

**PRESENTED BY:**

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ISDN 2400: Physical Prototyping 24-25 Spring  
Additive Manufacturing Lab I

# **SUBTRACTIVE MANUFACTURING LASER CUT**

# LAB OBJECTIVE

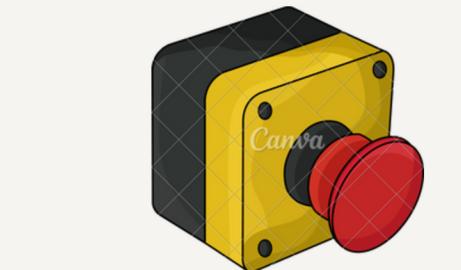


In this lab, you will learn some knowledge about:

- Subtractive manufacture
- How to operate the laser cutter



# HEADS UP !!!!!



## NO UNSURE ACTION

Do not perform any actions if you are unsure. If you have any doubts, contact the TAs or Staffs FIRST.

## FIND THE EMERGENCY STOP

Before use any machine, always know how to turn it off in case of emergency.

## DAMAGE? INFORM!

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## ASK FOR PERMIT

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## FOLLOW THE INSTRUCTION

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# REVISION SM TECHNOLOGY

## SUBTRACTIVE MANUFACTURING



Subtractive manufacturing involves material removal with turning, milling, drilling, grinding, cutting, and boring. The material is typically metals or plastics, and the end product has a smooth finish with tight dimensional tolerances.

# REVISION SM TECHNOLOGY

## CATALOG BY WAY OF SUBTRACTION

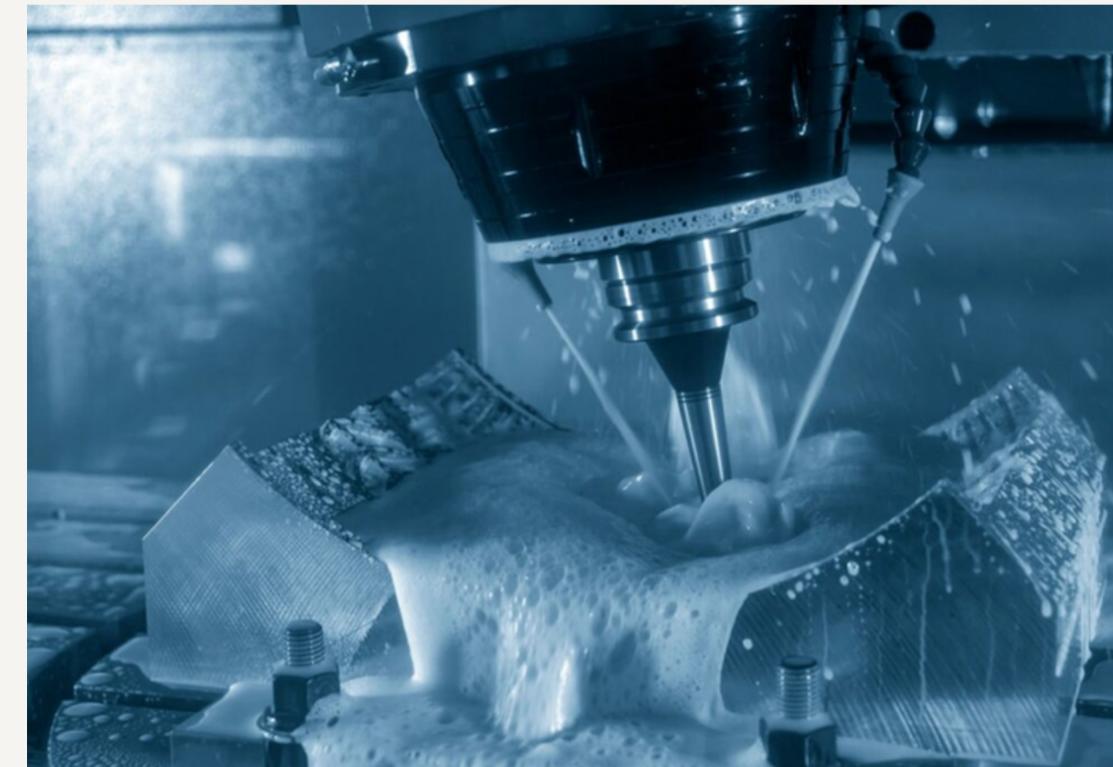
Subtractive manufacture can be divided into the following categories according to the cutting method:



- Force: Physical force to cut the part
- Thermal: Use heat to melt or sublimation
- Chemical: Chemical reaction to remove the material

# REVISION SM TECHNOLOGY

## FORCE SUBTRACTIVE



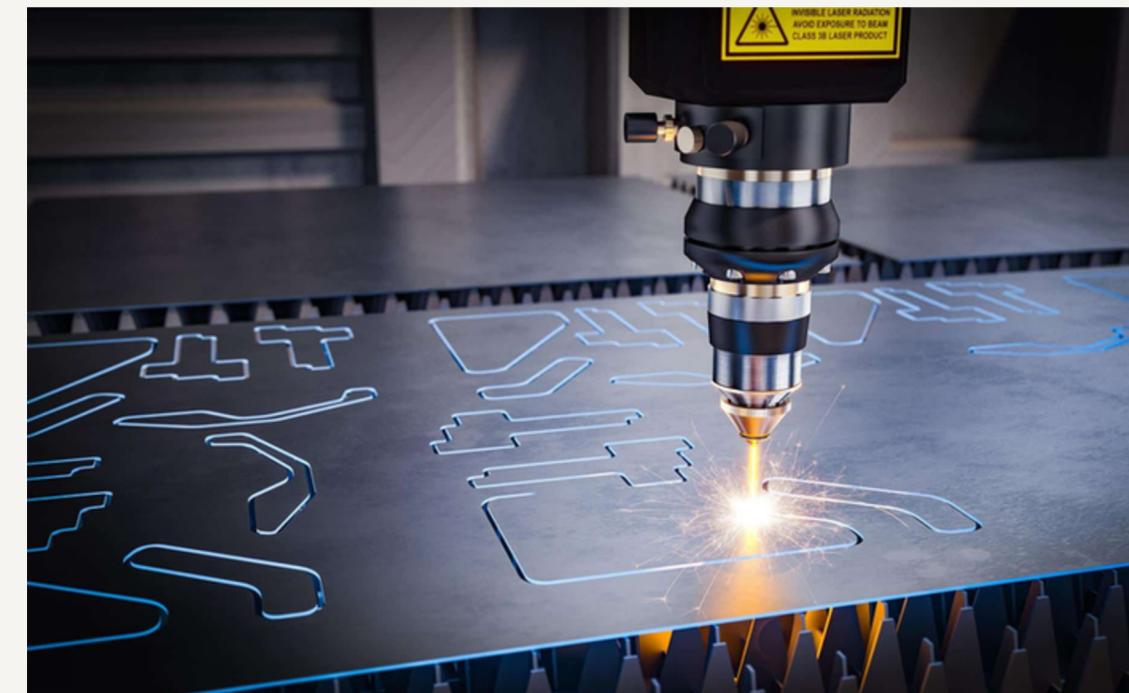
Knife cutting: milling, drilling



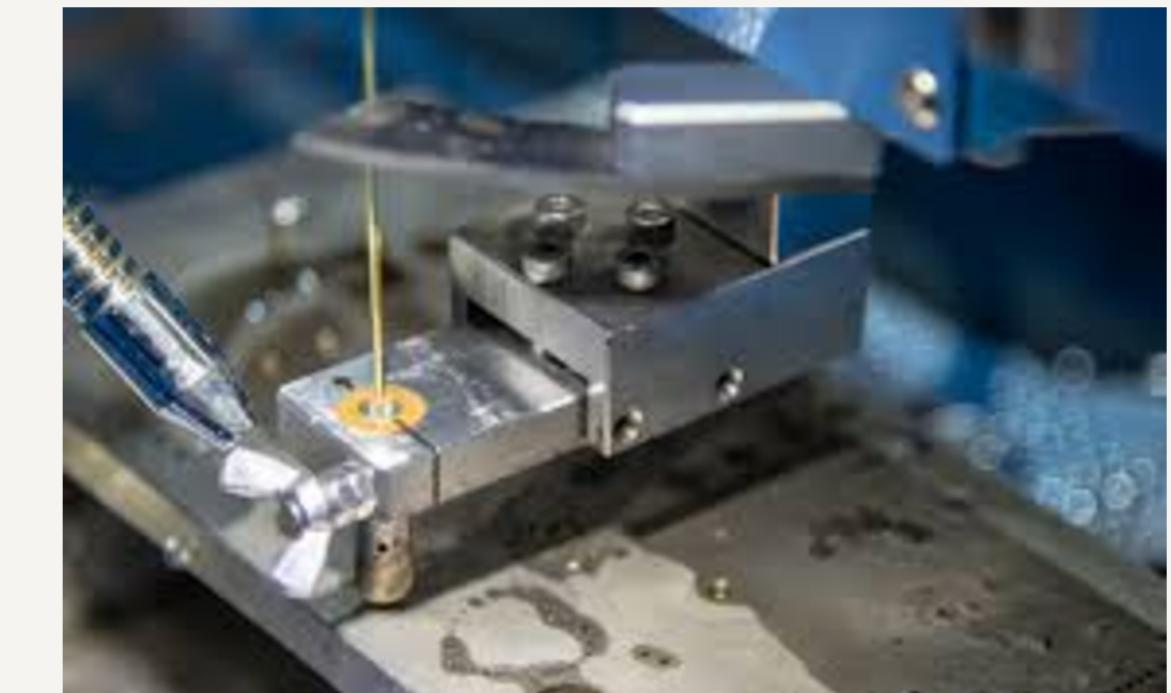
Water jet: Abrasive water jet,  
water jet

# REVISION SM TECHNOLOGY

## THERMAL SUBTRACTIVE



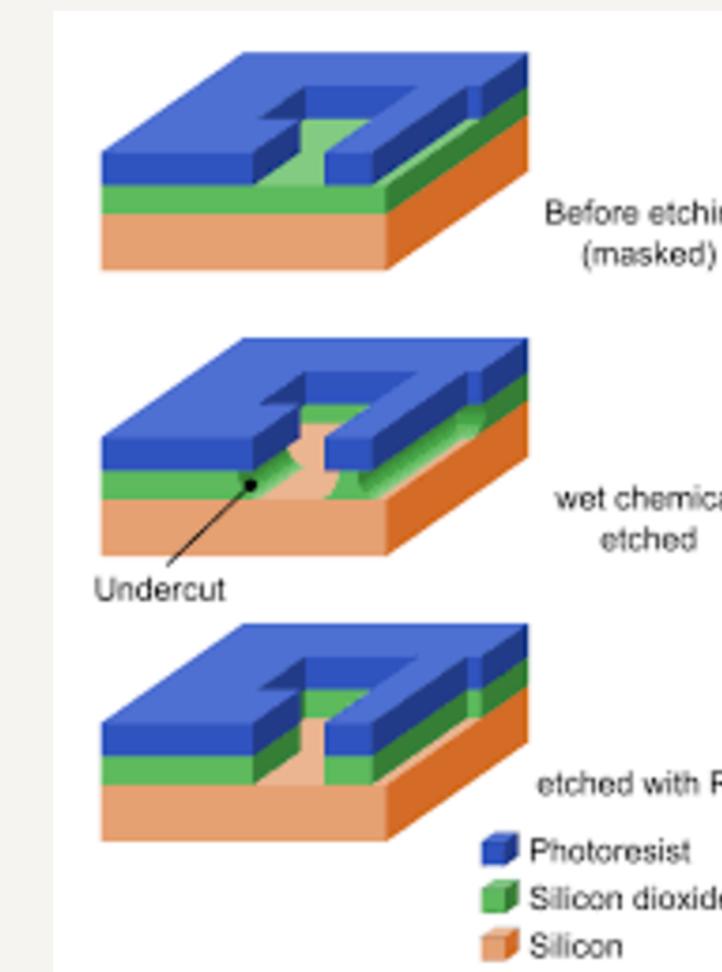
Particle ejecting: Laser cut,  
plasma cut, oxy-fuel cutting



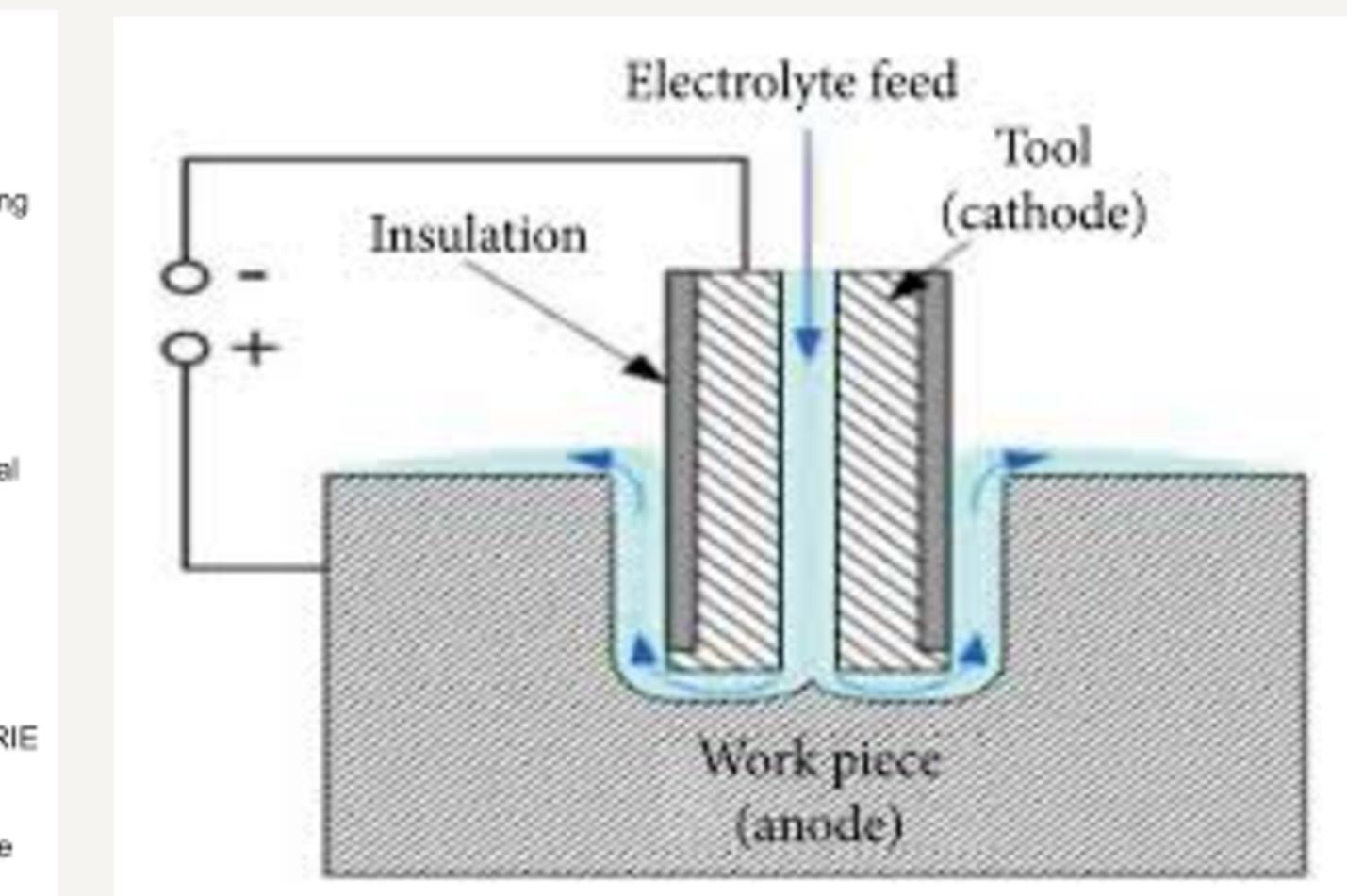
Electrical discharge: EDM,  
wire EDM

# REVISION SM TECHNOLOGY

## CHEMICAL SUBTRACTIVE



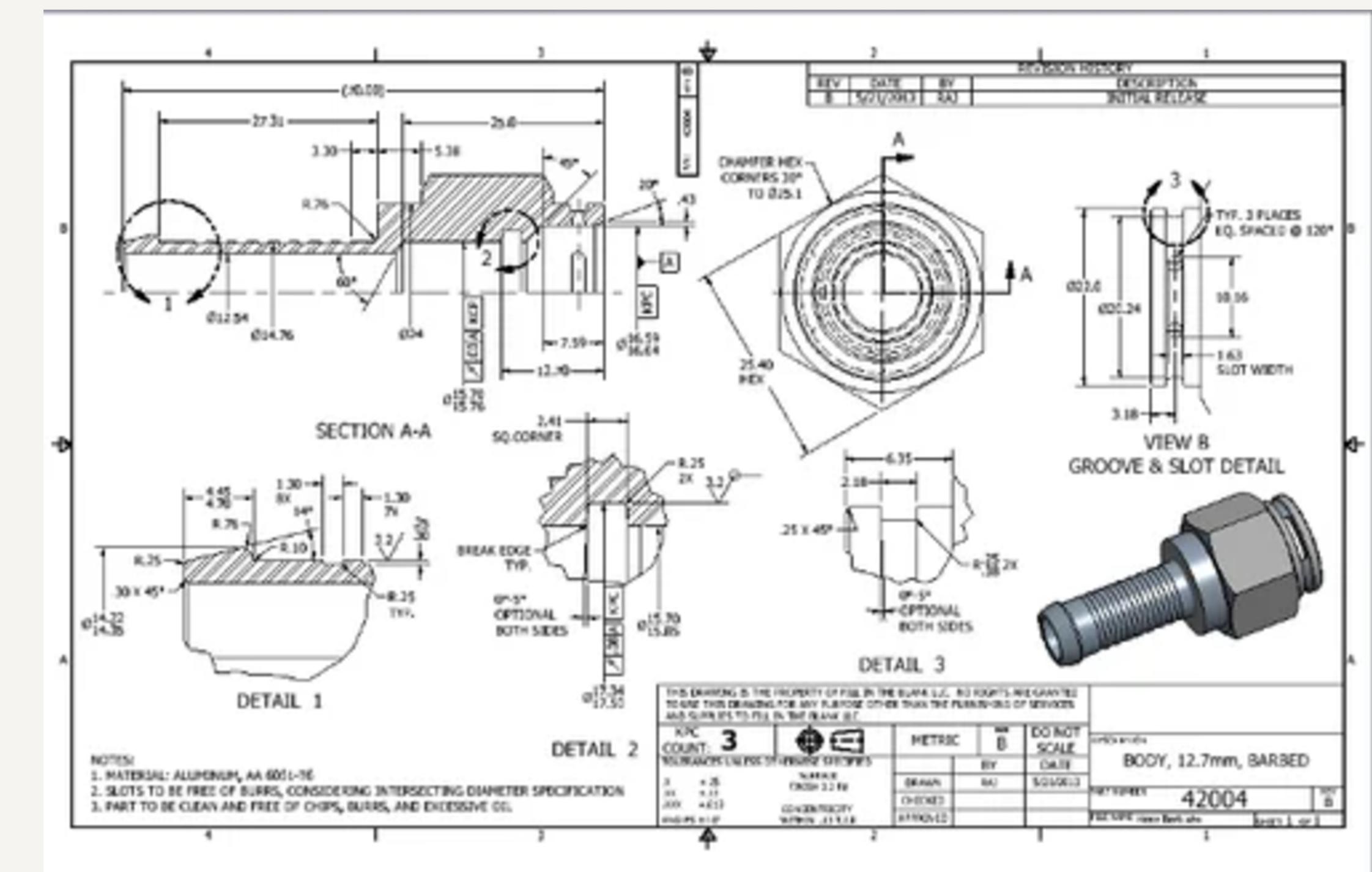
Etching



Electrochemical

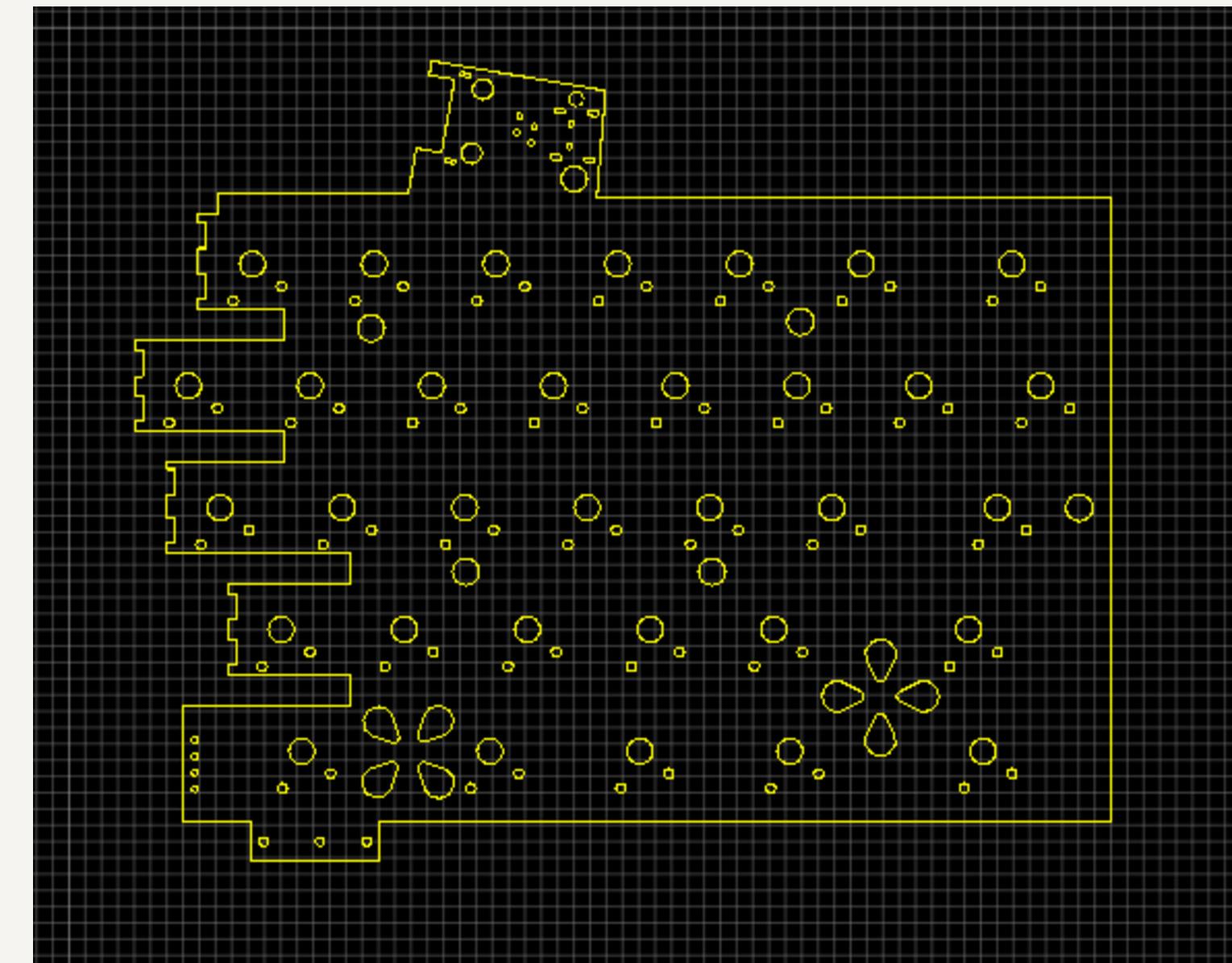
# CAD FILE FOR 3D SM TECHNOLOGY

## STEP & ENGINEER DRAFT (PDF)



# CAD FILE FOR 2D SM TECHNOLOGY

**DXF (DRAWING EXCHANGE FORMAT)**



# CAM FILE FORMATS G-CODE

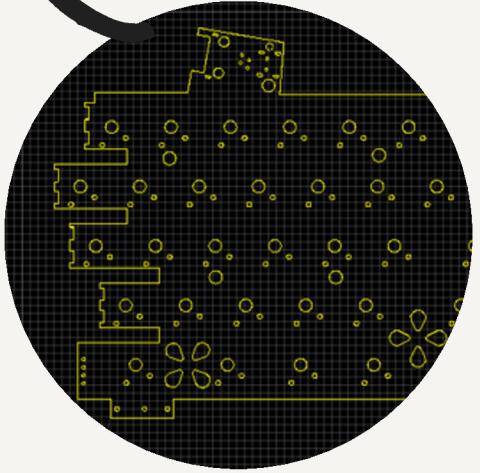


```
Fan speed setting ;Layer count: 25
;LAYER:0
M107
G0 F9000 X52.235 Y55.800 Z0.300
Nozzle travel speed (without extrusion) Layer height
Nozzle printing speed (with extrusion) Extrusion length
;TYPE:SKIRT
G1 F2340 X56.093 Y55.800 E0.18815
G1 X56.346 Y55.605 E0.20373
G1 X57.299 Y55.078 E0.25684
G1 X58.540 Y54.758 E0.31934
G1 X59.404 Y54.719 E0.36152
G1 X60.320 Y53.688 E0.42878
X, Y Coordinates
```

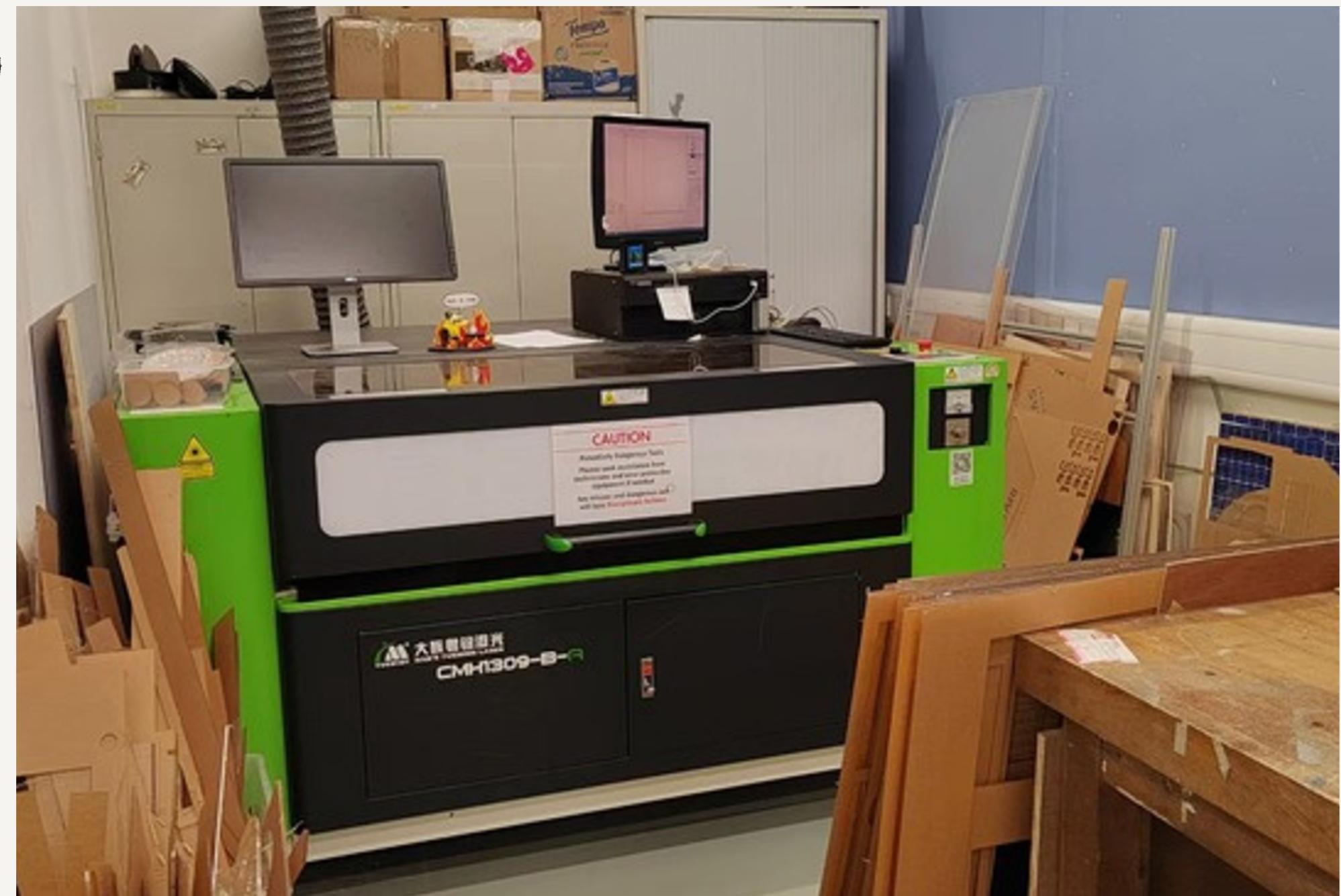
# LACER CUTTER IN LAB RM 4223



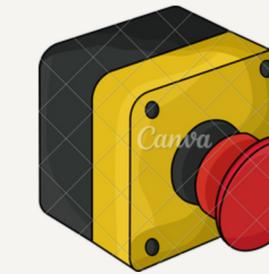
CAM



DXF file



# SLICER BAMBU STUDIO



## FIND THE EMERGENCY STOP



# LASER CUT COMMON MATERIALS WOOD BOARD, ARCYLIC BOARD, CLOTH

Important material data:

- Material type
- Thickness

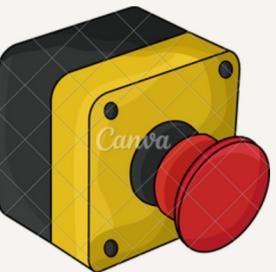


Layer Parameter	
Name	3
Processing Media	Laser
Work Parameter	
Max. Power(%)	20.00
Min. Power(%)	20.00
Work Speed(mm/s)	300.000

# DEMO FOR LASER CUT



# HEADS UP AGAIN



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# LASER CUTTING ASSIGNMENT

## LAB ASSIGNMENT (DDL: 3RD MAR 23:59)

- This is a group assignment. You will cut the fish's backbone with PETG, which will be used to create the fish's tail.
- Cut the fish backbone Part #18 +(one piece) and Part #13 with the laser cutter. [File shared in the Canvas →lab→Lab 3 Subtractive Manufacture →Laser cutting assignment]
- $P_{max} = 55$   $P_{min} = 50$   $v = 12$  (Just a reference)
- Feel free to modify the part if you want.
- Submission file:
  - A photograph showing your laser cutting part with your group number

**THANK YOU!**