

Enclosure Design for Portable router

Scope: Enclosure Design

Application: Internet Service Provider

Designing a Enclosure for a router involves a comprehensive process, beginning with the selection of materials, manufacturing process and surface finish in a fully realized enclosure ready for manufacturing. Precision is key during this stage, as the layout must accommodate various components, connectors, and circuitry for both LAN and WiFi capabilities. Design must also produces minimal interference with airwave signals.

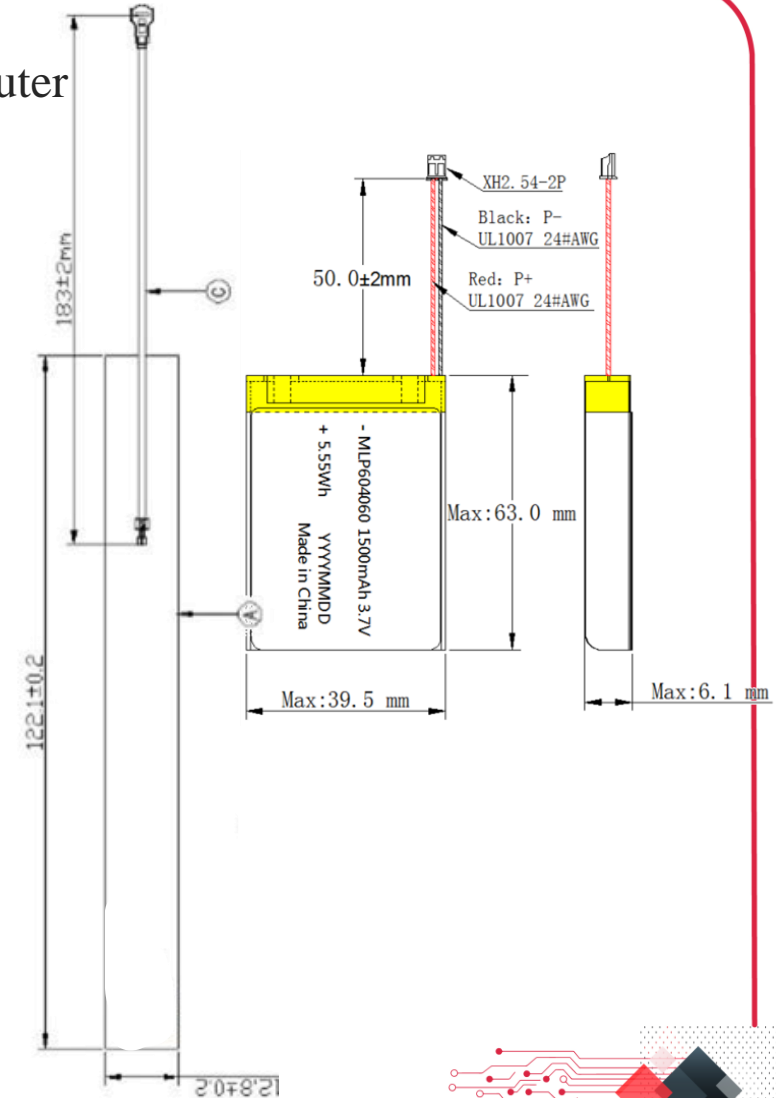
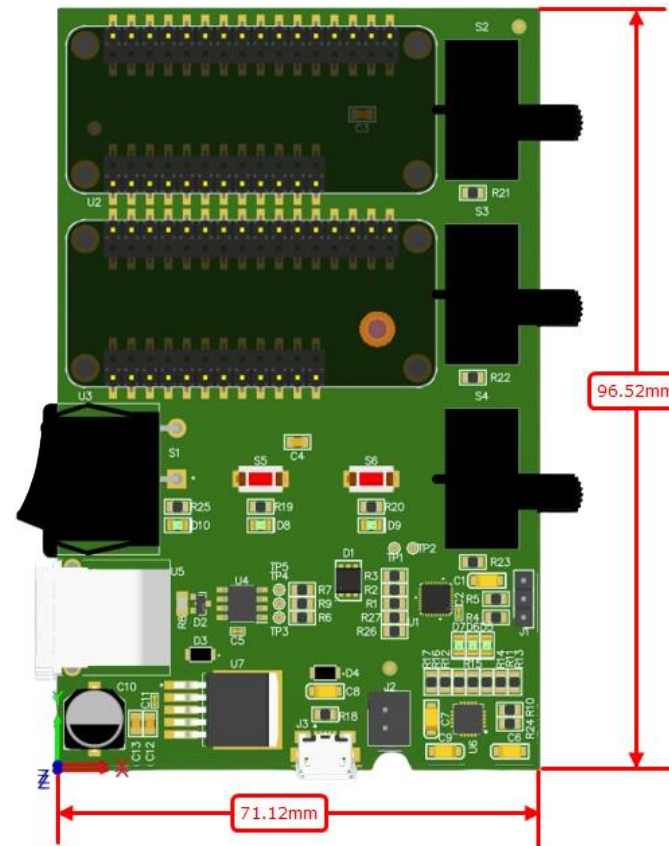


MCAD – Challenges

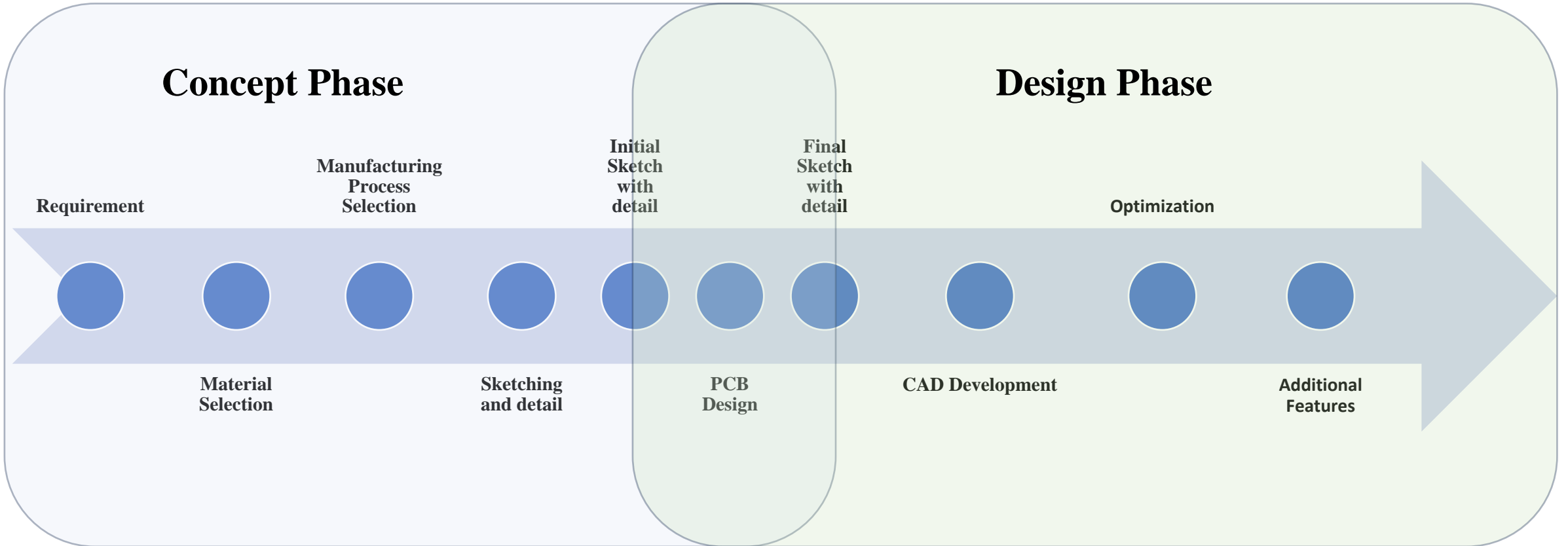
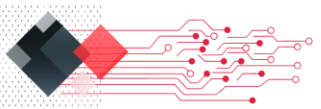
The client came to us with a request to design a protective case for their portable router circuit board. The information they gave us was quite a challenge to work with.

Challenges:

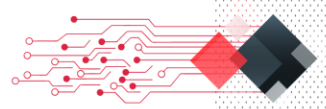
- Improper alignment in PCB Design (LED display, Switch with LED)
- Contain through hole components in the PCB
- The size of the antenna (122.3mm(max)) is larger than the PCB length (96.52mm)
- PCB Design consist of small notch at the bottom for the battery wire can pass through
- Short battery wire length



MCAD – SoW



Every stages of work have multiple brainstorming and review with the client



Concept Phase (cont.)

Requirement

They share info about the antenna, battery, a 3D step file for the PCB and a document contain additional details. We collect all these details and organize them in a step-by-step order.



Material Selection

The condition for material selection as per the inputs are

- Transmission friendly (produces minimal interference with airwave signals)
- Durability

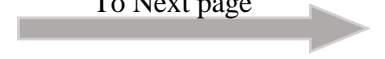
Based on the condition, we selected Polycarbonate

Polycarbonate is the gold standard of toughness for non-metallic electrical enclosures

Polycarbonate is the perfect combination of lightweight, durability and produces minimal interference with airwave signals.

Manufacturing Process Selection

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The condition for Manufacturing Process Selection as per the inputs are

- creating parts with tight tolerance
- excellent part-to-part repeatability
- Cost
- Fast cycle time

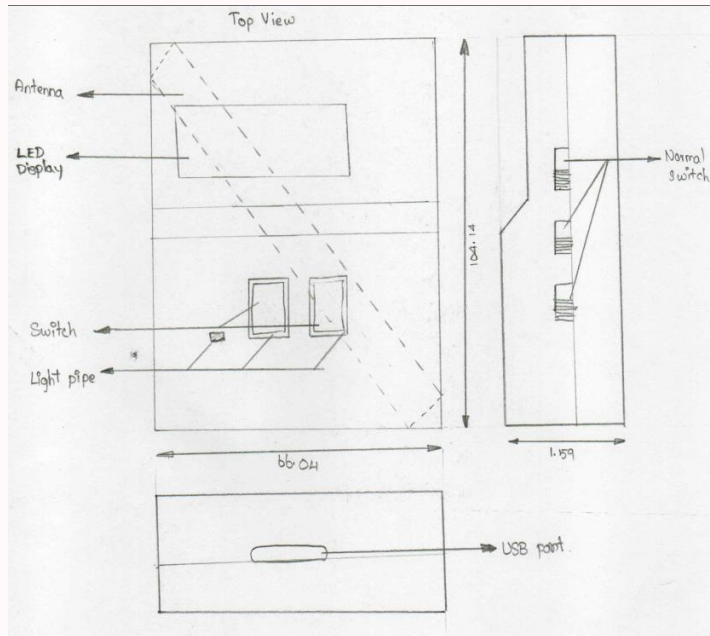
Based on that, we selected 3D printing for prototype and injection molding for mass production



Sketching and detail

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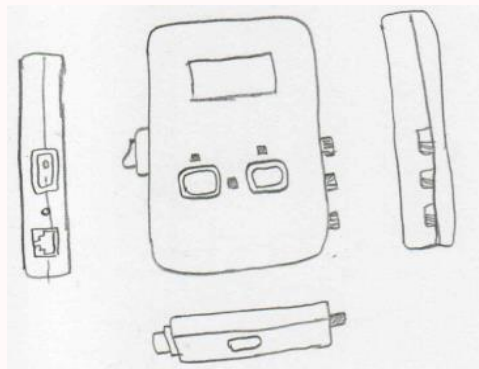
Initial Sketch with detail



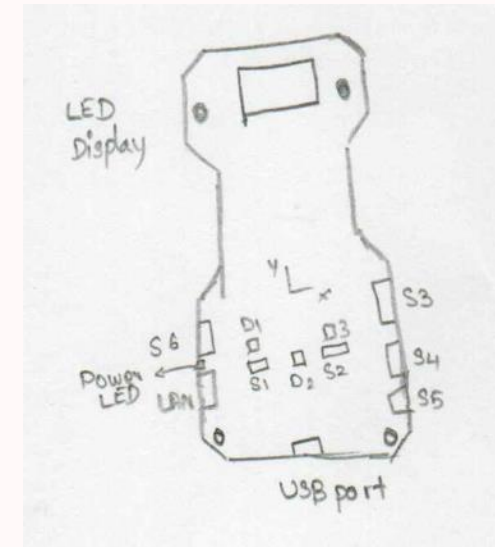
With the current PCB design, the aesthetic of the design not looks good.

Hence, in addition to enclosure design we asked to do the PCB layout.

We proposed the following sketch along with another board shape



Proposed PCB Design (Rough plan Sketch)

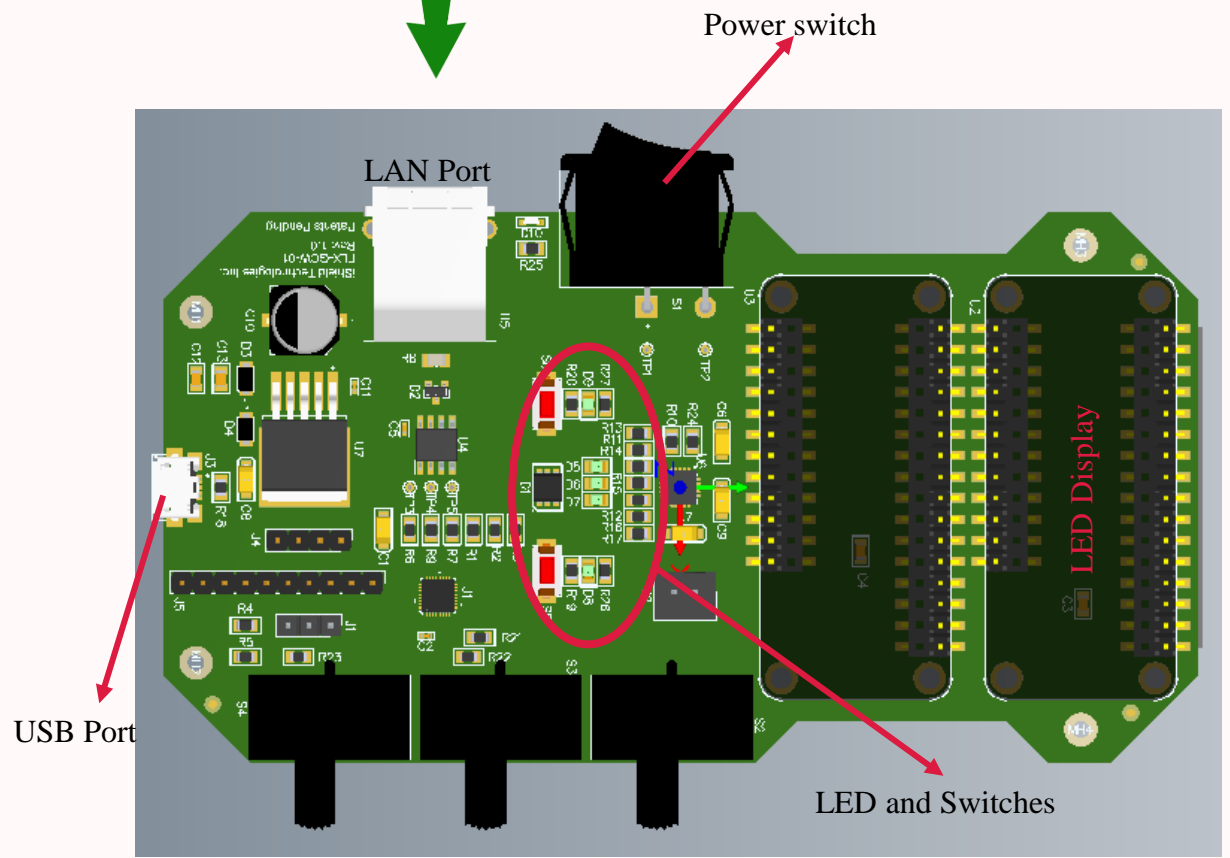


The proposed sketch for the board shape and position of the switches, LED and Display were accepted to their PCB design.

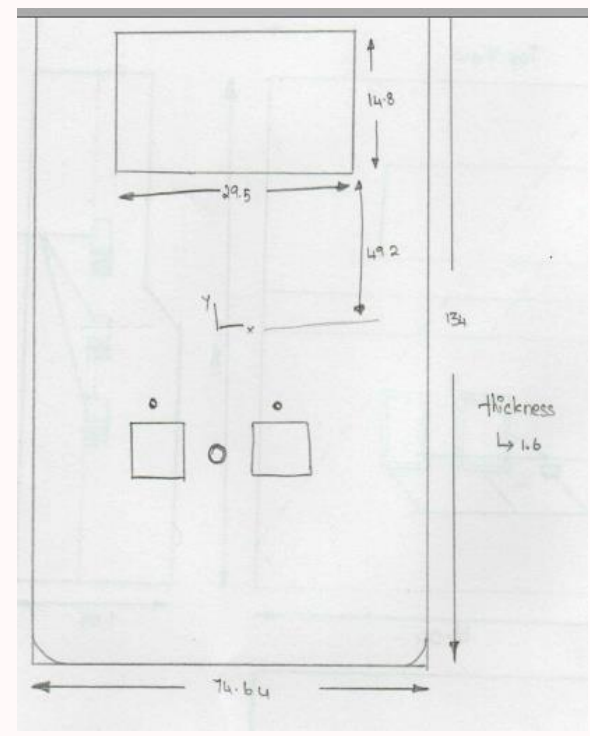
Concept Phase

Sketching and detail

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Final Sketch with detail (Enclosure)



Final PCB sketch converted in to the design model



Design Phase

CAD Model development stages

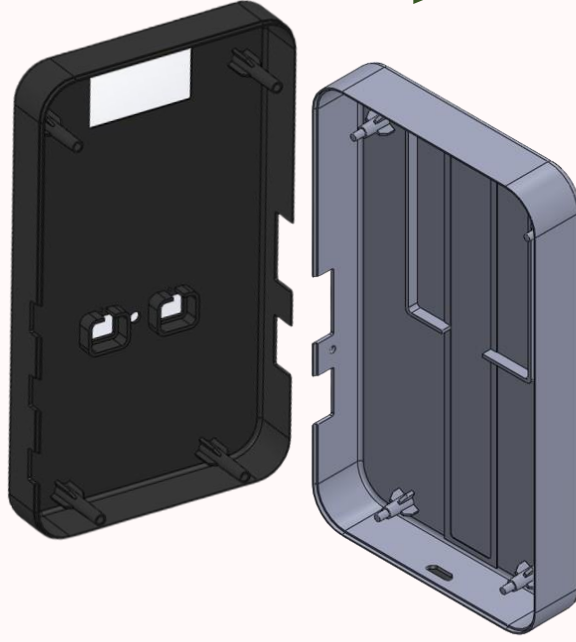
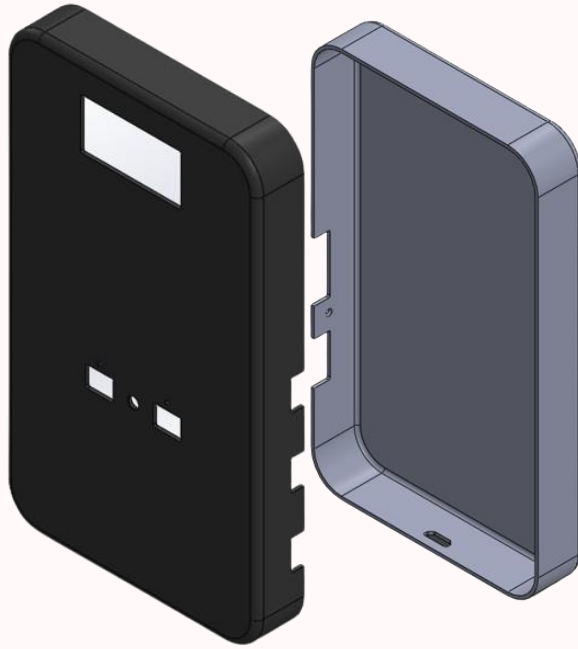
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Outline design

Adding Details

Optimizing

Aesthetics improvement



Top

Bottom



Button Holder

Button



Final CAD Model

Completed design has,

Final Dimension – 74.64 x 134 x 1.6 mm

Value Add's – Allocated exact mounting compartment for battery and antenna

Design created without screws



Left side View



Front View



Right side View

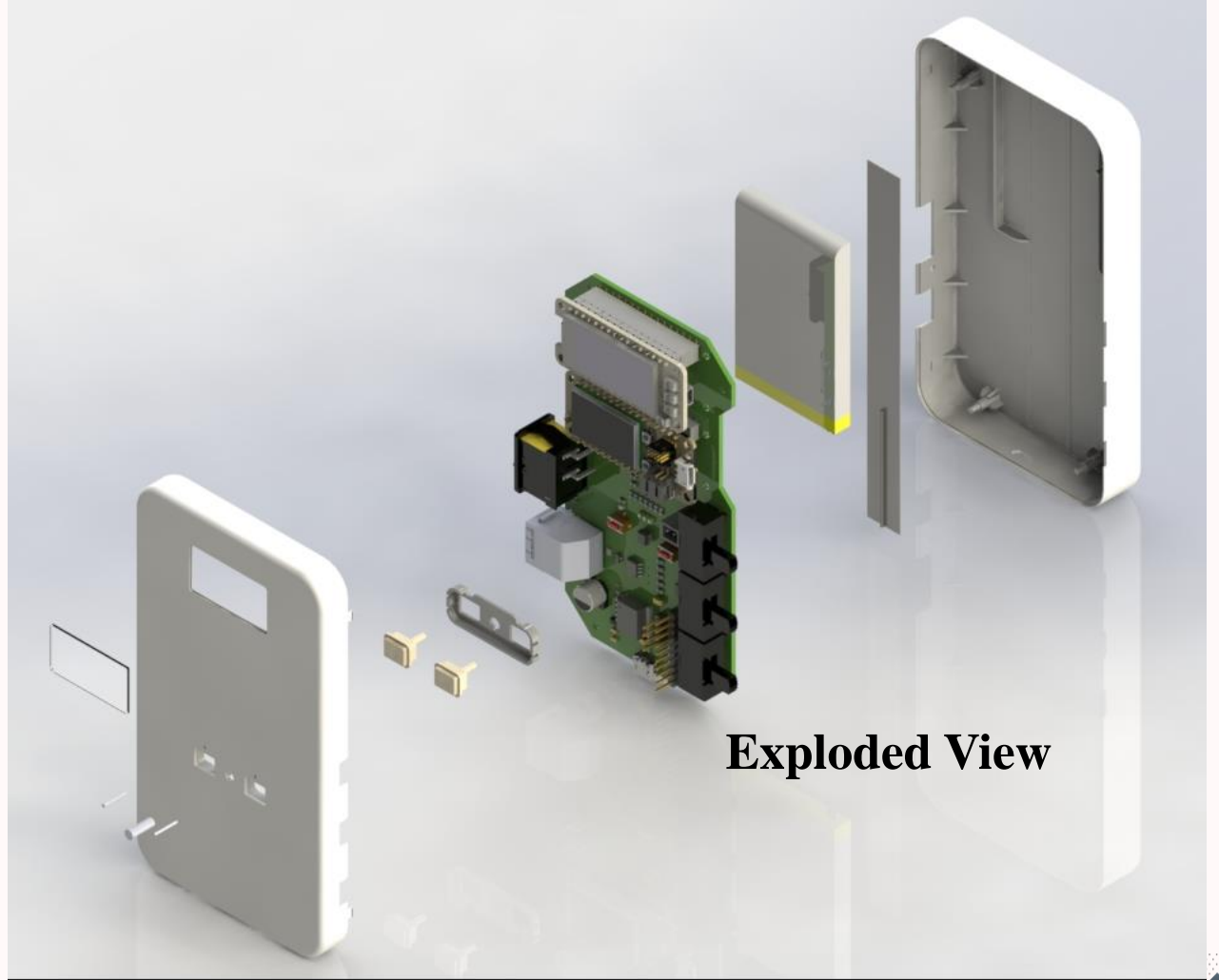


Bottom View



Result

Final CAD Model



A Heartfelt Customer's Voice

"We couldn't be more pleased with the exceptional work delivered by this outstanding team. Despite facing various challenges, they skillfully designed our enclosure with a perfect blend of creativity and expertise in MCAD Engineering Services. What truly sets them apart is their commitment to providing a cost-effective design without compromising on quality. The efficient manufacturing process they implemented not only saved us money but also ensured a swift turnaround. In a surprisingly short time frame, they not only met but exceeded our expectations, marking a significant milestone in our project. This team has proven to be the go-to choice for anyone seeking a winning combination of time, cost, and quality."



Conclusion

- In summary, Despite the challenges our team successfully designed the Enclosure after lots of brainstorming and with our expertise in MCAD Engineering Services.
- The final Design is produced with selecting material that minimal interference with airwave signals and high rigidity.
- Provide cost effective design and way to manufacturing the product.
- With completing this design in short time period, marking a significant milestone in our journey.

