

GRADUATE DIPLOMA IN ENGINEERING TECHNOLOGY

2020 ENGINEERING DEVELOPMENT PROJECT

AUTHORS: NIVED RAJAN, TONY PAULY, NIKHIL THOMAS AND SREESHOB SINDU ANAND

ABSTRACT

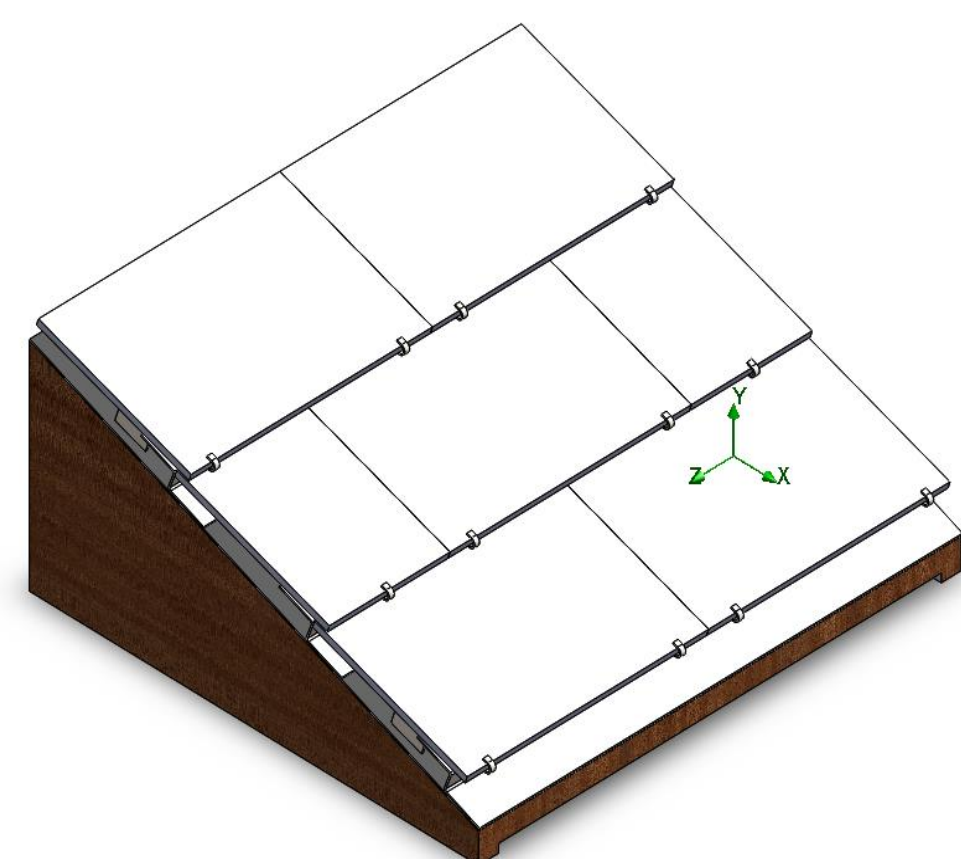
A well-engineered solar roof tiles mounting system is presented here by eliminating the drawbacks of the solar roof. The innovative design presented here is easy to install and can accommodate a range of solar tiles manufactured by leading manufacturers. The design also solves the overheating of the solar tiles, roof leaking issues, tilting of the tiles, and corrosion of mounting units.

Key words: Solar tiles, Roof leakage, Corrosion issues, Mounting units

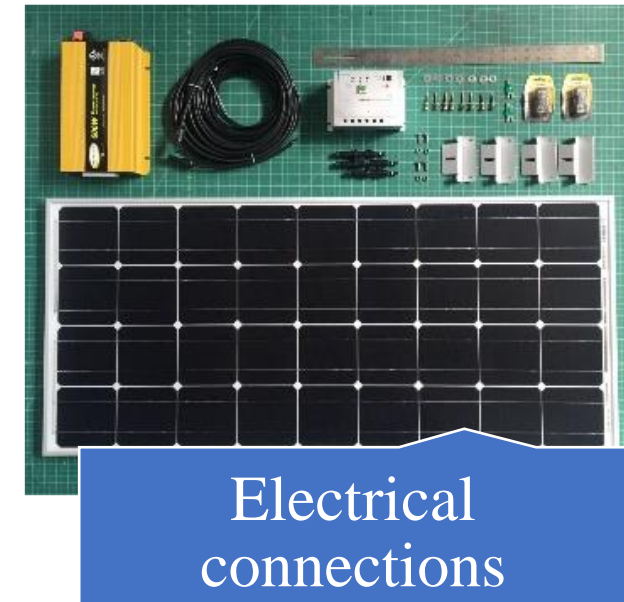
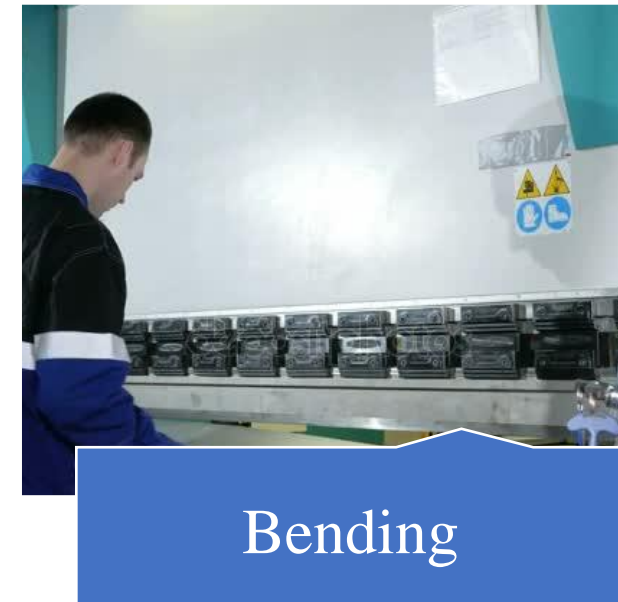
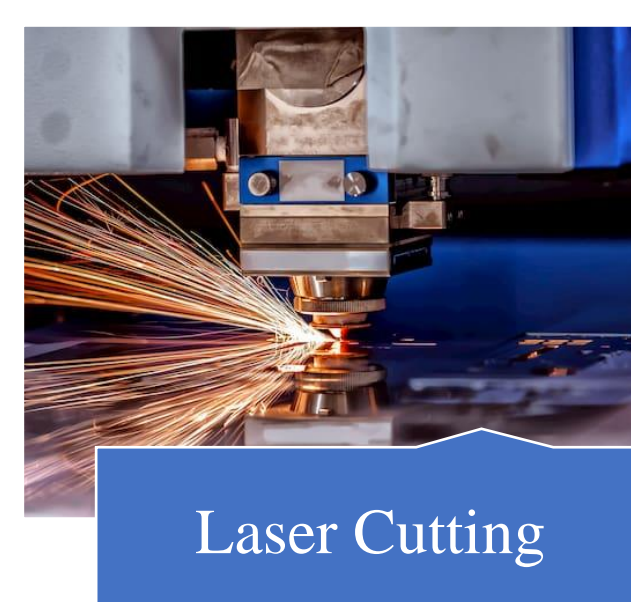
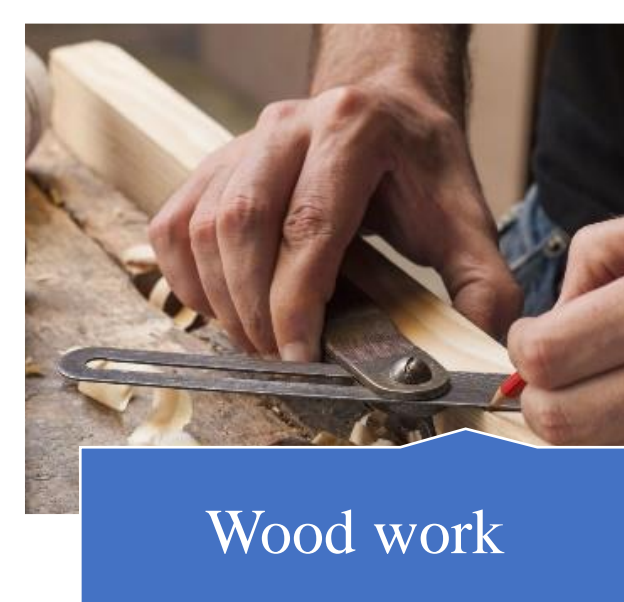
DESIGN METHADODOLOGY



3D CONCEPT TO PROTOTYPE



STAGES OF FABRICATION

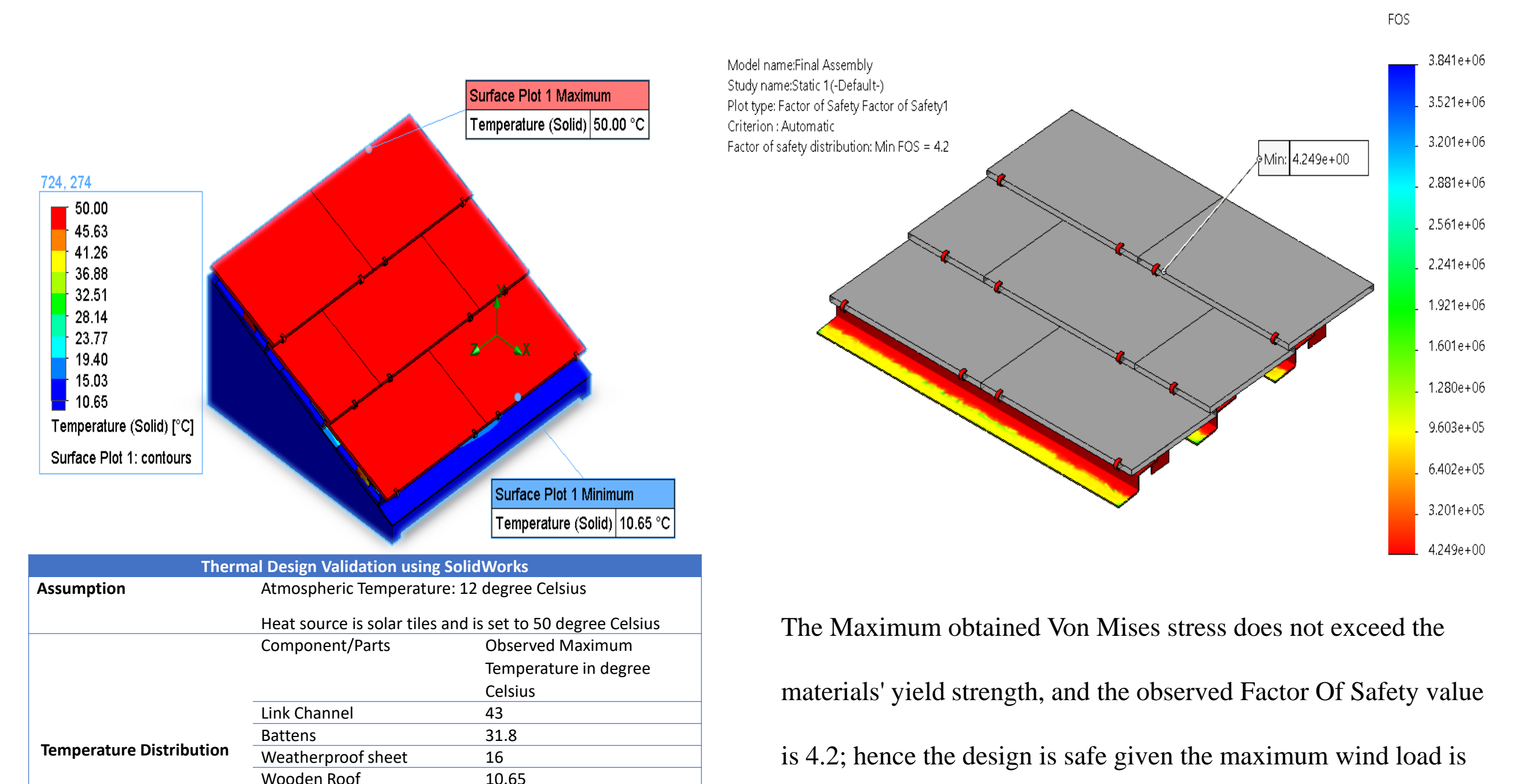


LITERATURE REVIEW

A comprehensive literature review is conducted and identified the inconsistencies like a gap in research in the following area of solar roof mounting units.

- × The overheating issues of solar roof tiles and associated safety concerns
- × Structural damage of solar roof tiles due to external wind loads
- × Corrosion of the solar roof tiles mounting units
- × Leaking issues of the solar rooftop

DESIGN VALIDATION



The Maximum obtained Von Mises stress does not exceed the materials' yield strength, and the observed Factor Of Safety value is 4.2; hence the design is safe given the maximum wind load is 50m/s.

The design demonstrates that generated heat is not transferred into the roof.

CONCLUSION

- ✓ The proposed design eliminated the risk of roof fire associated with solar tiles by reducing the heat transfer.
- ✓ The stainless-steel grade 316 used to fabricate the mounting unit contains a combination of iron, chromium, manganese, silicon, carbon, and significant amounts of nickel and molybdenum prevents corrosion issues.
- ✓ The design of the mounting unit, along with the waterproofing membrane, resolved the leakage issues.

FUTURE RECCOMENDATION

- ♣ Solar cells pasted on the ceramic tiles can be embedded in a semi-transparent medium that converts sunlight into electricity while allowing natural light to pass through the building.

ACKNOWLEDGEMENT

Project Supervisor: Dr. Mohammad AL-Rawi