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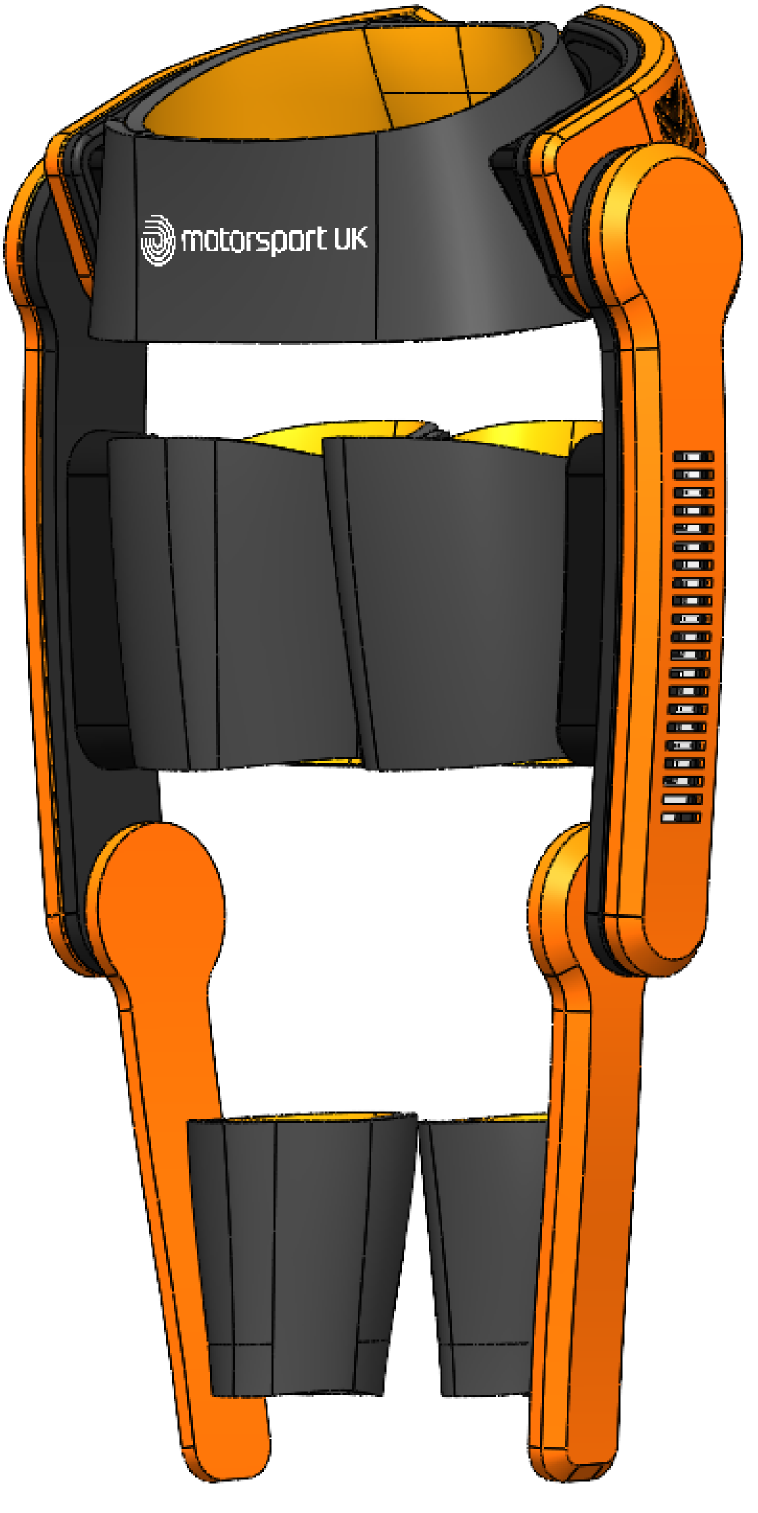
Digital analysis report



Comparison of Mild and Stainless steel materials

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Digital analysis report

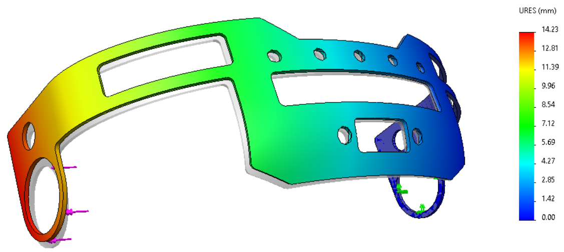
Outward flex: Mild steel

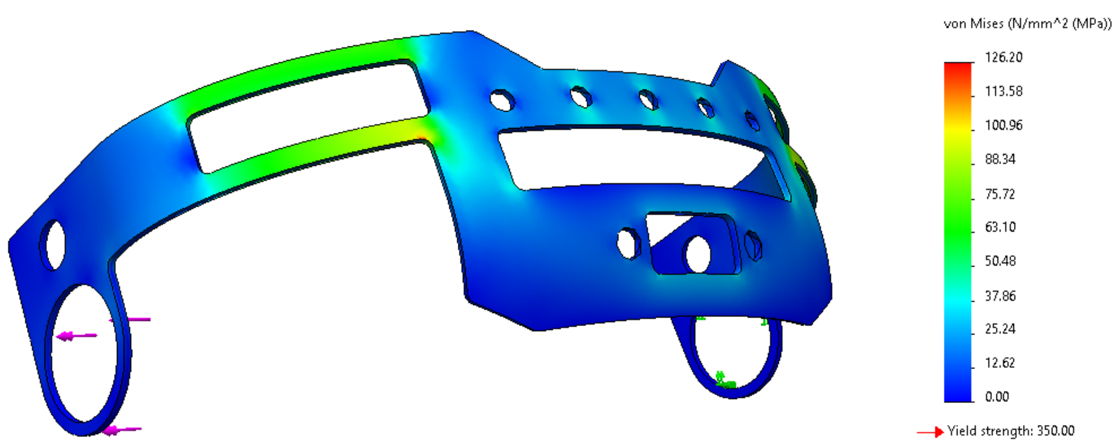
Displacement:

This test shows the displacement of the pelvic armature chassis under a force of 1.75 kgf.

The force is applied outwards at one end of the chassis and a fixed point is applied at the other.

The chassis shows a maximum displacement of 14.23 mm





Stress:

An visual representation of stress is also generated in this test.
It shows the key weak points and vulnerabilities of the part.
Stress is most felt at the conjunction between the two arms of the chassis and the main body as well as the corners of the cut outs on either arm.

The stress never overcomes the yield strength of the material, any deformation therefore is not permanent.

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Digital analysis report

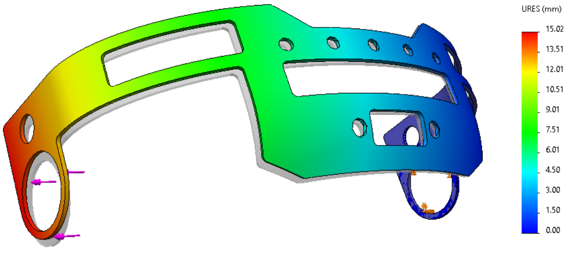
Outward flex: Stainless steel

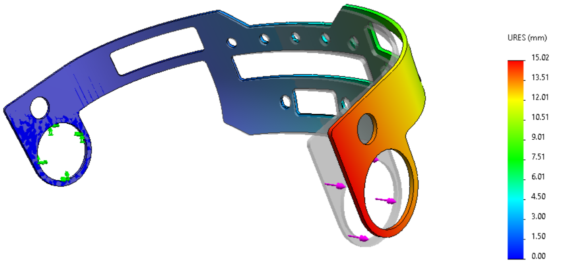
Displacement:

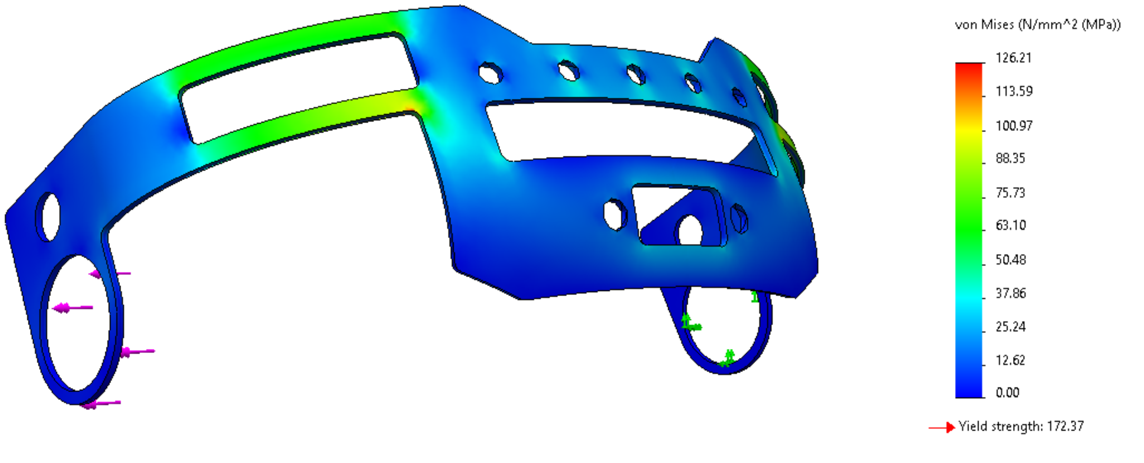
This test shows the displacement of the pelvic armature chasis under a force of 1.75 kgf.

The force is applied outwards at one end of the chassis and a fixed point is applied at the other.

The chassis shows a maximum displacement of 15.02 mm







Stress:

An visual representation of stress is also generated in this test.
It shows the key weak points and vulnerabilities of the part.
Stress is most felt at the conjunction between the two arms of the chasis and the main body as well as the corners of the cut outs on either arm.

The stress never overcomes the yield strength of the material, any deformation therefore is not permanent.

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Digital analysis report

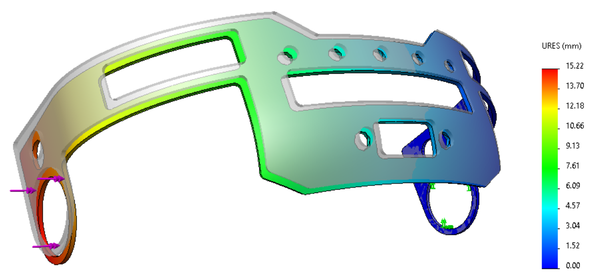
Inward flex: Mild Steel

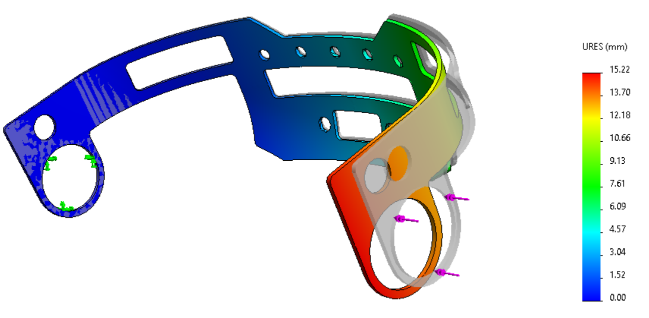
Displacement:

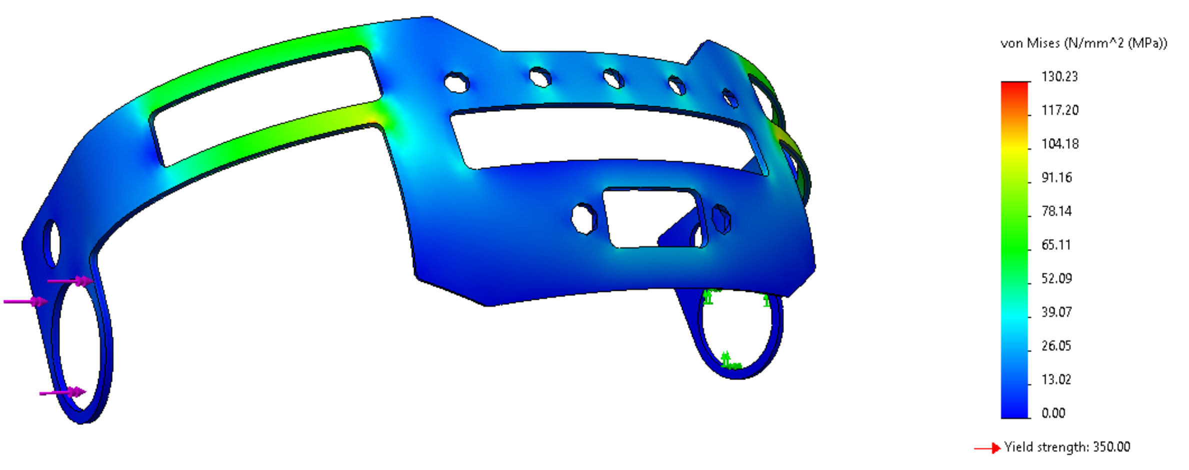
This test shows the displacement of the pelvic armature chasis under a force of 1.6 kgf.

The force is applied outwards at one end of the chassis and a fixed point is applied at the other.

The chassis shows a maximum displacement of 15.22 mm







Stress:

An visual representation of stress is also generated in this test.
It shows the key weak points and vulnerabilities of the part.
Stress is most felt at the conjunction between the two arms of the chassis and the main body as well as the corners of the cut outs on either arm.

The stress never overcomes the yield strength of the material, any deformation therefore is not permanent.

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Digital analysis report

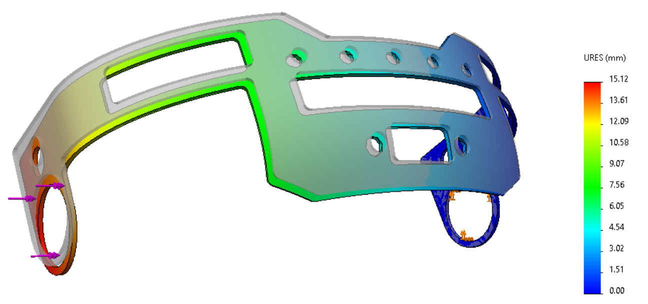
Inward flex: Stainless Steel

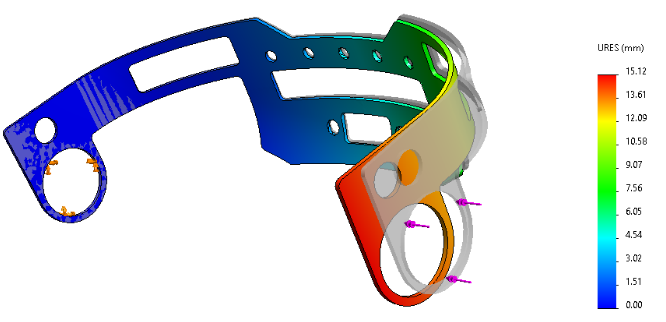
Displacement:

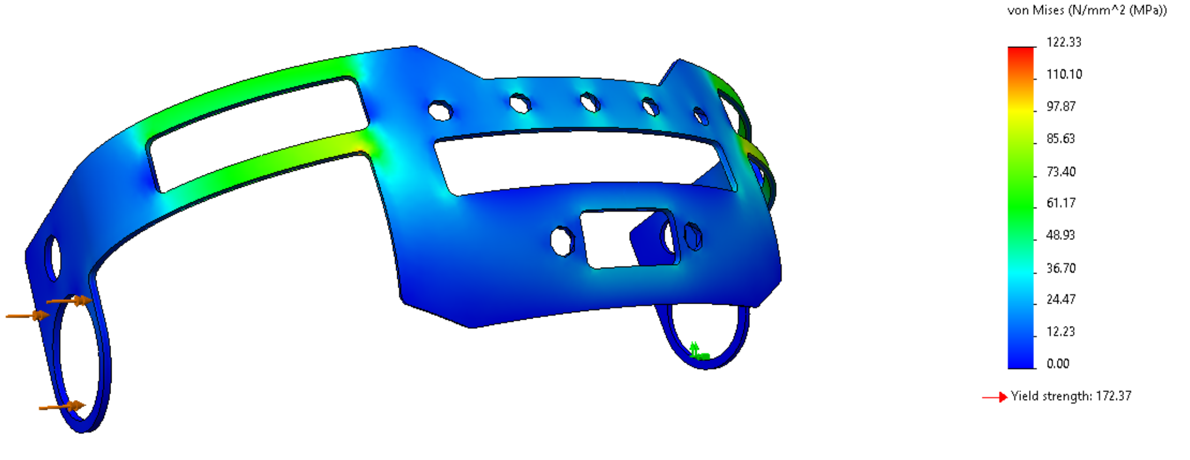
This test shows the displacement of the pelvic armature chassis under a force of 1.5 kgf.

The force is applied outwards at one end of the chassis and a fixed point is applied at the other.

The chassis shows a maximum displacement of 15.12 mm







Stress:

An visual representation of stress is also generated in this test.
It shows the key weak points and vulnerabilities of the part.
Stress is most felt at the conjunction between the two arms of the chassis and the main body as well as the corners of the cut outs on either arm.

The stress never overcomes the yield strength of the material, any deformation therefore is not permanent.

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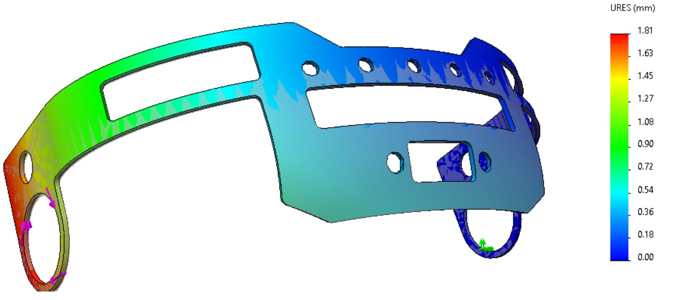
Digital analysis report

Torsional flex: Mild Steel

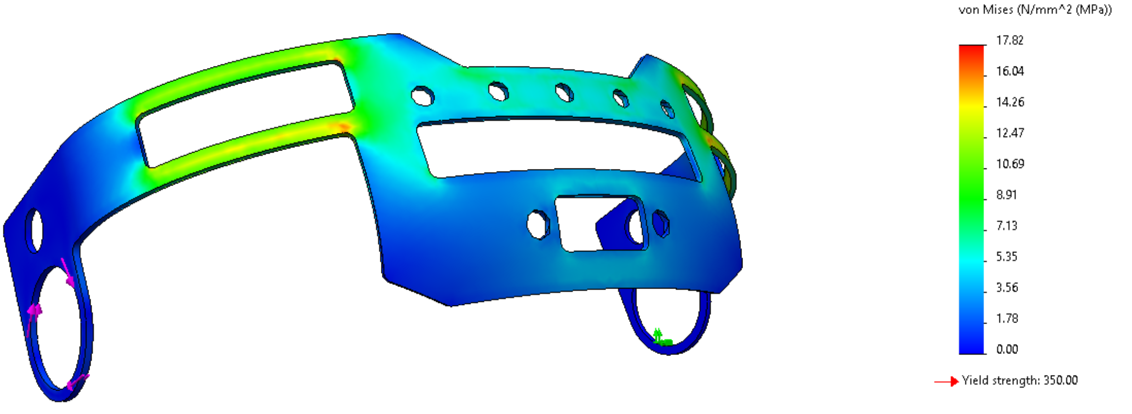


Displacement:

This test shows the displacement of the pelvic armature chassis under a force of 5 kgf.

A twisting force is applied at one end of the chassis and a fixed point is applied at the other.

The chassis shows a maximum displacement of 1.81 mm



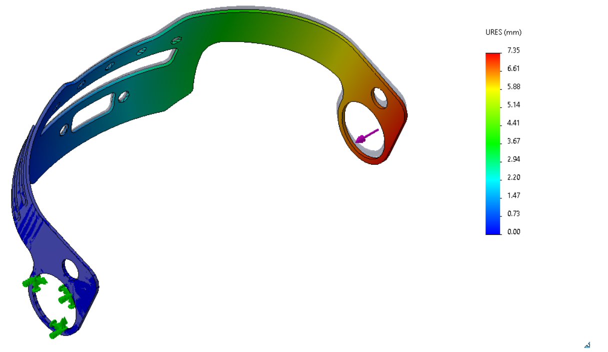
Stress:

An visual representation of stress is also generated in this test.
It shows the key weak points and vulnerabilities of the part.
Stress is most felt at the conjunction between the two arms of the chassis and the main body as well as the corners of the cut outs on either arm.

The stress never overcomes the yield strength of the material, any deformation therefore is not permanent.

Digital analysis report

Outward flex: Mild steel – Revised component

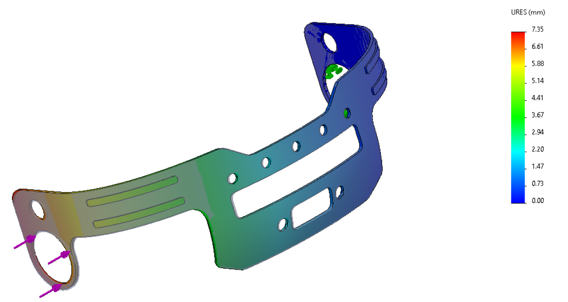


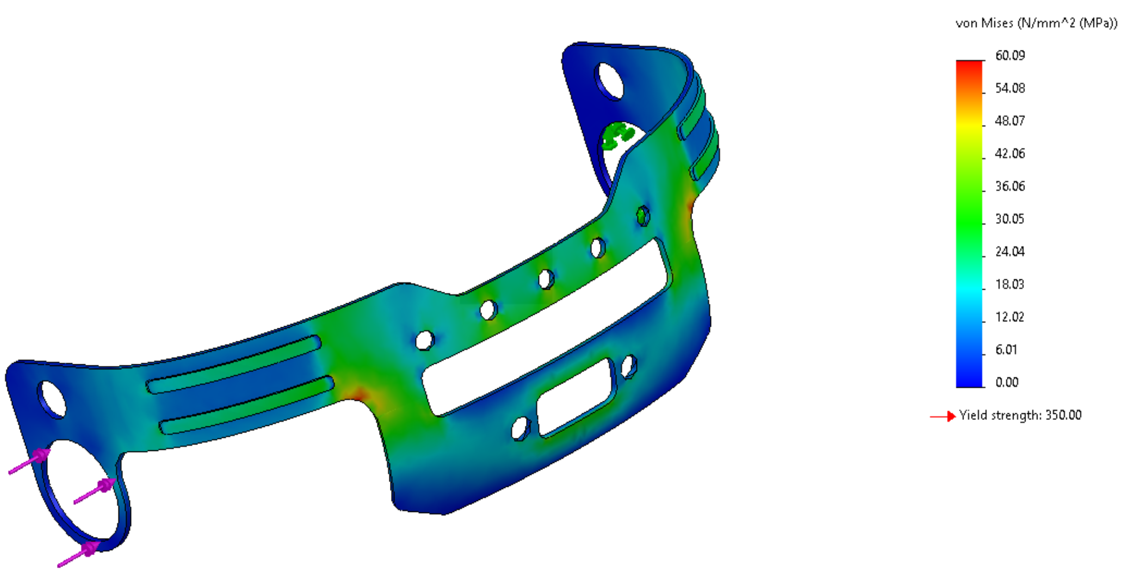
Displacement:

This test shows the displacement of the revised pelvic armature chassis under a force of 1.75 kgf.

The force is applied outwards at one end of the chassis and a fixed point is applied at the other.

The chassis shows a maximum displacement of 7.35 mm





Stress:

An visual representation of stress is also generated in this test.
It shows the key weak points and vulnerabilities of the part.
Stress is most felt a the radius joining the arms to the main body.
The stress never overcomes the yield strength of the material, any deformation therefore is not permanent.

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Digital analysis report

Life Cycle Analysis:

A life cycle analysis has been conducted on both materials in order to evaluate the environmental impact.

It assumes the following:

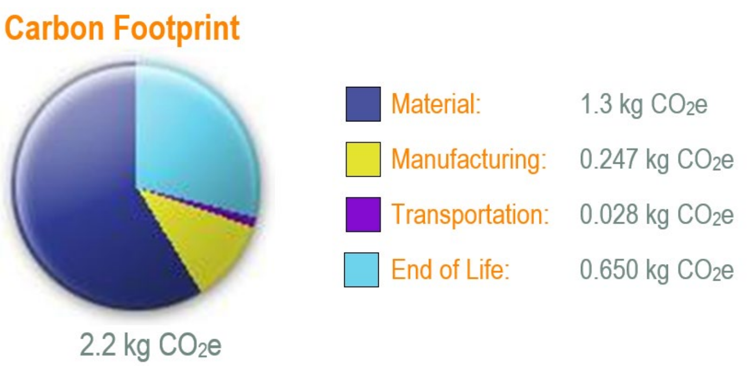
- Manufactured in Asia
- Used in Europe
- Built to last 5 years
- Used for 5 years

Mild Steel:

721.59 grams

1.60 USD

2.2kg of CO_2

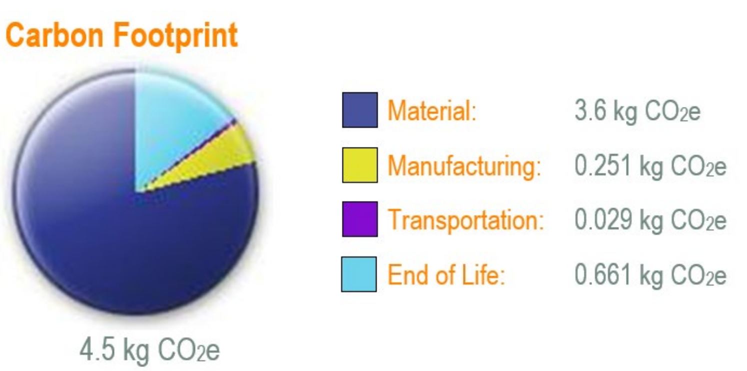


Stainless Steel:

733.51 grams

4.5kg of CO_2

2.70 USD



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Digital analysis report

Summary:

Throughout the testing mild steel is proven the more robust material, being able to take greater forces with less deformation, this is especially evident in the outward flex test where the mild steel deforms 14.23 mm under a load of 1.75 kgf when stainless steel deformed 15.02 mm at the same force.

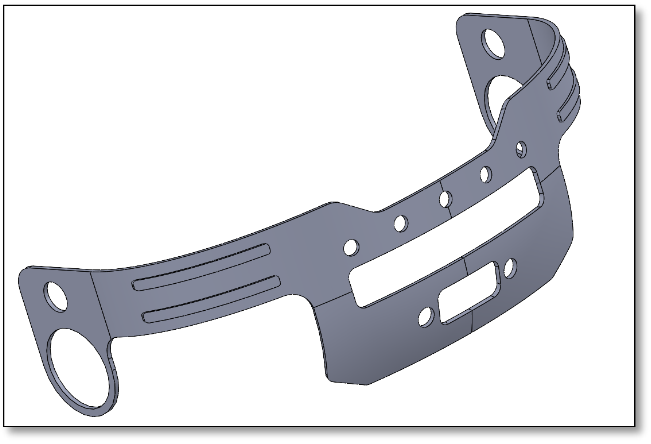
Interestingly both components faired very well under a torque force, both easily resisted a force of 5 kgf although mild steel again held a small advantage, with a displacement of 1.81 compared to stainless steel at 1.89.

A case could be made for both materials with the difference in strength being marginal both fair remarkably well under torsional loads which will be the force experienced most by the chassis.

However, the LCA proves mild steel the superior material, it emits fair less CO_2 emissions at 2.2 kg compared to stainless steel's 4.5kg.

Design considerations:

Design considerations have also been made to increase the rigidity of the component; embossed stiffening features have been added to the arms, the cut out has also been removed and the corner fillets have been given an increased radius to better distribute stress on the part.



This has allowed the component to withstand additional force. The original component experience a displacement of 14.23 at 1.75 kgf in the outward flex test, where as the revised component suffers only a 7.35 mm displacement in the same test.