Into to 3-D CAD with DesignSpark Mechanical

I am not going to show you “the way”, but rather a way.

The 30 second challenge.

Does everyone have a pencil or pen and a sheet of paper?

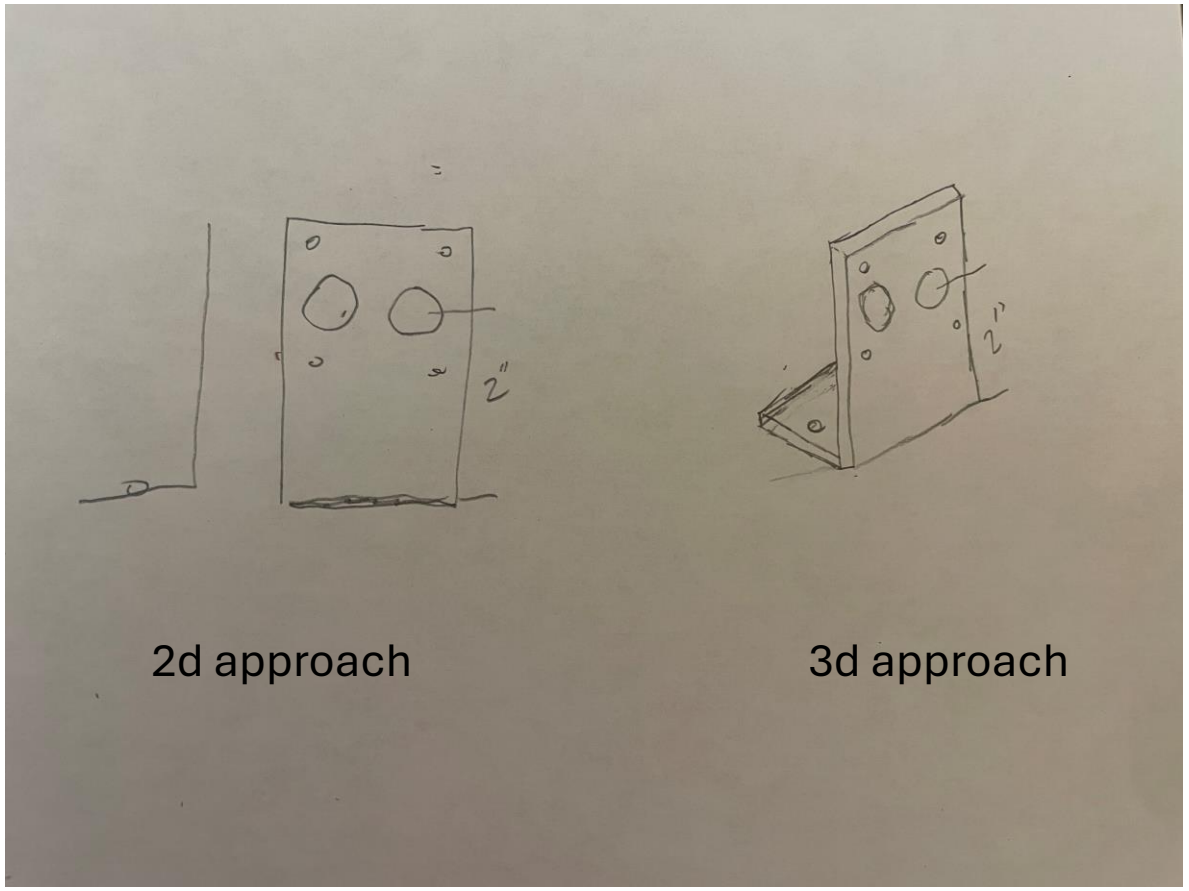
Design an L shaped bracket for an HSR04 ultrasonic sensor.

It must mount the sensor 2” above the robot deck and face forward.

The transmitter and receiver should fit through the mount.
The mount should have holes for screws in the 4 corners that match the holes in the sensor.

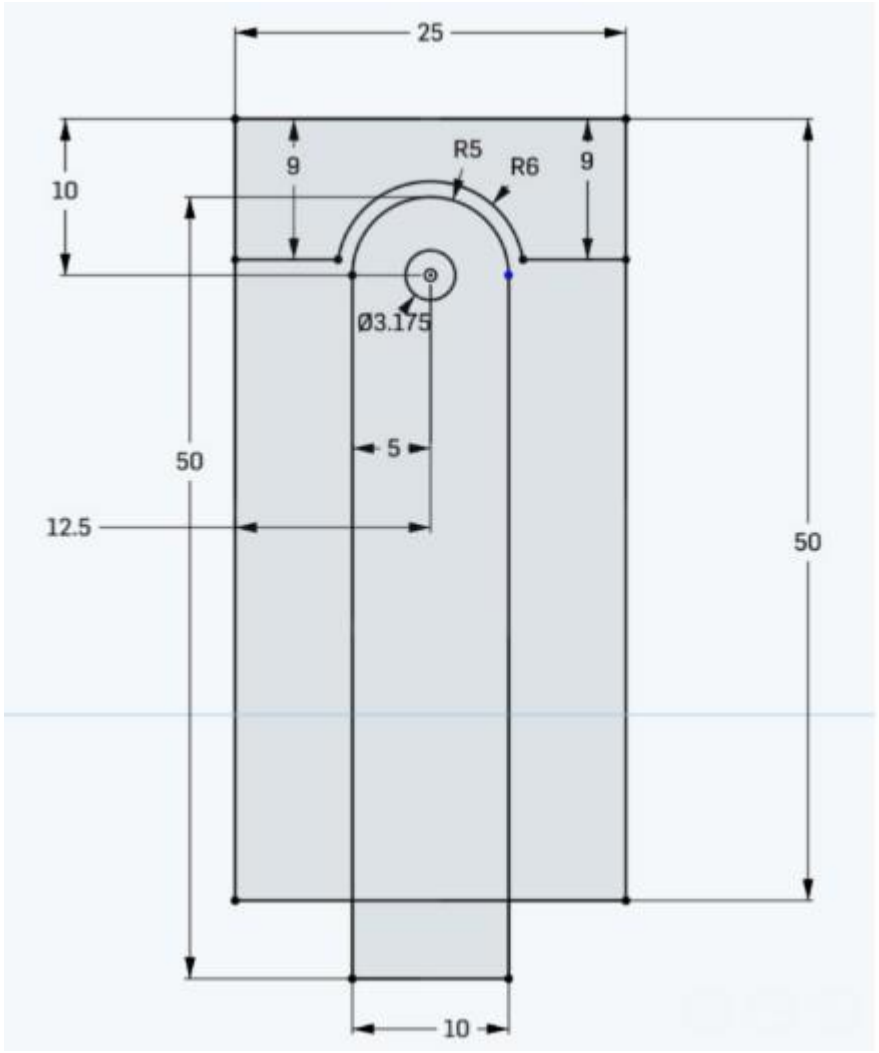
It should also have holes on the L part that touches the robot deck.

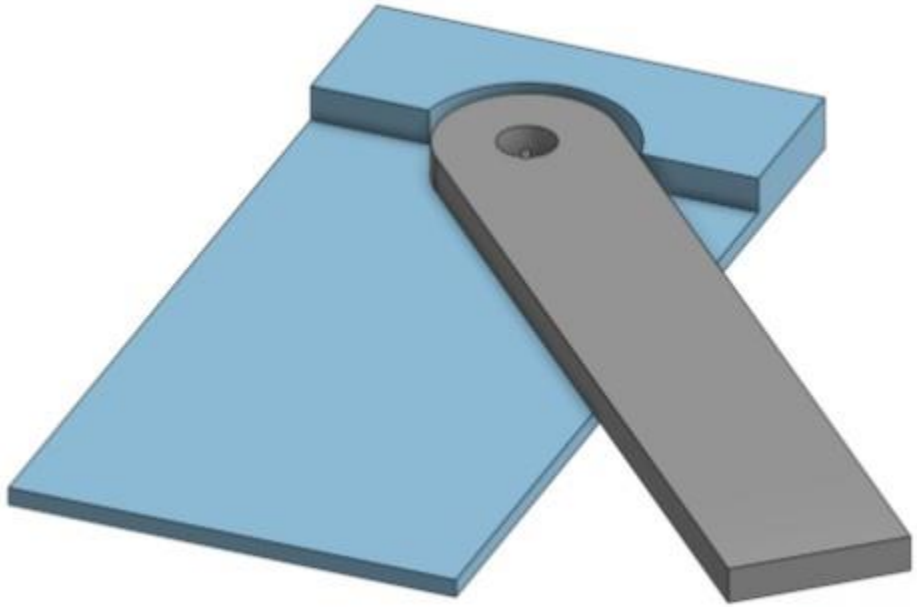
What does your design most closely resemble?



Your sketch provides some input into how you think.
This is also the first part of the process, an idea of what you want.

Paul’s Pendulum Challenge:





Switch to DesignSpark Mechanial

Download link:
https://www.rs-online.com/designspark/mechanical-download-and-installation

Quick once over of menu and tools

Design Tips:

Tip # 1

Start in 2D view. Make Use of Construction Lines.

Tip # 2

Never try to set dimensions with your mouse. Always use the dimension boxes.

Tip # 3

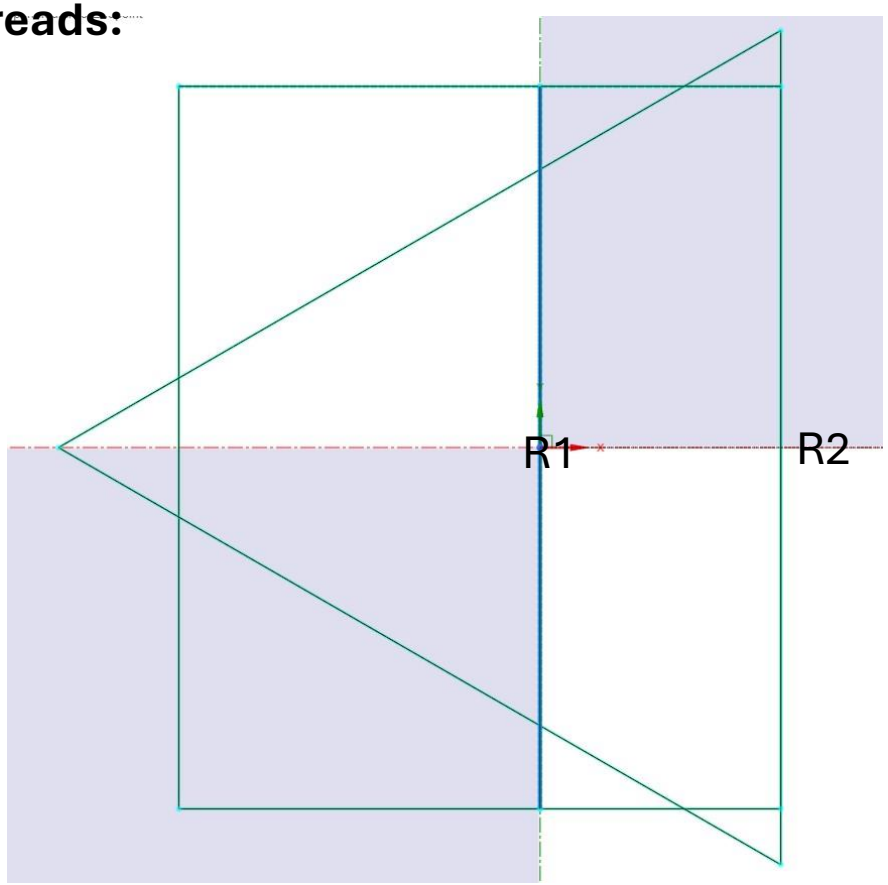
If you are going to 3D print the part, consider the strong and weak axis of the print.

Tip # 4

Don’t limit yourself to 3d-prints Use the appropriate material.

- Use Al rods/shafts instead of 3-d printed cylinders.
- If the part is a simple plate, consider flat material (acrylic, plywood, Al).

Threads:



P = thread pitch

Cutter	M3x0.5mm	6-32 NC
R1		
Height = P	.5	.79
Width = P x 0.5	5 x .5 = .25	.395
R2		
Height = P	.5	.79
Width = P x 0.3333	.5 x 0.3333 = .1666	.79 x .1666 =.1316
Triangle		
R2_width x 2	-1666 x 2 = .3333	.13333 x 2 = 2.666

	M3	6-32
Bolt hole = tap drill size (mm) – printer determined tol.	2.5 - .35 = 2.15mm	2.705mm - .35 = 2.355mm
Nut hole = tap drill size (mm) + printer determined tol.	2.5 + .25 = 2.75mm	2.705mm + .25 = 3.055mm

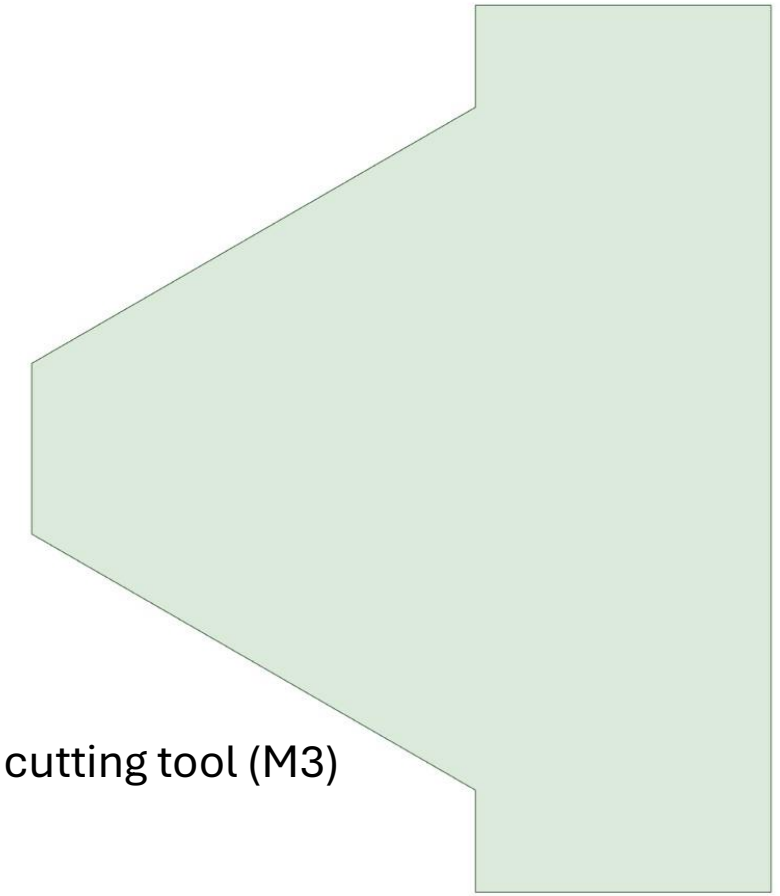
Threads:

Making Metric threads (shows how to make cutter):
https://www.youtube.com/watch?v=TmvqVSUB5eI

Metric Thread Dimensions For ISO Standard Screws & Bolts:
https://i.accu.co.uk/documents/marketing/Thread-Size-Sheet-V2.

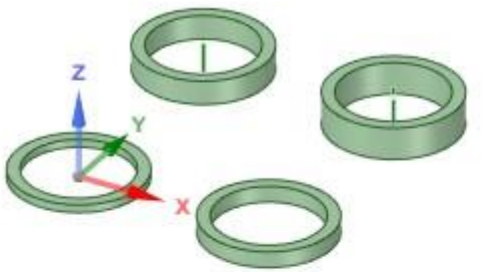
Unified National Imperial Screw Thread Calculator (imperial)
http://theoreticalmachinist.com/Threads_UnifiedImperial.aspx

You only need to make the tool once per thread size.
Save it as a design, then import when needed.



Thread cutting tool (M3)

Bumper – 3D parts



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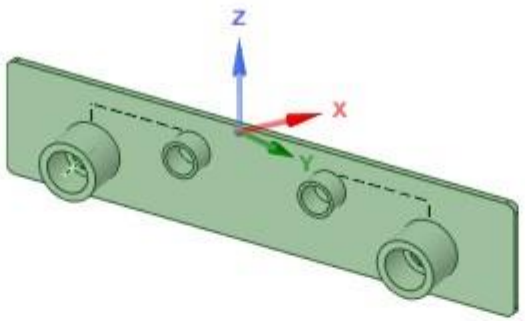
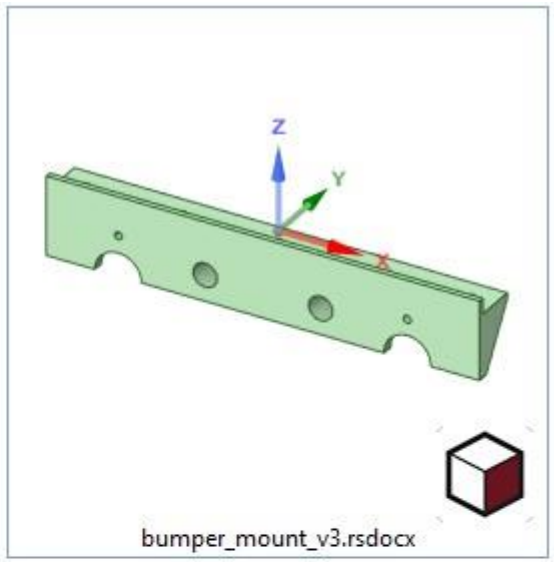


bumper_front_plate.rsdoc



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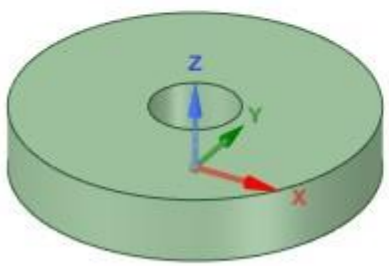

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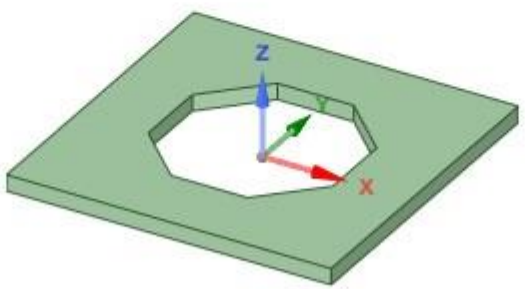

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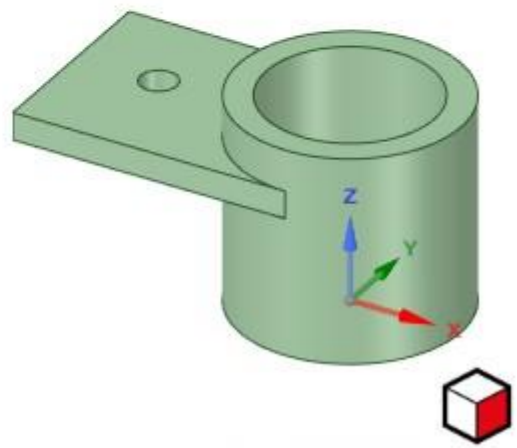
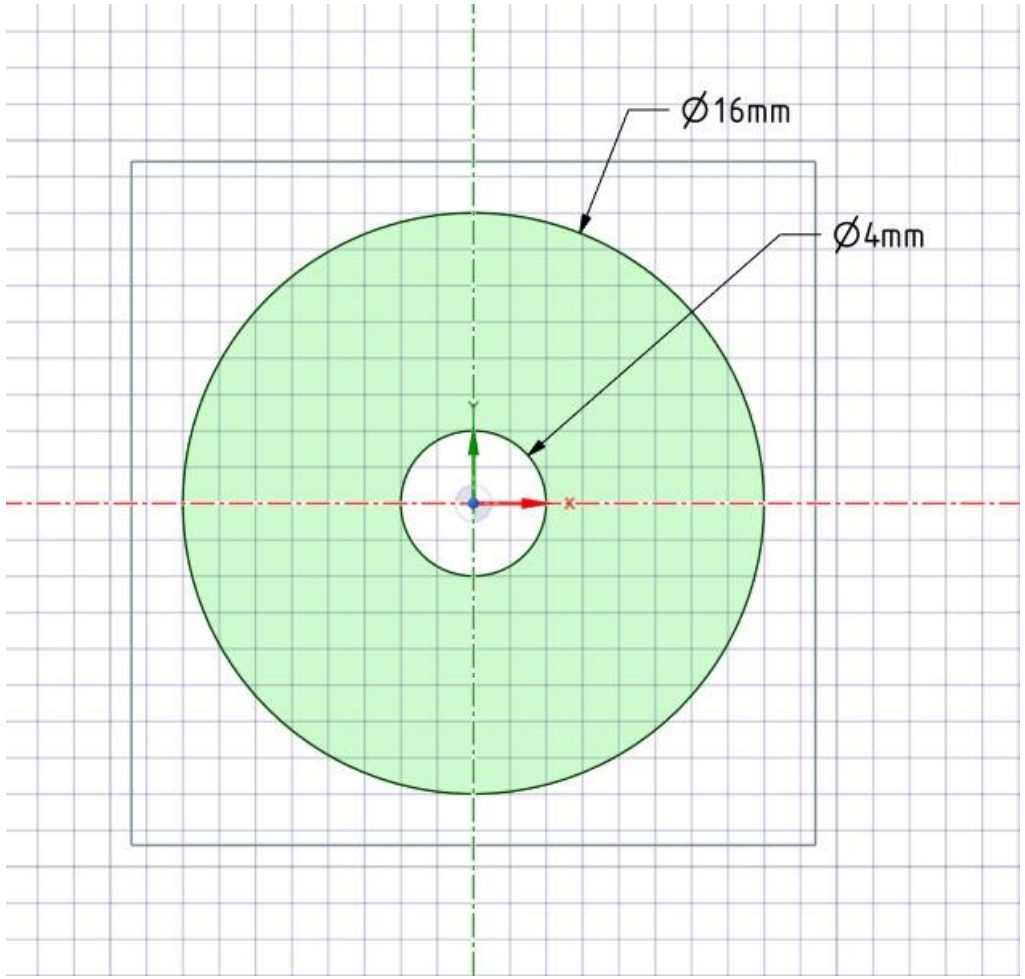
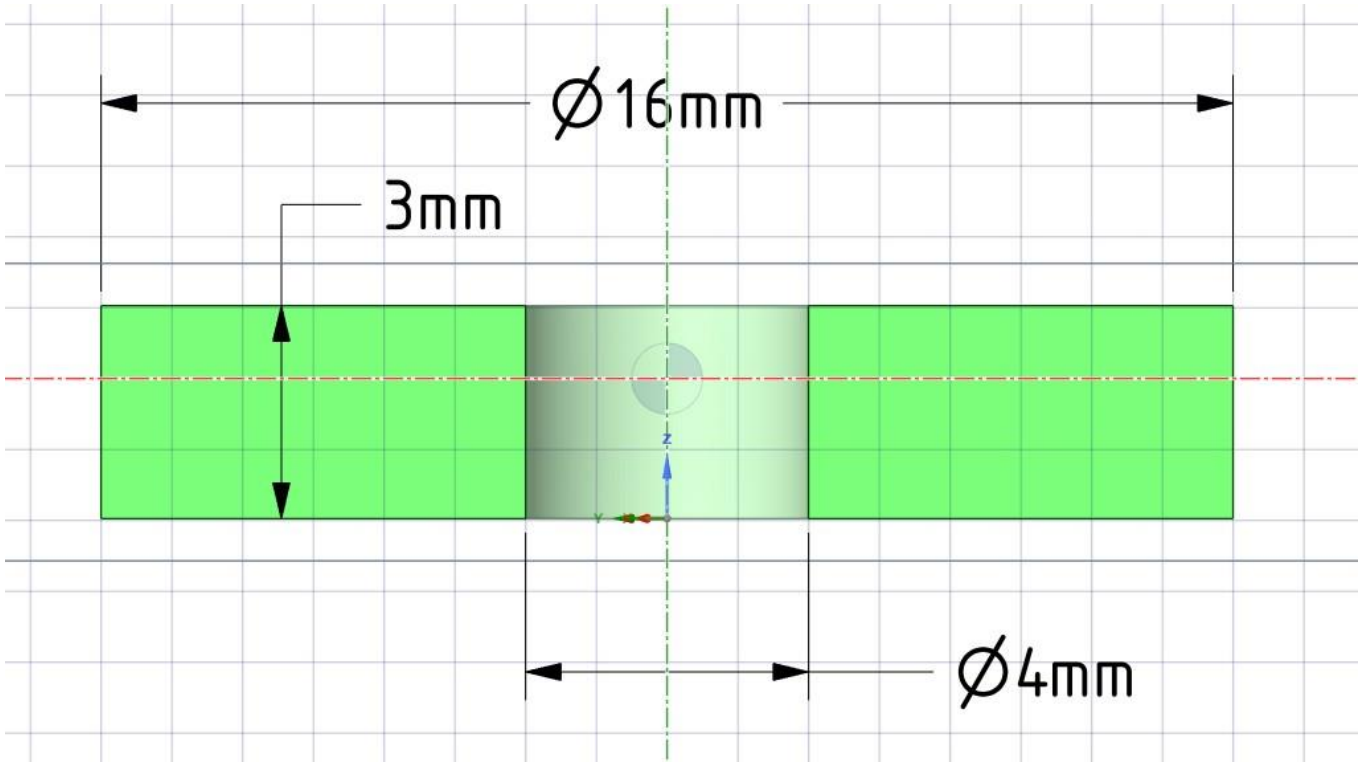


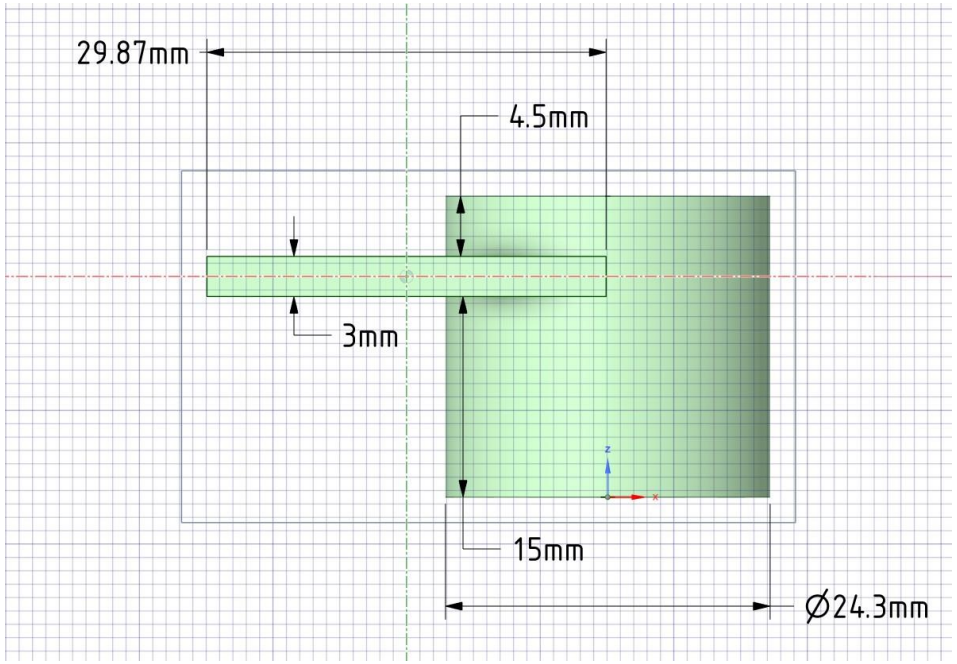
switch_housing_2022-v1.rsdoc

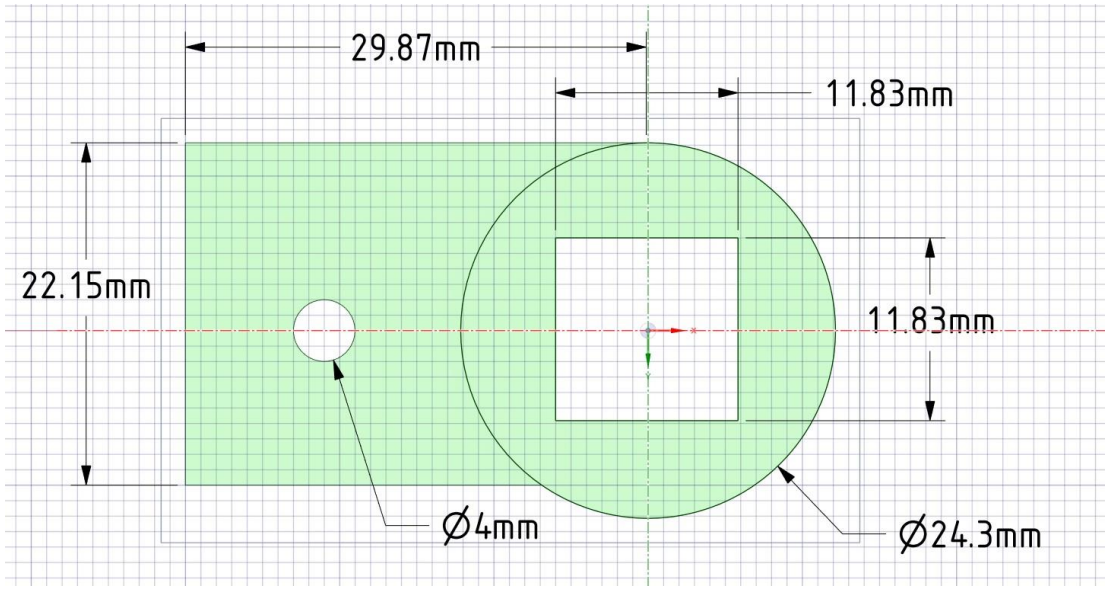
Bumper Mount

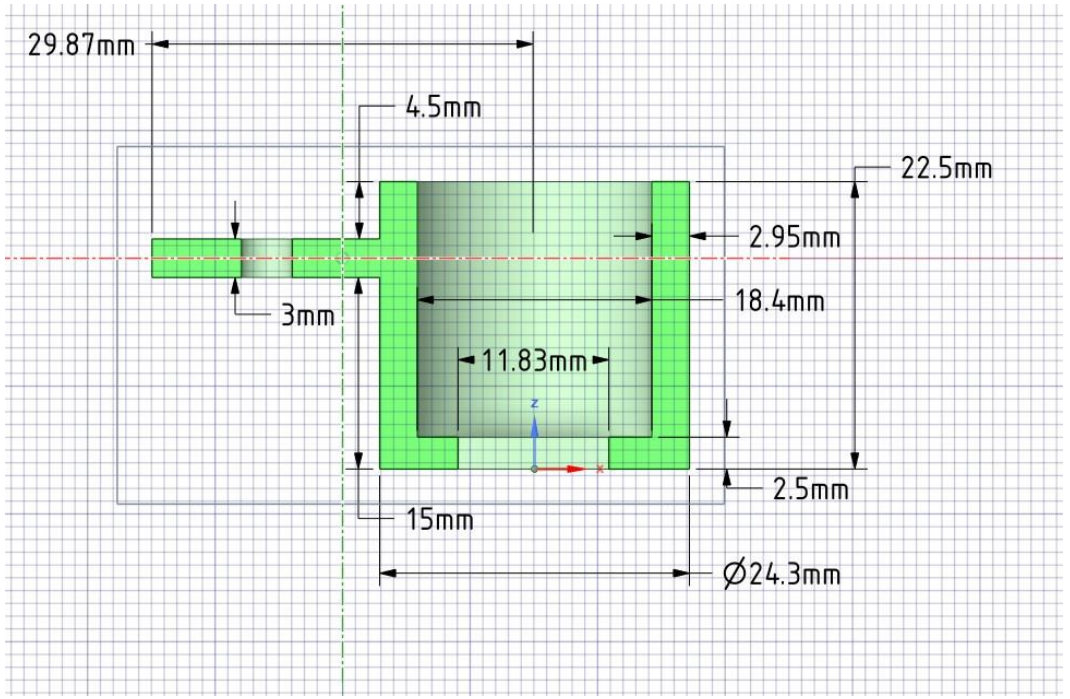




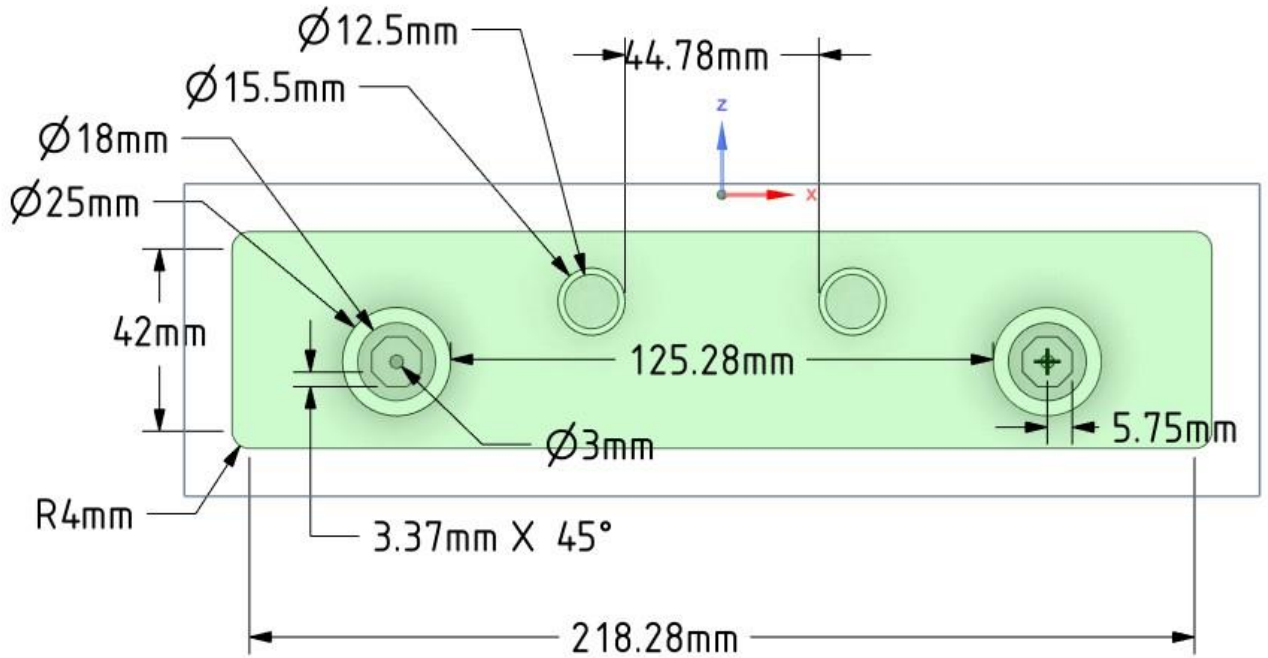
Switch Housing

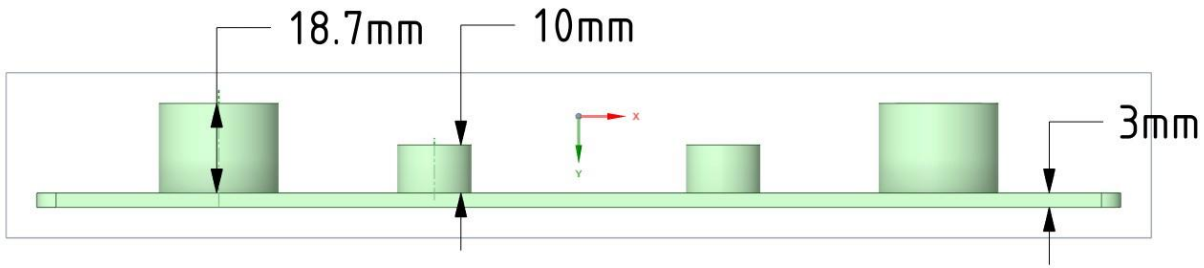


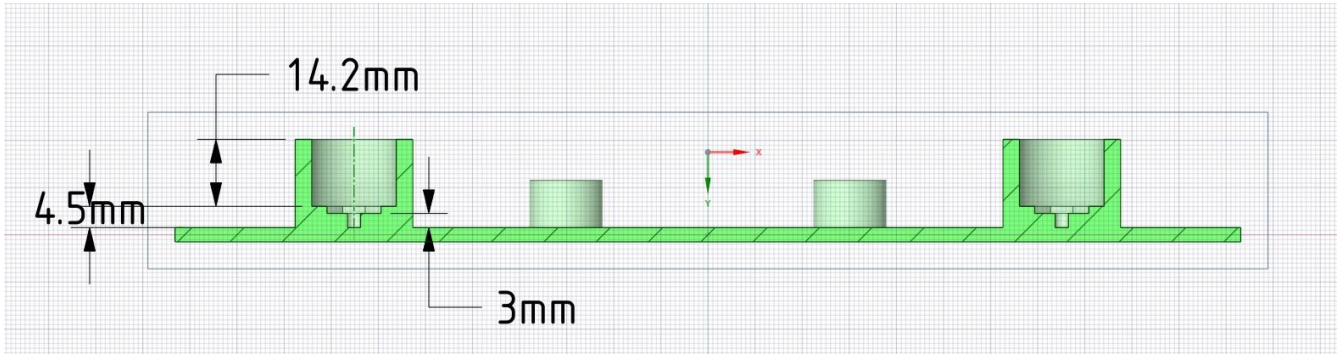




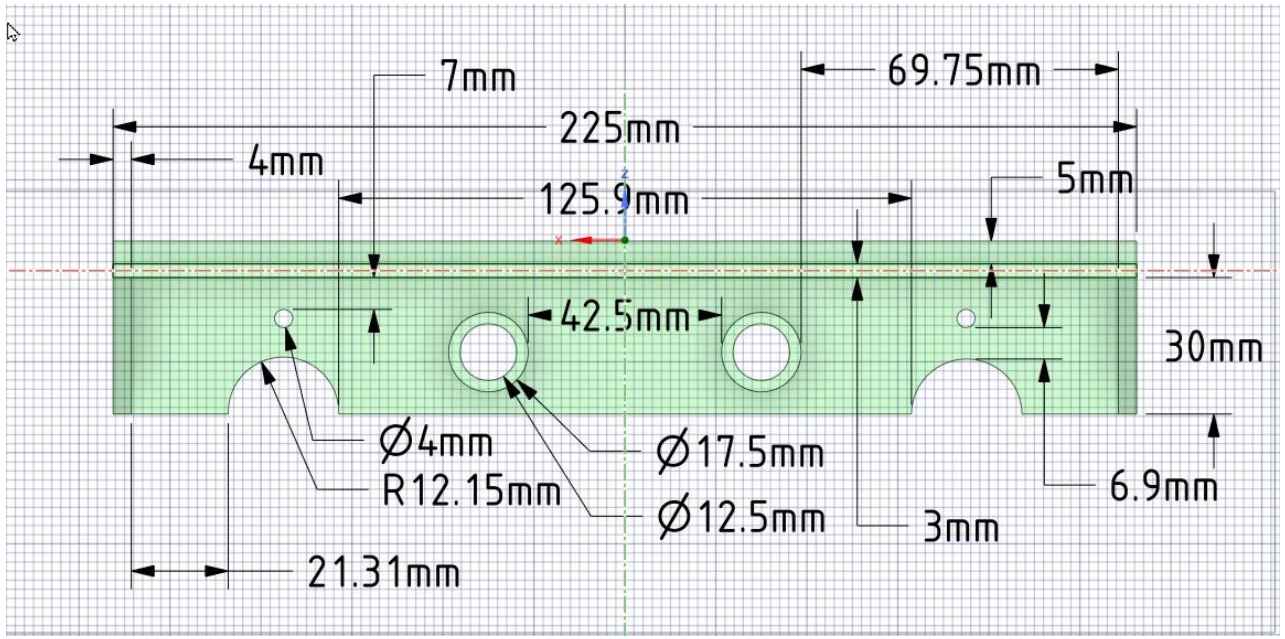
Front Bumper Plate

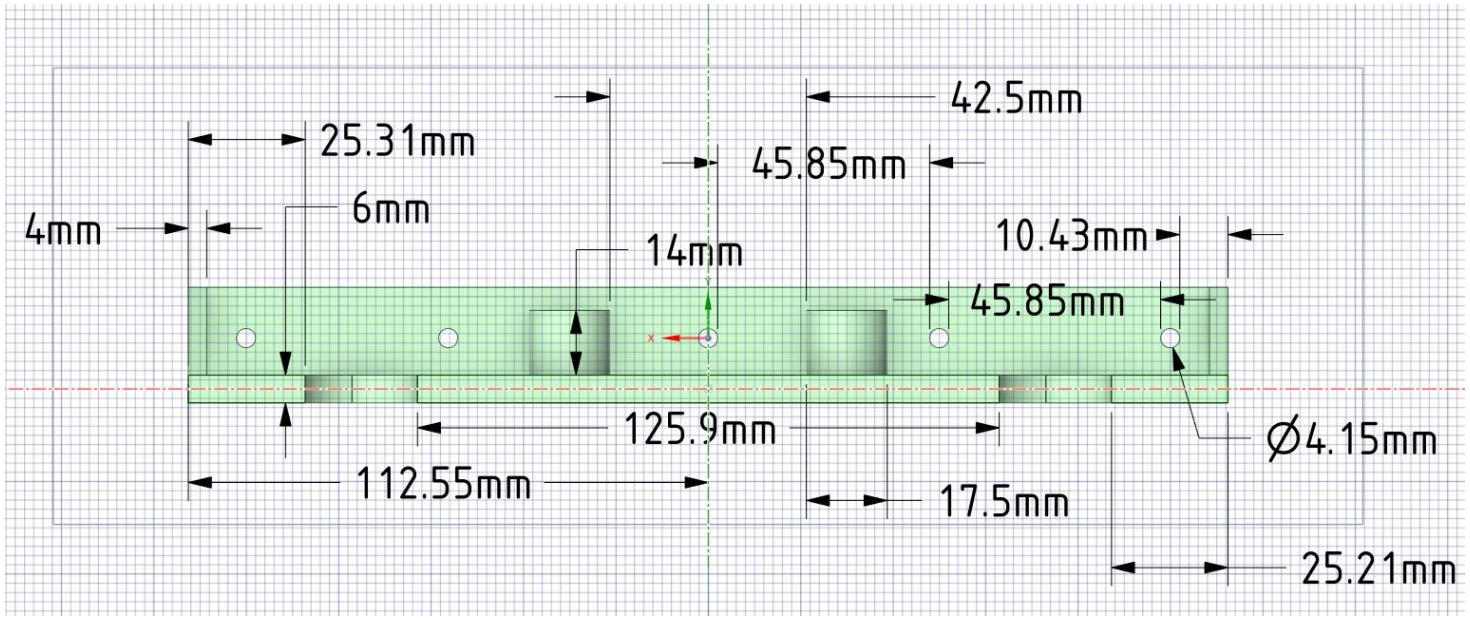


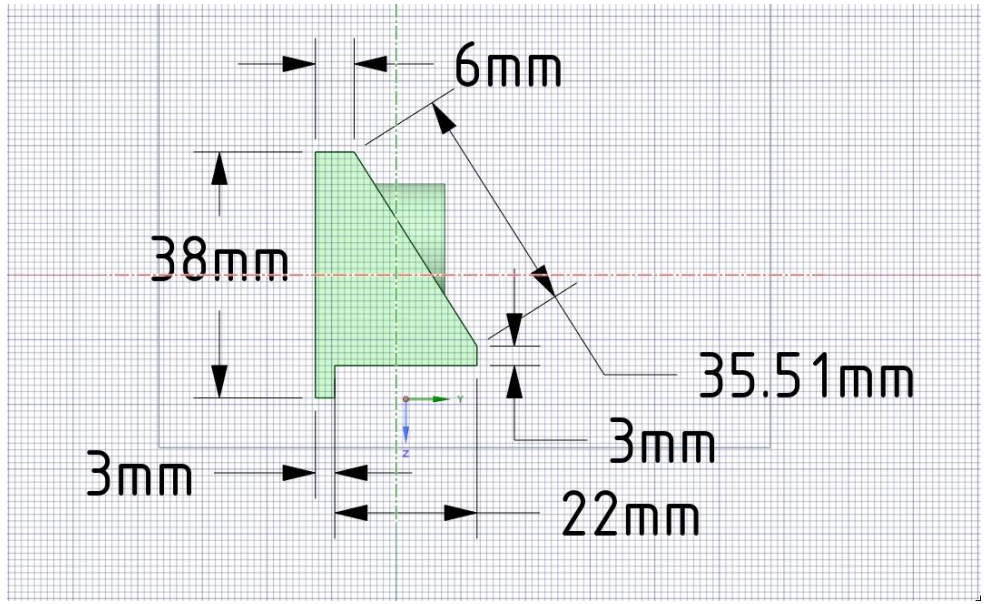




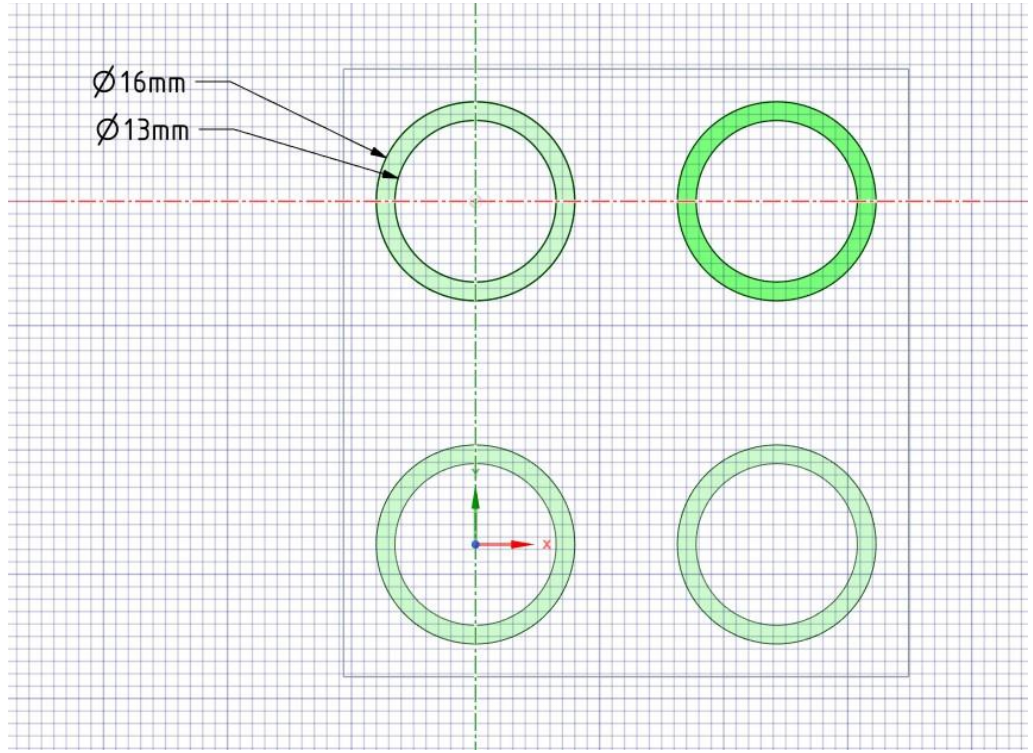
Bumper Mount

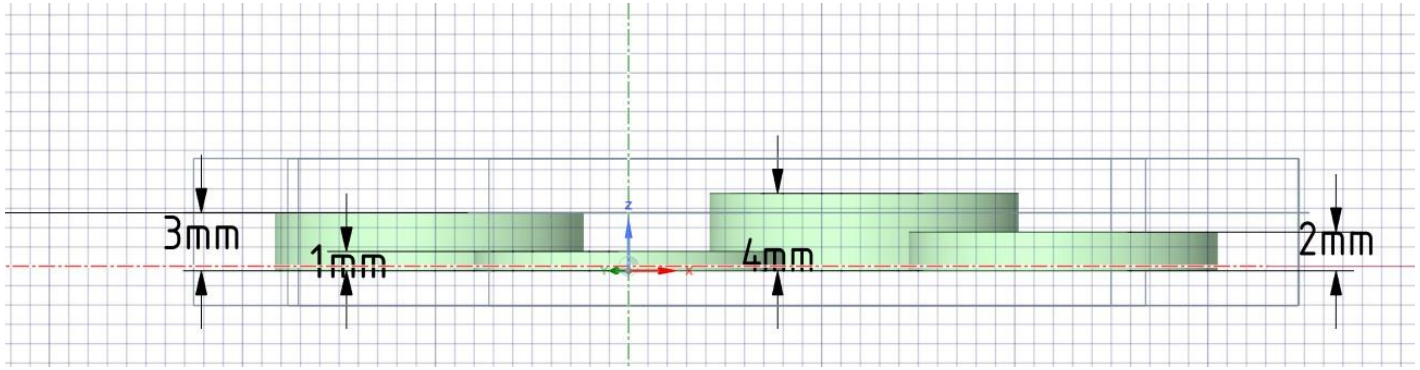






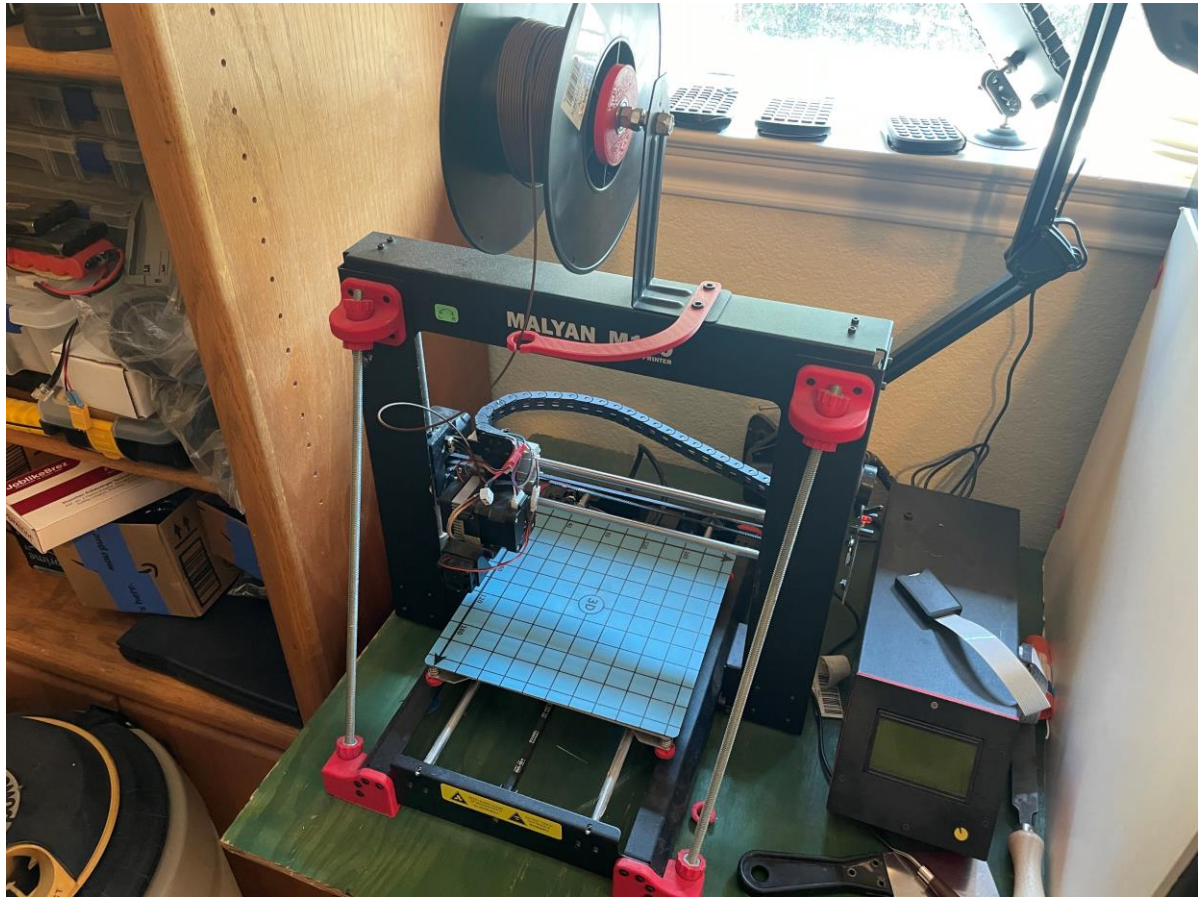
Bumper Mount





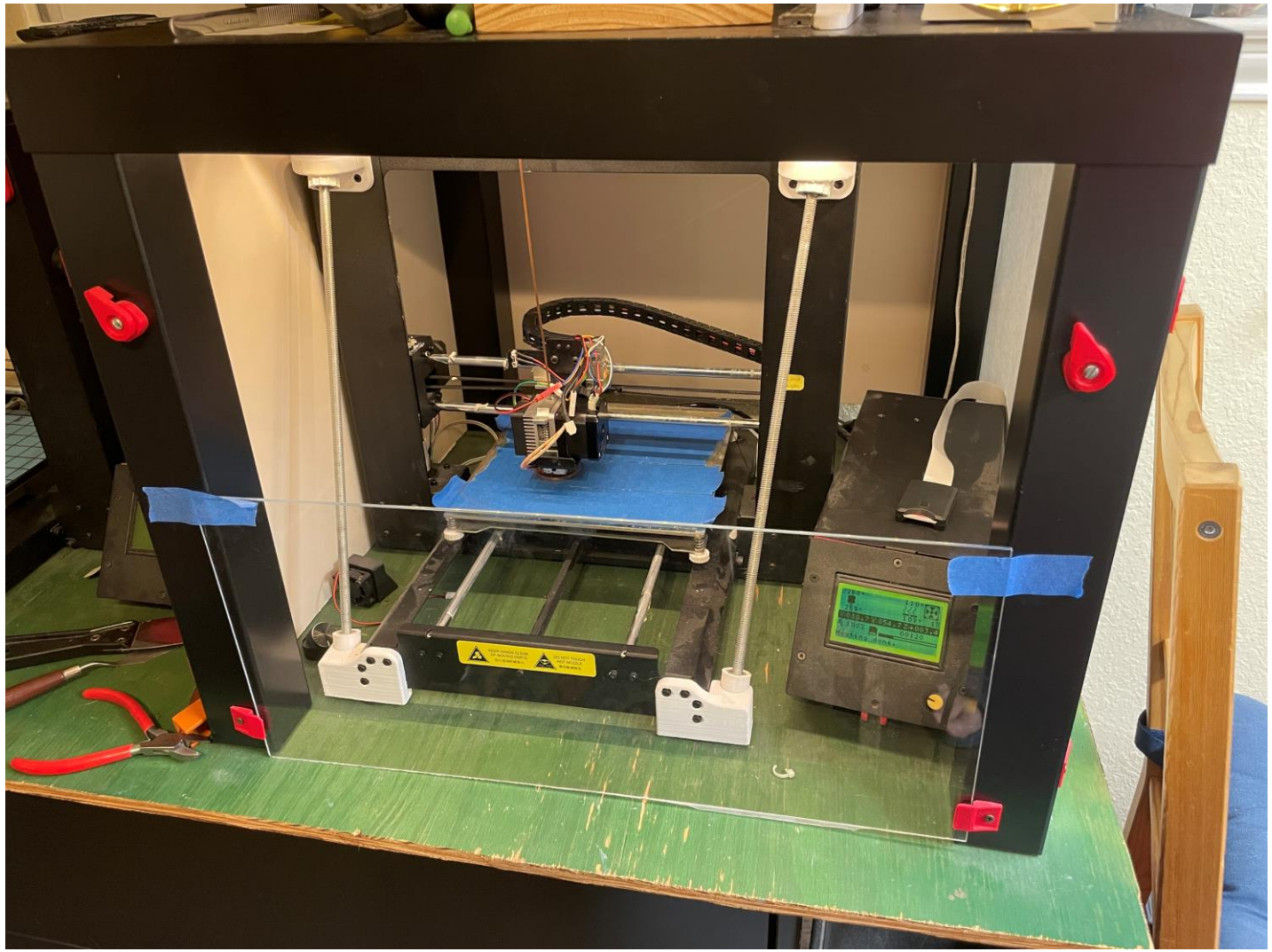
3D Printer considerations

There have been a lot of advancements in 3D printers over the 8 year since I bought my Malyan M150 printers in **2016**. Printers are now much easier for a beginner, and they Are more reliable. They also print faster.



- Bed slinger design
- Direct drive extruder w/ single drive wheel.
- Dual circular rails for axis movement
- Dual steppers on z axis
- Small fan to cool filament as it leaves nozzle
- All steel construction (except addons)
- 200x200mm bed (about 8x8”)
- Top mounted spool
- As configured can print only low temp filaments: PLA
- 1.75mm filament
- Martin software
- M3 extruder (similar to one on Ender 3)
- Magnetic bed plate
- microSD to SD card converter
- Cost $125

Configured for Higher Temp filaments:

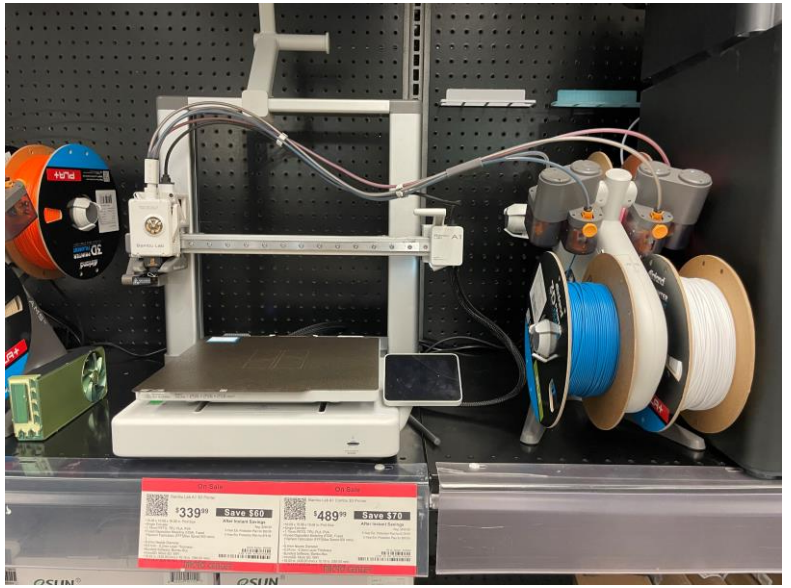


- Enclosure
- Different Bed surface
- All metal hot end

Modern 3D Printers:

Creality CR-10 SE
$270

Creality K1C
$450



Bambu A1
$340/$490

Bambu P1S
$600/$850

Cheapest Ok 3D Printer:

Creality Ender 3 V2
$130