Formula Student Pedal Box

Team A1

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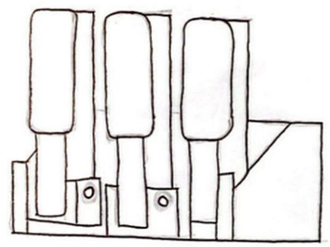
Aim of Project

The Aim of the project is to design and manufacture a pedal box suitable for a formula student car.

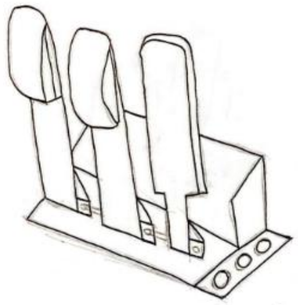
Background

- The Formula Student competition is an international competition that challenges universities to design and build a single seater race car to compete in Silverstone UK.
- The pedal box is key component that sits between the driver and the braking/ accelerating systems of a formula student car.
- A pedal box must be precise, lightweight, and meet the ergonomics requirements to fit any driver.
- The pedal box must comply with the Formula Student Regulations 2024
- Must be reliable under high forces
- Must meet the adjustability requirements for different drivers
- Material Selected was 304 Stainless Steel for the base. Pedals to be made from Aluminium.

Design Concepts



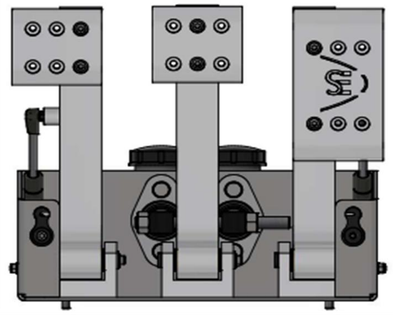
Concept 1

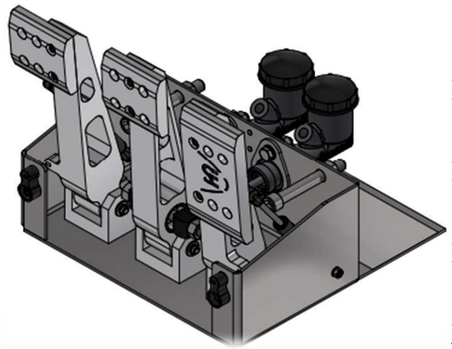


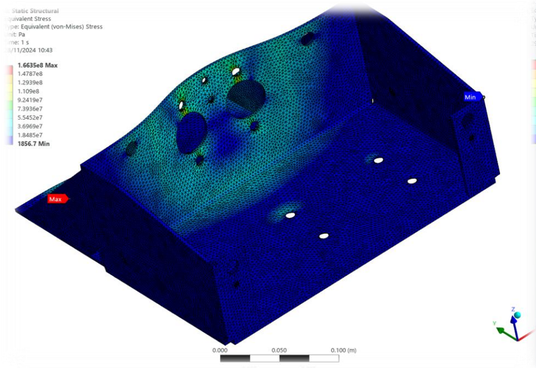
Concept 2

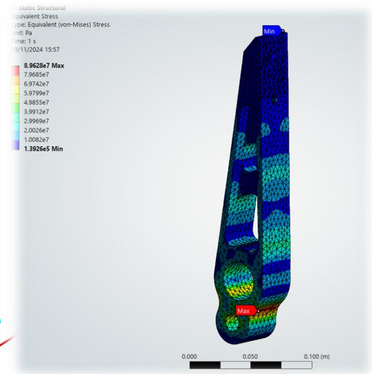
- From the 2 concept designs, you can see the progression to our final design.
- When we got sponsorship from Senator Engineering, it allowed us to get more creative with the designs of the pedals.
- The base was to be made of sheet metal, and the Pedals and brackets were made in a CNC machine.
- With a final design we were able to simulate forces on the pedals and base to ensure it would fail.

Final Design









Von Mises Stress

- <u>Base</u>
- Minimum factor of safety was 4.1069.
- The Maximum Von Mises Stress appears to be 166.3 MPa.
- Max Von Mises stress is 97.7 MPa lower than the material's yield strength.

- <u>Pedals</u>
- Factor of Safety for fatigue was 0.964. FOS for stress was 2.89 which is above 1, meaning its safe under the applied loading conditions.
- Max Von mises stress was 89.62 MPa which is 169.38 MPa lower than the materials yield strength

Conclusion

- The aim of the project was to design and manufacture a pedal box suitable for a Formula student race car
- All designs were within the rules and regulations of formula student
- Concept designs were drawn to give a visualization of a full assembly
- CAD parts were created using SolidWorks
- The pedal box was fully manufactured by Senator Engineering
- Team worked very well together, the work was split between each member and completed.

Acknowledgments

Firstly, we would like to say thank you to our supervisor Daniela Butan for all her help and guidance. We would also like to say a massive thank you to Tommy Brazill, a 4th year student, who shared his knowledge and his spare with us, and with who we couldn't have achieved this amazing design. Finally, a big thank you to Senator Engineering for sponsoring our project, without them we wouldn't have a manufactured pedal box

References

lhttps://www.imeche.org/events/formula-student

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