

DESIGN REVIEW

AFTERMARKET CENTRE SEAT and SEAT BELT MOUNTINGS MANUFACTURED BY VEHICLE ENGINEERING AUSTRALIA P/L

REVIEW BY

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EXECUTIVE SUMMARY

I have inspected the front row centre seat and seat belt mountings, and assessed their design and construction against the force requirements of VSB 5, "Manufacture and Installation of Additional Seats Issue 3.0 Revision 1 dated March 2017".

From my assessment it is my opinion that the front centre seat and seat belt mountings meet the design force strength requirements for a Category 1 Seat.



DEC 2023

MARLOC ENGINEERING**MECHANICAL ENGINEER/ AUTOMOTIVE / STRUCTURAL/CRANES/HEAVY VEHICLES/SOLIDWORKS COMPUTER ANALYSIS****11 Shropshire St. Queanbeyan EAST, NSW, 2620****Ph: 0429 993 400 mario@marlocengineering.com ABN: 30 748 804 395****DESIGN REVIEW****AFTERMARKET CENTRE SEAT and SEAT BELT MOUNTING
MANUFACTURED BY VEHICLE ENGINEERING AUSTRALIA P/L**

Reference:

- A. VSB 5 Manufacture and Installation of Additional Seats Issue 3.0 Revision 1 dated March 2017.
B. AS4100 -1998 Steel Structures

**Introduction**

1. Vehicle Engineering Australia instructed me, to review the design of mountings to suit a Techsafe front centre seat and seat belts. Against the force strength requirements of VSB 5 category 1 seat.

Construction Details

2. The seat mounting is fabricated from 5mm mild steel plate. The support legs are up to 80mm high and with a min of 3mm wall thickness in mild steel. The seat belt mounting is fabricated from 50x50x8mm EA in mild steel

Design Analysis

3. The design was verified using SOLIDWORKS Premium Finite Element Analysis, using the experience gained from the production of a number of components, including cranes. A number of 3D models were created and progressively assessed to confirm that the models were relevant and reflected the loading required. The Techsafe seat weight was less than 15kg and a weight of 15kg was assumed for the analysis.

Acceptance Criteria

4. From the FEA analysis the stress recorded was used as the acceptance criteria. The guidelines have been moderated to allow stress up to the UTS on the understanding that it is better for the seat and seat belt mountings to stretch (exceed yield stress but within UTS) and in the process absorb some of the energy of the collision, than for the seat to remain rigid and transfer all of the energy from the collision to the occupant. The UTS of mild steel ranges from 400 to 500MPa.

Seat Belt Forces

5. From VSB5 the forces on the seat and seat belt mountings are as shown.

	Lap Belt Anchorage Testing ($F_{lap\ belt}$)	Sash Belt Anchorage Testing ($F_{sash\ belt}$)	Seat Inertial Force (F_{seat})	Child Restraint	Head Restraint
Category 1 Seats	13.5 kN \pm 0.2 kN	13.5 kN \pm 0.2 kN	20 x 9.81 x seat mass Seat mass 15kg (2943N)	NA	NA

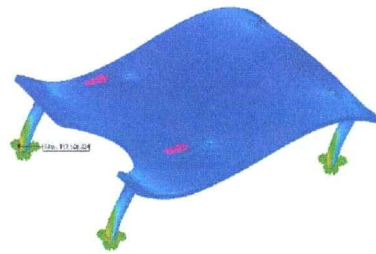
Seat and Seat Belt Anchorages Testing Configuration for Forward Facing Seats**Results of FEA**

6. For the seat mountings with a load of 2943N acting horizontally max stress was 153MPa. For The seat belt mount the max stress was 324MPa. Both are within the acceptance criteria.

Summary

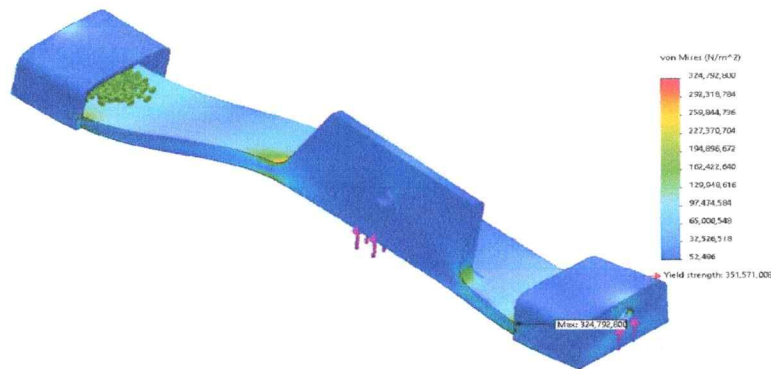
7. I have inspected the front row Techsafe seat mounting, and the seat belt mounting, and assessed their design and construction against the force requirements of VSB 5. I have formed the opinion, that the mountings as inspected meets the force requirements of VSB 5.

Model name: seatbelt anchorage
Study name: Static (Seatbelt-Mounting-1)
Plot type: Static modal stress (Stress)
Deformation scale: 73.9336



MAX STRESS 153MPa

Model name: seatbelt anchorage
Study name: Static (Seatbelt-Mounting-1)
Plot type: Static modal stress (Stress)
Deformation scale: 73.9336



MAX STRESS 324MPa

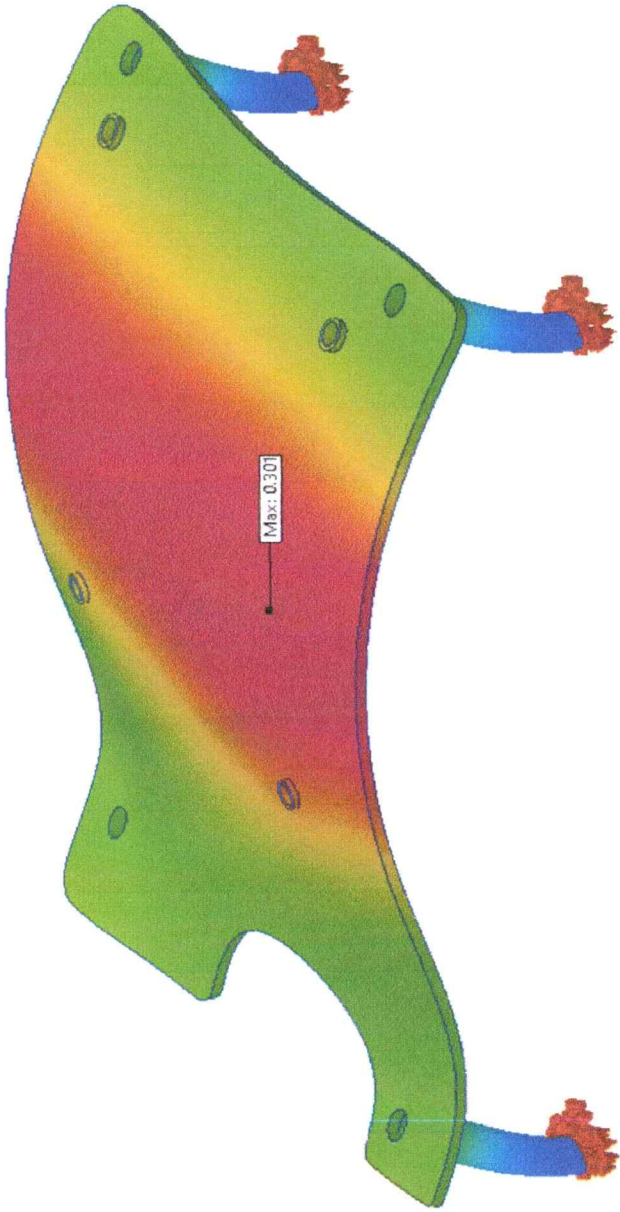
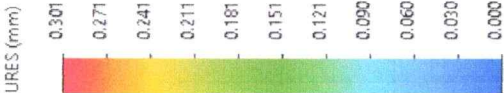
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14 Dec. 23

Attachments: FEA Results Various angles of seat load, horizontal, 15 and 30degrees, and horizontal

DISCLAIMER: This report refers to a seat and seat belt mountings as inspected. The installation of the seat is subject to separate verification and reporting. Quality control and manufacturing of the mountings are not the subject of this report. Any changes to the dimensions and materials will require additional verification. This analysis can only be used for the seat and seat belt mountings as described and inspected.



Model name: basewithlegs
Study name: 15degFwd20Gseatweight(-Default-)
Plot type: Static displacement Displacement1
Deformation scale: 172.78



Model name: basewithlegs

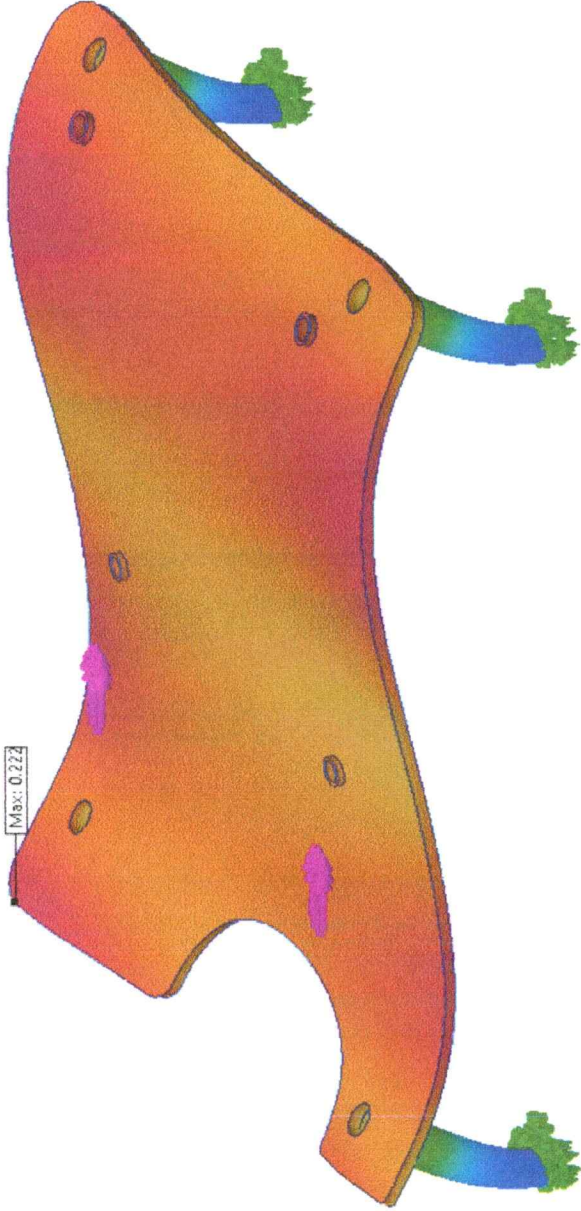
Study name: 30degFwd20Gseatweight(-Default-)

Plot type: Static displacement Displacement1

Deformation scale: 95.4632



Model name: basewithlegs
Study name: horizontal fwd 20G: seat weight (- Default -)
Plot type: Static displacement Displacement1
Deformation scale: 209.519



Model name: basewithlegs
Study name: 200seatweight(-Default-)
Plot type: Static displacement [Displacement]
Deformation scale: 47.9216

