

Powerseat Module Enclosure Design

Scope: Enclosure Design.

Application: Advanced Driver Assistance System (ADAS)

ADAS, or Advanced Driver Assistance Systems, integrates sensors and technologies designed to enhance the driving experience and improve safety. Among these advancements is Powerseat technology, a pivotal feature in automobiles that enhances comfort, accessibility, and safety through electronic controls. Powerseats offer customizable adjustments for seating position and support, catering to diverse user preferences. This not only enhances driver alertness and reduces fatigue but also plays a crucial role in ensuring safe vehicle operation.

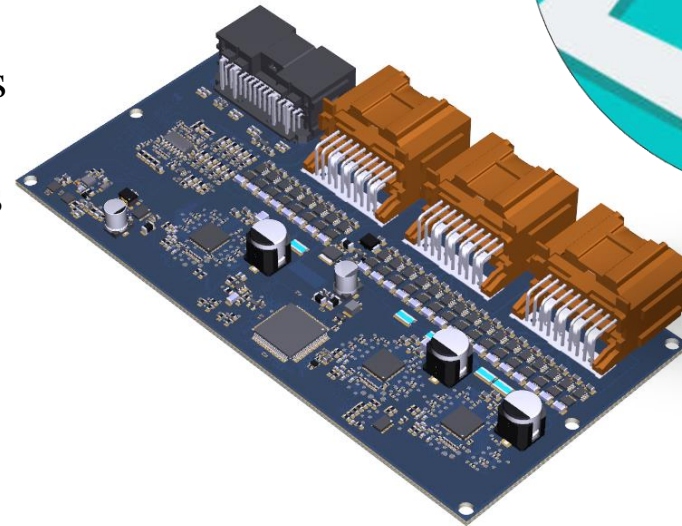


MCAD – Challenges

Designing a new enclosure for the Powerseat Module PCB presented us with a significant challenge due to the specific requirements provided by the client.

Challenges:

- ❖ No direct step file.
- ❖ Material selection for durability, impact resistance & other environment factors.
- ❖ Size and Space Optimization
- ❖ Additional space requirement for different assembly parts
- ❖ Efficient thermal management considerations
- ❖ Aesthetic Design depends Visual Appeal and Ergonomics
- ❖ User Accessibility and Maintenance
- ❖ Cost-efficiency



MCAD - SoW

1. Pre-design Phase

Requirement Analysis



Step file Conversion

2. Concept Phase

Material Selection



**Manufacturing
Process Selection**

3. Design Phase

CAD development



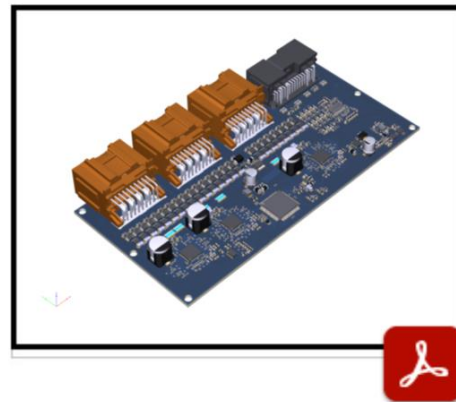
Result



Pre-design Phase

Requirement Analysis

- Received the following files from the client as input to proceed with the task. These files have been thoroughly studied and brainstormed with the client to identify necessary optimizations for generating the enclosure design for the power seat module.
 - PCB3D PDF**
 - Existing board outline drawing file**



PowerSeat_Module



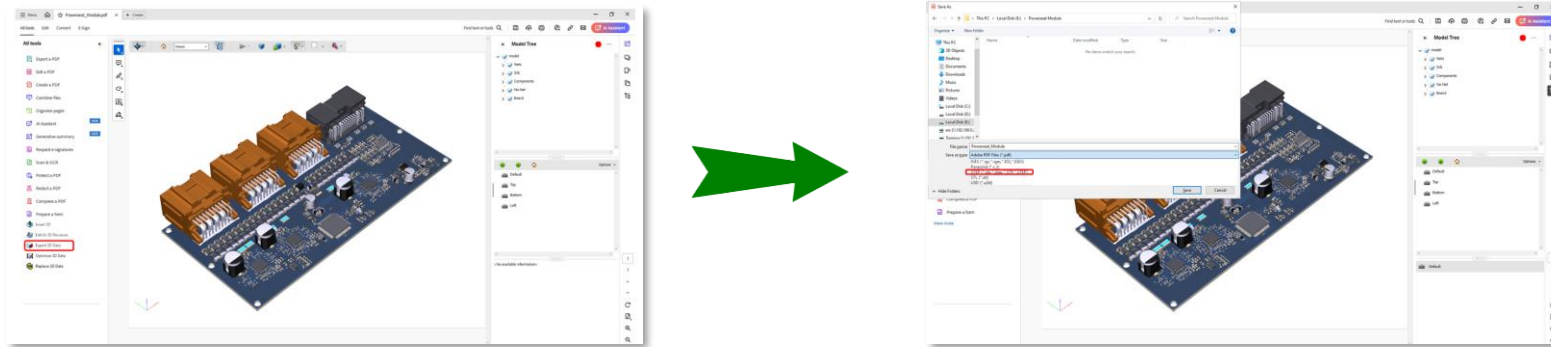
Powerseat_Module



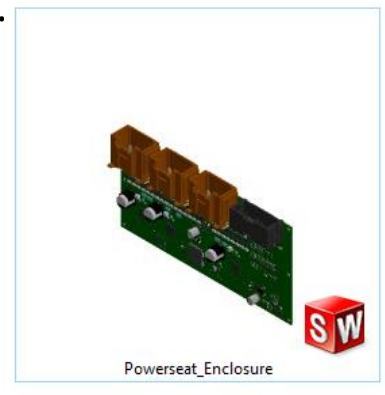
Pre-design Phase (Cont.)

Step File Conversion

From PCB3D PDF, PCB step file is exported as “.step” from the applicable **Adobe Acrobat Pro**.



The PCB3D PDF is finally converted into a STEP file (.step) and exported. The resulting PCB STEP file is then opened using an MCAD tool (SolidWorks).

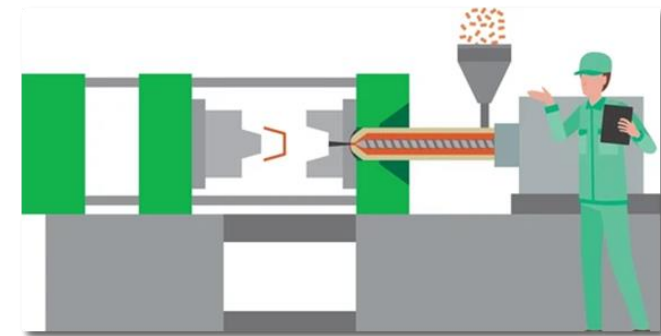


Materials Selection

- ❖ The enclosure material is selected based on its strong and durable and offer good resistance to impact, chemicals and heat and its ease of maintenance.
- ❖ Plastics have been determined to be the ideal material for this application.
- ❖ Acrylonitrile Butadiene Styrene (ABS): It can withstand good impact resistance, dimensional stability and heat resistance.

Manufacturing Process Selection

- ❖ Injection molding is favored in manufacturing because it offers precise tolerances, consistent quality, rapid production cycles, and cost-efficiency.
- ❖ It is widely used due to its ability to maintain tight tolerances and cost-effectiveness for high-volume production.

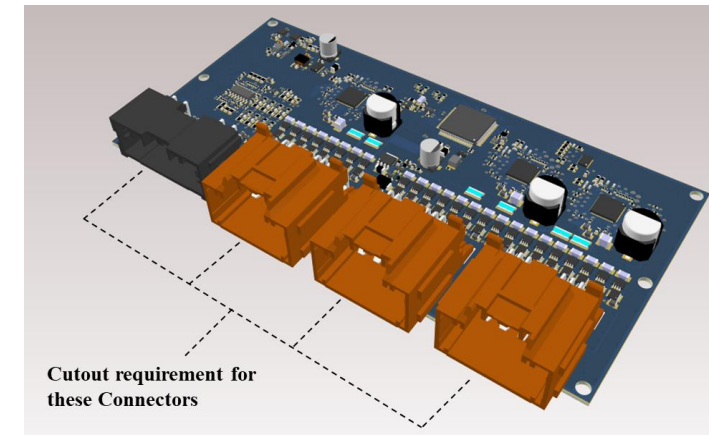
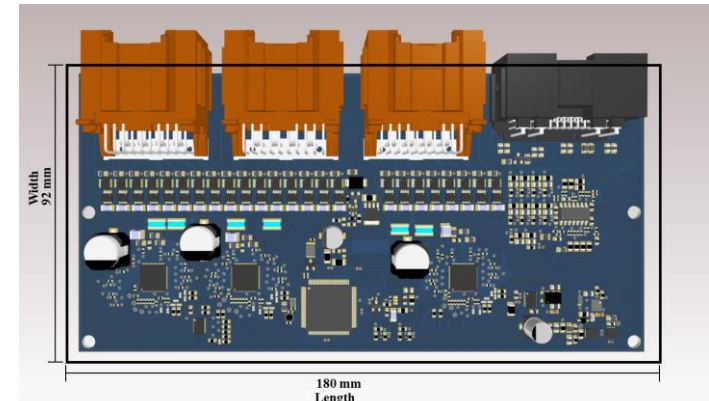
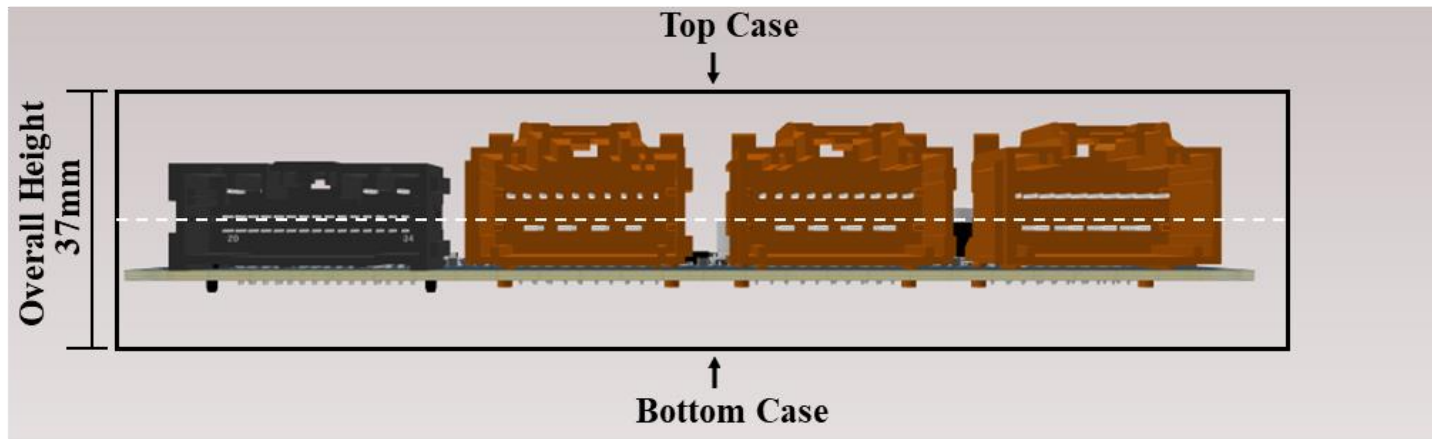


Concept Phase (Cont.)

Initial Sketches for Enclosure Design

Rough initial sketches are drawn with the details related to cutout for input output connectors.

- ❖ Size of the Enclosure
- ❖ Overall Height
- ❖ Cutouts requirement

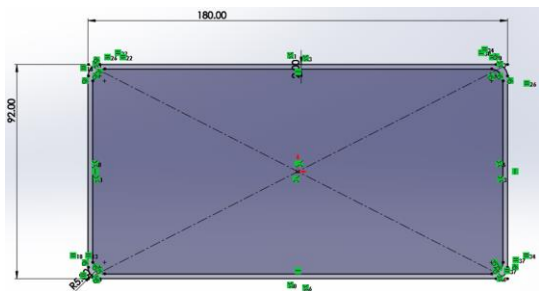
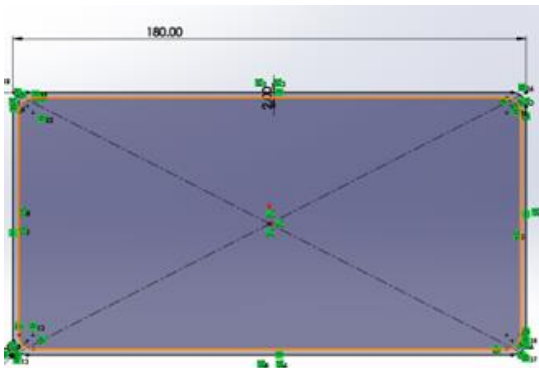


Design Phase

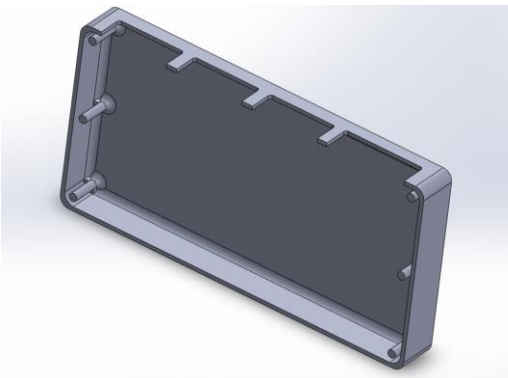
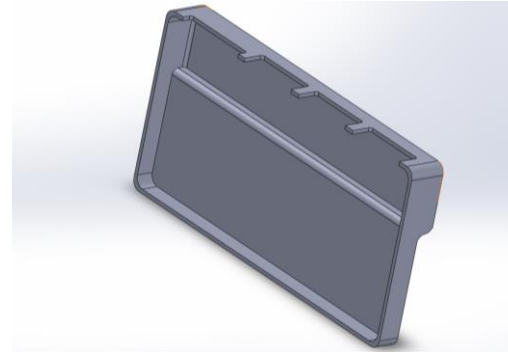
Using the sketch details, 3D modeling in the CAD tool is initiated, and design optimizations are completed through frequent discussions with the client to meet the requirements.

CAD Model development stages

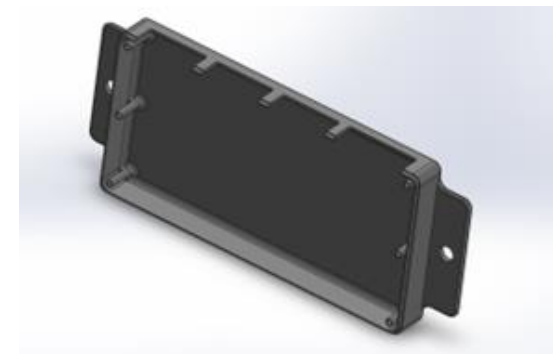
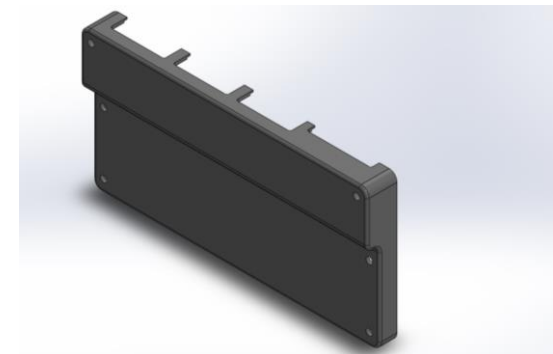
Design Outline



Adding Details



Optimization & Aesthetics improvement



Results

Final CAD Model

The final CAD model is optimally referenced with orthographic and exploded perspective views.



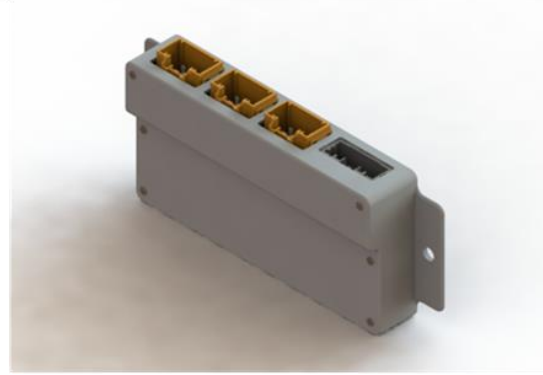
Top View



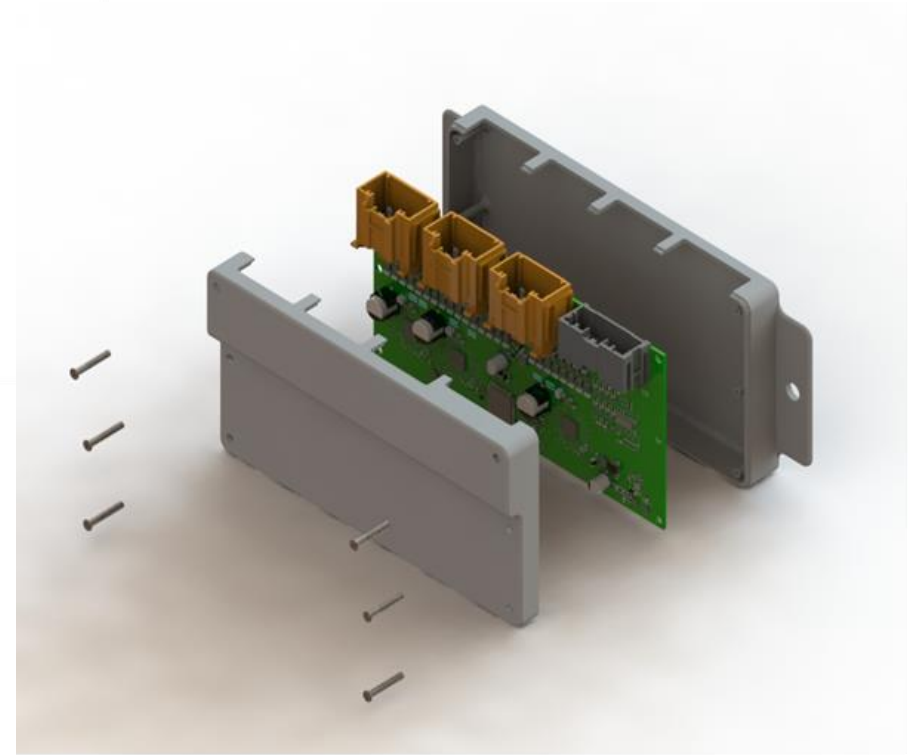
Side View



Front View



Isometric View



Exploded View



Customer Testimonial

"We express our sincere appreciation for their outstanding 3D enclosure design services. Despite facing numerous challenges, they expertly designed our enclosure, showcasing a perfect blending visual appeal with precise adherence to our specifications. Their dedication to providing a cost-effective design without compromising on quality is truly commendable. The efficient manufacturing process they implemented not only saved us money but also ensured a swift turnaround. They exceeded our expectations in an impressively short timeframe, marking a significant milestone in our project. This team is the premier choice for anyone seeking an optimal balance of time, cost, and quality. Their exceptional work has significantly contributed to the success of our project, and we eagerly anticipate future collaborations with this skilled and dependable team. "



Conclusion

- ❖ In summary, our team effectively tackled obstacles to produce a meticulously crafted Enclosure, drawing on intensive brainstorming sessions and our expertise in MCAD Engineering Services.
- ❖ The final design incorporates materials chosen for their high durability and good impact resistance, dimensional stability and heat resistance.
- ❖ Completing this design within a short timeframe represents a significant milestone in our journey.

