Success Story: Complete Product Development Innovation

EQUITUS
Design | Engineering | Innovations

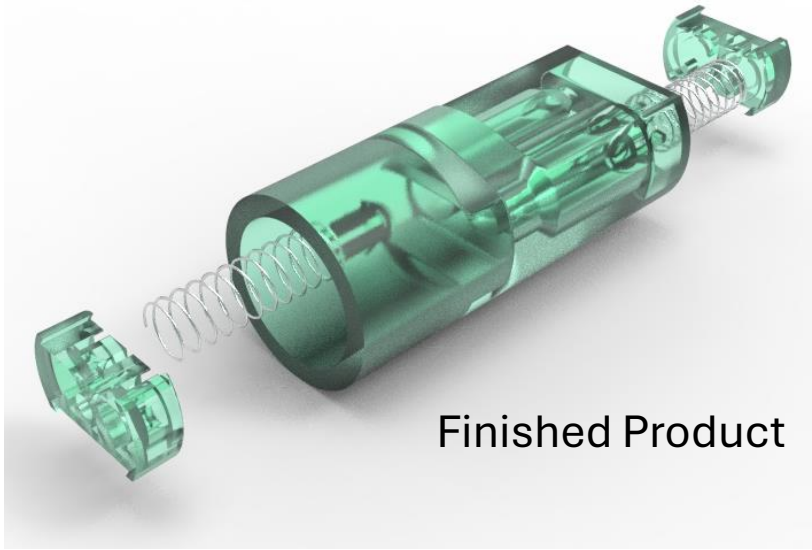
Project Brief: The requirements to have a valve that will open inwards to let air into the lungs when the pressure drops below a certain value and to let air out when the pressure goes above a certain value. This project was won by a competitive tender process via Interreg and Boost4Health initiatives.

Activities Carried Out:

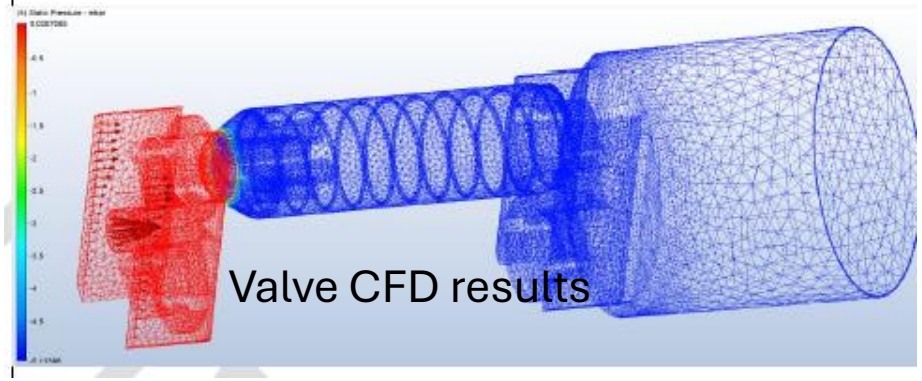
Complete development of the valve including 3D modelling, CFD, FEA, manufacturability and full scale commercialisation in accordance with **ISO13485**. CFD to determine pressure to calculate force required to overcome spring-rates, enabling opening and closing of the valve.

Outcome: Successful Delivery of the Design Package.

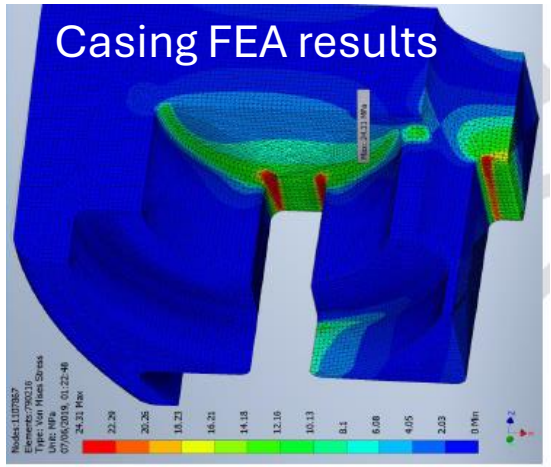
Benefits to Client: Product development where none exists, design, and verification within time, to cost, and assessment of multiple options.



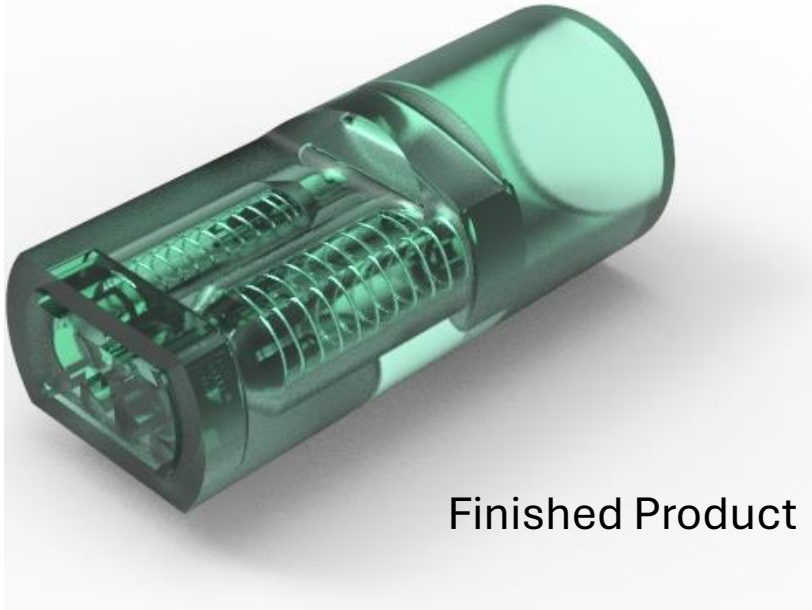
Finished Product



Valve CFD results



Casing FEA results



Finished Product

Alignment With UN SDGs

Link to Interreg North West Europe Project Brochure

Success Story: Sustainable Product Development

EQUITUS
Design | Engineering | Innovations

Project Brief: Achive reduction in mass and material consumption against the existing design whilst retaining a minimum safety factor of 2.

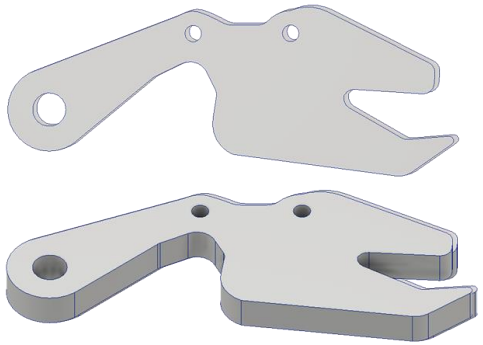
Activities Carried Out:

Redesign of the component with Computer Driven Design principles, and Generative Design

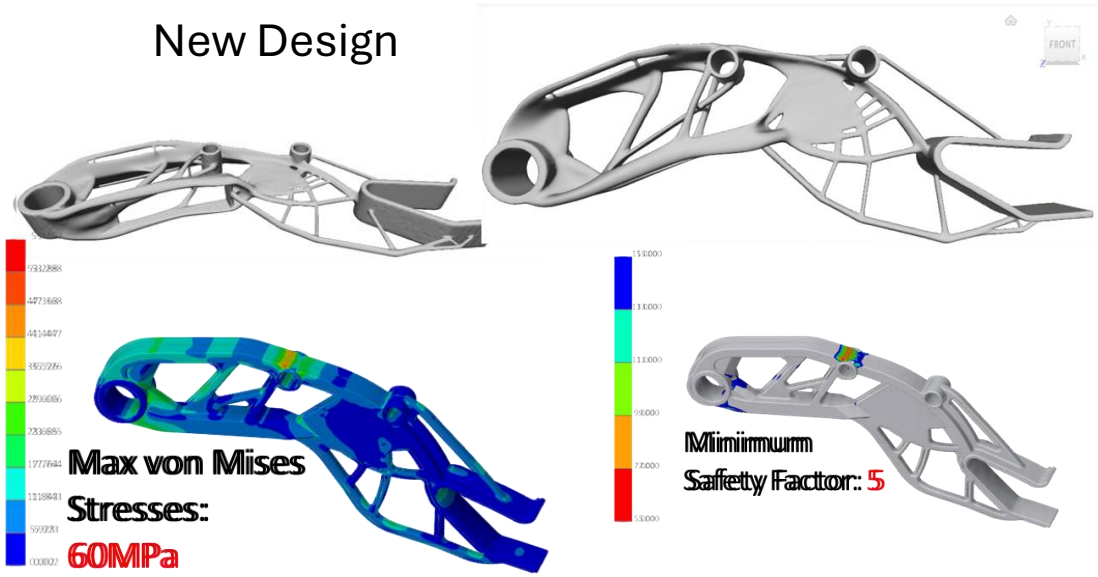
Outcome: New design around 73% lighter, minimum safety factor 2.

Benefits: Truly rapid prototyping, multiple 'what-if scenarios', smart product development, sustainability, flexibility, affordable, agile, increased productivity

Old Design



New Design



3D Printed Finished Component

Alignment With UN

Success Story: Digital Intervention/Industry 4.0, Product Design Verification

EQUITUS
Design | Engineering | Innovations

Project Brief: Help with digitisation of product development process and enhance the capabilities of the design team

Activities Carried Out:

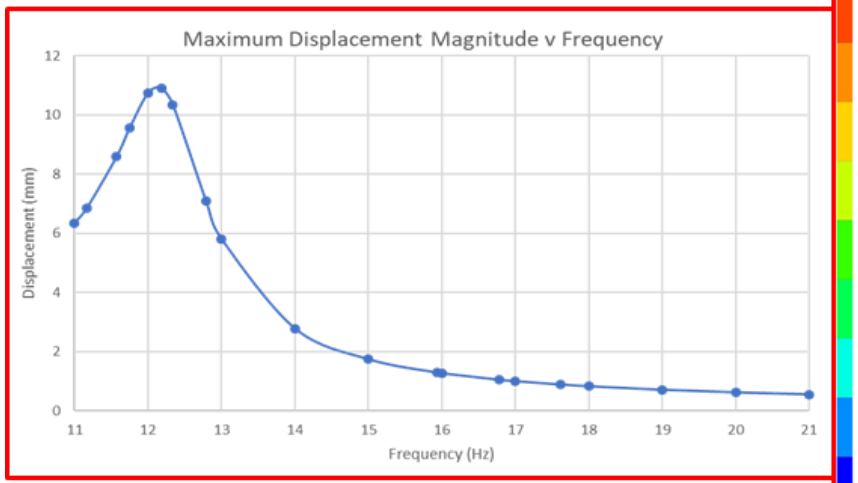
Assessment of the components in accordance with Eurocodes for extreme winds and earthquake resilience
Preparation of methodology document to be used by in-house design team
Delivery of technical training

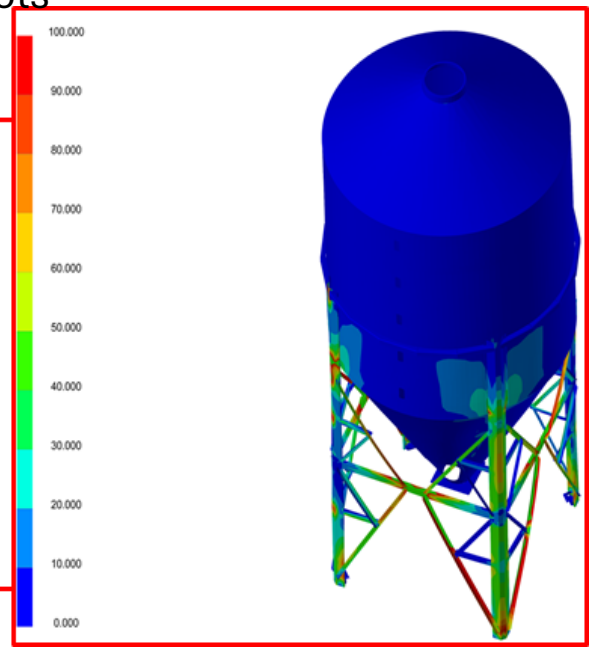
Outcome: Client's in-house design team equipped to work on all aspects of product development and validation at every stage of the design process.

Benefits:

Ability to easily verify and validate existing designs using computer based modelling
Ability to enhance their product offering by introducing new, higher capacity products
Potential to enter new markets like New Zealand and Japan which are earthquake hot spots

Alignment With UN



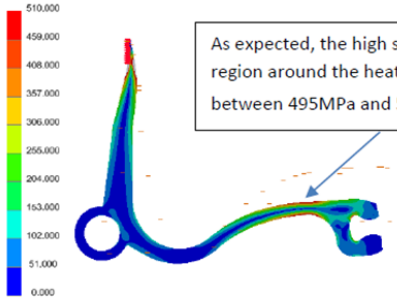


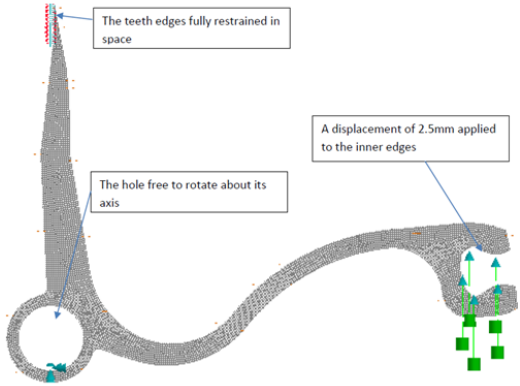
Success Story: Digital Intervention/Industry 4.0, Product Design Verification

EQUITUS
Design | Engineering | Innovations

Indusry 4.0 Intervention:

- Created Capacity Planning and Flow Lead-Time tools as part of their Lean 4.0 toolset
- Provided advice on specific engineering improvements to gripper design and potential usage of alternative materials



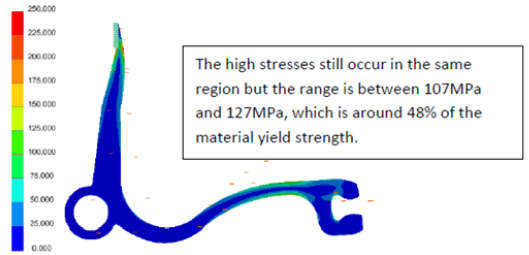


Young's Modulus: 43GPa

Maximum Tensile Strength (UTS): 330MPa

Assumed Yield Strength (0.2% Proof Strength): 80% of UTS = 264MPa

The stress results for this rerun are shown in the image below



Outcome/Benefits:

- Capacity Enhancement by 20% & opportunity to export to China
- Potential to reduce failures by 60% with the use of alternative materials as predicted by CAE
- Nomination for Insider export awards

Alignment With UN

Success Story: Product Design Verification

EQUITUS
Design | Engineering | Innovations

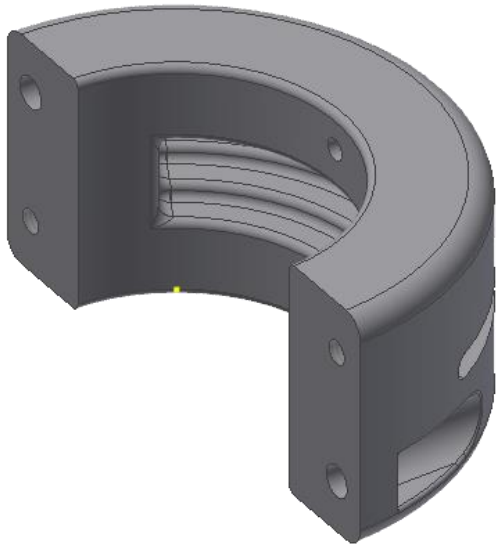
Project Brief: This was a design assessment and optimisation exercise for a client of ours who designs, manufactures and installs children's playgrounds.

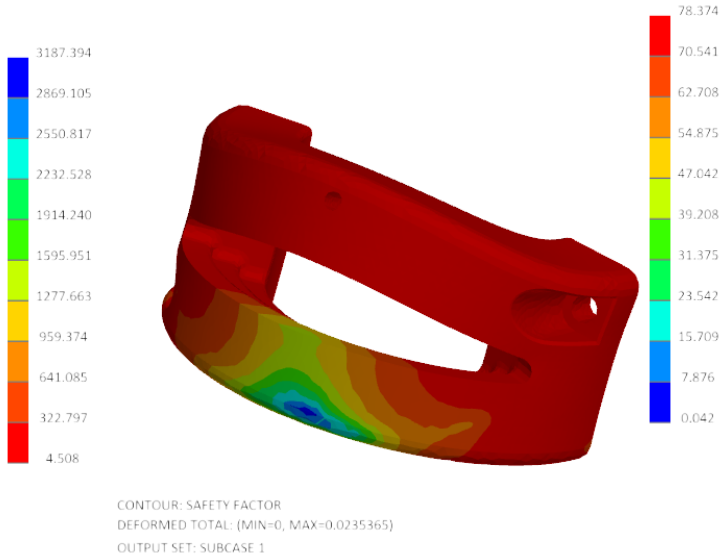
Activities Carried Out:

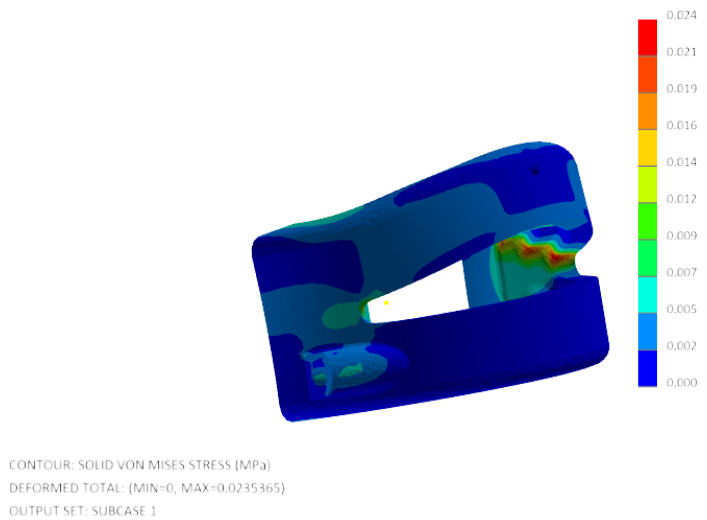
Verification and optimisation of the design as per EN1176 - Playground Equipment Standard.

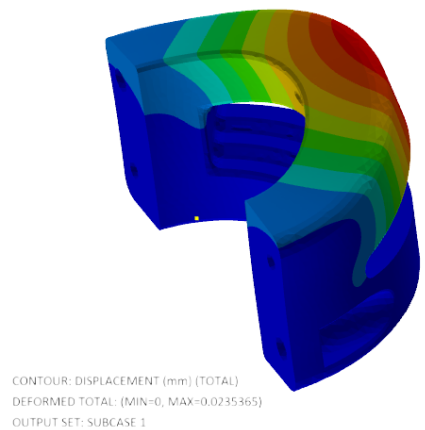
Outcome: Measurement of stresses and loads on the components of clamps and suggestions for design improvements.

Benefits: Rapid prototyping, Product development, design, and verification and design optioneering done within a short time.









Alignment With UN

Success Story: Design Validation

EQUITUS
Design | Engineering | Innovations

Project Brief:

Validate the structural capability of the MGSE.

Activities Carried Out:

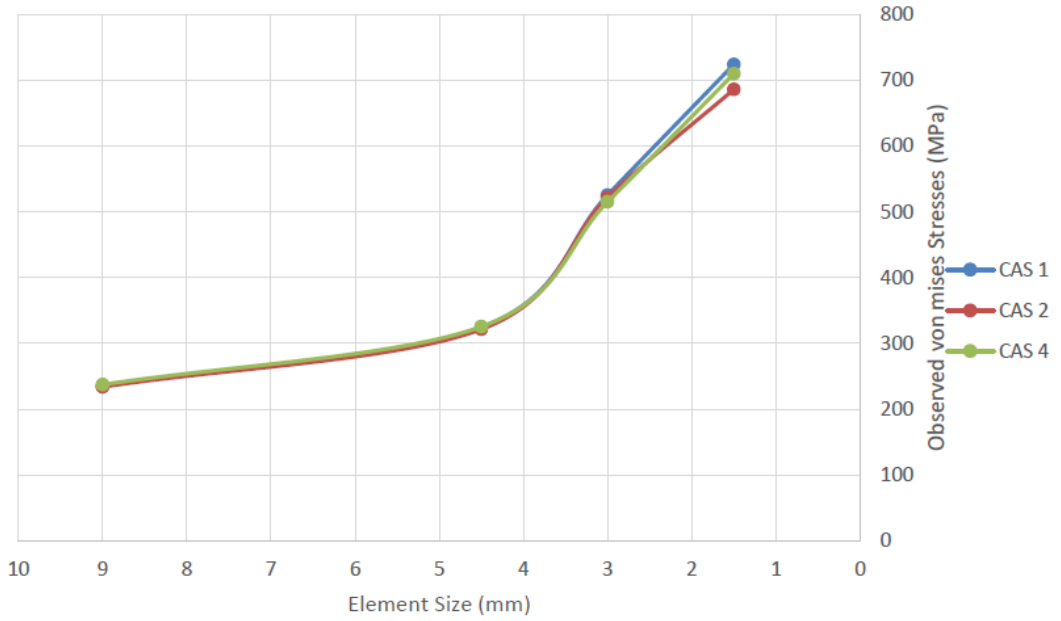
- Design validation of supporting instrument cart including full FEA analysis and verification.
- Suggestions for design changes

Outcome:

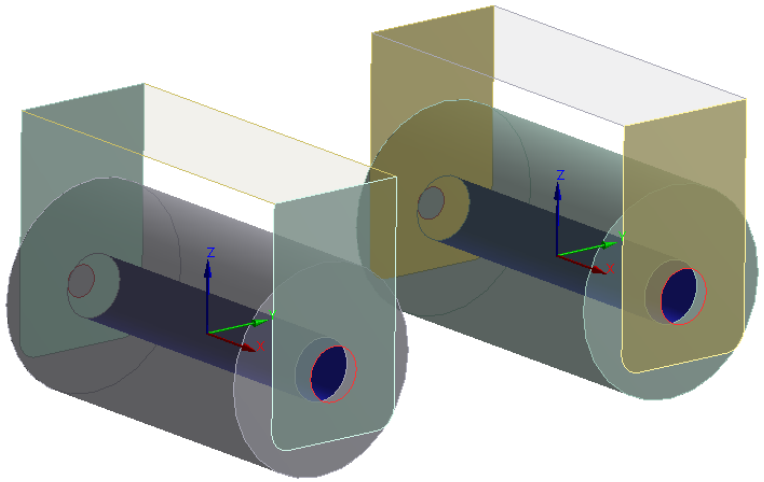
Design modifications were made to the rails as per Equitus recommendations, to change the rail profiles

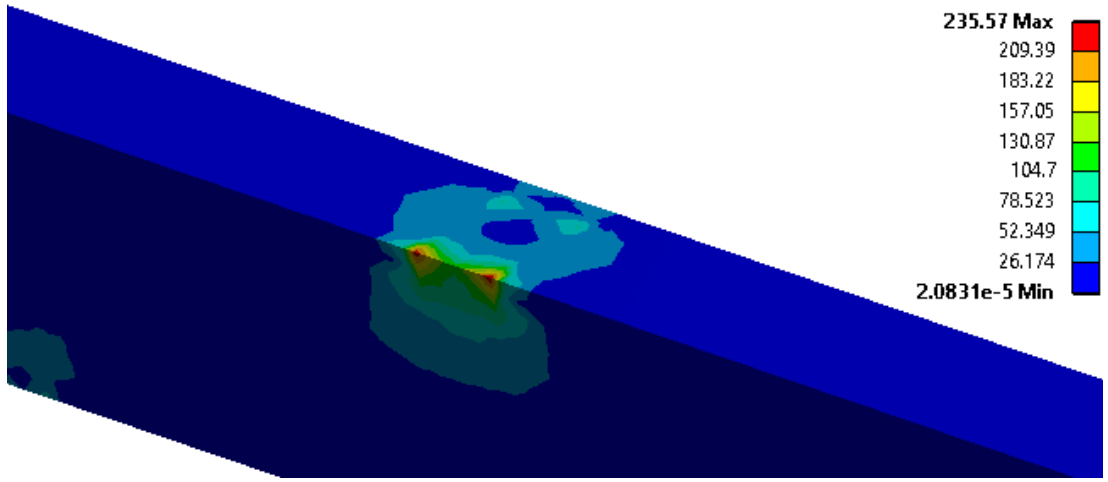
Benefits to Client:

Successful change in design based on Equitus input ensured that the final manufactured equipment will serve its desired purpose.



Alignment With UN





Success Story: Bicycle Frame Validation

EQUITUS
Design | Engineering | Innovations

Project Brief:

Provide evidence of capability by validating a bicycle frame for static and fatigue failure limits using digital engineering.

Activities Carried Out:

- Validation of static failure limit
- Validation of fatigue failure limit

Outcome:

Capability to perform the required validations using digital engineering was proven successfully

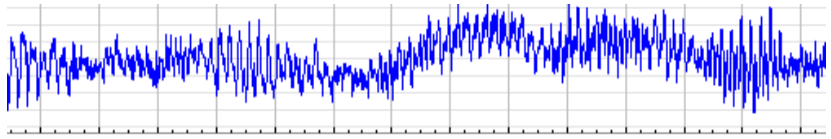
Benefits to Client:

An easier method of design validation available

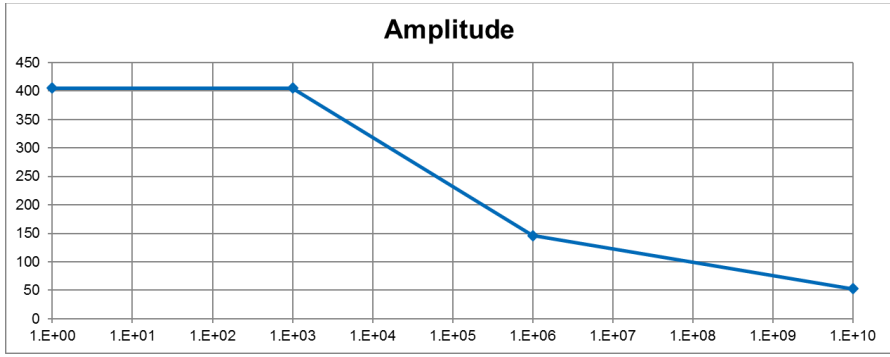
Capability to assess multiple 'what-if' scenarios on various configurations fairly quickly

Ability to cut project costs and timescales

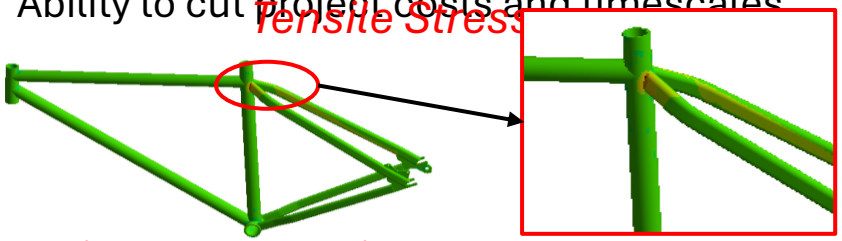
Amplitude v Time: Fatigue load spectrum



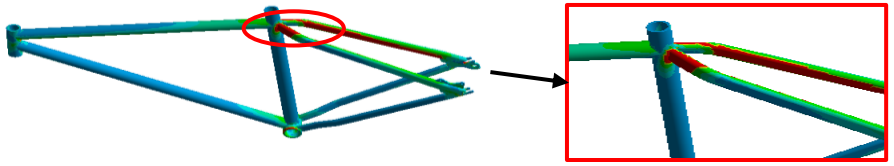
Material S-N Curve



Tensile Stress



Fatigue Damage



Alignment With UN

Success Story: Bicycle Frame Validation

EQUITUS
Design | Engineering | Innovations

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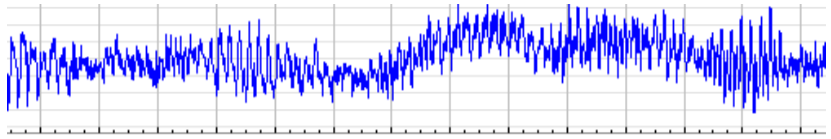
Amplitude v Time: Fatigue load spectrum



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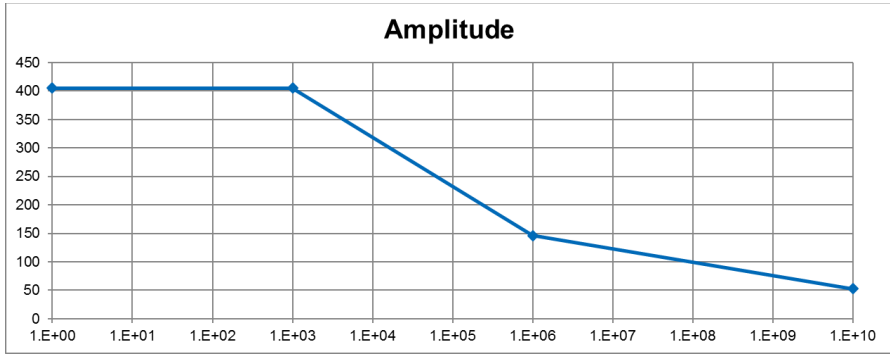
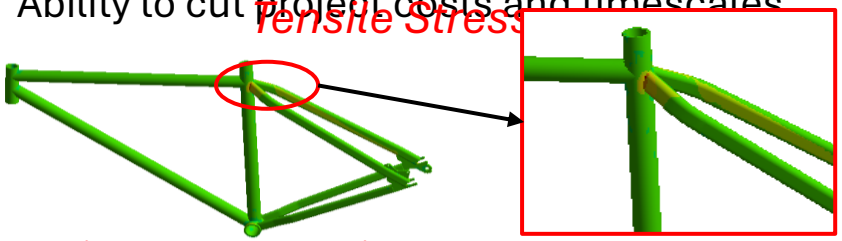
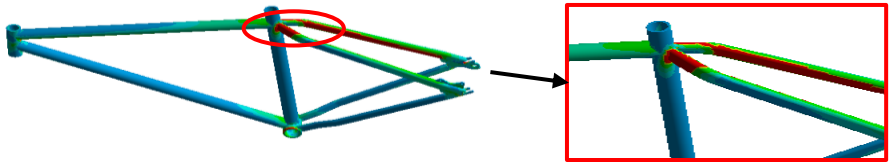


Tensile Stress



Fatigue Damage

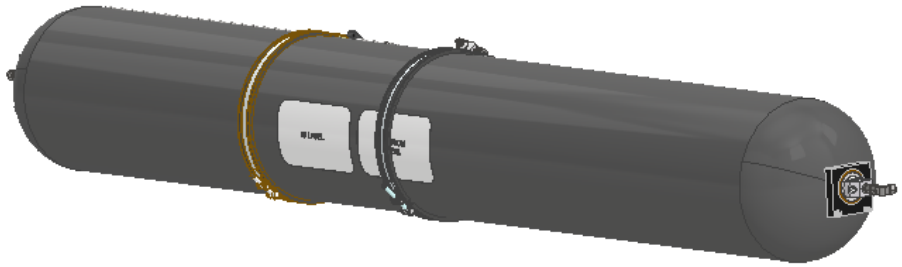


Alignment With UN

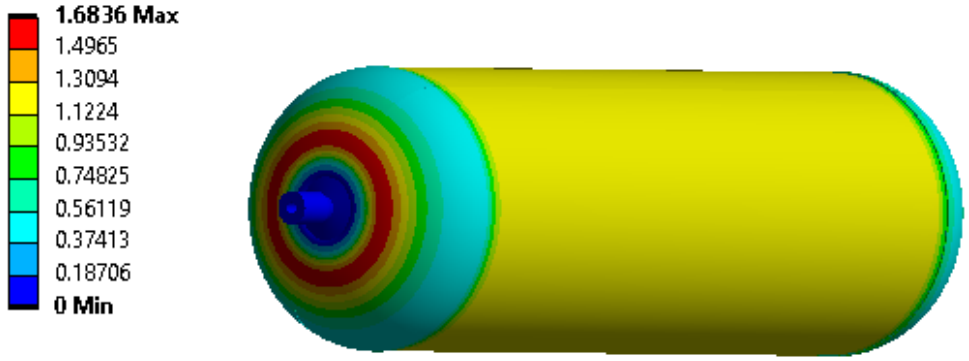
Success Story: Design of Cylinders

EQUITUS
Design | Engineering | Innovations

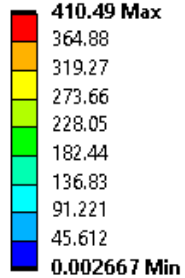
1. Design and validation of hydrogen carrying cylinders to withstand typical compressed hydrogen storage pressures (typically around 350 to 700 bar), and phenomena like embrittlement
2. Experience of developing systems as per standards such as ISO 11119, ISO 9809, ISO 7866, EN 13445, EN 1491 amongst others
3. Design for Manufacture
4. Validation and analysis
5. Experience of working with low permeability materials



3D Model of Cylinder Assembly



Displacement under 500bar Pressure



Von Mises Stresses under 500bar Pressure

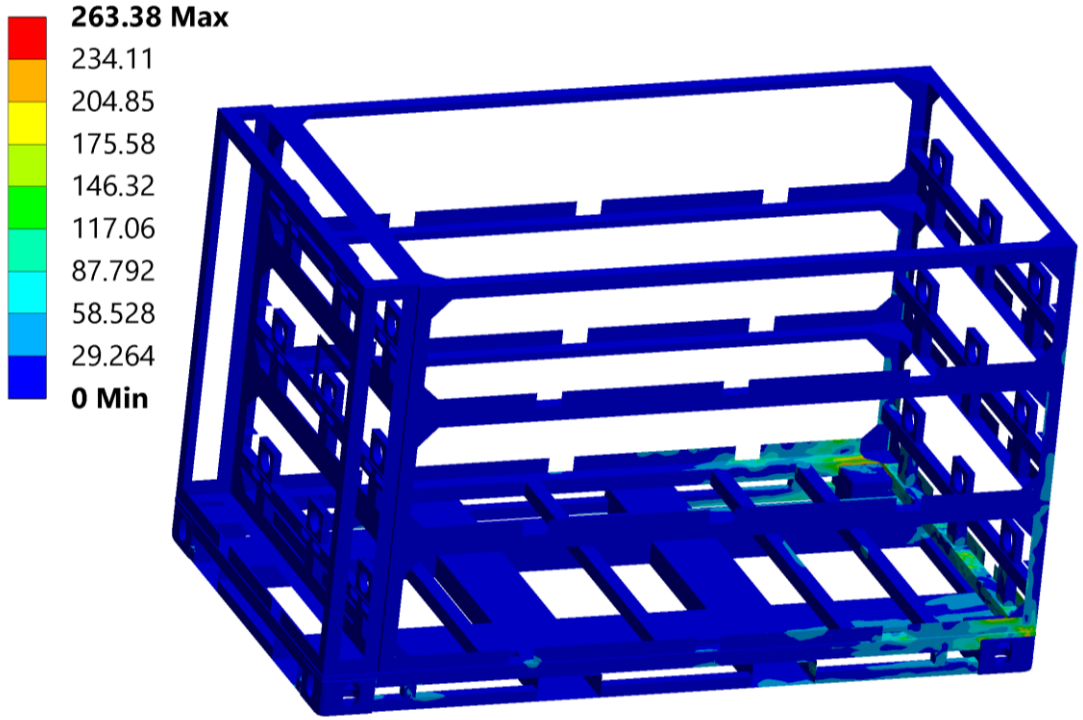
Alignment With UN SDGs

Success Story: Design of Cylinder Transporation Frames

EQUITUS
Design | Engineering | Innovations

1. Design and validation of hydrogen cylinder transportation frames
2. Experience of developing systems as per standards such as ISO 10961, amongst others
3. Design for Manufacture
4. Validation and analysis to include impact, roll over and fall over protection systems as per ISO 10961
5. Experience of working with various metals

3D Model of Multi-Cylinder Transportation Frame



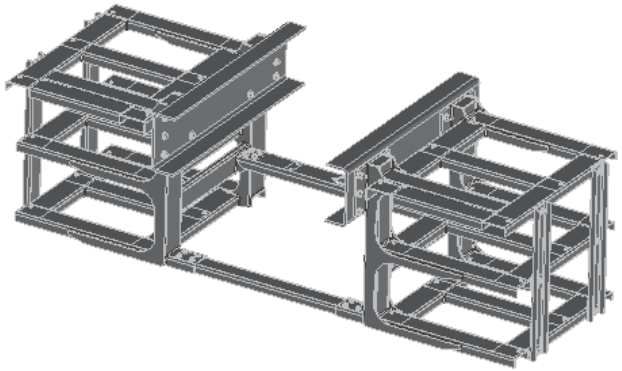
Stresses due to Impact as per ISO 10961

Success Story: Design and Validation of Onboard Frames

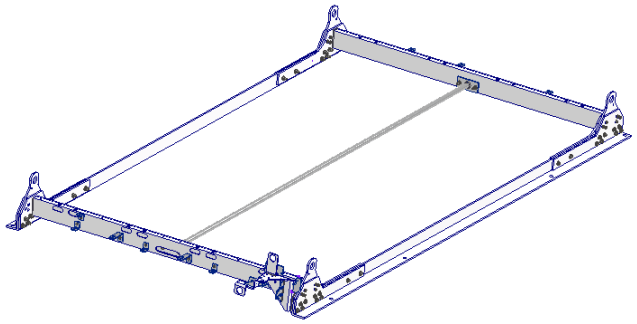
EQUITUS
Design | Engineering | Innovations

Design of hydrogen frames for trucks and buses as per the following standards amongst others:

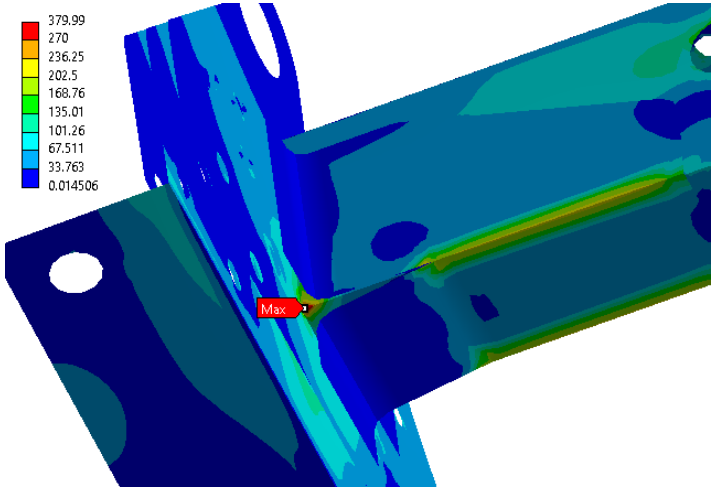
1. EC79: type-approval of hydrogen-powered motor vehicles
2. ECE-R115: retrofitting compressed gases as part of motor vehicles' propulsion systems
3. ECE-R134: safety-related performance of hydrogen-fuelled vehicles



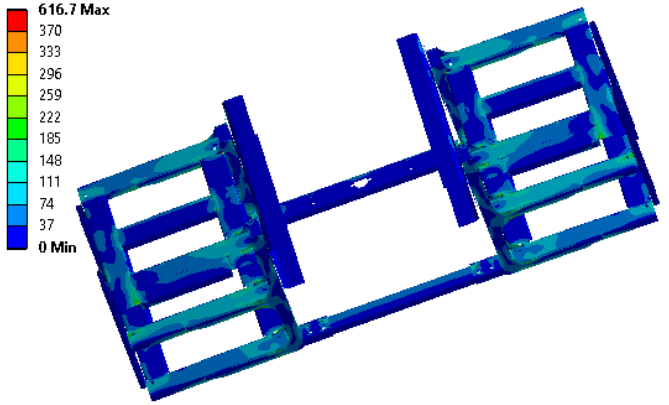
3D Model of Battery Frame Assembly



3D Model of Cylinder Frame Assembly



Stresses on Frame as per ECE – R134



Stresses on Frame as per EC79