Continental
The Future in Motion

TIE M+ Demo

Subject Development Committee
Finite Element Analysis Engineering Team

BA Autonomous Mobility

TIE M+ Demo

Introduction

- **Task description:** Evaluate the maximum temperature of assembly parts when in use.
- **Scope:** Evaluate the integrity of demo sensor parts and the chip on PCB.
- **Requestor:** TIE M+ Organizing Committee
- **Inputs:**
  - demo. stp
  - datasheet.pdf

Demo
Agenda

1. Inputs – MD (overall dimensions, geometry and materials)
2. Inputs – HW Power estimation and Layout design
3. Boundary conditions
4. Results – Values and Graphic with temperature limits
5. Conclusions

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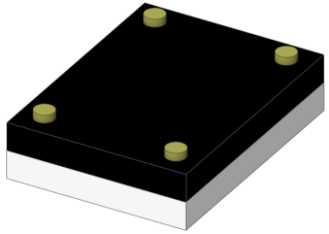
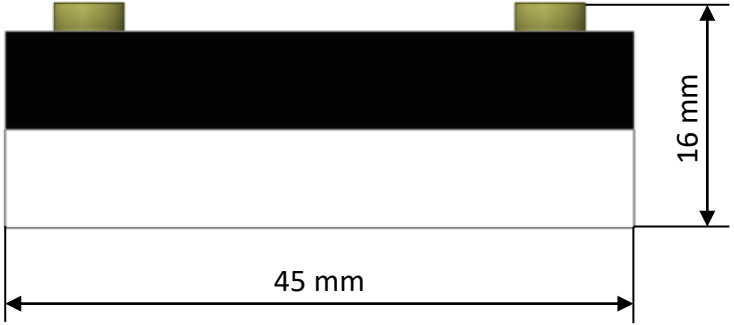
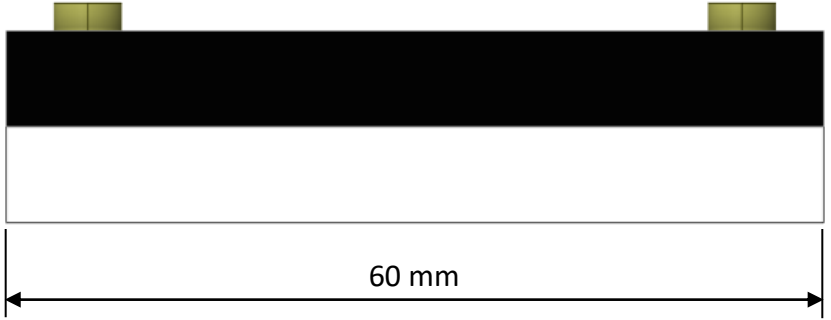
Inputs: Assembly Dimensions



Isometric view





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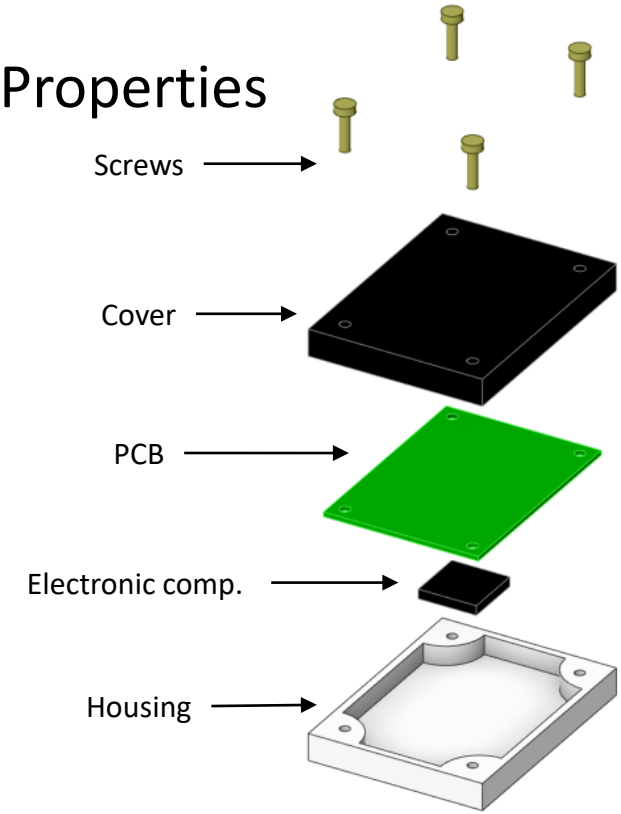
Inputs: Material Assignment and Thermal Properties

No.	Part name	Solid material	Surface material	Thermal conductivity [W/mK]	Power [W]
1.	Cover	Plastic	black	0.2	-
2.	Housing	Al Die Cast 99.5	natural	100	-
3.	PCB	FR4	shellac	50 50 0.7	-
4.	Screws	Steel	natural	15	-
5.	Electronic comp.	Mold	black	8	2



Notes:
The surface is relevant from the thermal point of view for radiation heat transfer for all material types

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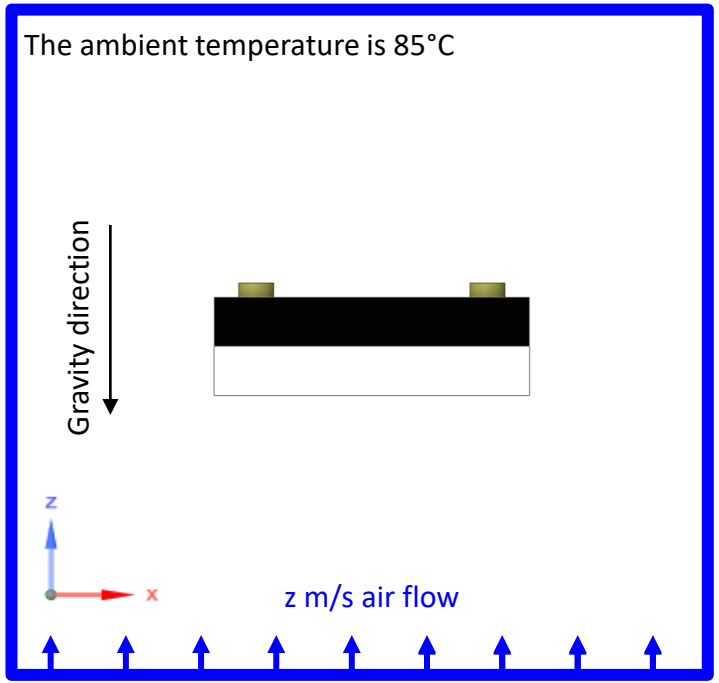
Boundary conditions



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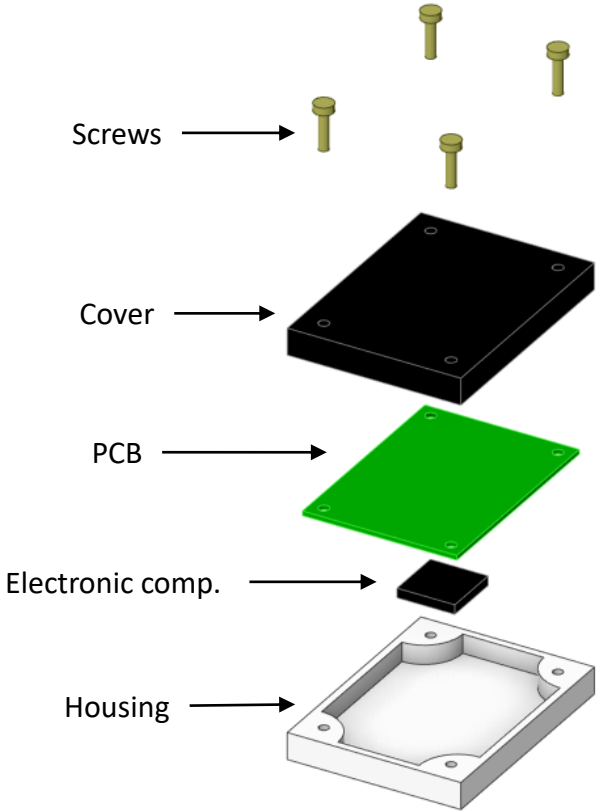
Summary report

No.	Part Name	Power [W]	Temperature limit [°C]	Maximum temperature [°C]
1.	Housing	-	-	100.2
2.	Cover	-	-	91.9
3.	PCB	-	-	116.9
4.	Electronic comp.	2	125	128.9



- Components with thermal paste

Red values are above the temperature limit!

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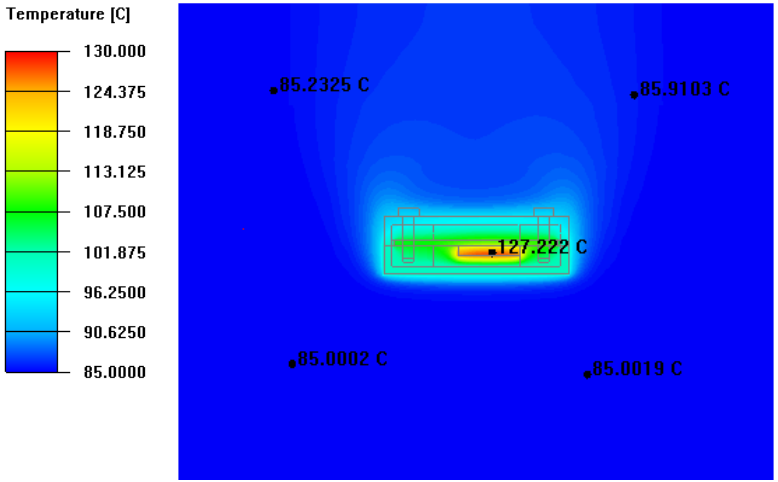
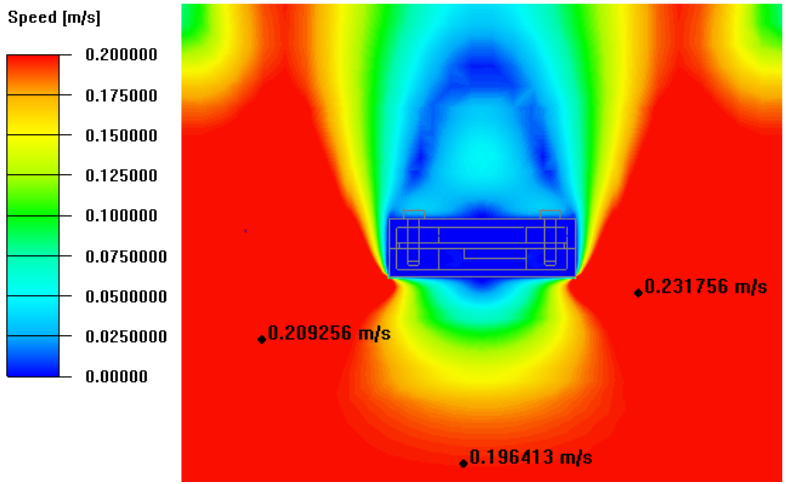
Temperature and velocity gradient – section view





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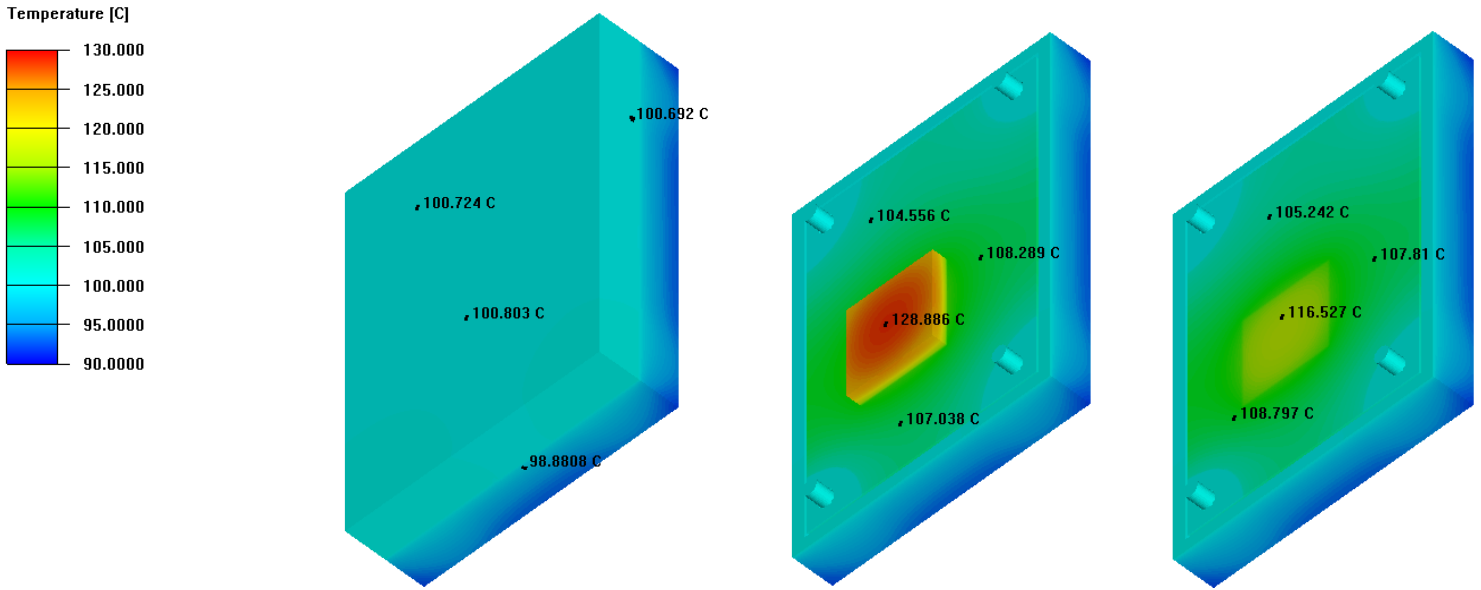
Temperature on demo



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Conclusions

- In the thermal analysis at 85°C, axis Z = 0.2 m/s air flow it can observed that:
  - The electronic component temperature is above the temperature limit.
  - Solution proposal: add thermal interface material for better heat dissipation.

! Please have in mind that the simulations are based on estimated input values!
Please also consider that the model is simplified. So, please do not rely on absolute values.

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Appendix

- The contest subject will include:
  - CAD in *.step format.
  - All required thermal constraints and parameters (if needed, with values).
  - All other required material/assembly properties.
  - Power Point Template for final report.
- Contestants are expected to:
  - Perform requested analyses in accordance with the provided data.
  - Answer FEM / FEA related questions on materials, mechanics and/or analysis.
  - Report results by respecting the template and demo presentation, properly scale legends and drawing own conclusions.
  - Propose solutions / improvements where necessary.

Important dates & places

- All the related information about the registration, contest guidelines & rules, bibliography, schedule, etc. will be found at the following address:
  - TIE-M plus Thermal – eecamp
- Preliminary schedule and important dates:
  - Demo subject release: **WK102023**
  - Contest subject requirements release (pdf only): **6 April 2023**
  - CAD model release (needed to solve the requirements): **10 April 2023**
  - Final report to be uploaded by the contestants on the platform: **23 April 2023**
  - Announce the finalists (contestants who will present on 9 May, live): **28 April 2023**
  - Final presentation and debates with the Technical Committee: **9 May 203**

Registration date: 6-09 April 2023

Note: except for May 9, the other dates may suffer +1-2 days delay.

Thank you
for your attention!