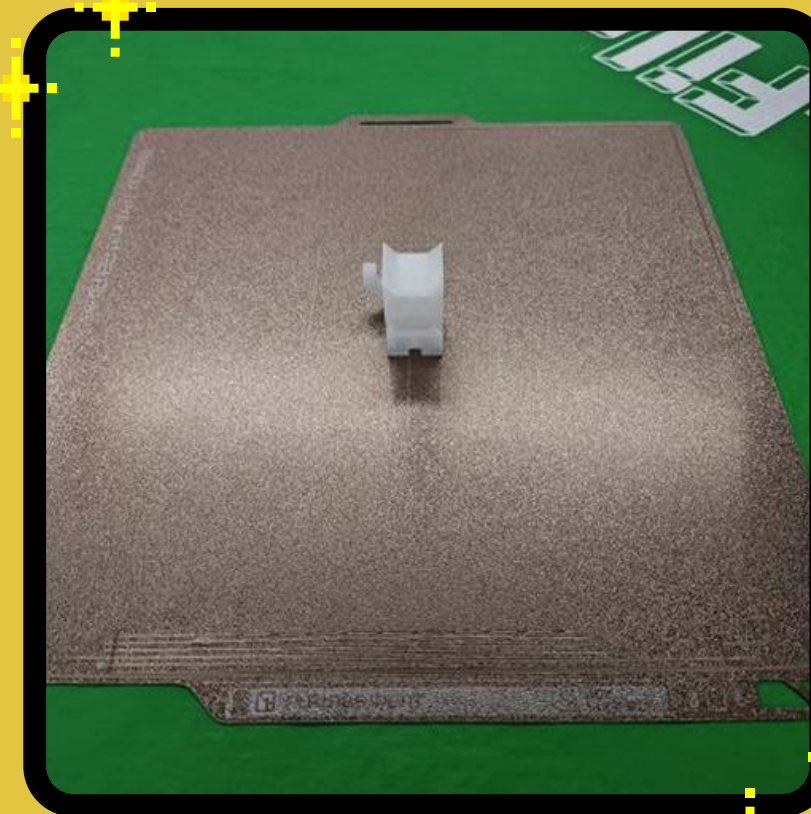
Come back to pick up your part

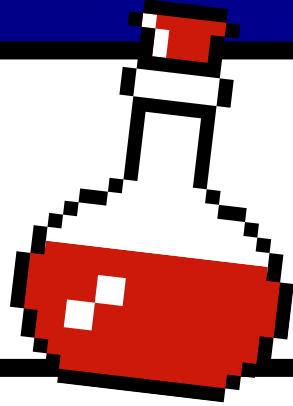


- 👁️ Watch, if you want
(behind the glass only)
- 🔥 Warning: Hot surface
- 🚫 Do not touch while printing

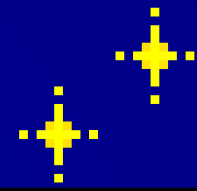
Make sure to ask a staff member to help you get the print out.

🎓 Final Result

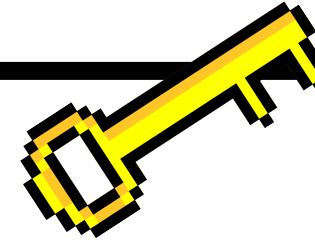




THE MAKERSPACE TEAM



— O X



This presentation covers the theoretical portion PART 1 of the 3D Printing Training Manual.

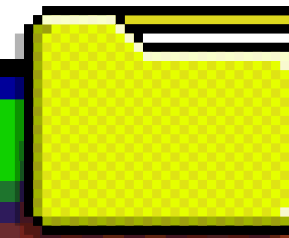
✓ To complete your certification:

- Visit the UTRGV Makerspace
- Ask the staff for instructions on the hands-on PART 2 session

Once PART1 and PART 2 of the training are completed, you'll earn your official 3D Printing Certification Badge! 🏆

🔧 For any questions, feedback, or support,
contact us at the Makerspace Service Desk, or via email:

👉 makerspace@utrgv.edu





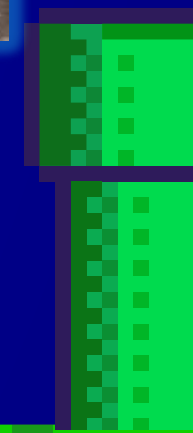
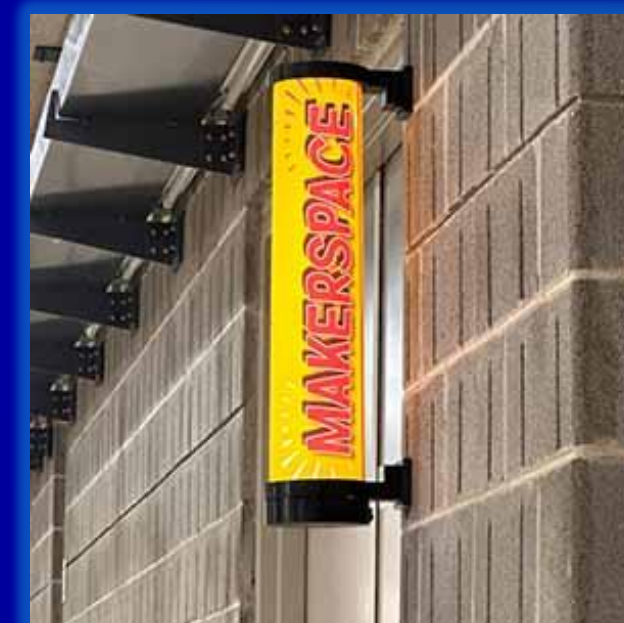
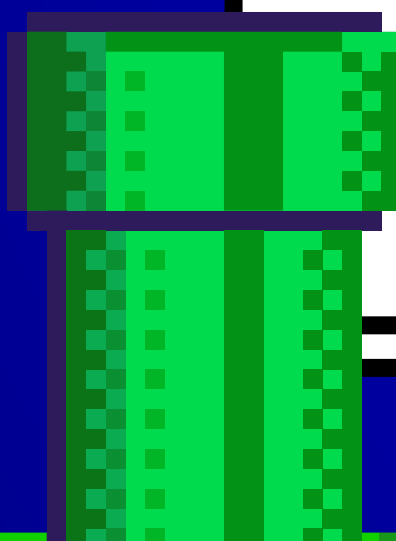
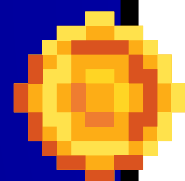
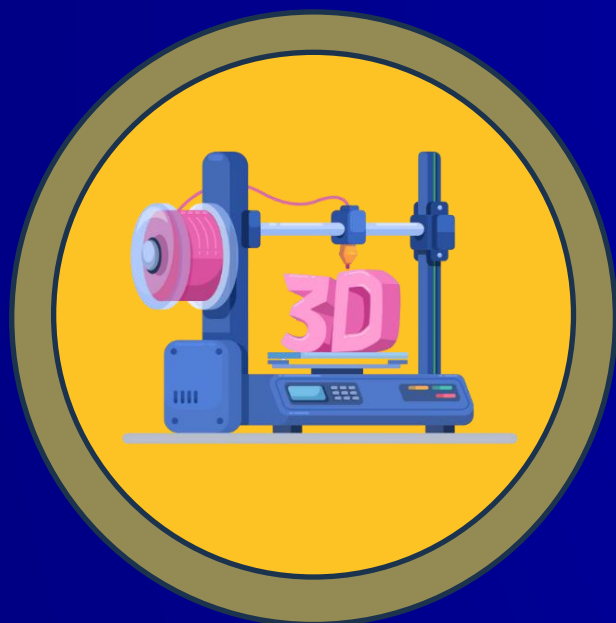
CONGRATULATIONS! —○×

YOU'VE COMPLETED THE 3D
PRINTING TRAINING
CERTIFICATE ✓

That's it — you're done!

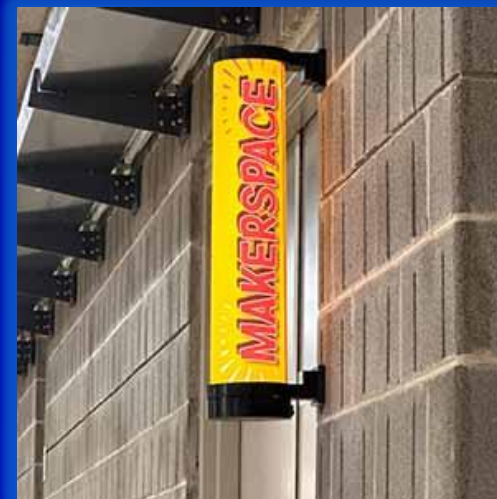
You can now pick your certification badge up
and start printing at the Makerspace.

Remember to always check-in at the Service
Desk first.





UTRGV



MANUAL DE ENTRENAMIENTO DE IMPRESIÓN 3D

-OX

Preparado por: Alvaro Silvestre (Estudiante MECE)
Revisión: Dr. Noe Vargas en 09/18/2025



[Click for English](#)

COMENZAR

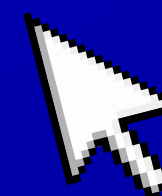


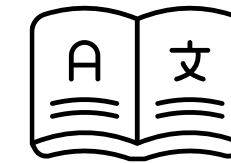
TABLA DE CONTENIDOS

—OX

01

Parte 1: Fundamentos

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2. [Slicing](#)
3. [Impresión](#)



[Click for English](#)

02

Parte 2: Entrenamiento

1. [Geometría](#)
2. [Slicing](#)
3. [Impresión](#)



[Botón para contactarnos](#)



[¿Ya tienes experiencia?](#)

[↺ Sáltate al Checklist final y a las pautas de impresión](#)



[Botón para regresar
de cualquier
diapositiva a la:
TABLA DE
CONTENIDOS](#)

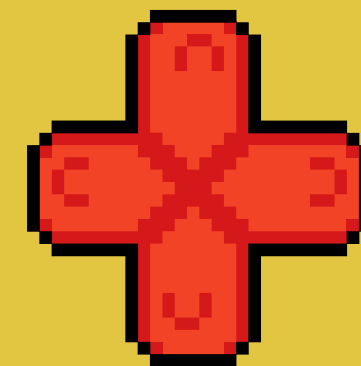
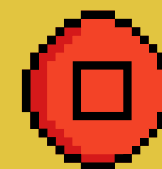
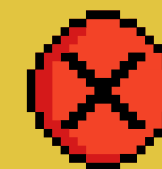
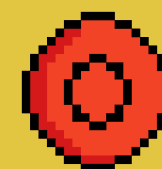


PROPÓSITO - O X

Este manual, preparado por el equipo del Makerspace, te enseñará cómo imprimir en 3D usando la impresora Bambu Labs X1 Carbon.

Cubre el proceso de slicing e impresión, no CAD.

Si necesitas ayuda en cualquier momento, ¡no dudes en preguntar a un miembro del staff! 💬



—Ox

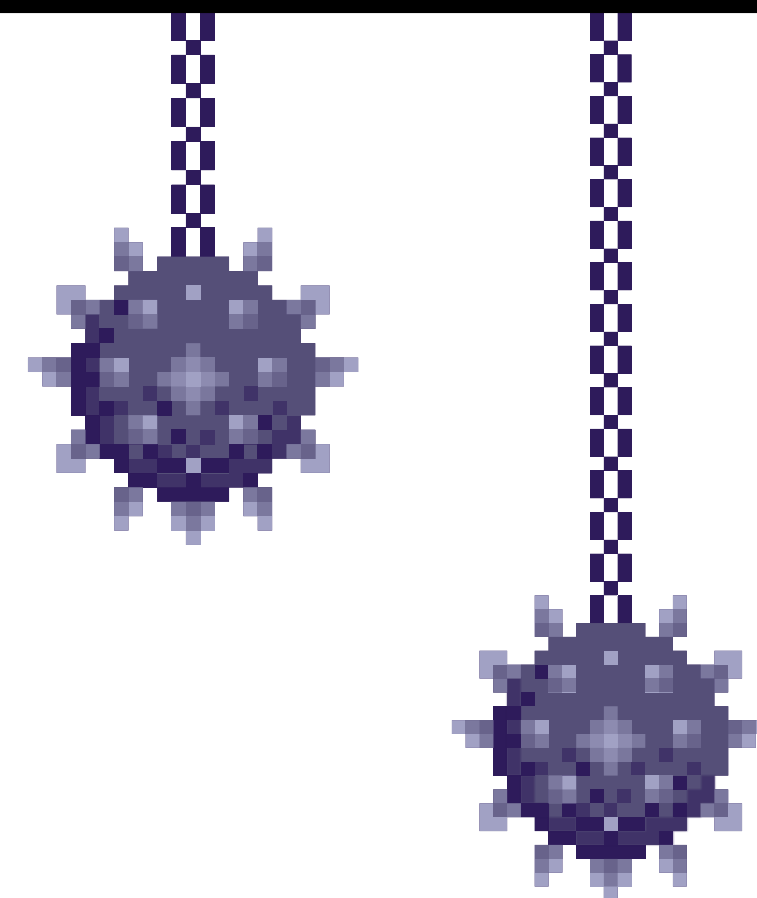
NOTAS IMPORTANTES

⚠ Entrenamiento obligatorio

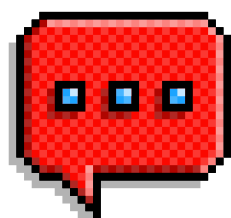
Todos los usuarios deben completar este entrenamiento antes de usar las impresoras, incluso si ya tienen experiencia imprimiendo en 3D.

⚠ No es un curso completo

Esta guía introduce el proceso, pero no enseña técnicas avanzadas.

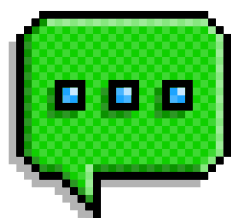


REGLAS PARA EL FILAMENTO



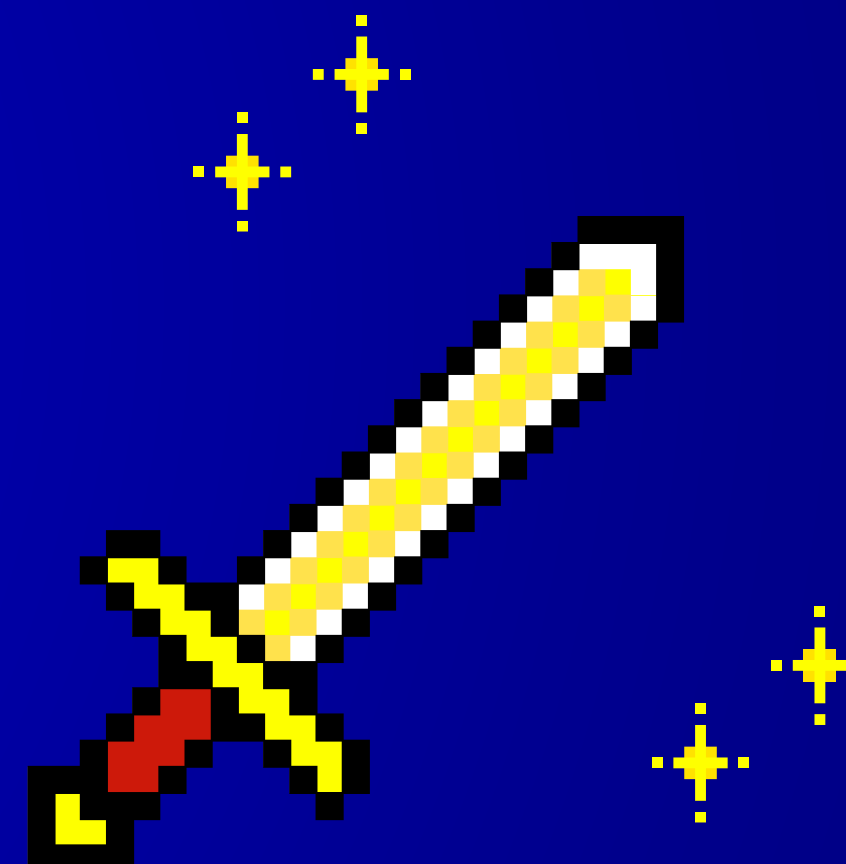
Límite: Una impresión = **máximo 150g de filamento**
(Salvo aprobación del Dr. Vargas o si traes tu propio
filamento)

—OX



Después de usarlo:
Pega la punta del filamento a la rueda o pásala por los
orificios laterales del carrete para evitar enredos.

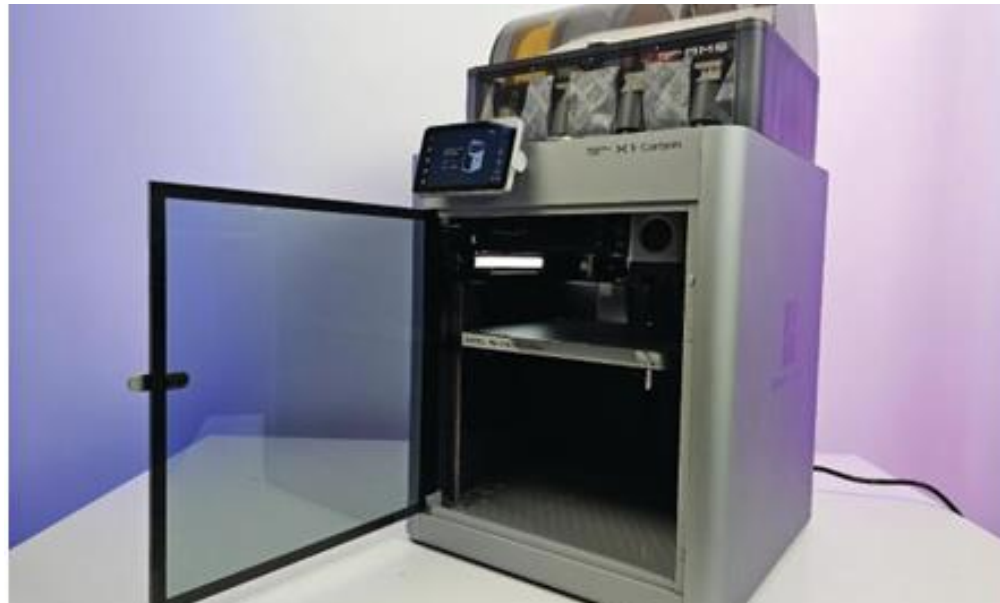
—OX



DESCRIPCIÓN GENERAL

—O×

 La Bambu Lab X1 Carbon



- Impresora 3D rápida, confiable y de gama alta para consumidores
- Sensores integrados y auto-calibración
- Más info: [Página de la impresora](#)



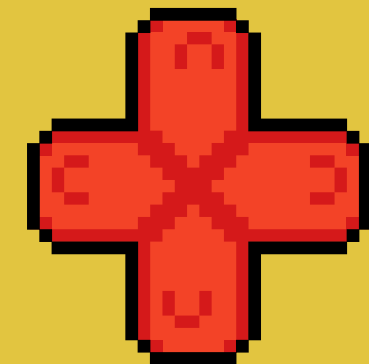
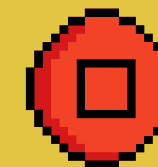
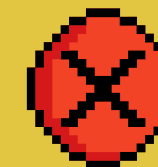
 Este archivo
se usa para
entrenamiento:



Cali Cat - The Calibration Cat

Cali Cat is designed to be the purrfect initial calibration and benchmarking print. It is a simple, standard test to ensure you have the basics down before proceeding to advanced prints. Cali Cat is the alternative to boring calibration cubes. It's a test...

 Thingiverse / \$0.00



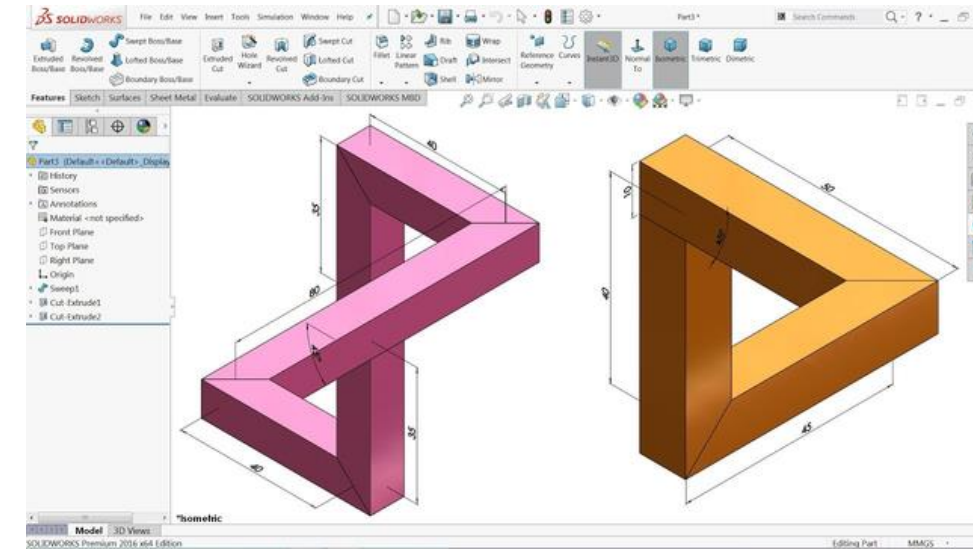


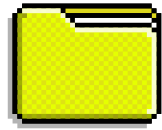
-OX

PARTE 1 - FUNDAMENTOS: GEOMETRÍA

 Geometría 3D = La forma digital
Necesitas un modelo 3D creado en
programas de CAD, como:

- Fusion 360
- SolidWorks
- Maya
- Blender
- Inventor

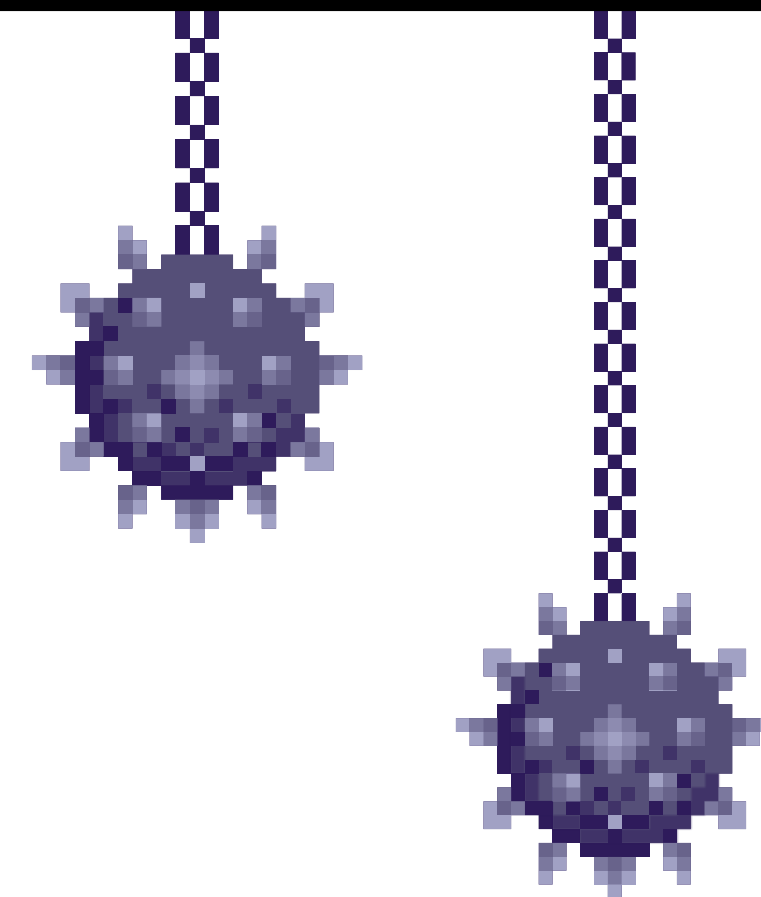
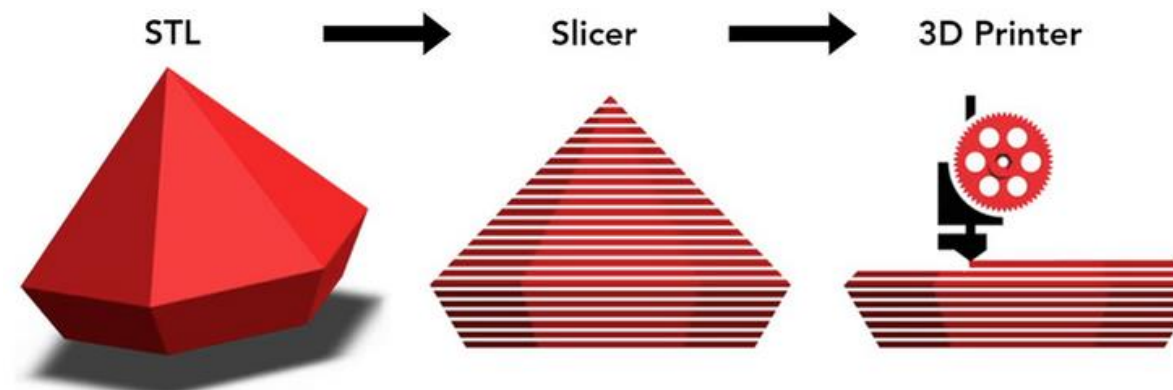
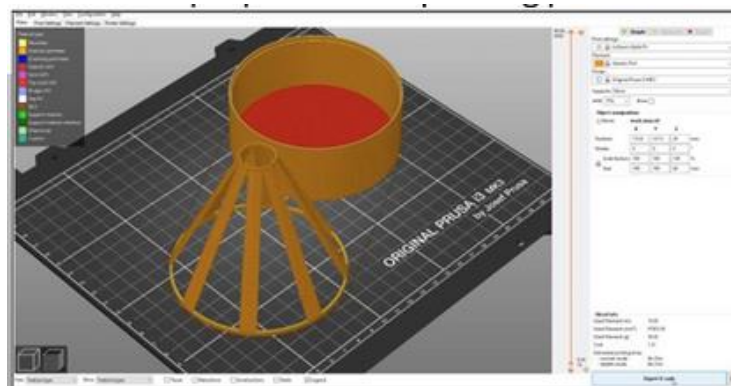




-0x

PARTE 1 - FUNDAMENTOS: SLICING

✂ Slicing = Convertir tu modelo en capas



- Resultado: GCODE
- GCODE = Instrucciones para la impresora
(movimientos, temperatura, etc.)
- Software: Bambu Studio, Cura, etc.



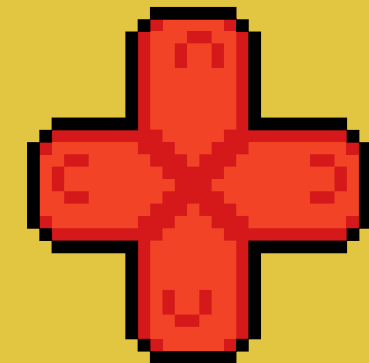
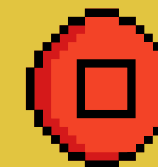
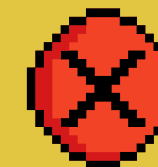
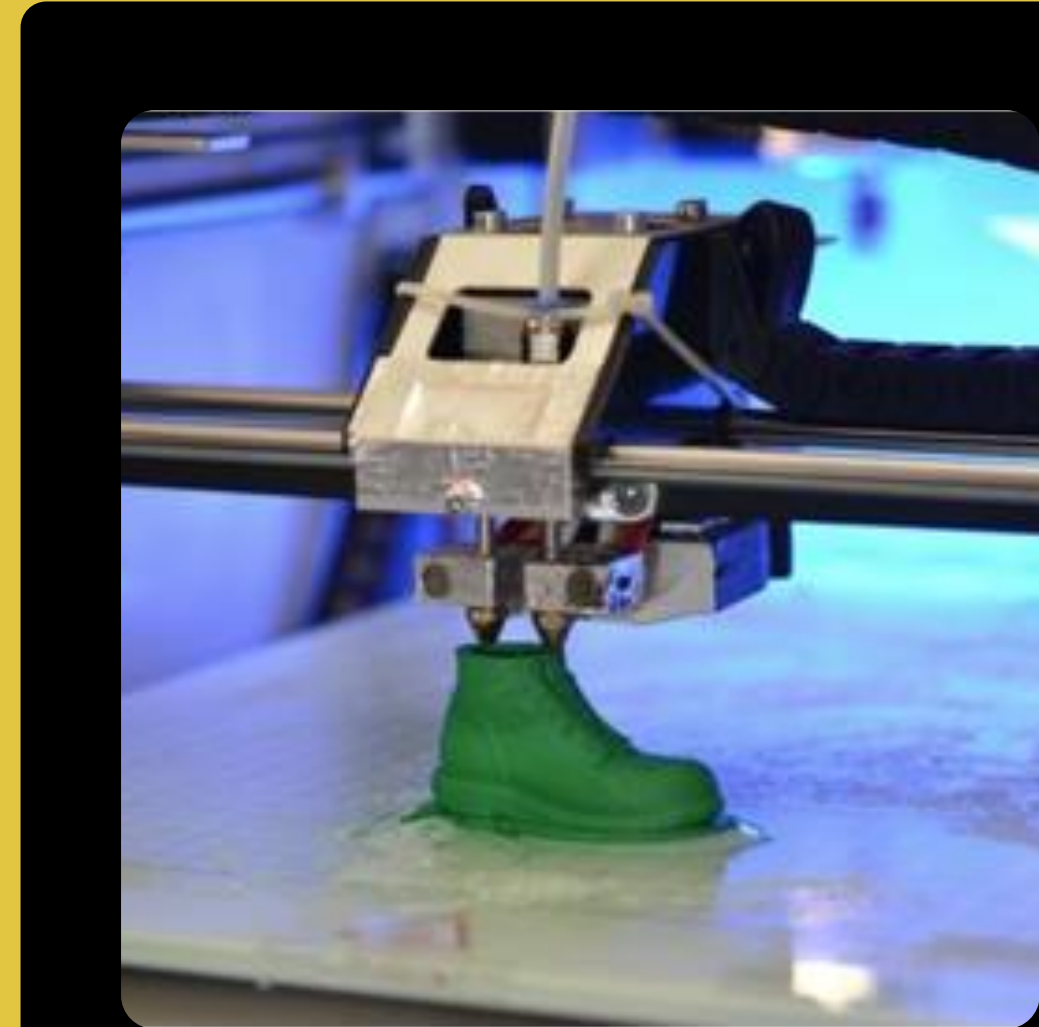
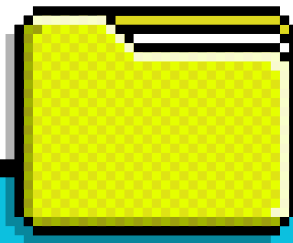
PARTE 1 - FUNDAMENTOS: IMPRESIÓN - O X

🖨️ La impresora 3D empuja filamento derretido a través de una boquilla caliente.

- La boquilla sigue las instrucciones del GCODE para construir tu modelo.
- ¡Tu modelo se hace realidad!

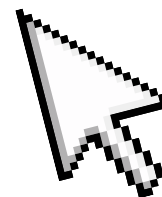
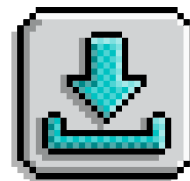


```
jiggershelltophalf.gc...  
G1 X105.344 Y85.040 E0.1090  
G1 X166.530 Y87.946 E0.1683  
G1 X167.185 Y92.941 E0.1696  
G1 X167.525 Y98.425 E0.1851  
G1 X167.538 Y98.625 F2400  
; outer perimeter  
G1 X167.961 Y98.175 F4800  
G1 X184.357 Y98.175 E0.5521  
F2400  
G1 X184.357 Y99.525 E0.0455  
G1 X166.566 Y99.525 E0.5991  
G1 X166.383 Y94.728 E0.1617  
G1 X165.844 Y89.732 E0.1692  
G1 X164.985 Y84.898 E0.1654  
G1 X163.737 Y79.913 E0.1731  
G1 X162.222 Y75.242 E0.1654  
G1 X160.345 Y70.581 E0.1692  
G1 X158.202 Y66.163 E0.1654  
G1 X155.648 Y61.704 E0.1731  
G1 X152.917 Y57.623 E0.1654  
G1 X149.844 Y53.648 E0.1692  
G1 X146.503 Y49.894 E0.1692  
G1 X142.911 Y46.382 E0.1692  
G1 X139.083 Y43.126 E0.1692  
G1 X135.040 Y40.144 E0.1692  
G1 X130.899 Y37.505 E0.1654  
G1 X126.486 Y35.101 E0.1692  
G1 X121.918 Y33.009 E0.1692  
G1 X117.216 Y31.238 E0.1692  
G1 X112.402 Y29.796 E0.1692  
G1 X107.613 Y28.713 E0.1654
```



PARTE 2 - ENTRENAMIENTO: GEOMETRÍA

Paso 1: Descarga el archivo de Cali-Cat



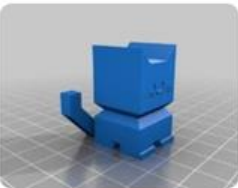
Este es el modelo que vas a imprimir:

Thing details **Files** 1 Comments 192 Makes 647 Remixes 141 Apps 4

License CC BY-NC-SA    

[Cali Cat - The Calibration Cat](#)
by [Dezign](#) is licensed under the [Creative Commons - Attribution - Non-Commercial - Share Alike](#) license.

Take advantage of extra features by downloading [UltiMaker Cura](#)



calicat.stl

Size	Updated	Downloads
42 kb	05-09-2016	591K

[Open in Cura](#) [...](#) [↓](#)



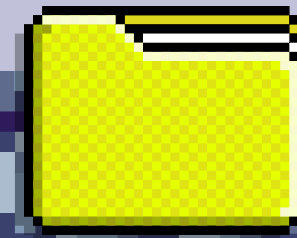
—Ox

PASO A PASO: BAMBUL STUDIO

▶ Mira este tutorial:

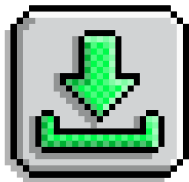


🎯 Objetivo: Familiarizarte con el software slicer



PARTE 2 - ENTRENAMIENTO: SOFTWARE DE SLICING

Paso 2: Instala Bambu Studio



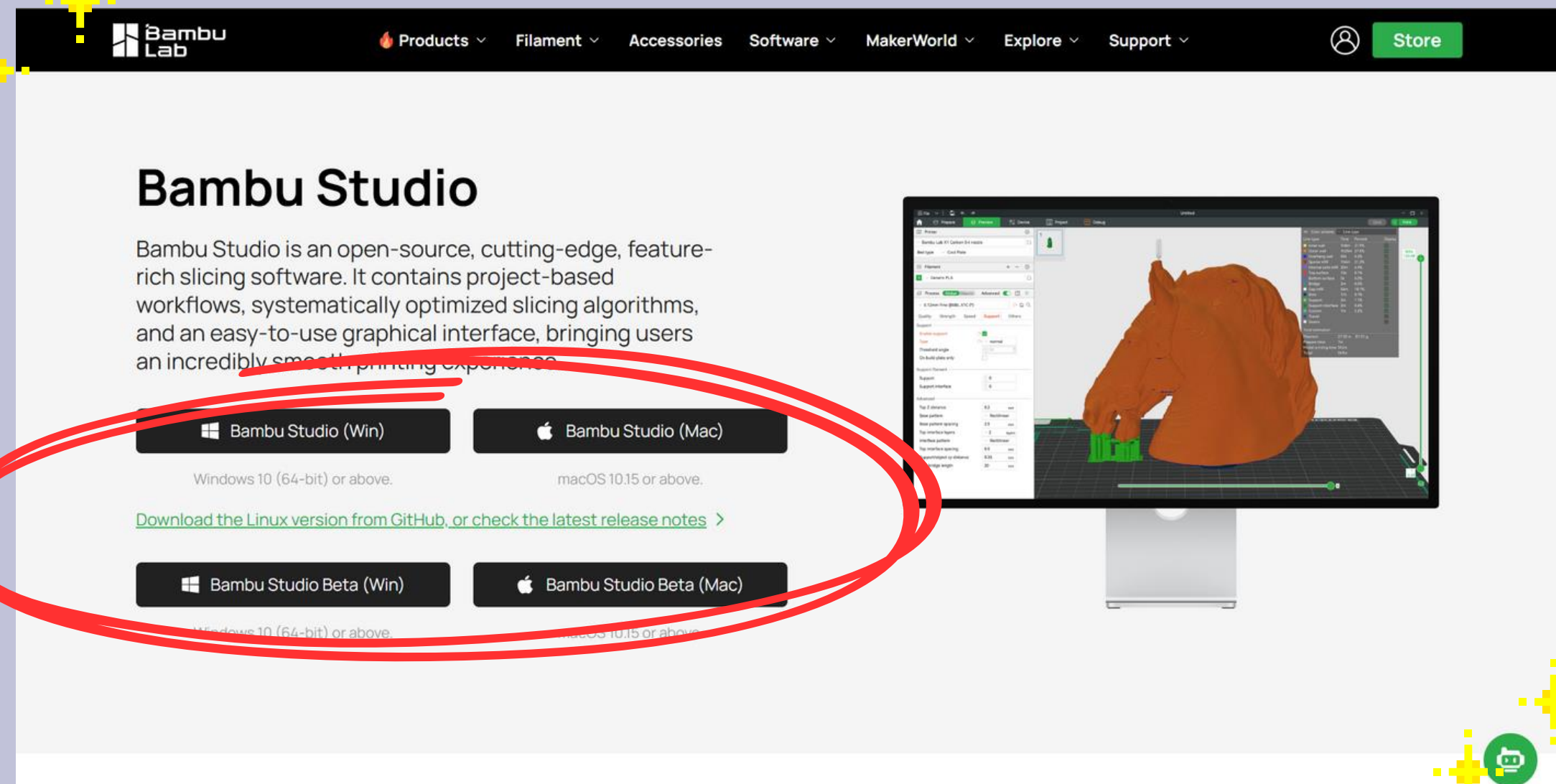
<https://bambulab.com/en/download/studio>



? ¿Necesitas ayuda? ¡Pregunta al staff!



Botón para contactarnos



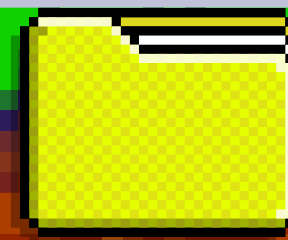
Bambu Studio

Bambu Studio is an open-source, cutting-edge, feature-rich slicing software. It contains project-based workflows, systematically optimized slicing algorithms, and an easy-to-use graphical interface, bringing users an incredibly smooth printing experience.

[Download the Linux version from GitHub, or check the latest release notes >](#)

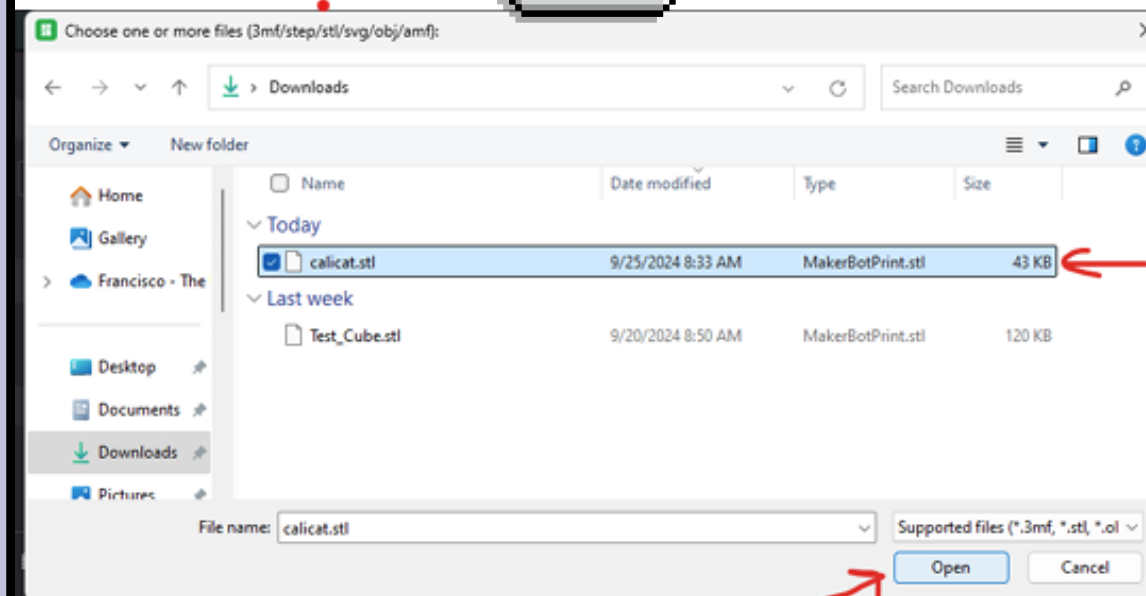
Windows 10 (64-bit) or above. macOS 10.15 or above.

Windows 10 (64-bit) or above. macOS 10.15 or above.

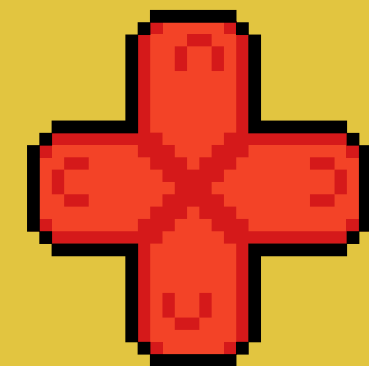
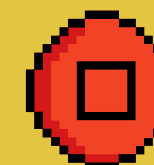
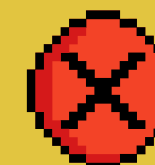
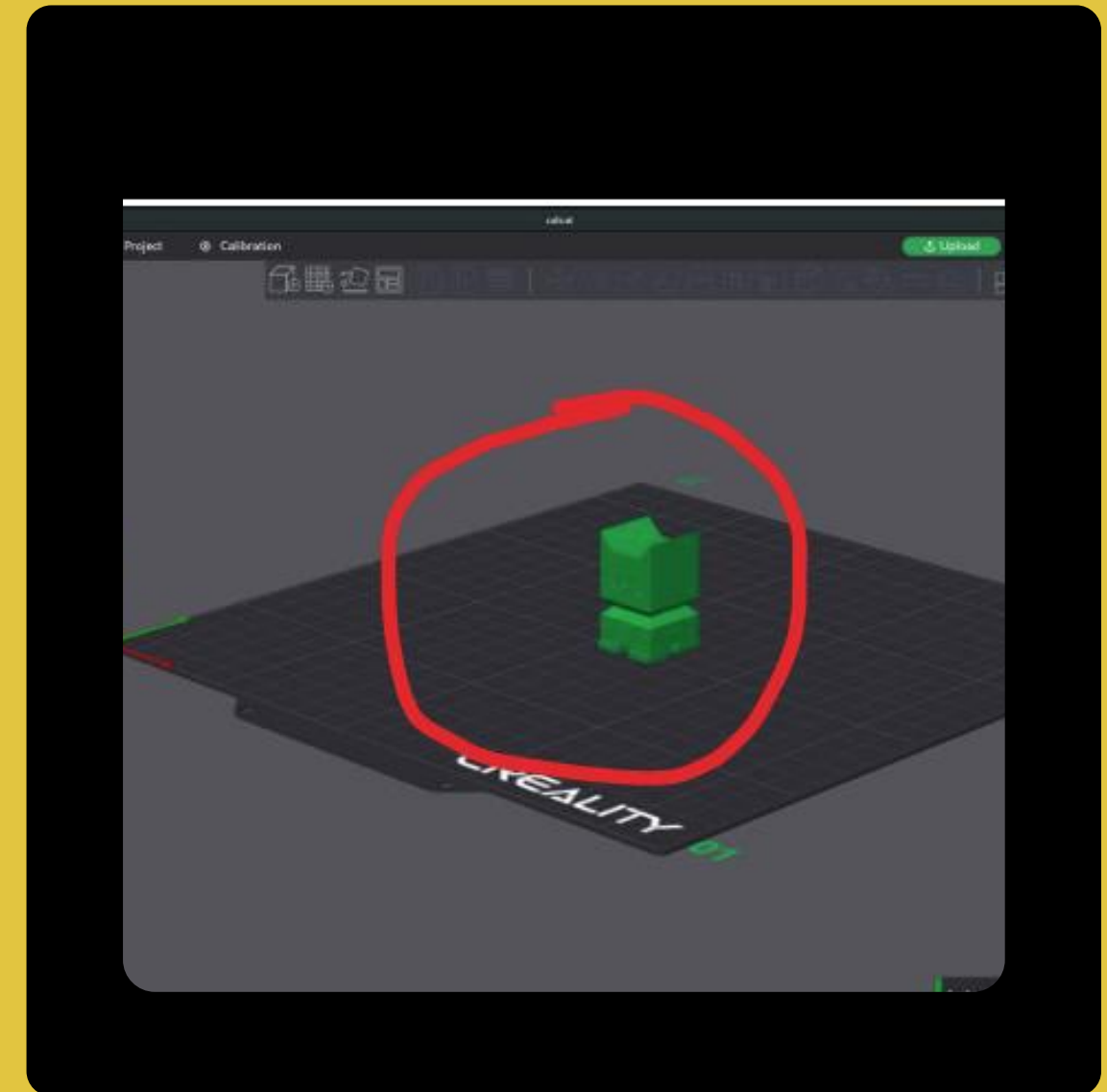
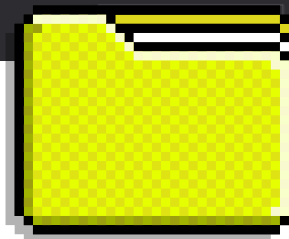
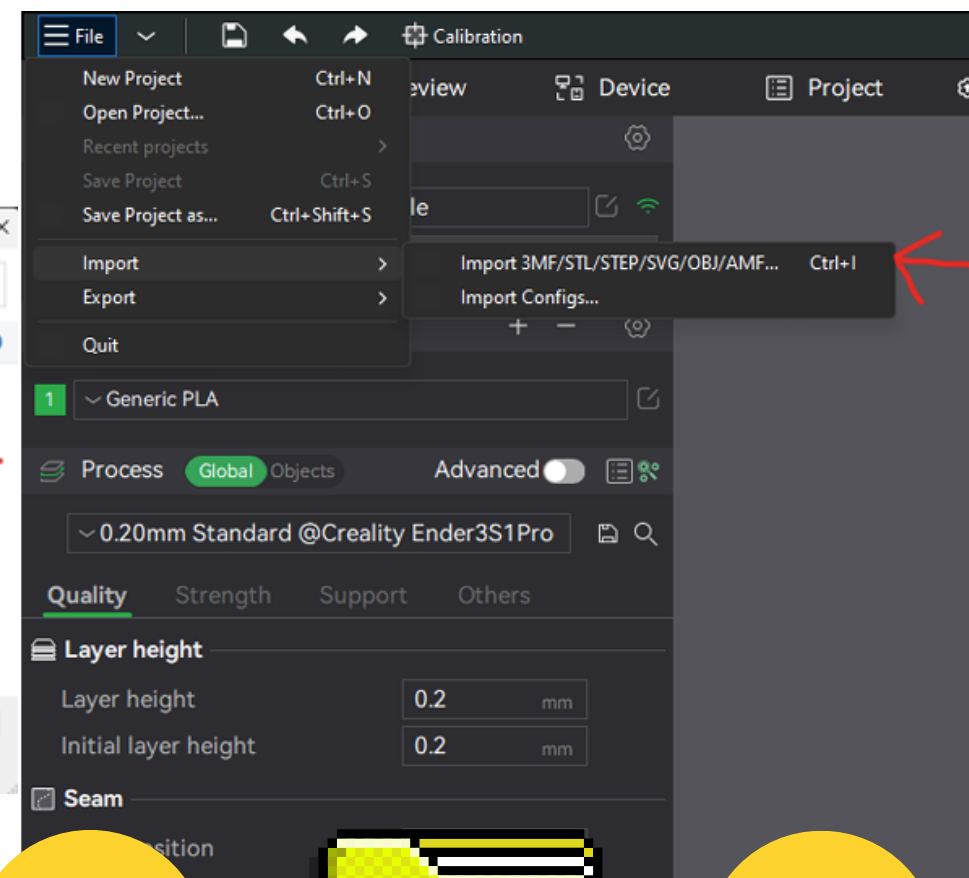


CARGAR EL MODELO -OX

🐱 Abre el archivo de
Cali-Cat en Bambu Studio

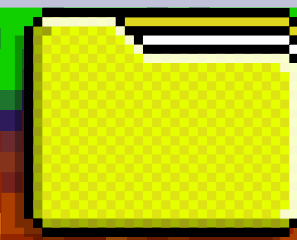
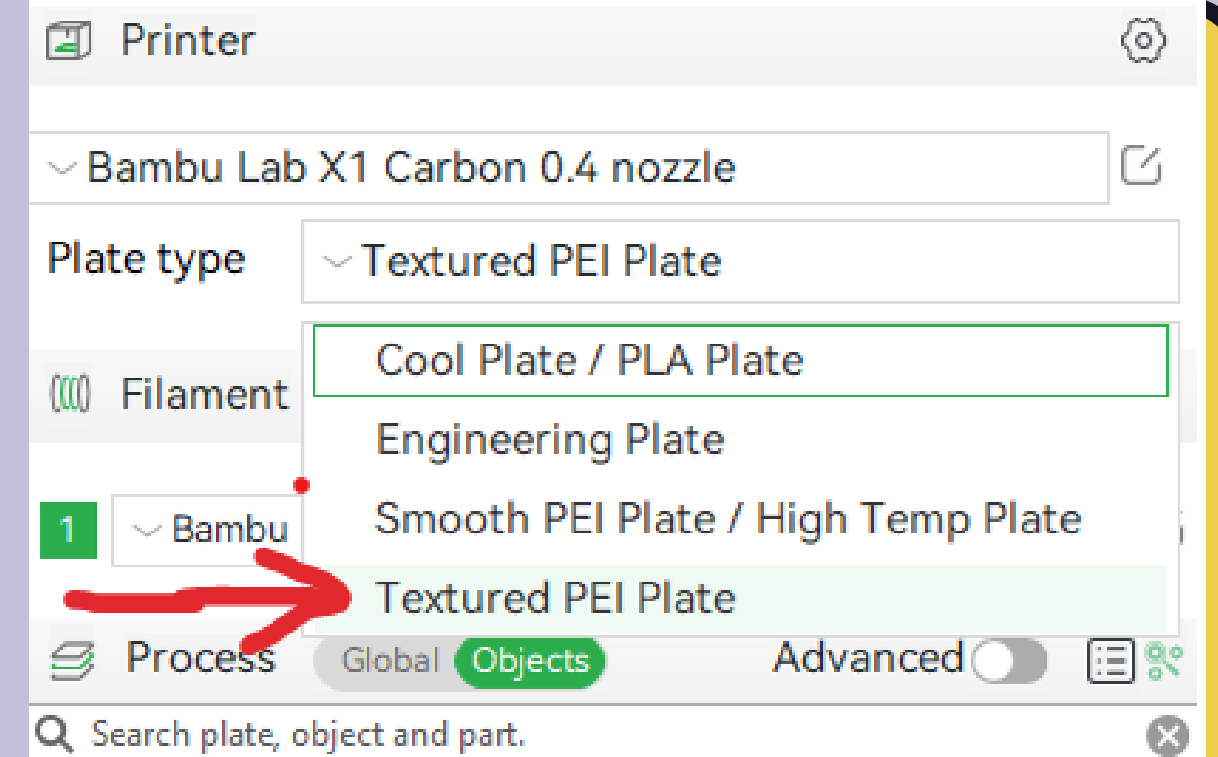
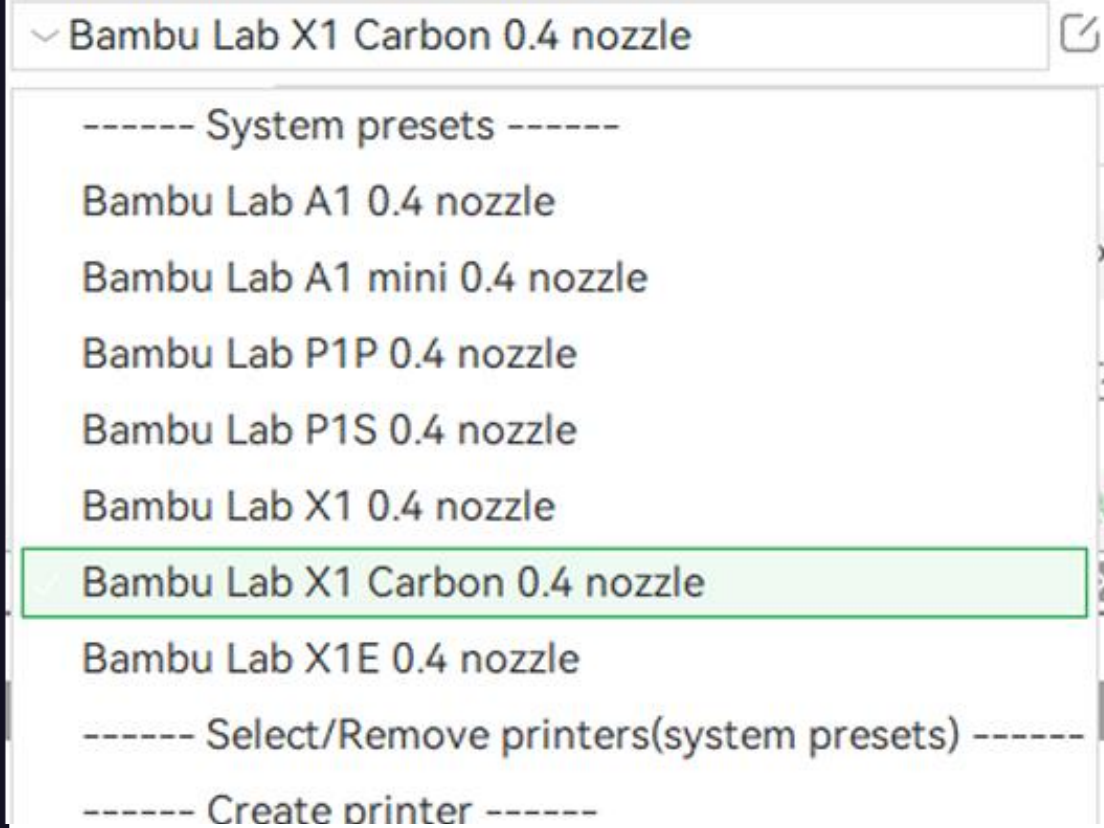
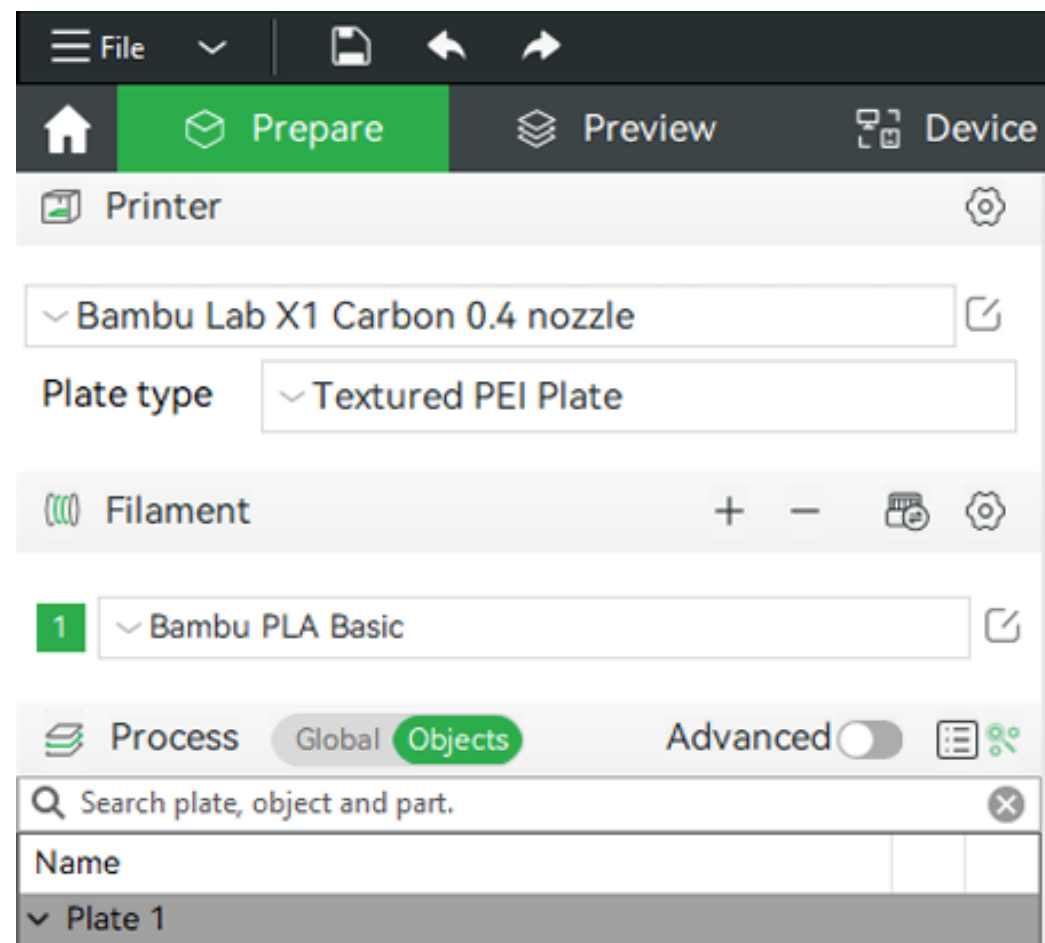


Usa la función de
"importar"



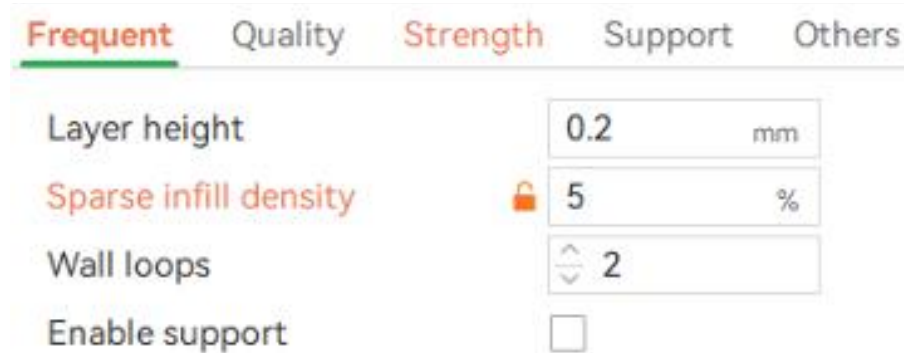
CONFIGURACIÓN DE LA IMPRESORA

Usa exactamente estos valores

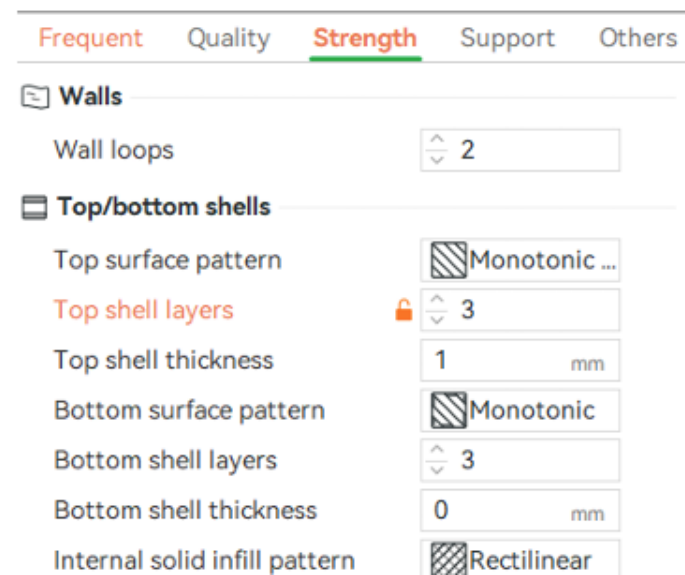


CONFIGURACIÓN DE IMPRESIÓN

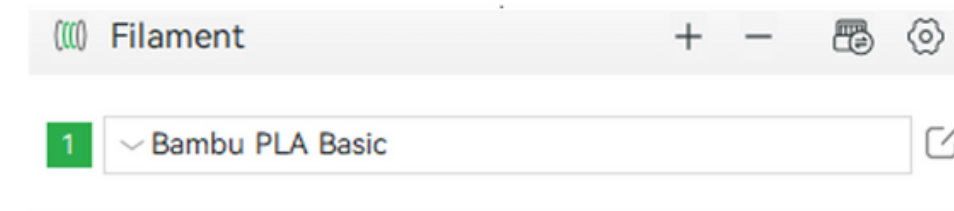
- Layer Height: 0.1–0.3mm
(valores mas pequenos tardaran mas)
- Infill: 5%



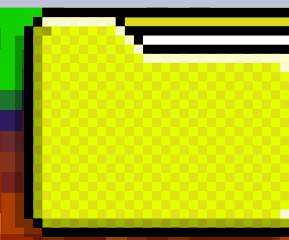
- Top Shell layers: 3



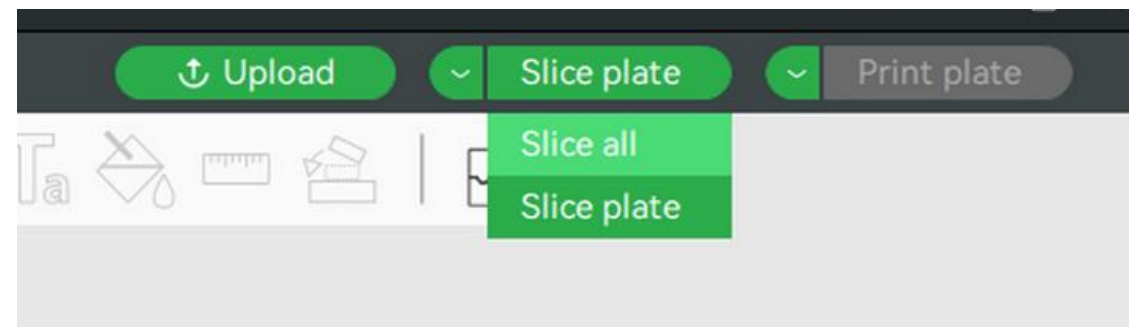
- Material: BambuLab
PLA Basic



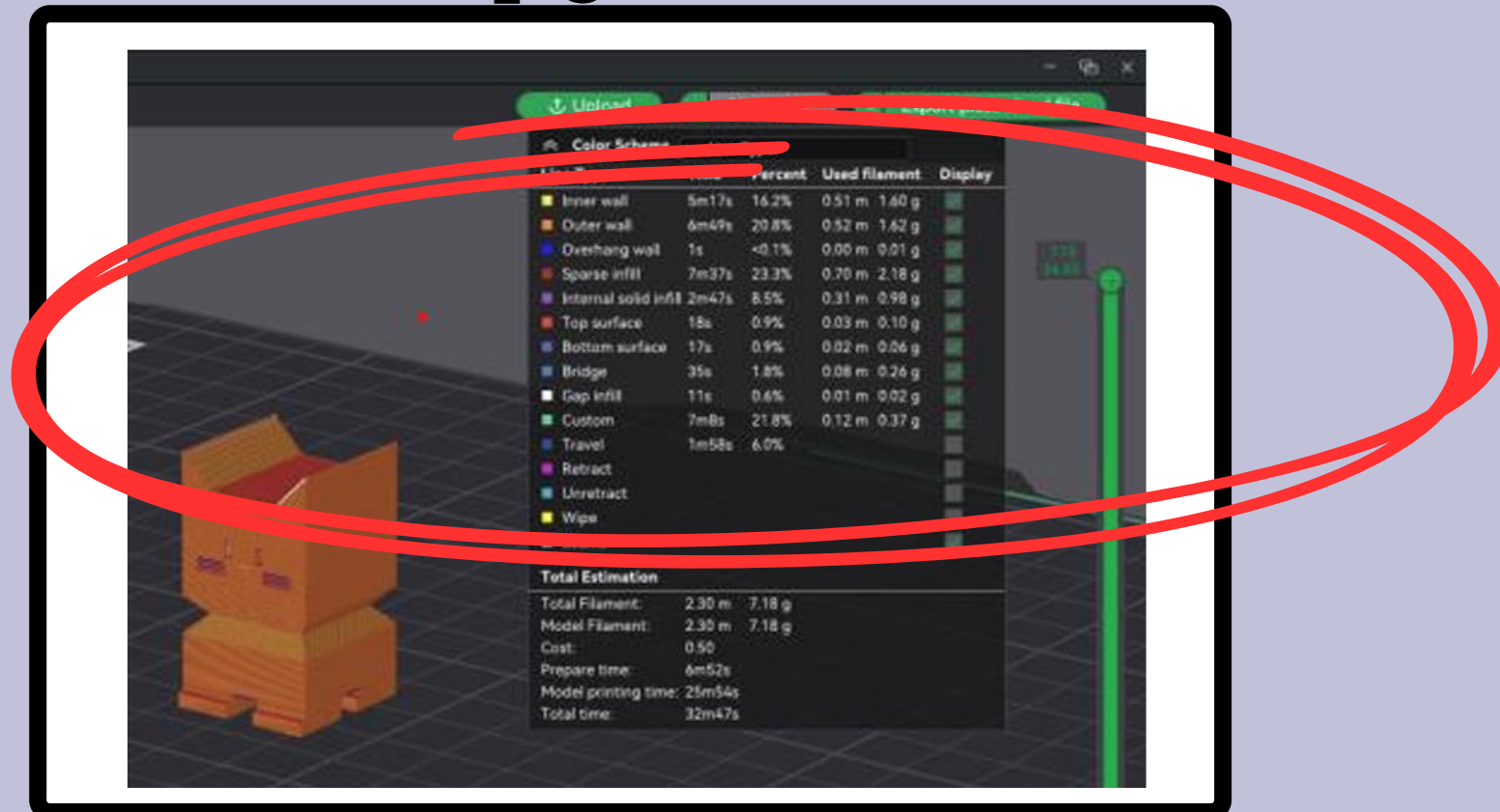
Pide aprobación del staff staff



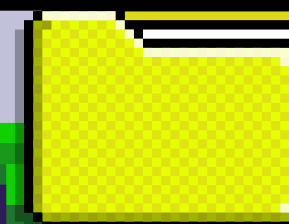
GUARDAR EL ARCHIVO



Haz slice y guarda tu archivo



Color Scheme					Line Type		Used filament		Display	
Line Type	Time	Percent	Used filament							
Inner wall	18m26s	15.3%	5.94 m	17.99 g						
Outer wall	27m4s	22.4%	5.49 m	16.65 g						
Sparse infill	18m22s	15.2%	5.72 m	17.32 g						
Internal solid infill	24m35s	20.3%	5.45 m	16.53 g						
Top surface	1m38s	1.4%	0.12 m	0.37 g						
Bottom surface	5m21s	4.4%	0.99 m	2.79 g						
Bridge	4m26s	3.7%	0.69 m	2.09 g						
Gap infill	12s	0.2%	0.01 m	0.04 g						
Custom	7m0s	5.8%	0.12 m	0.36 g						
Travel	14m4s	11.6%								
Retract										
Unretract										
Wipe										
Seams										
Total Estimation										
Total Filament:	24.53 m	74.33 g								
Model Filament:	24.53 m	74.33 g								
Cost:	1.86									
Prepare time:	6m45s									
Model printing time:	1h54m									
Total time:	2h1m									



PARTE 2 - IMPRESIÓN: INICIAR

👤 Se requiere supervisión del staff

Una vez que hayas terminado la PARTE 1 del entrenamiento, ve al Makerspace y pregunta al staff como completar la PARTE 2.

- Primero, un miembro del staff revisará el archivo de slicing.
- Una vez revisado, el archivo se transferirá a una tarjeta SD.
- La tarjeta SD se insertará en la parte lateral derecha de la pantalla táctil.

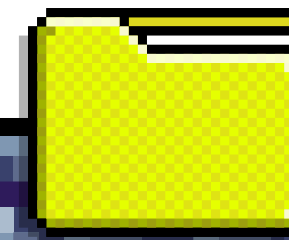


📁 En la pantalla táctil:

- Ve a la pestaña "Print" (Imprimir).
- Selecciona tu archivo.
- Selecciona tu material (si el material no está configurado, selecciona el filamento que elegiste al hacer el corte).

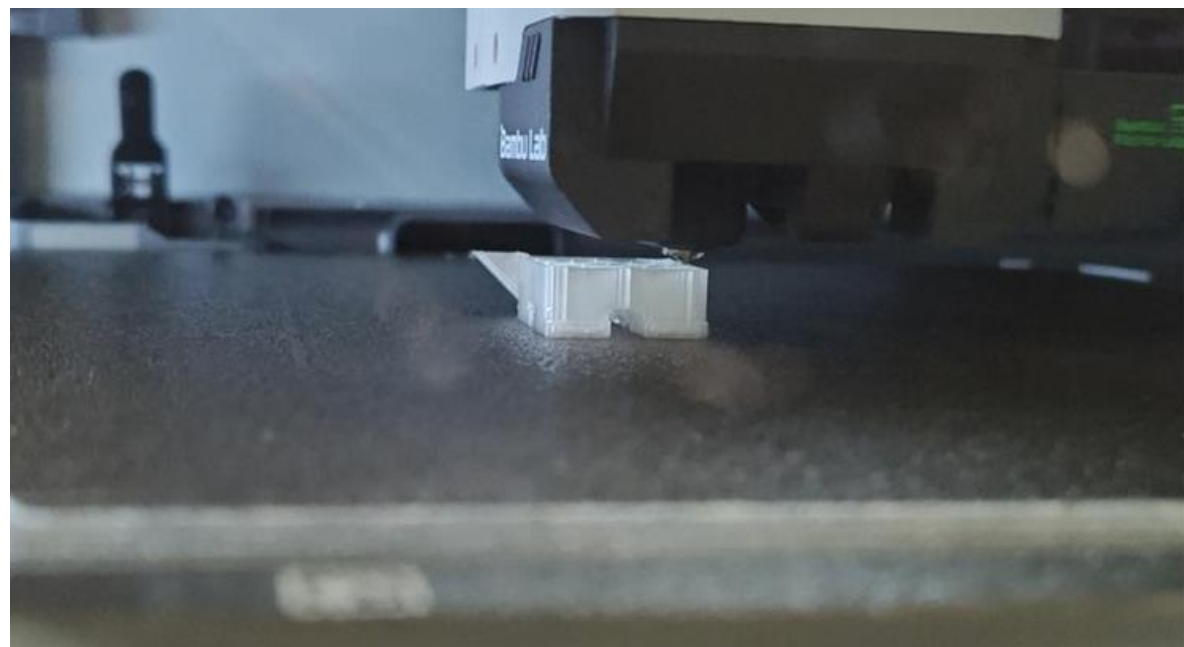


- Presiona print (imprimir).
- La impresora se calibrará automáticamente.
- ¡La impresión comenzará!



PART 2 - TRAINING: WATCH & PICK UP

Espera mientras la impresora fabrica tu pieza



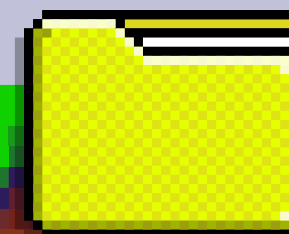
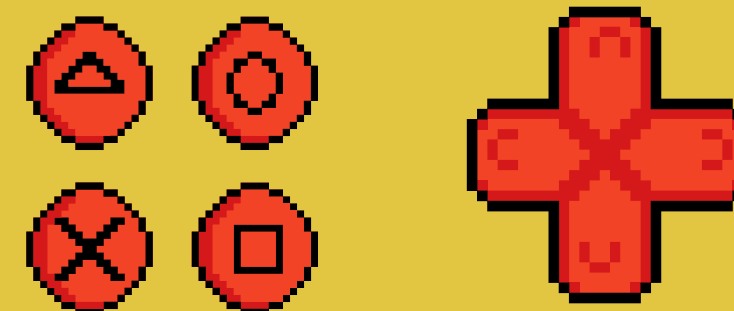
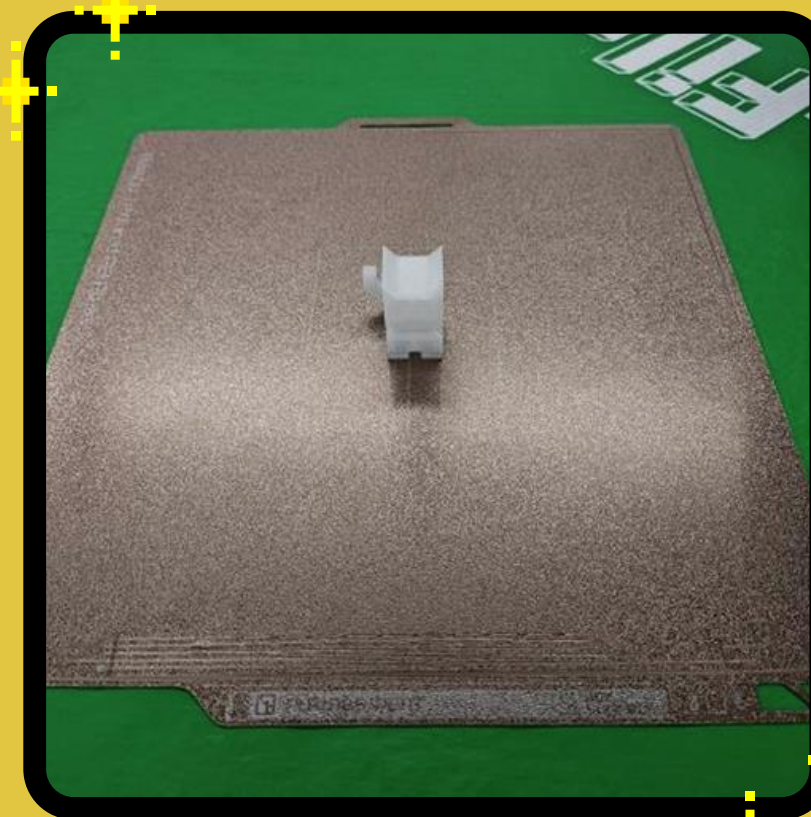
- 👁️ Puedes mirar si quieres (solo detrás del cristal)
- 🔥 Advertencia: Superficie caliente
- 🚫 No toques mientras está imprimiendo

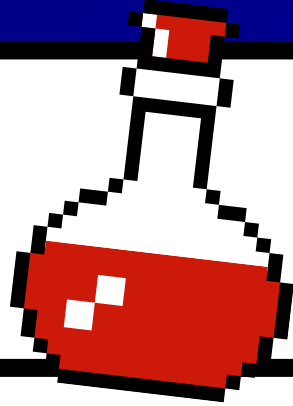
Regresa para recoger tu pieza



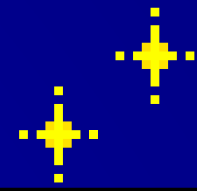
Asegúrate de pedir ayuda a un miembro del personal para sacar la impresión.

🎓 Resultado Final

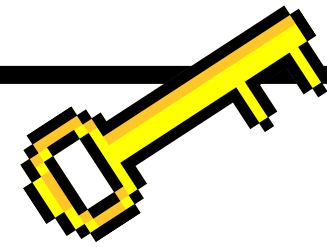




THE MAKERSPACE TEAM



— O X



Esta presentación cubre la parte teórica del manual de entrenamiento de
Impresión 3D

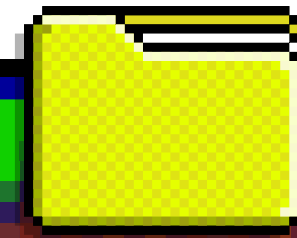
✓ Para completar tu certificación:

- Visita el Makerspace de UTRGV
- Pregunta al personal por las instrucciones de la sesión práctica

Una vez que completes ambas partes, recibirás tu Insignia oficial de
Certificación en Impresión 3D 🏆

🔧 Para cualquier pregunta, comentario o
soporte, contáctanos en el Service Desk del
Makerspace o via email:

👉 makerspace@utrgv.edu





¡FELICIDADES! —○×

HAS COMPLETADO EL
CERTIFICADO DE
ENTRENAMIENTO EN
IMPRESIÓN 3D ✓

¡Eso es todo!

Ahora puedes pasar a recoger tu insignia
y comenzar a imprimir en el Makerspace.

