

Vehicle Integration_{EV21}

DMT-10C

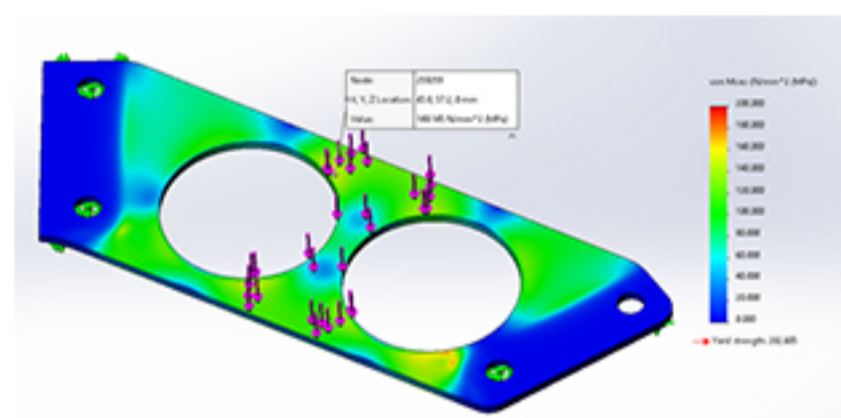
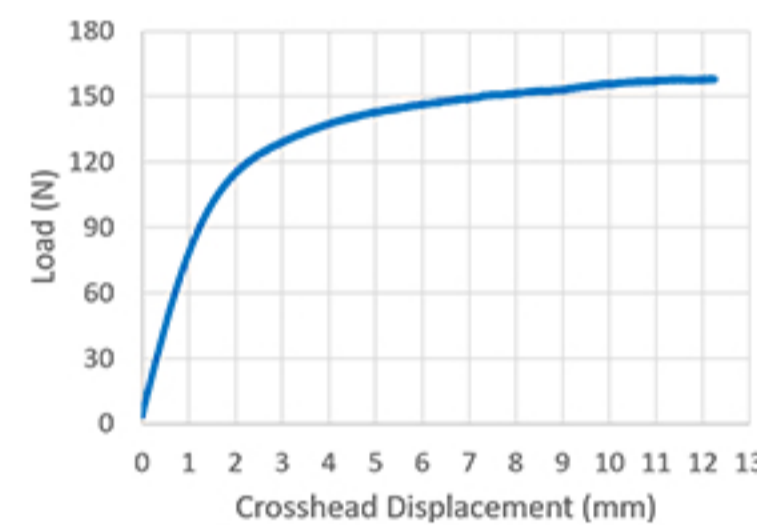
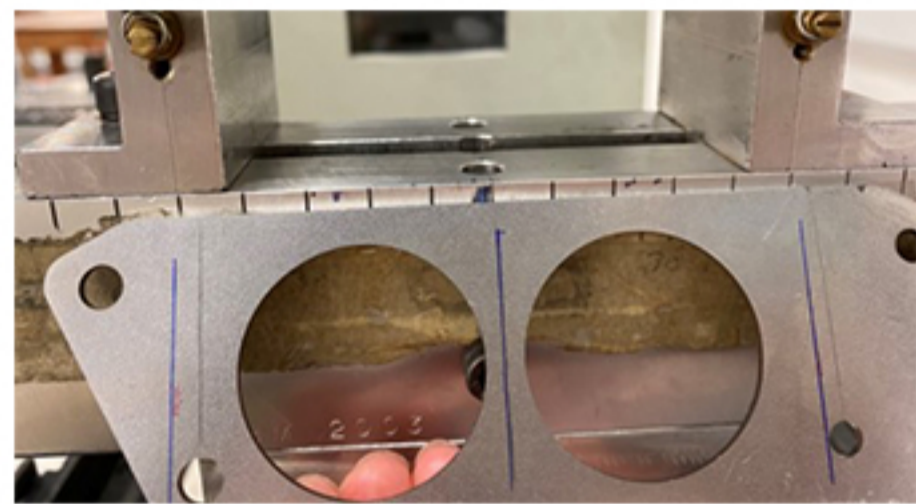
Steering Column Mounting

mounting of the steering column onto the EV21 chassis

- Five E235 steel support tubes welded onto two laser-cut DC01 steel plates that are bolted onto the three pre-designed column bearing housings

Low cost (£24*) Excellent weldability
High elongation at break → Ductile instead of brittle failure!

- Expected to withstand 1000N applied onto the steering wheel in the vertical and axial directions, and 700N in the lateral (driver's left or right) direction with a minimum safety factor of 2.19
- Mounting plate re-designed → weight-saving hole diameter reduced by 25%
- Re-designed plate expected to withstand 250N applied by the driver's knees to the point shown without yielding with a safety factor of 1.8



Lightweight (~485g)

Reliable and Consistent Steering Performance
loose M5 holes in plate allow for perfect bearing alignment during assembly, and the maximum elastic deformation is just 0.55mm at full load**
Corrosion Resistant Coating (ISO C3 Rating)

*cost for 3m mild steel tube and 2 laser cut DC01 steel plates

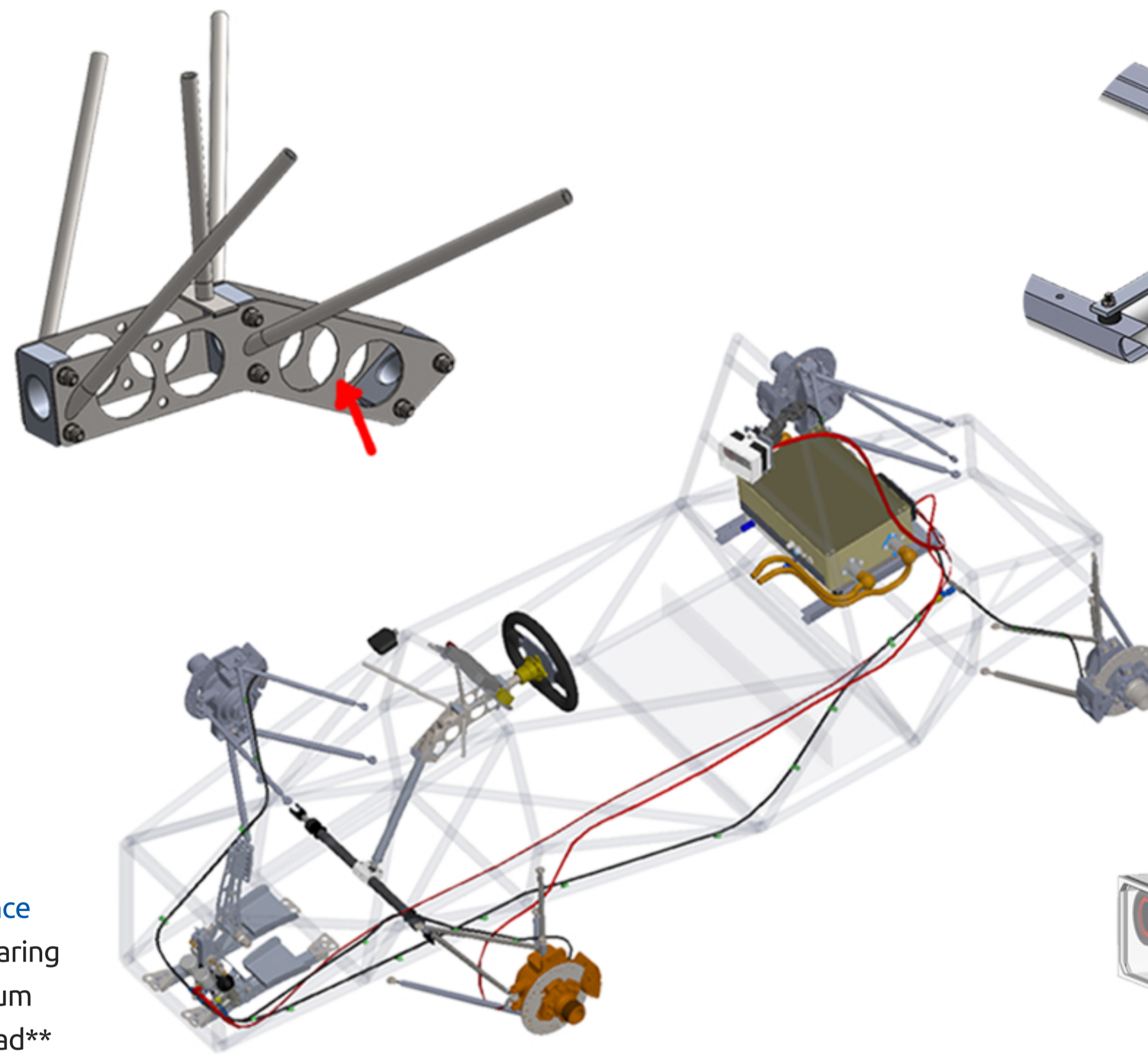
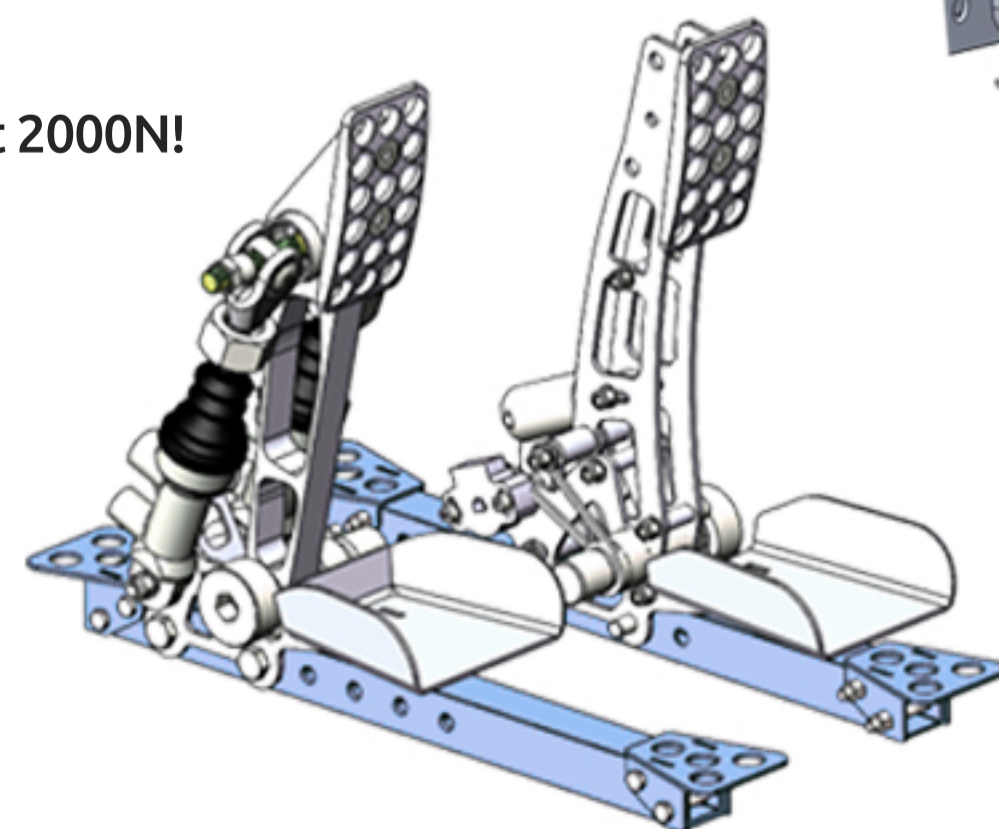
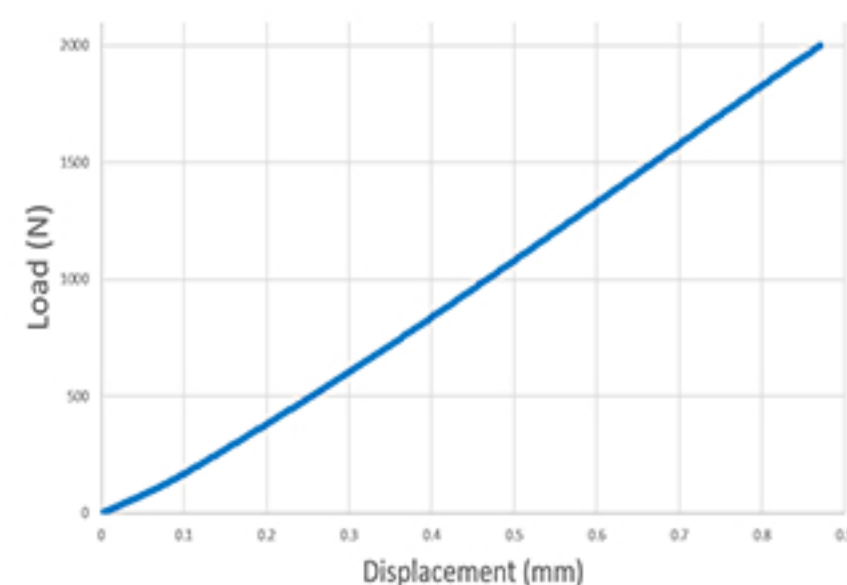
**at the 700N lateral loading case, the 1kN cases showed less deformation!

Pedalbox Mounting

mounting of brake and throttle pedals onto the EV21 chassis

- Aluminium beams with a steel insert bolted onto the ends to be welded onto the chassis
- Holes drilled for pedal position adjustability
- Design was 3-point-bend tested and comfortably passed FS regulation strength requirements

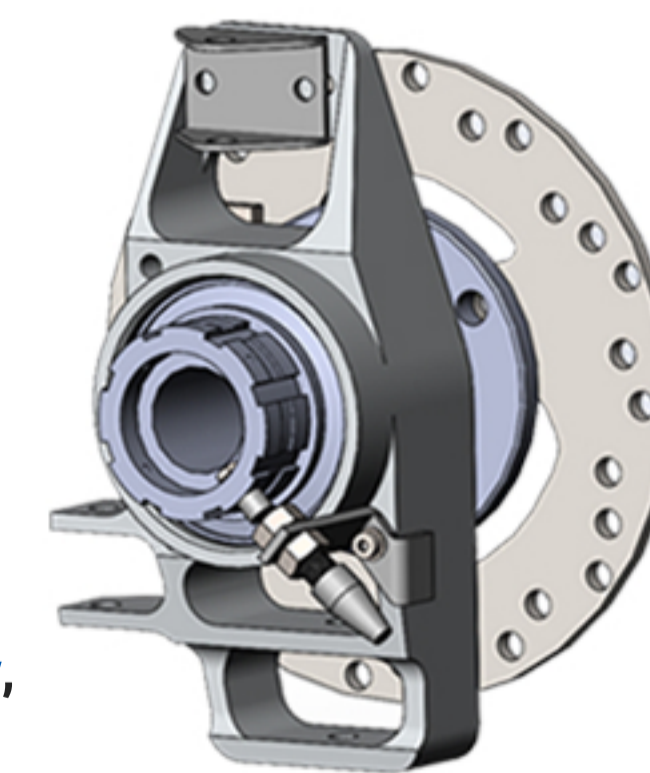
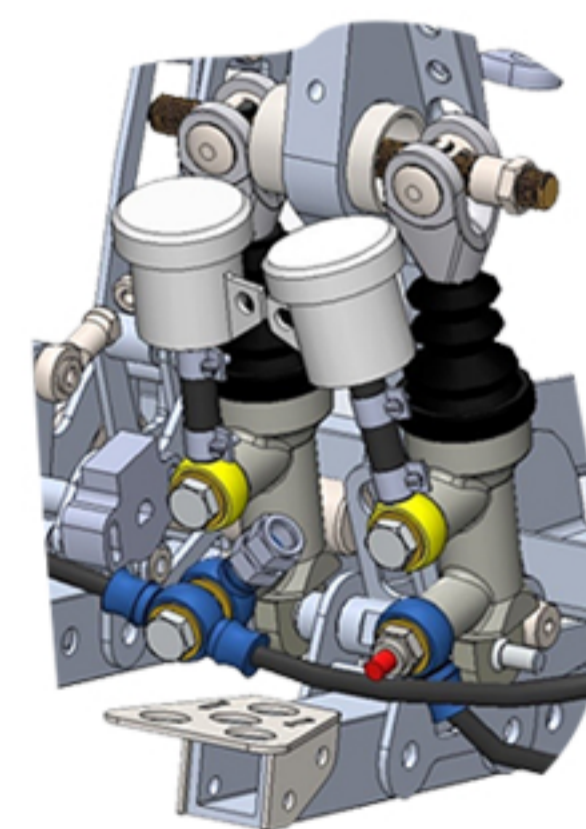
No yielding observed even at 2000N!



Hydraulic Brake Lines

hydraulic system that connects the two brake master cylinders to the four wheel brake calipers, one on each wheel

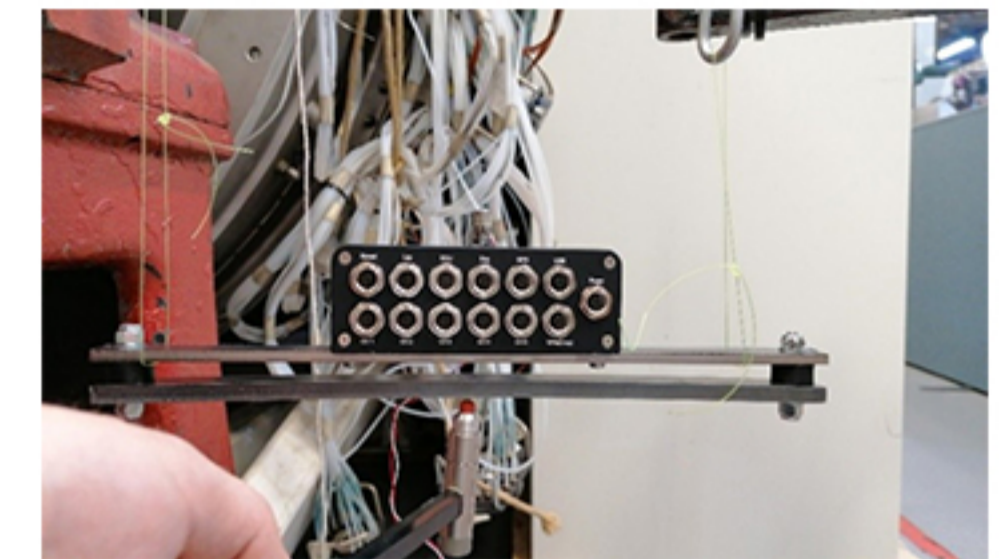
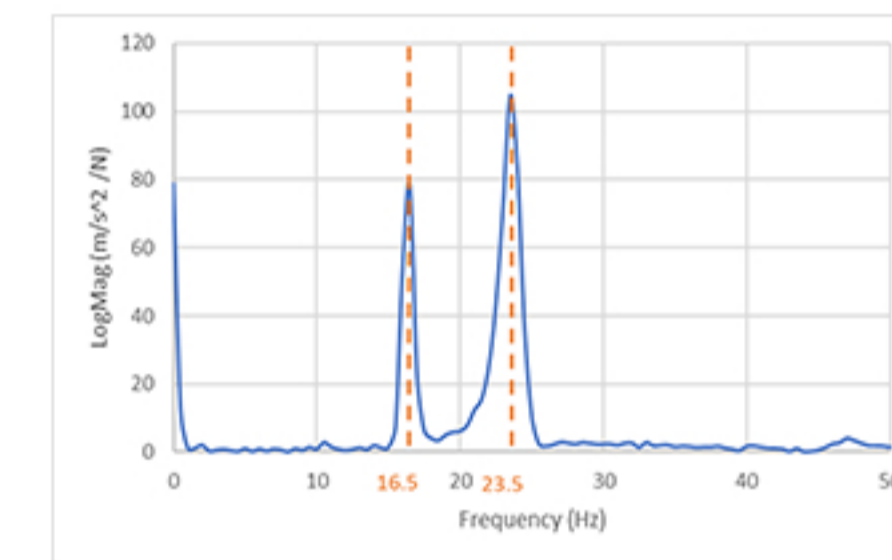
- Goodridge and APS stainless steel fittings chosen for high performance
- Braided Goodridge flexible stainless steel hose chosen for ease of assembly and future re-usability
- Capability to fit two brake pressure sensors for telemetry, one in the front and one in the rear
- Custom hose guides 3D-printed from Onyx nylon to secure fluid lines to chassis safely without compromising performance or reliability



Data Logger Mounting

mounting of AiM EVO4S data logger on motor controller mounting channels

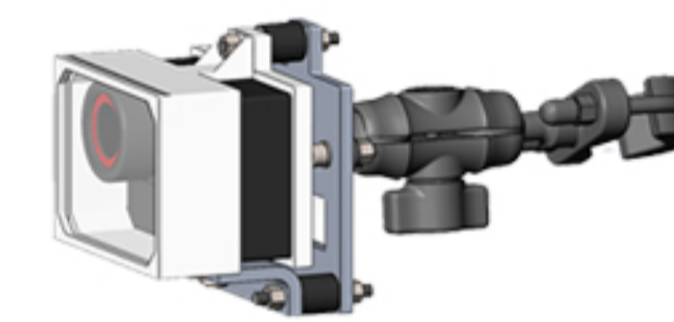
- Use of laser-cut lightweight aluminium plate on anti-vibration mounts
- Natural frequency of the system when mounted needs to be outside the 1-20Hz range of road excitation
- Hammer test performed on string supports → $\omega_n = 16.5 \text{ Hz}, 23.5 \text{ Hz}$
- Based on test results, smallest natural frequency when actually mounted onto the EV21 expected to be 24Hz



Camera Mounting

mounting of AiM SmartyCam camera to record video feed of EV21

- 3D-printed Onyx nylon housing with Perspex screen to protect camera against track debris
- Mounted on the roll hoop with an adjustable arm
- Use of anti-vibration mounts for smoother video recording



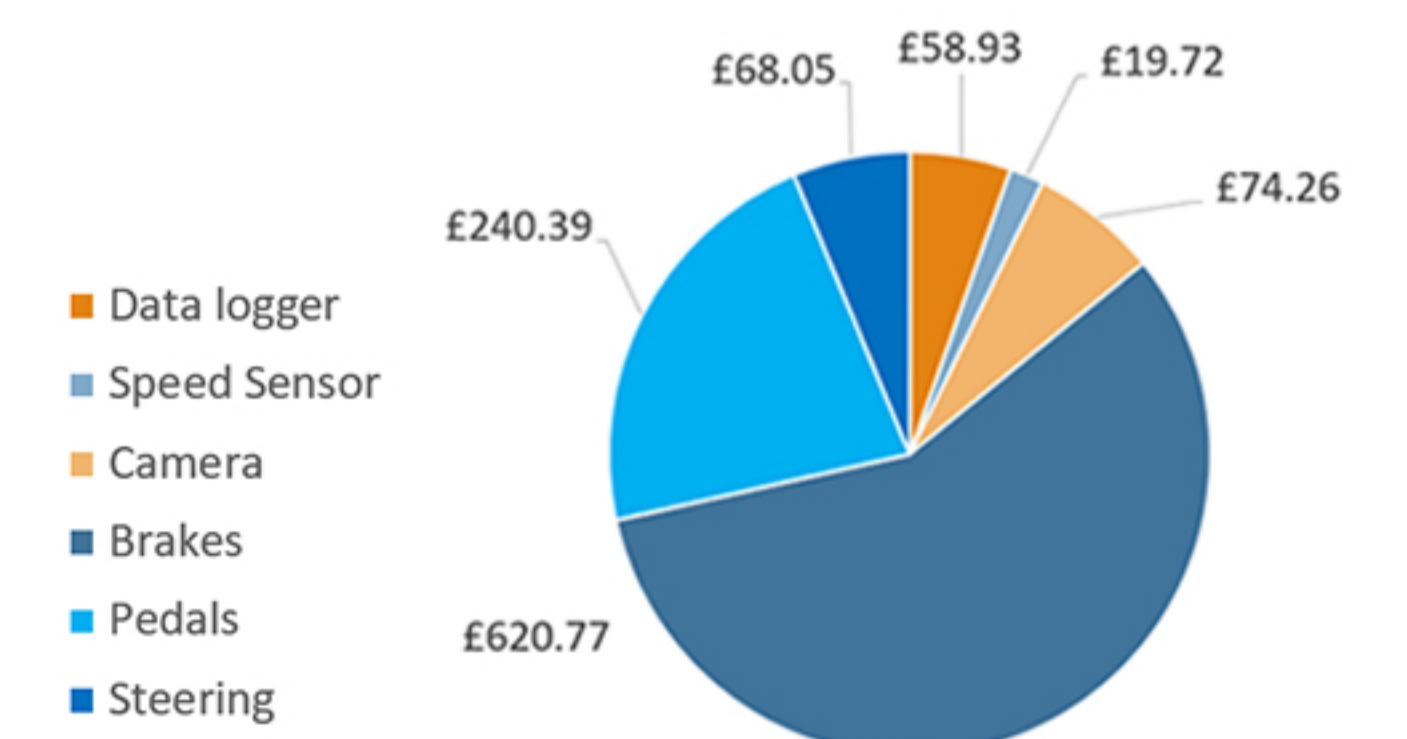
Wheel Speed Sensor Mount

mounting of AiM wheel speed sensor to monitor speed of front wheels

- Mild steel bracket manufactured and bolted to wheel upright
- Sensor installed on steel bracket



Records each revolution of the magnet that is mounted on the rotating wheel nut



Total cost: £1089