

Report Title: Designing of a Shielded Enclosure
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Description: The task was to design a shielding enclosure (faraday cage) for a data acquisition unit (DAQU) as part of a scanning table construct. The shielding enclosure was designed on the Autodesk fusion application. The 3D printed shape is then covered with copper tape, shielding the DAQU from EM interference.
Objective: <ul style="list-style-type: none">- <i>Design of a shielded enclosure</i>

1. Procedure

This section discusses the procedures used in designing the shielded enclosure.

- [1].** Multiple sketches of the shielded enclosure were brainstormed, and each was then discussed with Dr. Ademola. Through these discussions, options were narrowed down to one design.
- [2].** The design constraints and general measurements were noted, such as maximum dimensions of the design based on the spacing available, DAQU dimensions, holes of the screw's dimensions, and etc.
- [3].** The sketch was then designed on Autodesk fusion.
- [4].** Modifications to the design were made as further reflections shed light on better improvements and new considerations.
- [5].** The final design was exported to UltiMaker Cura to determine the printing time of the design.
- [6].** The design was required to be split into more parts, ensuring that the printing time was around 8 hours maximum.

2. Drawings

This section includes 2D drawings made before designing the shielded enclosure on fusion; this is to ensure that the dimensions of the shielded enclosure match the specifications of the design.

The base of the shielded enclosure, figure 1.

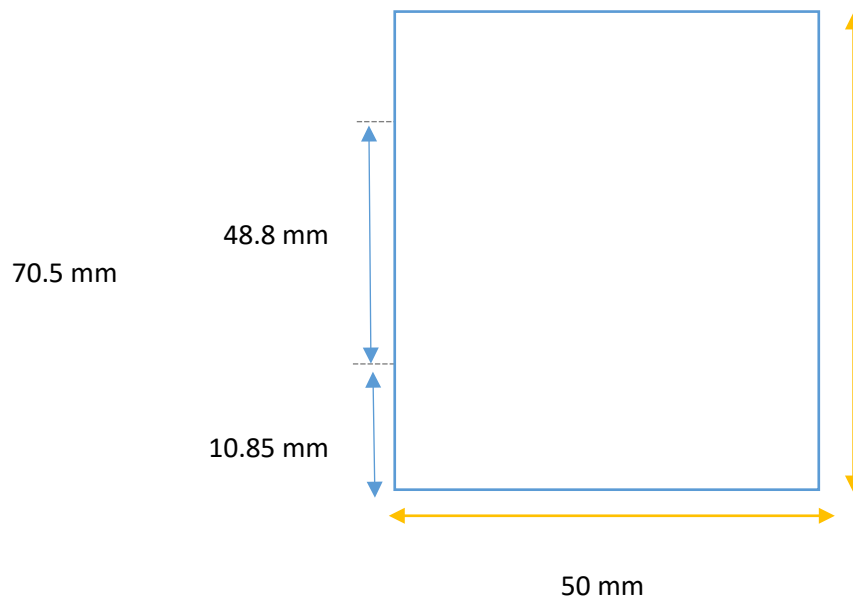


Figure 1. The base measurements

The stand of the shielded enclosure, figure 2.

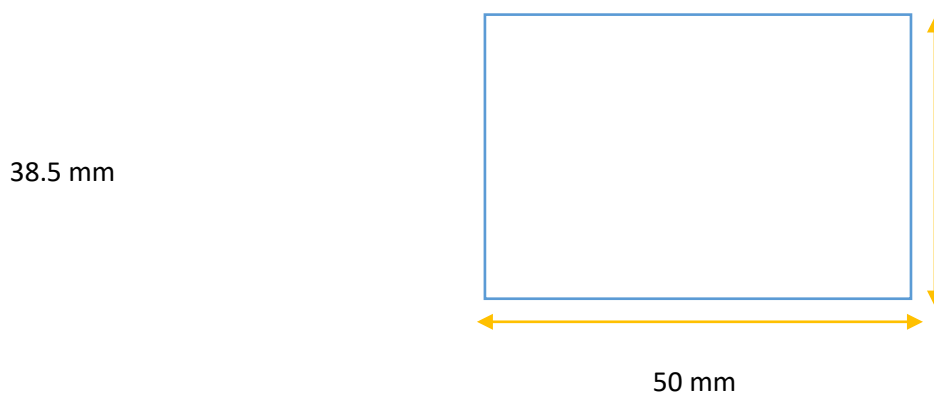


Figure 2. the stand measurements

The base of the DAQU's case, figure 3.

Note: the four holes are to screw the split parts of the shielded enclosure together.

*: accounting for the wall thickness, **: tolerance added, ***: screw head size and 1mm for spacing.

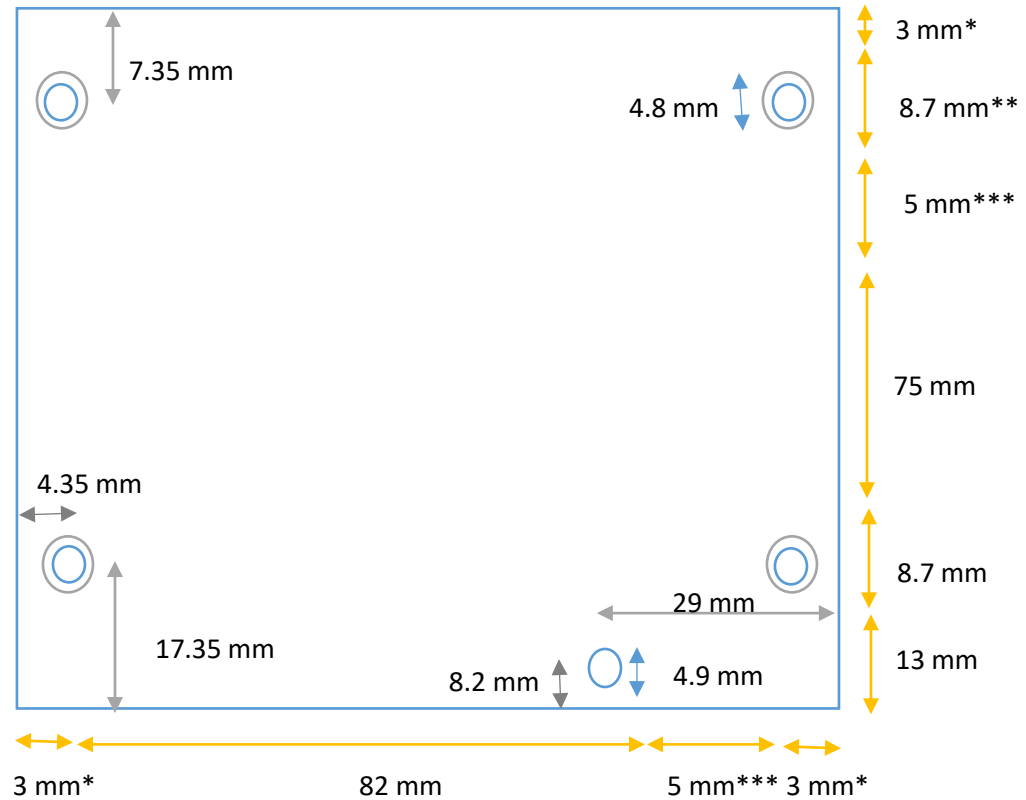


Figure 3. The base of the DAQU's casing measurements

The two sides of the DAQU's casing, figure 4.

Note: the cut is added for the DAQU's wires.

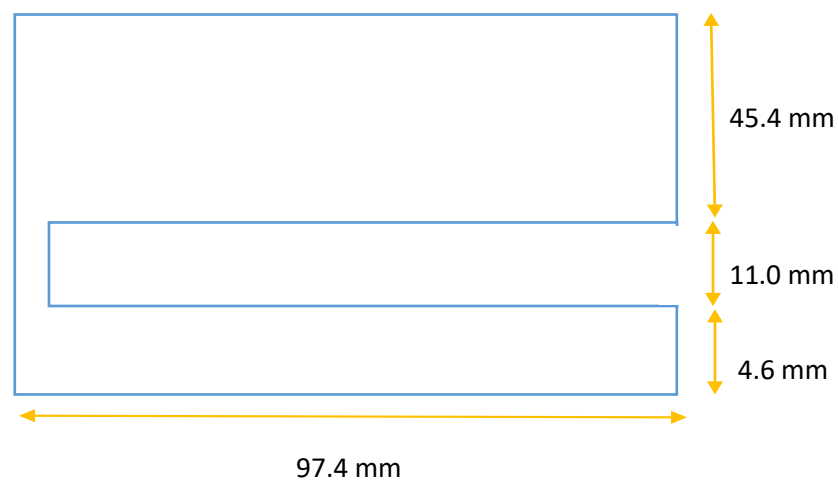


Figure 4. The sides of the DAQU's casing measurements

3. Design Parameters

The table below details the shielded enclosure design parameters.

Design parameter	Value
Shielded Enclosure maximum height*	95 mm
Shielded Enclosure maximum width*	95 mm
Shielded Enclosure maximum length*	115 mm
DAQU dimensions (L x W x H) mm	75 x 82 x 22.8
Tolerance added	0.95**
Wall thickness	3 mm
Minimum distance between the DAQU and the top of the Shielded Enclosure ***	20 mm
Minimum height of the Shielded Enclosure stand****	20 mm
Maximum printing time of the design	8 hours

*Measured based on the spacing available for the shielded enclosure on the case containing the power supply, motor drivers, and the DAQU.

**Tolerance considered from previous experience with the 3D printing machine to be used (a designed object of 10 mm length was printed with a 9.5 mm length). However, for screw holes, the diameter is increased by 1mm.

***This is to provide space for heat produced by the DAQA.

****This is to ensure there is enough space for the screws to fasten the DAQU to the casing.

4. Results

This section includes the 3D design on fusion before the splitting of the structure, figure 5, and the two split parts, figure 6 (a) and (b).

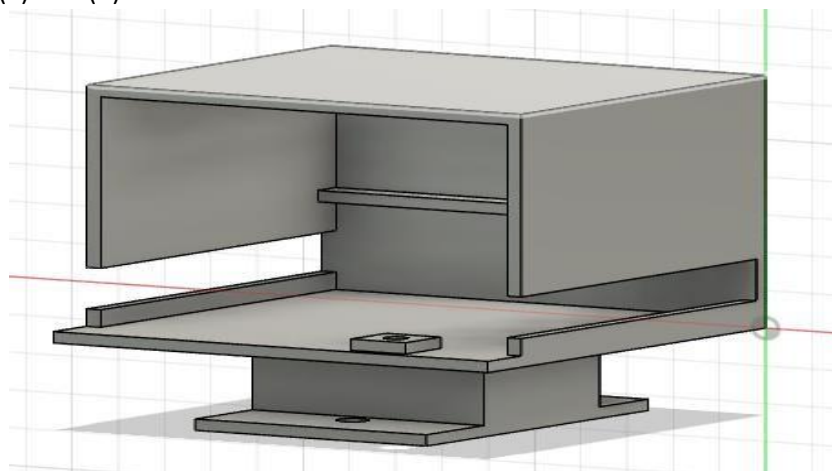


Figure 5. Shielded Enclosure 3D design.

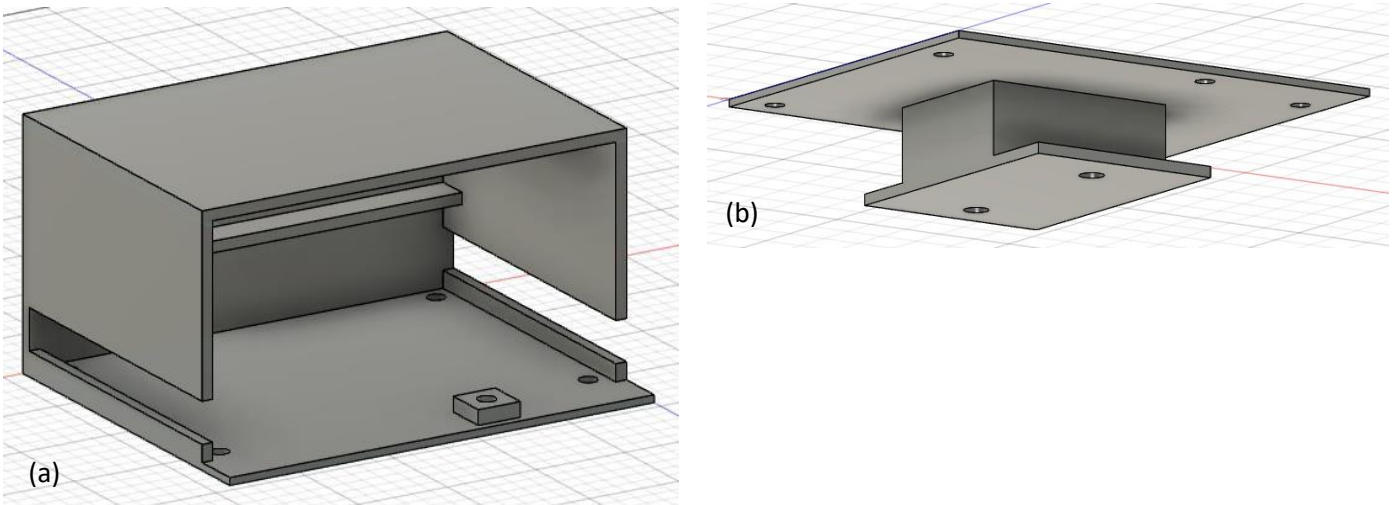


Figure 6. Split parts of Shielded Enclosure 3D design. (a) Top part. (b) Bottom part.

5. Future Steps

The top and the bottom parts of the shielded enclosure were exported separately into UltiMaker Cura, and while the bottom part only takes 7 hours and 22 minutes to be printed, the top part would take 22 hours and 7 minutes. Therefore, the future step is to work out a way to split the top part such that each new part is printable within 8 hours and that the parts could be feasibly and efficiently screwed back. Furthermore, learning how to use and calibrate the 3D printing machine is expected.