



PUTTING CHASSIS CRACKING TO BED



Two Part Session:

- Pt. 1 Common Failure Modes
- Pt. 2 Chassis Rules
- Question Time





Darrel Gascoyne vicroads Jason Stables holmwood highgate (aust.) Bob Woodward barkwood consulting Romesh Rodrigo



Common Failure Modes





Darrell Gascoyne, Manager Operations Anthony Harris, Auto Technician (Heavy Vehicles) Andrew Stroud, Auto Technician (Heavy Vehicles)

VicRoads Regulatory Services Chassis Cracking?



Tri axle chassis crack, 68 T B-Double Loaded Flour

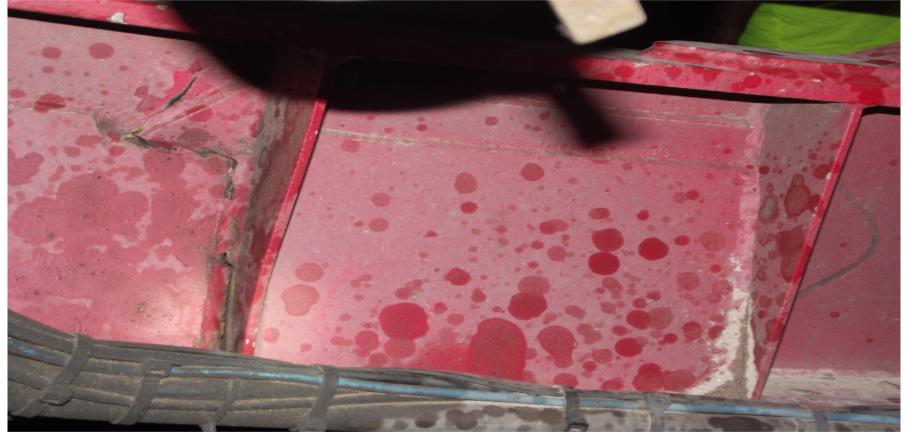












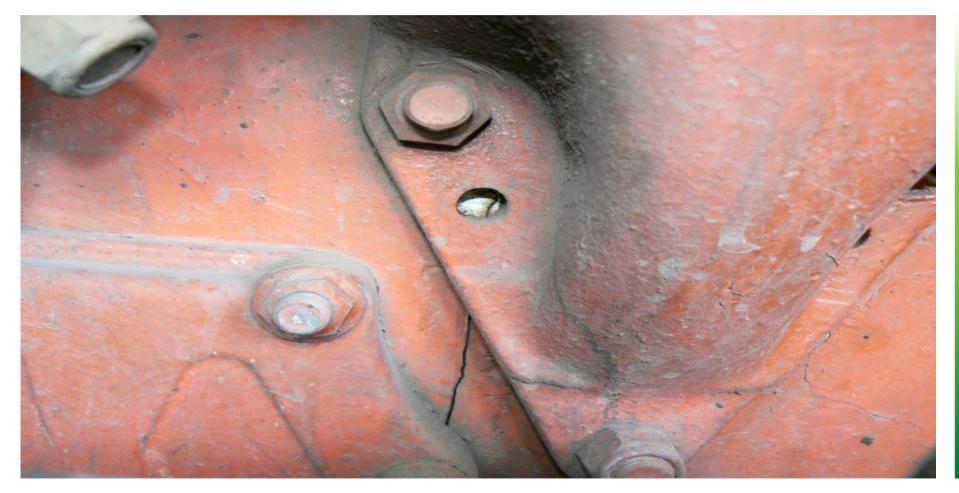
Bitumen tanker



Lead tri axle drop cracked



Kenworth chassis



Tipper body sub frame



Waste truck cracked sub frame



Turntable ripple plate mount



Fuel tanker leg support



Log trailer chassis



Waste truck rear chassis cross tie



Log trailer cross support



A trailer cross member



Tipper sub frame cracked



Jack knife resulting in cracks in drawbar (Repaired)



Concrete agitator front sub frame cross member







Yet another for the same vehicle



Log trailer cracked welded and recracked







Tipper rear door hinge

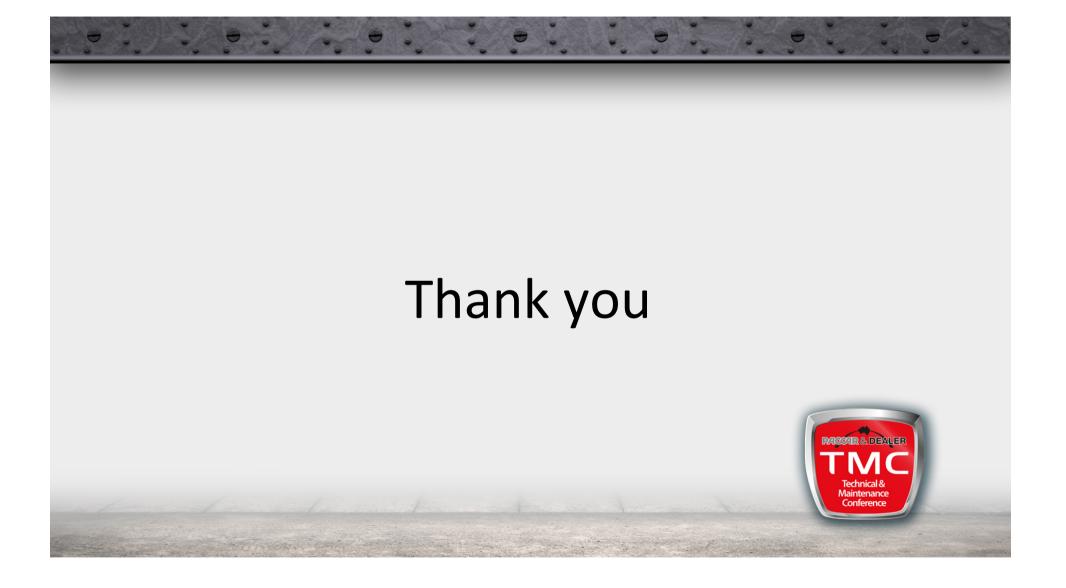


It keeps breaking so I keep adding





?





Jason Stables

Trailer Manufacturer's View





COMMON FAILURE MODES



Common failure mods

Poorly executed modifications, drill holes close to edge



More poorly executed modifications (added toolbox)



With poorly executed previous repair



Overloading / NOT fit for purpose

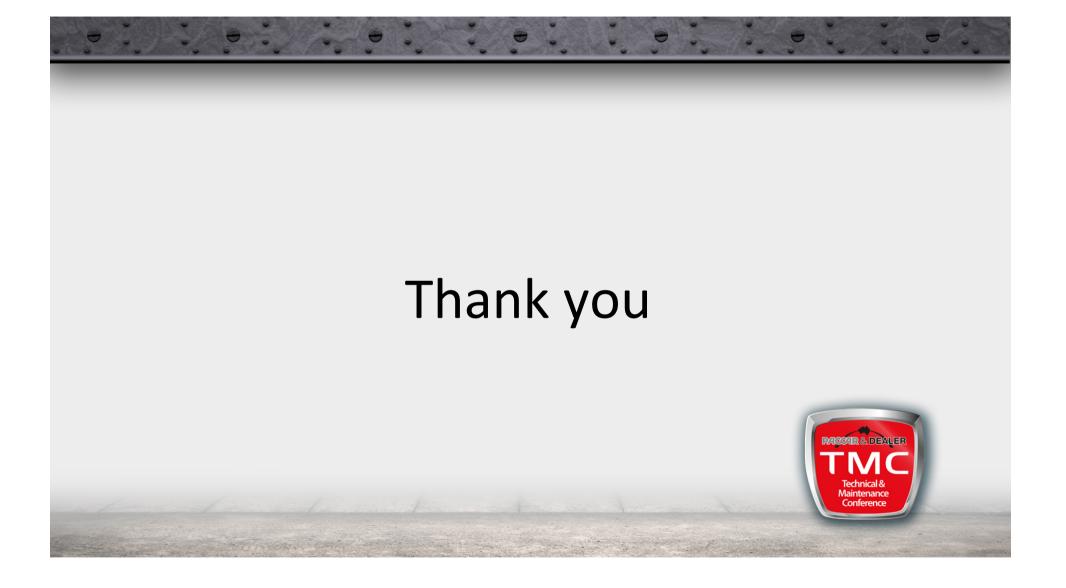


• Ensure trucks and equipment are fit for purpose or application and used within manufacturers ratings

What to do

- Ensure any staff carrying out modifications are suitably qualified to do so and understand potential ramifications of their actions
- Consult engineering staff or equipment designers suppliers as necessary







Bob Woodward

A Consulting Engineer's View





This presentation will provide:

- A little of my background in road transport
- Primary causes chassis cracking (truck and trailer)
- Design basics
- Weld Repairs
- Bolts & Bolt Holes Do/s & Don't/s
- Ancilliaries
- Conclusion



Background

- Involved in specialist trailer design 35 years
- Innovative trailer designs world 1st tandem tri B-double design
- Joint holder two (2) patents in trailer design
- Heavy Vehicle Engineering Signatory 21 years



So what are the primary causes of chassis cracking?



Poor:

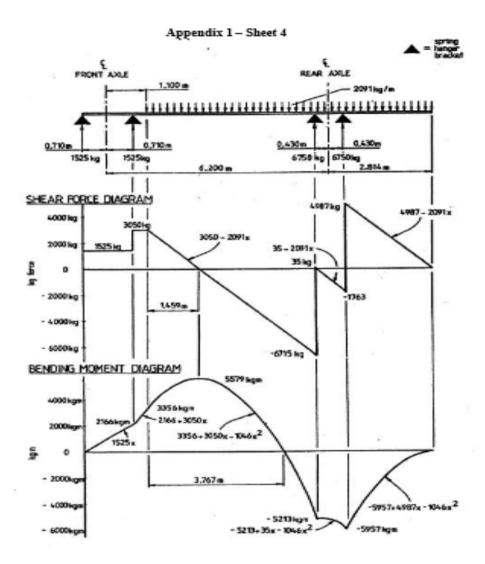
- Design
- Modification practice
- Welding practices
- General Maintenance



The design:

- Don't ASSUME the chassis is up to the task
- Shear force and bending moment assessment
- Service factors VSB #6 are typically 3 (or 5 for Tippers)
- Tip Over Axles
- Chassis extensions





Weld repairs:

- Avoid welding across flanges unless absolutely necessary
- Trailer hanger attachment to chassis suspension manufacturer typically wants weld all around;
- But welding across chassis?????
- Have had trailers that each with average 7,000,000 kilometres new axles, air bags, trailing arms but no hanger attachment issues:
- Crack repairs a good start
- Ensure that there is no undercut or cold lapping.
- Minimise heat concentration



Bolts and bolt holes:

Scriber use

• If you are going to use a scriber to locate the centre of a drill hole, ensure that the scribe mark will be "drilled out". If not, you risk a crack starting at the edge of the hole where the scribe mark continues.

Use hardened washers both under the head and the nut

• alternatively use flanged head bolts and flanged nuts.

NEVER use spring washers against the chassis.

• Use Nyloc or thread locking nuts – only use once!



Bolts and bolt holes:

Ensure bolts are appropriately tightened

don't guess always use a light lube on the thread (sewing machine oil is ideal).
If the manufacturer doesn't have a specific torque, get a generic bolt torque chart and use that.

Don't cut holes with an "oxy"

• minimise clearance.

Avoid bolts within 20% of depth from edges.

Special considerations

attaching aluminium to steel





Romesh Rodrigo

TRUCKS, BODIES AND CHASSIS



Failure of chassis due to lack of suitable subframe (tilt tray)

- Chassis has failed in the area of the main lift ram
- Specified chassis required a more substantial subframe to counter the load imposed by the ram
- Requires more localised reinforcement in the ram area
- Possible application of underslung subframe



Don't use wooden packers and flitch plates...

- Over time wood can shrink
- This allows movement between the chassis and subframe
- This could result in chassis failure over time
- In this case the driver would be experiencing adverse ride and handling of this particular vehicle



...another view

- Obvious is the movement of the body/subframe/packer assembly
- Bad for handling, potentially dangerous due to body movement
- Use of flitch plates does not allow for packer shrinkage over time
- IF a body uses wood packers it needs to be secured with "U" bolts and crush tubes
- All body mountings must be checked periodically



"Figure 8" bolt holes

- Poor workmanship
- Must be immediately rectified by body builder
- If noted in service it must be repaired ASAP to avoid chassis failure



Another example of holes too close

- In this case the flitch plate should have been moved
- Or the hole in the chassis should have been filled prior to the mounting of the subframe
- Appears to be a high investment body considering the galvanising
- So is the truck!!!!!!



Examples of poor body and component mounting

- Flitch plate on an angle and only picks up top holes
- Poorly fabricated spare wheel bracket
- Spare tyre actually hitting rear axle front suspension hanger
- Note the gap between the subframe and chassis
- Poor execution of simple van body mounting



Same body builder different truck

- In this case the spare tyre hits the batteries
- Note the angle of the bottom of the flitch plate
- Raises concerns for the rest of the body mounting





Effect on other components

- In this case the tail pipe length has been reduced to accommodate a tuck away tail lift
- There is nearly 1500 mm of tail pipe here which is unsupported
- Will fail quickly resulting in expensive repair and potential road hazard
- Also note the "burr" in the exhaust
- Potential resultant tyre failure due to badly routed exhaust



Bare chassis don't like point loading

- The subframe is offering no support to the chassis
- This mount has the effect of point loading the chassis
- The subframe and chassis should behave as one to be effective



Resilient Mounts for very rigid bodies

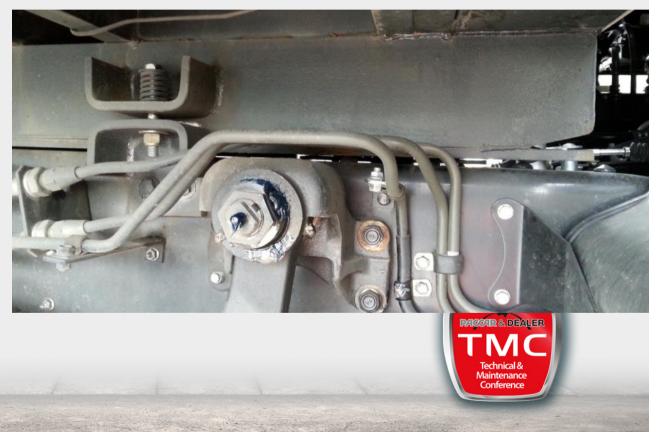
- Required for tankers
- Chassis by nature of their design will move
- The body must move with it or allow the chassis to move



Most general freight bodies do not require

resilient mounting

- Curtain sider with resilient mount which has resulted in subframe deformation
- Subframe chassis support is now diminished
- Puts more load on remaining mounts
- Potentially resulting in point loading of the chassis



Mechanical component failure resulting in chassis issues

- Bad welding results in mechanical component failure
- This can in turn cause issues due to unusual load input into the chassis rails



What's important?

- Subframe, subframe, subframe
- Intelligent body design
- Good workmanship
- Specifying the right chassis for the right application
- Preserving Chassis integrity
- Periodic body inspection and maintenance
- Subframe



More information

Buzu Australia - Technical Reference Information - Windows Internet Explorer provided by Isuzu Australia Limited 🕒 💭 👻 🔳 http://body.isuzu.com.au • 47 🗙 📴 Sing 🏠 = 🔯 = 🖙 🖶 = Page = Safety = Tools = 📦 = 🚖 Favorites 🛛 📓 Isupy Australia - Technical Refer Technical Reference Information TRUCKS Welcome to the Isuzu Trucks Technical Reference Information Website Provided by Isuzu Australia Limited On this site you'll find downloadable technical materials related to the latest Isuzu Trucks model range marketed in Australia. This information is intended to assist Australian body builders in the design and fitment of bodies to Australian specification N, F, FX, FY, C and E Series Ituzu trucks. Login or register to access our file repository Email Address Login Provider Passenth RELIABILITY IS EVERYTHING SUZU yright © 2009 Isuza Australia Limited | <u>Centect us</u> E" READER" A spring reaction force fulcrum 425 410 × 10* (mm²) 600 - 620 -Section A-A 57 FRANK #21 B 爾羅菲 5 ISUZU MOTORS LIMITED

N-Series for Australia

BODY BUILDERS GUIDE

November 2013

This material is a summary of engineering data related to body mounting of the following models.

Common notes which do not depend on the vehicle type and destination are brought together as " I General Precautions".

For the body builders, to work on an appropriate condition of making the best use of the characteristic of this vehicle when examining and working in addition to experience use of its company, it is strongly encouraged to refer to this guide.

Model year	2013/2014 (Version II)		
Vehicle model	NLR,NMR,NNR,NPR,NQR,NLS,NPS		
Conformity regulation	Follow ADR(Australian Design Rule)		
Conformity No.	ADR (3/03)	ADR (5/05)	ADR (6/00)
	ADR (8/01)	ADR (13/00)	ADR (18/03)
	ADR (30/01)	ADR (35/02)	ADR (43/04)
	ADR (80/03)	ADR (83/00)	

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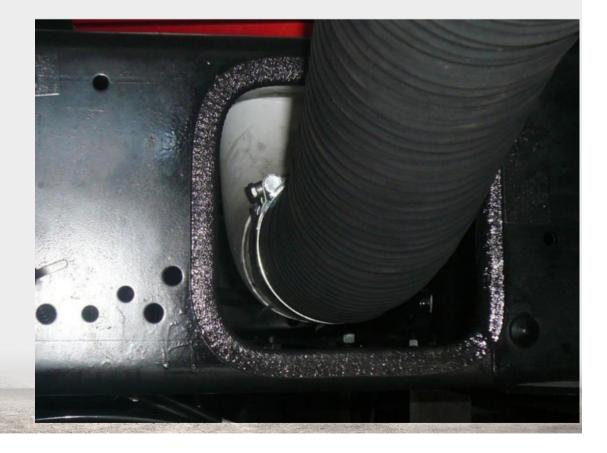
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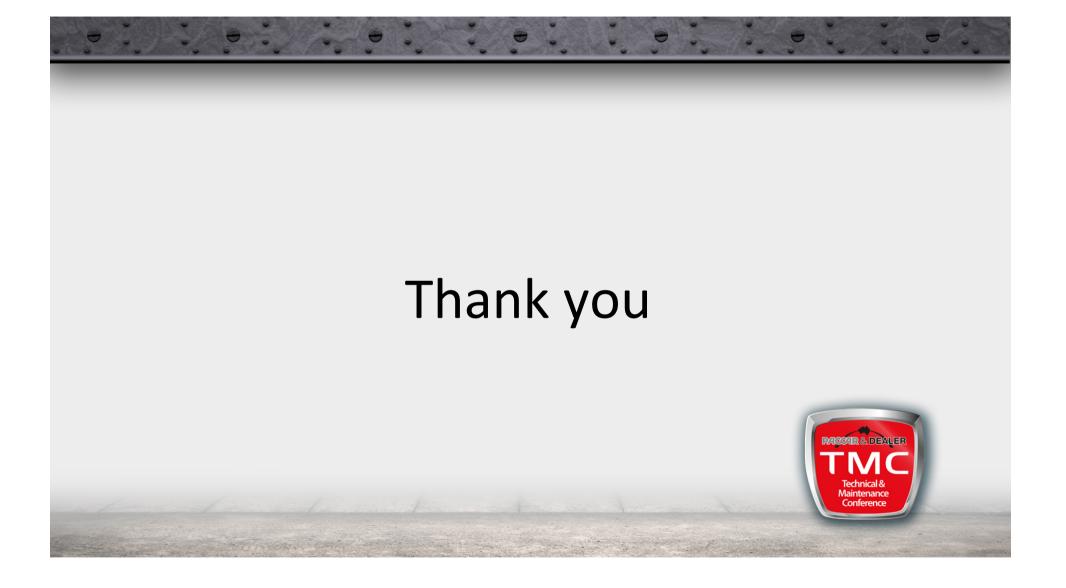
Antrakan Gevernment Hadrusture Internet 0 Vehicle Standards Bulletin VSB6 . . . Road Safety 0 Vehicle Standards Bulletin 6 sets out the requirements for modifying a heavy vehicle. Heavy Vehicle Modifications Administration : A pop- sec set Vehicle Regulation 0 Contents (A PDP: 61 KB) Surface Thansport Security Section A - Engines : - PDP: 84 KB; Section B - ReplacementTransmissions (A POP 29 KB) Section C - Tailshafts (> POP 616 KR) Section D - RearAules []- POP: 32 KB] Section E - Front Axle Steering Wheels and Tyres (- POP: 930 KB) Section F - Suspension : A PDP: 181 KBI Section G - Brakes (J- POP: 1456 KB) Section H - Chassis Frame (J- POP: 2291 KB) Section 1 - Body Mountine : J. 202: 1202 KBI Section K - Cabin (J-PDP: 424 KB) Section M - Fuel Systems [J-PDF: 34 KB] Section P - Tow Couplings Fifth Wheel [J-PDP: 1545 KB] Section Q -Truck Mounted Lifting Systems Slewing (>POP) 1645 KBI Section R - Vehicle Mounted Lifting Systems - NonSlewing (J- POF: 780 KB) Section S - Vehicle Rating (J- PDP: 200 KB) · Section T - Tow Trucks (& PDD 154 x8) 1 🖬 🖬 🖬 PACOAR& DEALER

> Technical & Maintenance Conference

PLEASE don't do this!!

• Rapid failure inevitable!





Chassis Rules

Panel Discussion



