



Motor Claim Advisor Vehicle Damage Assessor

TOP DIVERSIFIED SDN. BHD.

TRAINING GUIDELINE & SAFETY RULES

- ▶ **Fire exits and fire drills**
- ▶ **Health and safety**
- ▶ **Coffee and lunch breaks**
- ▶ **On Time**
- ▶ **No smoking in building**
- ▶ **Mobile phones off**

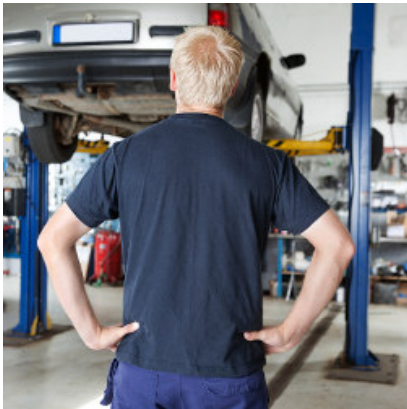


Safetymatters



Vehicle Damage Assessment Technique

To provide an understanding of vehicle damage assessment techniques and the requirement to establish a correct repair method.



Estimate Approach

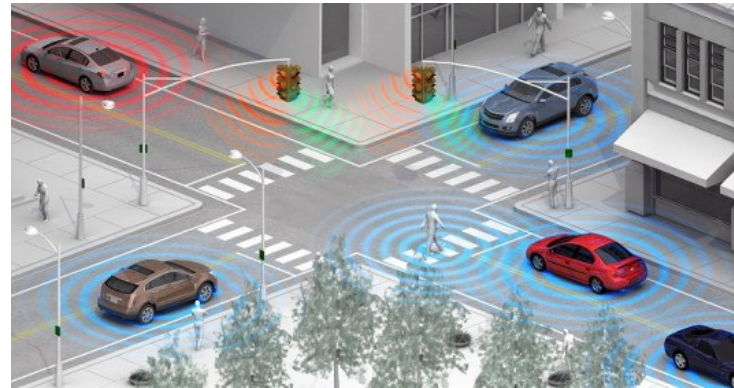
- ▶ **An “estimate” by the repairer or engineering assessor based on opinion and experience**
- ▶ **Definition of “estimate”:
An approximate calculation or form an opinion about**



Understand Highly Technical Features

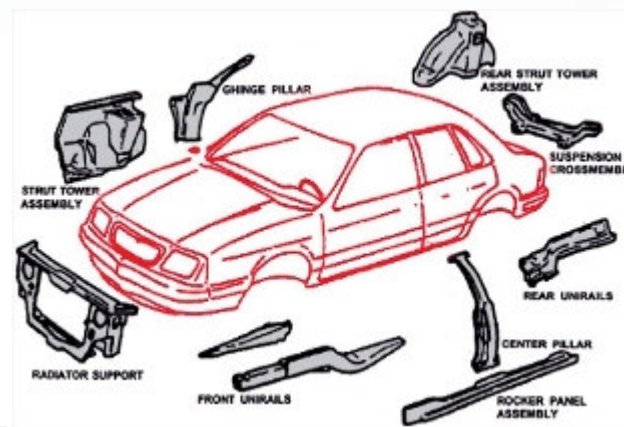
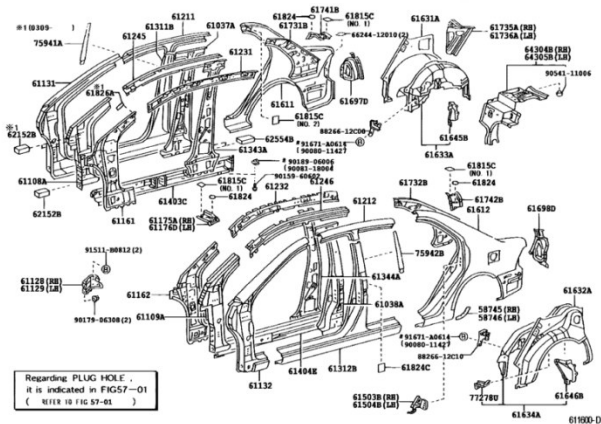
On modern vehicles:

- ▶ **We cannot “estimate” due to highly technical features designed into the vehicle.**
- ▶ **The old traditional method of estimating and the computer driven method where a cost is derived must change.**



Understand The Method of Repair

- ▶ **The method of repair is primary.**
- ▶ **The cost of repair is a result of the correct method of repair being used.**
- ▶ **Never repair at a cost without first considering that the correct method of repair has been applied.**



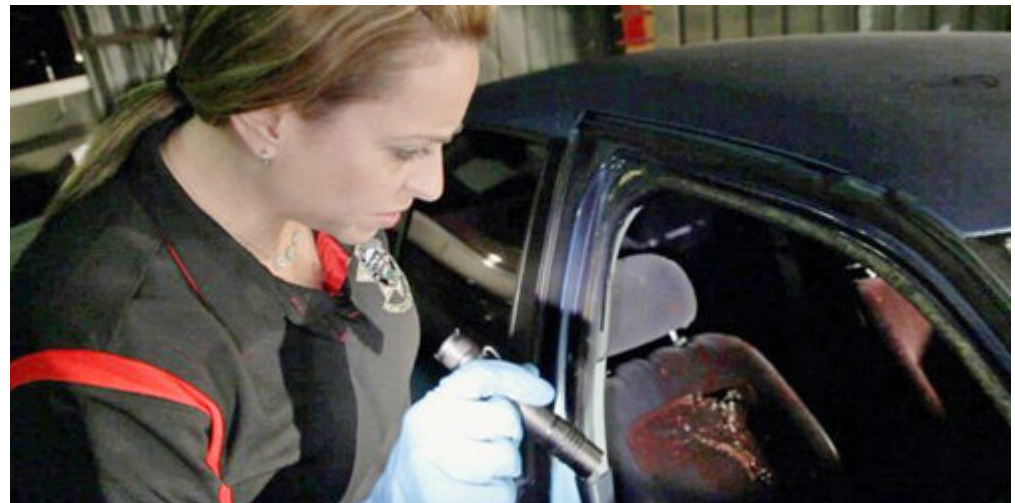
Used Your Senses

The uses of all our senses:

- ▶ **Eyes – looking**
- ▶ **Ears – listening**
- ▶ **Hands – feeling and touching**
- ▶ **Mouth – talking and asking questions**
- ▶ **Nose – smelling**



A good vehicle damage assessor is like a detective, they examine with an investigate approach.



Estimate Approach

There are two distinct operations when assessing a vehicle:

1. Collect the vehicle data and appraise pre-accident condition.
2. Assess the accident damage and collate a repair specification.



Part 1 : Collect Vehicle Data

This section will deal with Part 1:

1. Collect the vehicle data and appraise pre-accident condition.

2. Assess the accident damage and collate a repair specification.



Vehicle Data

- ▶ **Vehicle registration number.**
- ▶ **VIN (Vehicle Identification Number).**
- ▶ **Make & model.**
- ▶ **Trim level.**
- ▶ **Body style.**
- ▶ **Engine and transmission.**



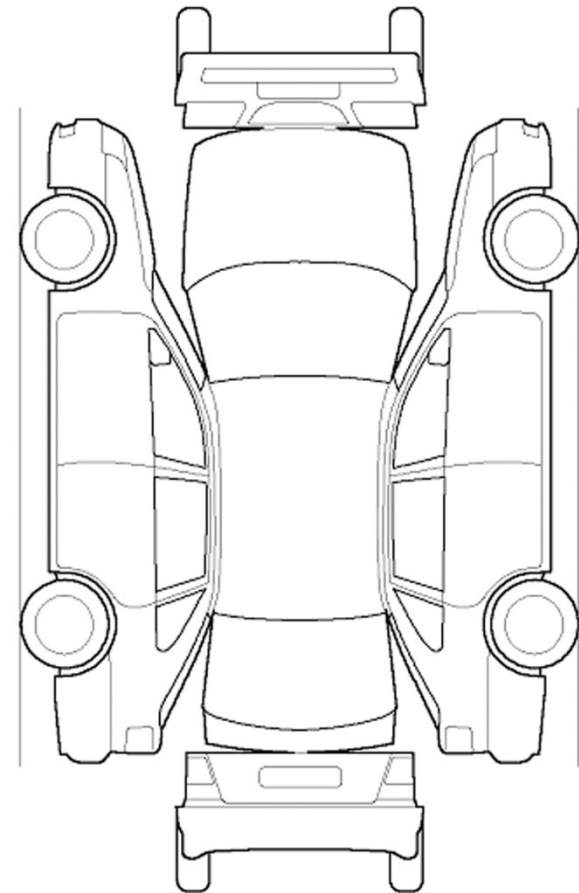
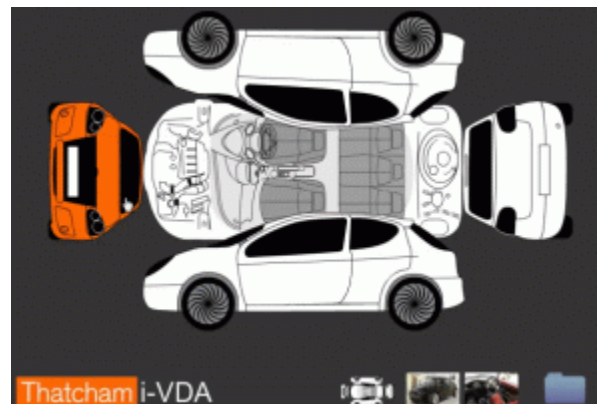
Same Routine Inspection and Process

- ▶ **Always approach a vehicle from the same direction.**
- ▶ **Never rush in and start writing.**
- ▶ **Stand back from the vehicle, walk around it and look at the entire vehicle.**
- ▶ **Have a repeatable procedure to ensure consistency.**



Standard Routine Inspection

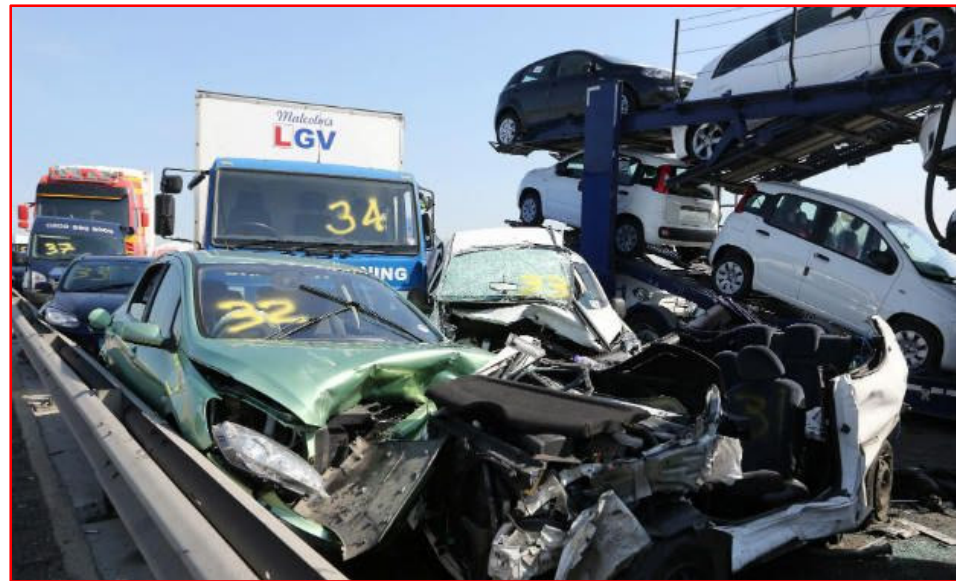
1. **Registration number and badges.**
2. **Inside cabin, take odometer reading, carry out interior checks.**
3. **Right hand front tyre.**
4. **Right hand condition appraisal**
5. **Right hand rear tyre.**
6. **Rear condition appraisal.**
7. **Open boot and carry out checks.**
8. **Left hand rear tyre.**
9. **Left hand condition appraisal.**
10. **Left hand front tyre.**
11. **Front appraisal, check registration on front plate.**
12. **Under the bonnet.**
13. **Windscreen.**



Talk to Driver and Car owner

To carry out the assessment, information is needed about:

- ▶ **The accident circumstances.**
- ▶ **The number of occupants and where they were sitting.**



Investigative Approach

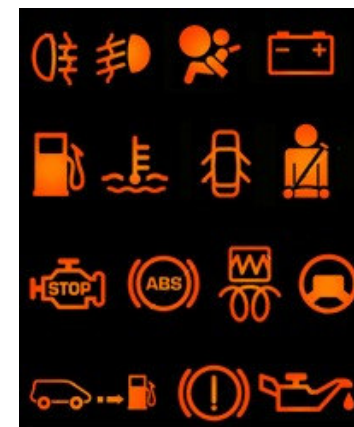
- ▶ **Appraising with an investigative approach**
- ▶ **General vehicle condition**
- ▶ **Pre-existing damage**
- ▶ **Direction and angle of impact**
- ▶ **Relevant area of damage**
- ▶ **Extent of damage**
- ▶ **Nature of damage**



Static Check at Driver Side

Static checks to:

- ▶ **Steering wheel and column.**
- ▶ **Foot brake and parking brake.**
- ▶ **Seat belts and SRS systems.**
- ▶ **Seat frames and mechanisms.**
- ▶ **Warning lamps illuminated on the dash panels/**
- ▶ **Damage to trim and its general condition.**



Exterior Vehicle Body Check

- ▶ **Wheels & tyres.**
- ▶ **Body panel gaps.**
- ▶ **Door and panel closers – Do the doors, tailgate bonnet etc. all close and open?**
- ▶ **Under bonnet checks.**
- ▶ **General condition.**
- ▶ **Previous old damage.**



Chassis No or VIN

Manufacturer's unique security markings at each end of the stamped number are not present on VIN plates or visible VIN.

[PICTURE]

Country: Japan
Manufacturer: Mazda
Vehicle Type: 1=car
Model: NA=90-97, NB=99-05
Body Sytle: 35=convertable
Engine: 2=1.6L DOHC 3=1.8L DOHC 4=1.8L DOHC Turbo

JM1NA3521L0101234

Check Digit: no meaning
Year: L=90, M=91, N=92, P=93, R=94, S=95, T=96, V=97, W=98, X=99 Y=00, 1=01, 2=02, 3=03, 4=04, 5=05
Plant: 0=Hiroshima, 1=Hofu
Car Number: starts at 100000 and is reset each model year



Standard Chassis No Practices

- ▶ **VIN should always be checked on the stamped number.**
- ▶ **These are the numbers which are most difficult to alter successfully.**
- ▶ **Cross reference this number to the visible VIN or VIN plate.**



Static Check Process Detail

- ▶ **Is the steering wheel damaged (check it's true and not buckled)?**
- ▶ **Does the foot brake pedal hold pressure?**
- ▶ **Is the parking brake serviceable?**
- ▶ **Is the driver's seat frame twisted (especially important in rear & side impacts)?**



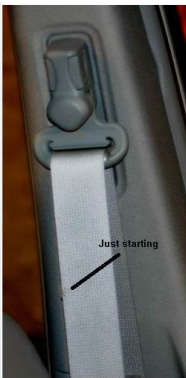
Trace Mark

Belt is stretched and burnt due to being burdened in the accident

[PICTURE]



Rear Drivers



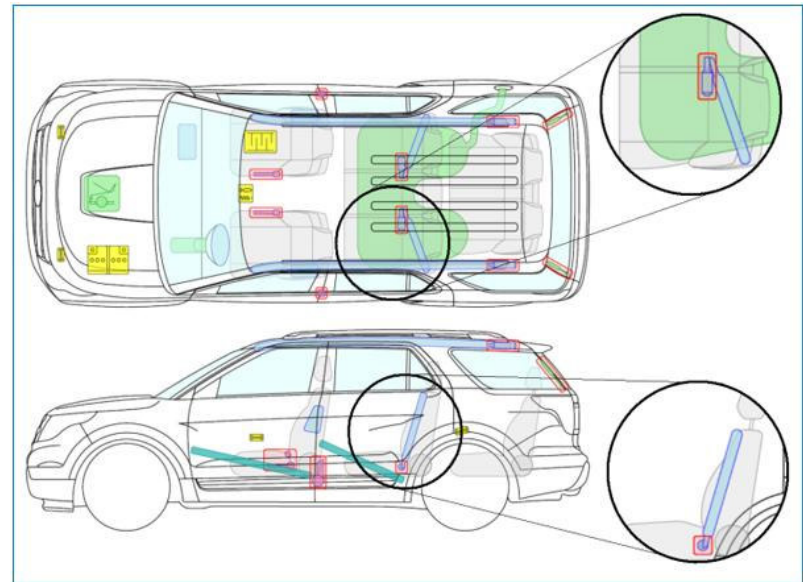
Front Drivers



Rear Passenger



Front Passenger



[PICTURE]
Not fired



[PICTURE]
Fired



NOTE

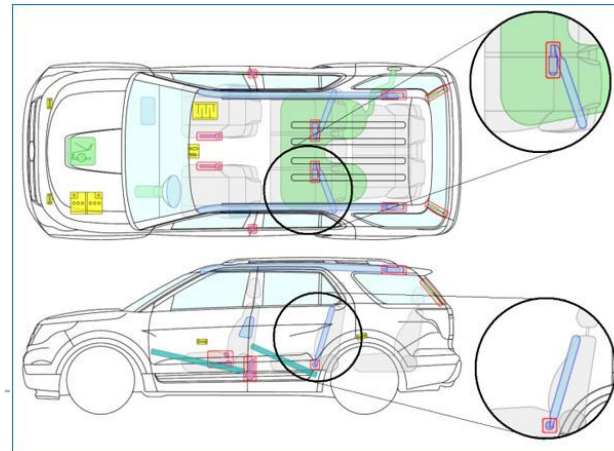
SERIOUS INJURY CAN RESULT FROM UNINTENDED AIRBAG DEPLOYMENT, SO USE ONLY THE PROCEDURES AND EQUIPMENT SPECIFIED IN THIS MANUAL.

COMPONENT HANDLING AFTER CRASH

While the crash happened with airbag or belt pre-tensioner deployed or triggered, Airbag Control Unit must be replaced as well as other impacted components. After the Airbag Control Unit firing, it will be locked permanently and cannot be reuse anymore. Related DTC will also be triggered accordingly.

Reuse of components if no obvious damage;

COMPONENTS	REUSE
AIRBAG CONTROL UNIT(ACU)	ACU cannot be reused if any of the airbag or belt pre-tensioner is deployed.
FRONT IMPACT SENSOR (DRIVER & PASSENGER SIDE)	<ul style="list-style-type: none">• Cannot be reuse after front crash occurred. Replace both Driver and passenger side component.• If non frontal crash, the component can be reuse if no obvious damage
SIDE IMPACT SENSOR	<ul style="list-style-type: none">• Cannot be reuse after side crash occurred. For impacted side must replace the respective component. For non impacted side, replace the respective component if obvious damage.• If non side crash, the components can be reuse if no obvious damage



Special Function	Purpose	Time of execution
Date of after sales service	To set the date of the SRS service conducted. NOTE The SRS system must be change after 10 years of usage.	When replacing new SRS ECU or replace new air bag module

DATE OF AFTER SALES SERVICE

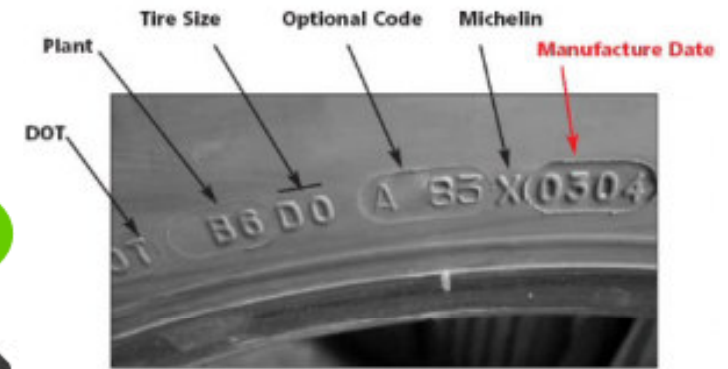
Selected	System	Subsystem	ECU Identification
✗	Power Train	Engine	EASY-U_IJAFM+/CFE
✗	Power Train	Transmission	PUNCH_CVT
✗	Chassis	ABS/ESC	BOSCH-ESP9
✗	Chassis	Gear Shift Lock	GSLU
✗	Body	BCM	ABCM
✓	Body	SRS	AB10 SRS



1. Set up the PADT-II program (refer to 11A/6)

Tires Information and Record Format

- ▶ Record the tyre size, and details (i.e. 205/55R16 92 V).
- ▶ If a commercial vehicle, record the ply rating as some commercial vehicles will be fitted with reinforced tyres



Estimate Form

- ▶ During the training course the VDA document set will be used throughout so the delegate becomes familiar with them

ESTIMATION FORM		
V.1.0		
REPAIRER DETAILS		
COMPANY NAME		
MRC WORKSHOP KUALA LUMPUR		
COMPANY ADDRESS		
HEITECH PADU VILLAGE		
CONTACT PERSON NAME		
MR. KHIEW		
DESIGNATION		
ESTIMATOR		
TEL:	03-86013000	Fax: 03-86013000
EMAIL: mrceclaim@mrc.com.my		
CLAIM TYPE		
TICK ONE		
1	OWN DAMAGE (OD)	/
2	WINDSCREEN	
3	OD-THEFT RECOVERY	
4	OD-ACTUAL TOTAL LOSS	
5	OD-BEYOND ECONOMICAL REPAIR (BER)	
6	OD-CONTRACT REPAIR	
7	OD-KFK	
8	THEFT	
9	THIRD PARTY PROPERTY DAMAGE (TPPD)	
10	THIRD PARTY BODILY INJURY (TPBI)	
ACCIDENT INFORMATION		
DAMAGE CATEGORY		
TICK ONE		
1	ACTUAL TOTAL LOSS (ATL)	
2	BEYOND ECONOMICAL REPAIR (BER)	
3	CONTRACT REPAIR	
4	REPAIRABLE DAMAGES	/
5	CASH-IN-LIEU	
Accident Date (d/m/y)		25/12/2012
Location of Damaged vehicle		JALAN PEGOH SEBERANG 2
Vehicle towed to workshop		Yes No
Driveable?	Yes No	TP Involved? Yes No

ACCIDENT INFORMATION			
Police Report No		Report Date	
IPOH025833/12		26/12/2012	
Police Station State		Police Station ID No	
IPOH			
Investigation Officer (IO) Name		IO ID No	
ASMARANI BIN MOHD NAMAWI		R06614	
INSURANCE INFORMATION			
Insurance Company Name			
TOKIO MARINE INSURANS (M) BERHAD			
Policy No			
WB-489678			
Coverage Period			
Start Date (d/m/y)	04/10/2012	End Date (d/m/y)	03/10/2013
Sum Insured (RM)	RM50000.00	Market Value (RM)	RM47K
Windscreen coverage	YES NO	Amt covered (RM)	NIL
OWNER/DRIVER INFORMATION			
Name			
CHEAH CHUY HUAT			
Address			
NO. 2 LINTASAN IDRIS SATU, TAMAN IDRIS, IPOH			
Postcode	City	State	
30100	IPOH	PERAK	
Country			
MALAYSIA			
HP NO	OFFICE NO	HOME PHONE	OFFICE NO
012-5886488			
EMAIL			
GENDER			
MALE		DOB (D/M/Y)	
		12/04/1944	
DRIVING LICENSE NO - AA316942			
Start Date (d/m/y)	06/06/2012	Expiry Date (d/m/y)	12/04/2014
License Class			
B, D, E			

Repair specification sheet 1

Action: N = Renew | R/R = Remove and Refit | S = Straighten | P = Paint only | B = Blend | C/R = Check and report | SC = Specialist charge

Operation: M.E.T. = Mechanical, Electrical and Trim | CP = Corrosion Protection

Ref	Part description / repair action	Action	M.E.T.	Panel	Paint	CP	Others
	REMOVE / CLOSE DOWN VEHICLE						
	FRONT BUMPER	N					
	FOG LAMP LH	R/R					
	FOG LAMP RH	R/R					
	NUMBER PLATE	R/R					
	FRONT GRILLE	R/R					
	BUMPER REINFORCEMENT	R/R					
	FENDER RH	N					
	SIDE SIGNAL LAMP RH	N					
	SPLASH SILL RH	N					
	MUD FLAP RH	N					
	BONNET	N					
	NOZZLE	R/R					
	HOSE	R/R					
	GARNISH	R/R					
	INSULATOR	R/R					
	FRONT END PANEL	N					
	HEADLAMP LH	N					
	HEADLAMP RH	N					
	GRILLE	N					
	RADIATOR	N					
	RADIATOR STROUT	N					
	RADIATOR FAN MOTOR	N					
	COOLANT	N					
	CONDENSER	N					
	CONDENSER STROUT	N					
	CONDENSER FAN MOTOR	N					
	CHASSIS LH	N					
	ENGINE & SUSPENSION	R/R					
	WHEEL HOUSE LH	S	0.3	0.8	0.5		
	CHASSIS RH	S	0.3	0.5	0.5		
Opinion times totals for this sheet							

REJ

Repair specification sheet 2

Action: N = Renew | R/R = Remove and Refit | S = Straighten or R = Repair | P = Paint only | B = Blend | C/R = Check and report | SC = Specialist charge

Operation: M.E.T. = Mechanical, Electrical and Trim | CP = Corrosion Protection

Ref	Part description / repair action	Action	M.E.T.	Panel	Paint	CP	Others
	BOOT LID	S	0.5	1.0	3.5	0.4	
	TRIM	R/R					
	REAR END PANEL	N					
	REMOVE BOOT CARPET	R/R					
	REMOVE SPARE TYRE	R/R					
	REMOVE TYRE JACK	R/R					
	REMOVE REAR LAMP	R/R					
	BOOT FLOOR	S	0.3	2.0	1.5		
	QUARTER PANEL LH	S	0.3	1.5	4.5		
	REAR DOOR LH	B	0.5	0.9			
	UNIVERSAL JIG			2.5			
	INITIAL PULL			2.0			
	GEOMETRI / WHEEL ALIGNMENT					1.0	
	CHECK SUSPENSION						
	ECU CHECKING						RM80
	WIRING CHECKING		0.5				
	TEST DRIVE						0.5
	CAR WASH						RM10
	JPJ APPLICATION						RM60
	PUSPAKOM INSPECTION FEES						RM85
	PUSPAKOM RUNNER FEES						RM60
	TOWING CHARGES						RM80
Opinion times totals for this sheet							
Totals brought forward							
Total							



Record Format in Estimate Form

Remember to record the accident circumstances and number of occupants here.

[PICTURE]

Record all tyre, seat belt and headrest details here. If required, make notes on the condition report on page 2.



Part 2 : Assess the Accident Damage and derived a Repair specification with Estimate

This section will deal with Part 2:

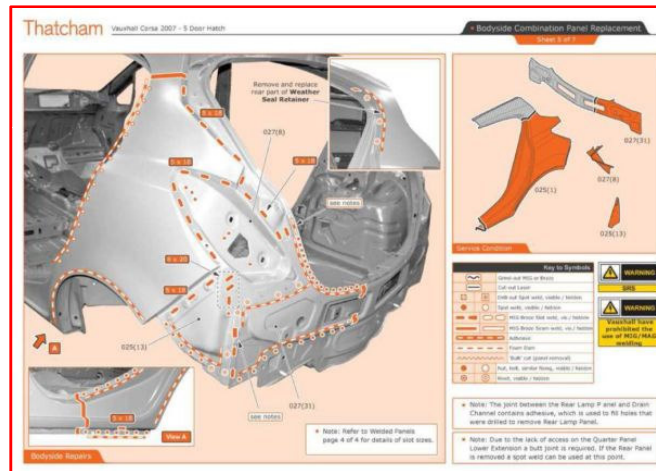
1. Collect the vehicle data and appraise pre-accident condition.

2. Assess the accident damage and collect a repair specification.



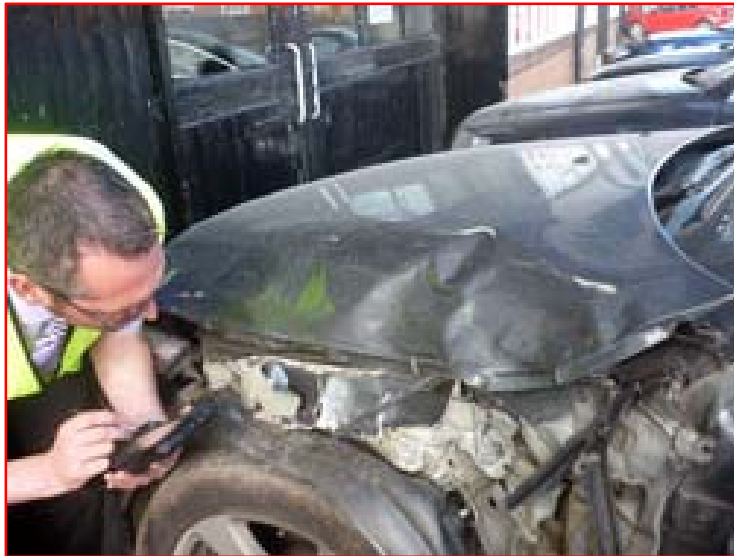
Right Approach and Things to Consider

- ▶ **Will the cost of repairs increase? No! Because it is likely that you are currently paying for an inefficient process.**
- ▶ **Without access to a method, the repair might be started without the correct information.**
- ▶ **Complications may then require additional labour and parts, causing delays to the customer, additional courtesy car costs, and the vehicle may become uneconomical to repair.**



Reduce Supplementary with Right Method

- ▶ **The repairer may continue using an incorrect method or process, causing the repair to be undertaken in an unsafe manner.**
- ▶ **Ultimately, insurers are paying for this inefficiency and are risking liability.**
- ▶ **Method based VDA will negate the need for supplementary estimates and will reduce the cost of repairs overall.**



New Vehicle Body Structure Design

Ford Focus 1 - 1998-2004

Range of mild steels and joining techniques, e.g. MIG and spot welding

Opel/Vauxhall Corsa – 2007 onwards

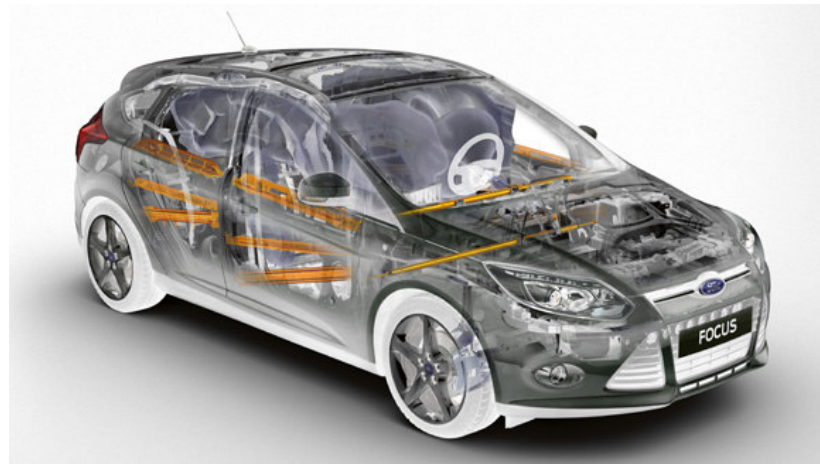
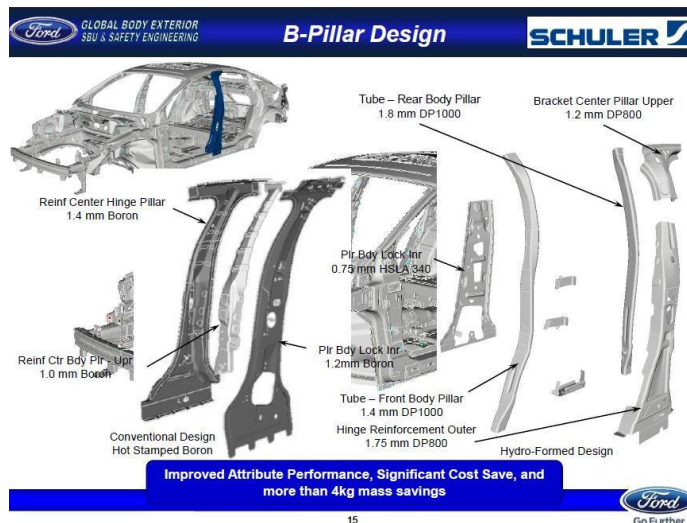
Introduction of HSS and UHSS and associated joining technologies.

Audi A6 – 2004 onwards

Stainless steel, aluminium, magnesium and fibre reinforced plastics.

Joining methods: MIG brazing, laser welding, structural adhesive and solid riveting.

“The car of the future is the car in your drive.”





Audi S3 Sportback

Karosseriematerialien
Materials in the body structure
08/13

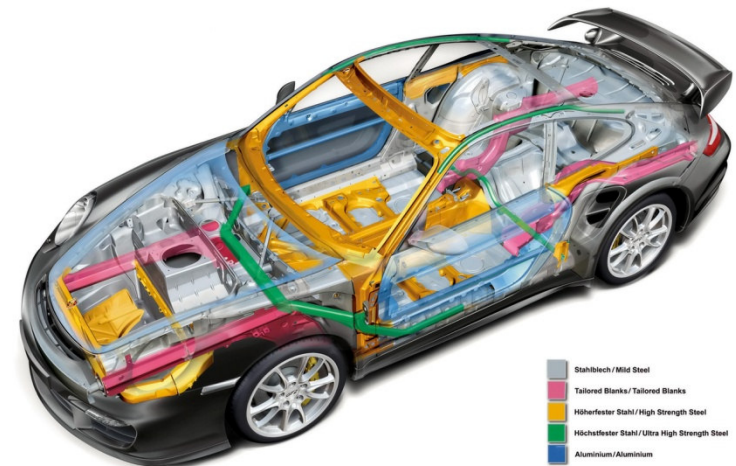
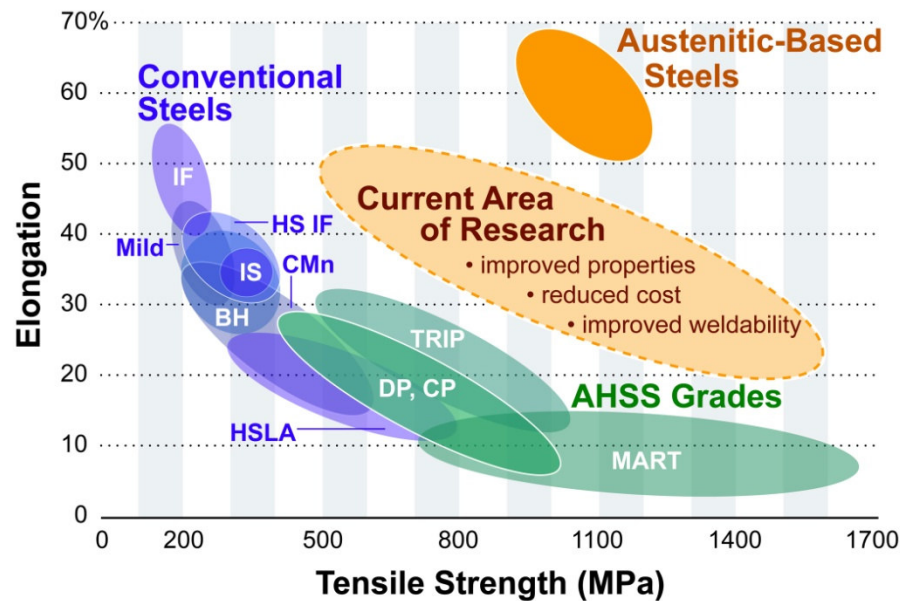
-  **Ultrahochfeste Stähle (warmumgeformt)**
Ultra-high strength steels (hot-formed)
-  **Höchstfeste Stähle**
Higher strength steels
-  **Hochfeste Stähle**
High-strength steels
-  **konventionelle Stähle**
Conventional steels
-  **Aluminium-Blech**
Sheet aluminium
-  **Aluminium-Profil**
Aluminium section



Metallurgy

Yield and tensile summary:

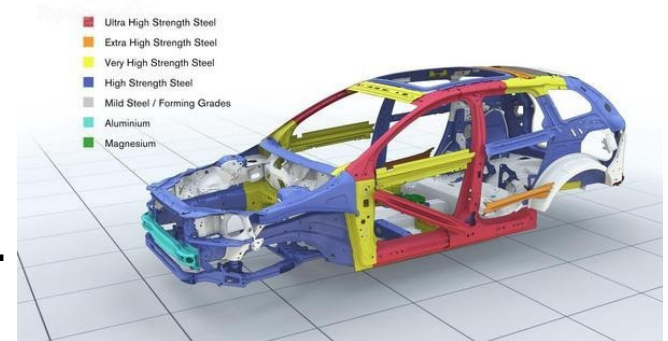
- ▶ **Yield is the strength at which the metal changes from elastic to plastic in behaviour – the point of no return.**
- ▶ **Tensile strength is the breaking strength of a material when subjected to a tensile (stretching) force – the point of fracture.**



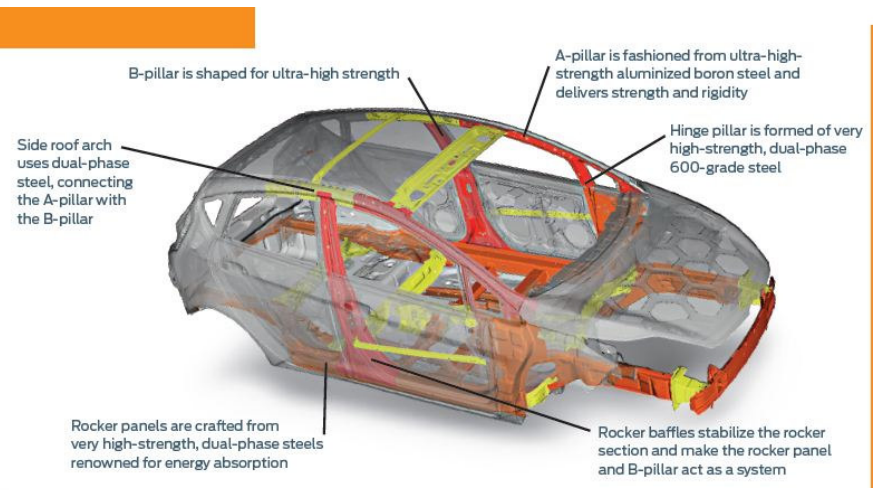
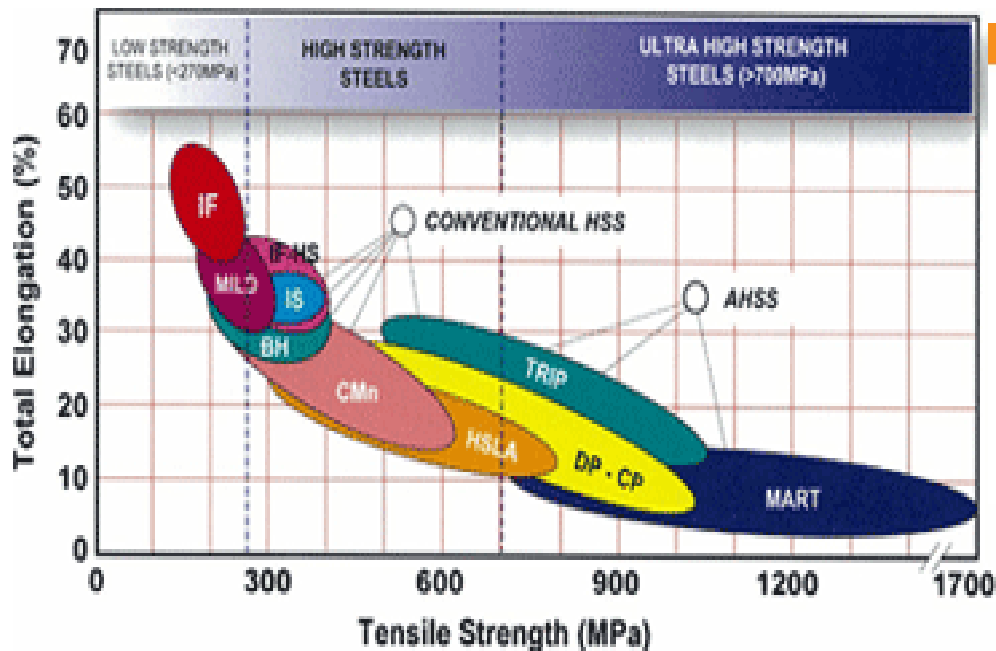
Types of High Strength Steel

HSS/UHSS:

- ▶ **Not a single steel, refers to a family of steels.**
- ▶ **Divided by grade and the type of heat treatment used in manufacture.**
- ▶ **Yield and tensile strengths vary from 270 Mpa to 1500 Mpa.**
- ▶ **Boron is a trace element added along with chromium to carbon manganese steels, giving the steel a harden ability equivalent to that of high carbon steels.**



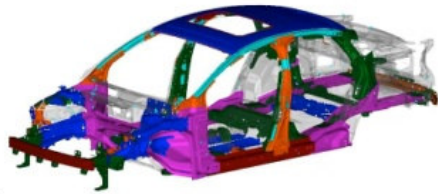
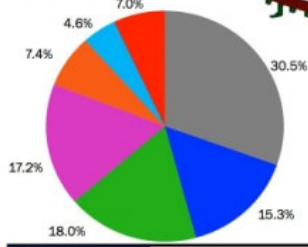
Safety Cage - steel grades





Material - BIW

- Mild Steel
- BH - HSLA (YS < 300)
- HSLA (YS > 300)
- DP 600
- DP 800
- DP 1000
- Boron - Martensitic



Average Yield Strength = 348 MPa

Great Designs in STEEL Seminar

www.autosteel.org



Audi RS Q3

Karosseriematerialien
Materials in the body structure
09/13

- Ultrahochfeste Stähle (warmumgeformt)
Ultra-high strength steels (Hot formed)
- Ultrahochfeste Stähle
Ultra-high strength steels
- Höchstfeste Stähle
Higher strength steels
- Hochfeste Stähle
High-strength steels
- konventionelle Stähle
Conventional steels
- Aluminium-Blech
Sheet aluminium
- Aluminium-Profil
Aluminium section

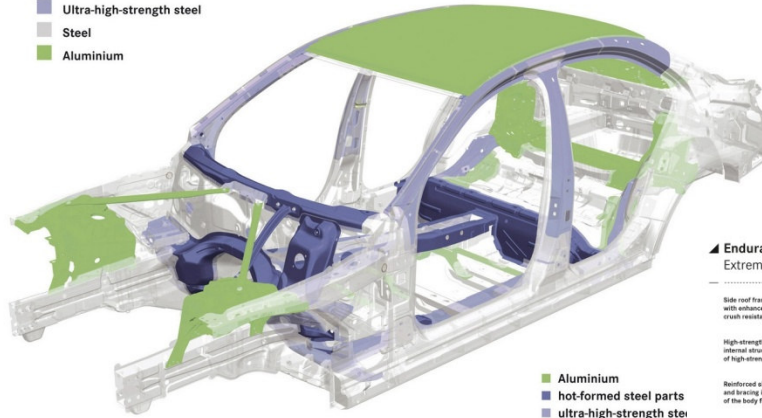


B]

[PICTURE]

Press Hardened Steel [P]

- Hot-formed ultra-high-strength steel
- Ultra-high-strength steel
- Steel
- Aluminium



- Aluminium
- hot-formed steel parts
- ultra-high-strength steel

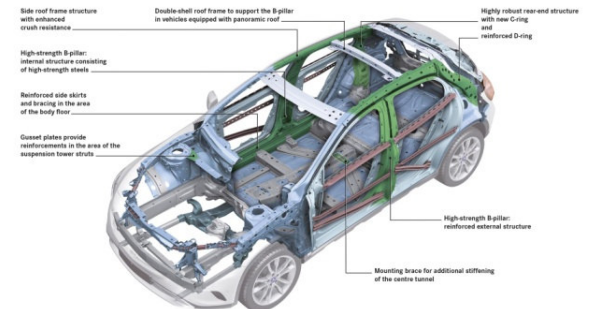
Thanks to intelligent and innovative lightweight construction, the aluminium hybrid body is around 70 kg lighter than conventional production using steel.

Mercedes-Benz has pulled off this technological leap primarily through an design and the extensive usage of aluminium, hot-formed steel parts and ultra steels - an unusual combination in volume-production vehicles. The proportion of materials has therefore increased noticeably compared with the successful p

[PICTURE]

Aluminium/ Magnesium plastic + aluminium bonnet.

Endurance testing at Mercedes-Benz: a car's lifespan in fast motion
Extremely robust, reinforced body withstands the gruelling on- and off-road testing marathon



Repair Method Approach

- ▶ **An approved method should be used at all times**
- ▶ **Obtaining methods from *Escribe/ Thatchamnet*.**

escribe

the essential tool for body repair

delivering fully-researched



model specific repair methods for the safest and most efficient repair.

Thatcham METHODS Methods explained

Thatcham Mechanical, Electrical and Trim (MET) methods explained

- Thatcham MET methods are displayed using a strip route table, additional information & torque settings paragraph, component location and overview illustrations. When required, additional information will also be displayed in detail with a diagram and explanation text box.
- The black tab at the top right hand corner of the page contains the title of the section. The orange tab at the top left hand corner of the page contains the title of the panel/component replacement.
- Each MET method page has a location diagram in the top left hand corner of the page to show the exact position of the panel/component being described and in some cases will show trim with numbered annotations relating to the strip route table.
- Below the location diagram will be an overview illustration where necessary. This will show the component concerned and how it is serviced e.g. a bumper may be shown with adjoining mouldings or trims which are serviced with the bumper.
- Situated in the centre of the page, 'Additional Information' relates to the strip route table, but may also refer to an additional diagram or illustration.
- Situated below 'Additional Information', 'Torque Settings' also relates to the strip route table and will provide information on manufacturer's or Thatcham's guide torque setting requirements.
- On the right hand side of every MET method presented is a strip route table. This table contains numbered 'action' phrases relating to the strip or removal of components necessary to carry out the panel replacement in question. If this strip route continues on the following page, a note at the bottom of the table will inform the user. The strip route is designed in strip order, and is reversed for vehicle rebuild. Any special procedures or operations, e.g. adjust headlamp aim, will always be positioned at the end of the strip route and will be drawn to the user's attention.
- When multiple methods are selected there may be some duplication within the strip routes, because of the unique way Thatcham create their methods. Duplication occurs when a collection of single panels are displayed, e.g. within a 'Bumper Front' method part of the strip route may repeat some headlamp method details.

01112012 16:37 - J:\E3300-00-102 - CR - 0514 423\Thatcham (Marketing) - David Malins - 086002 - 10.2012 The Motor Insurance Repair Research Centre

Thatcham Vauxhall Corsa 2007 - 5 Door Hatch

Bodyside Combination Panel Replacement Sheet 5 of 5

Remove and replace rear part of Weather Seal Retainer

Service Condition

Key to Symbols	
	Green-out MIG or MIG-M
	Cut and Laser
	Drib out liquid weld, visible / hidden
	Spot weld, visible / hidden
	MIG Arrow Spot weld, vis / hidden
	MIG Arrow Seam weld, vis / hidden
	Adhesive
	Foam Disp
	Stake (not panel removal)
	Nut, Bolt, similar fixing, visible / hidden
	Hole, visible / hidden

WARNING
SAFETY

WARNING
Vauxhall have prohibited the use of MIG/MAG welding

Note: The joint between the Rear Lamp Panel and Drain Channel contains adhesive, which is used to fill holes that were drilled to remove Rear Lamp Panel.

Note: Due to the lack of access on the Quarter Panel Lower Extension a butt joint is required. If the Rear Panel is removed a spot weld can be used at this point.

Refer to Welded Panels page 4 of 4 for details of slot sizes.

Bodyside Repairs

Repair Method Approach



About I-CAR	I-CAR Training	Training Recognition	OEM Training	Tec Inform
-------------	----------------	----------------------	--------------	------------

- Acura Training
- Audi Training
- Chrysler Training
- Ford Training
- GM Training
- Honda Training**
- Infiniti Training
- Jaguar Training
- Land Rover Training
- Lexus Training
- Nissan Training
- Porsche Training
- Scion Training
- Toyota Training
- Volvo Training
- VW Training



What Would a Structural Technician Do?

COURSE UPDATE

Structural Straightening Steel (SSS01)

Keep up with new vehicles, new materials and new straightening methods.

> [CLICK TO WATCH VIDEO](#)



OEM Training: *Honda Training*

The ProFirst body shop recognition program from American Honda Motor Co., Inc. requires the I-CAR Gold Class Professionals designation as part of its program requirements, in addition to completion of the Honda/Acura-specific I-CAR course, Collision Repair for Honda and Acura Vehicles (HON01e).

Through earning the Gold Class designation, collision repair facilities can increase operational efficiencies, reduce cycle times, minimize repair mistakes, and most importantly, complete safe repairs.

The ProFirst body shop recognition program is available to both dealer-owned and independent collision repair facilities.

PROGRAM REQUIREMENTS

To qualify, and continue to qualify for the ProFirst body shop recognition program, two requirements must be met:

1. Achieve and maintain the Gold Class designation and have at least one person employed at the collision repair facility who has completed the I-CAR training course.

ProFirst

Collision Repair Facility

Recognized by American Honda Motor Co., Inc.



HONDA

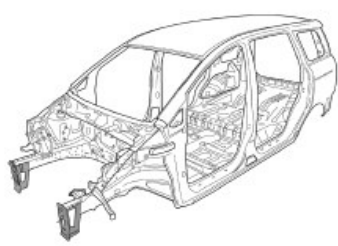

Find a Honda accepted I-CAR training program near you!

ZIP/Postal Code:

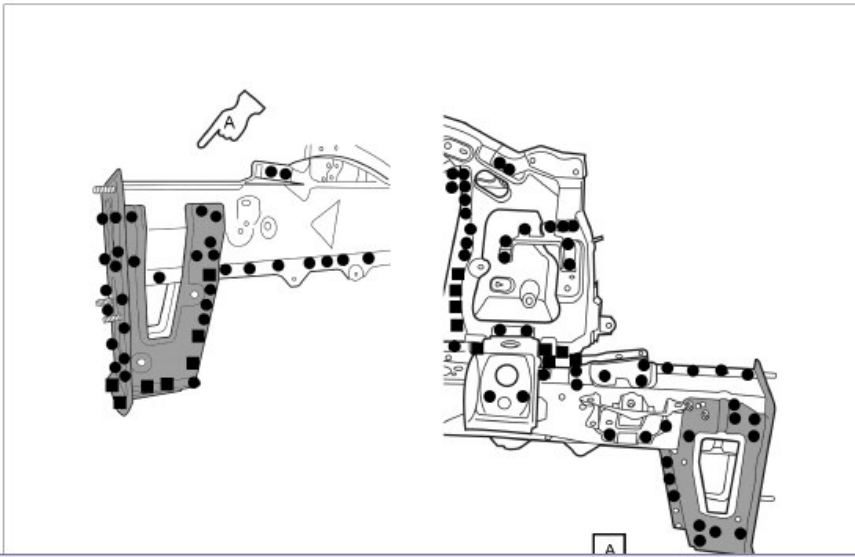
OEM – Manufacturer Specification

WELDED PANEL REPLACEMENT

PLATE ASSY FEM MOUNTING



	●●●●	Spot welding: • Indicate two panels to be welded
	■ ■ ■ ■	Spot welding: • Indicate three panels to be welded
	▲ ▲ ▲ ▲	Spot welding: • Indicate four panels to be welded
	+++++	CO ₂ braze welding
		Anti-corrosion agent applications (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS

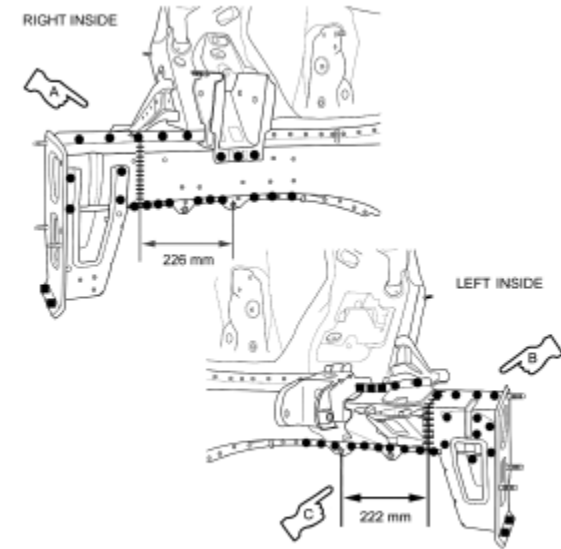


WELDED PANEL REPLACEMENT

FRONT SIDEMEMBER (PARTIAL REPLACEMENT)

	●●●●	Spot welding: • Indicate two panels to be welded
	■ ■ ■ ■	Spot welding: • Indicate three panels to be welded
	▲ ▲ ▲ ▲	Spot welding: • Indicate four panels to be welded
	+++++	CO ₂ braze welding
		Anti-corrosion agent applications (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS



VEHICLE BODY MIS-ALIGN

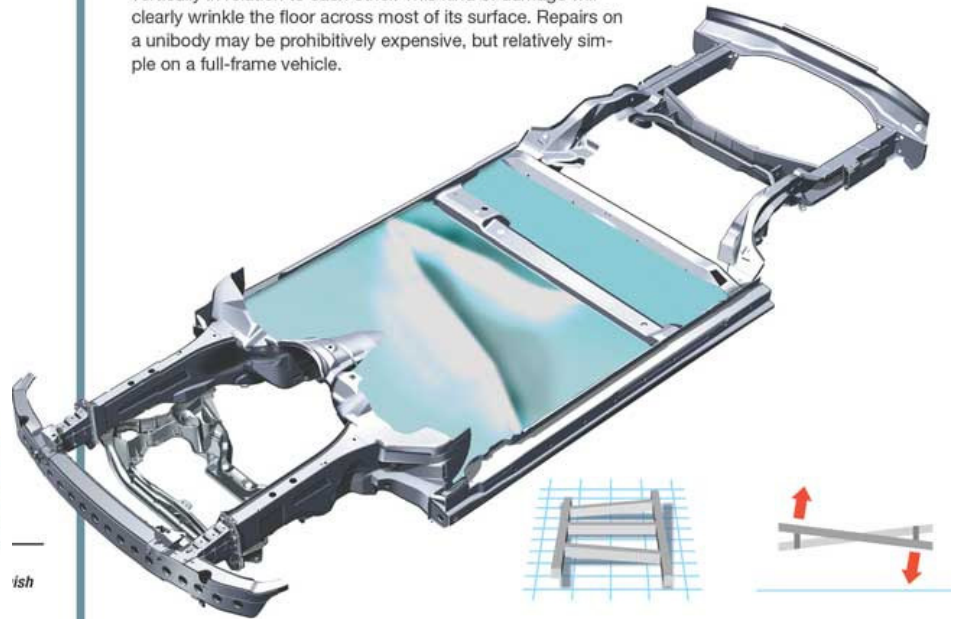
The 'Diamond'

When a collision causes one of the frame rails to move in relation to the other, severe deformation will occur to floor sections. While this can be repaired on full-frame vehicles, this kind of damage to a unibody vehicle is unrepairable.



The 'Twist'

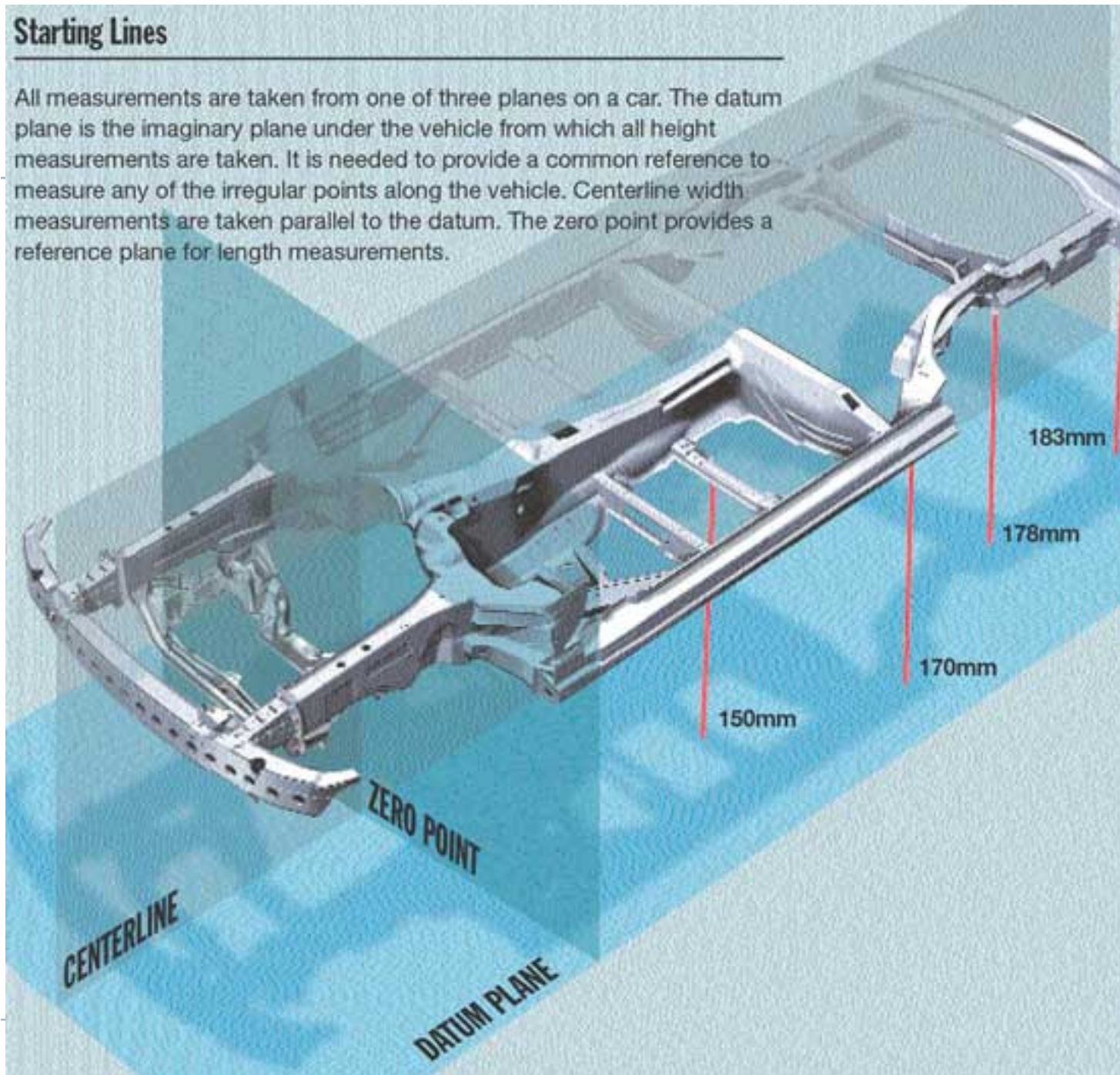
Twist-type damage happens when the frame rails are moved vertically in relation to each other. This kind of damage will clearly wrinkle the floor across most of its surface. Repairs on a unibody may be prohibitively expensive, but relatively simple on a full-frame vehicle.

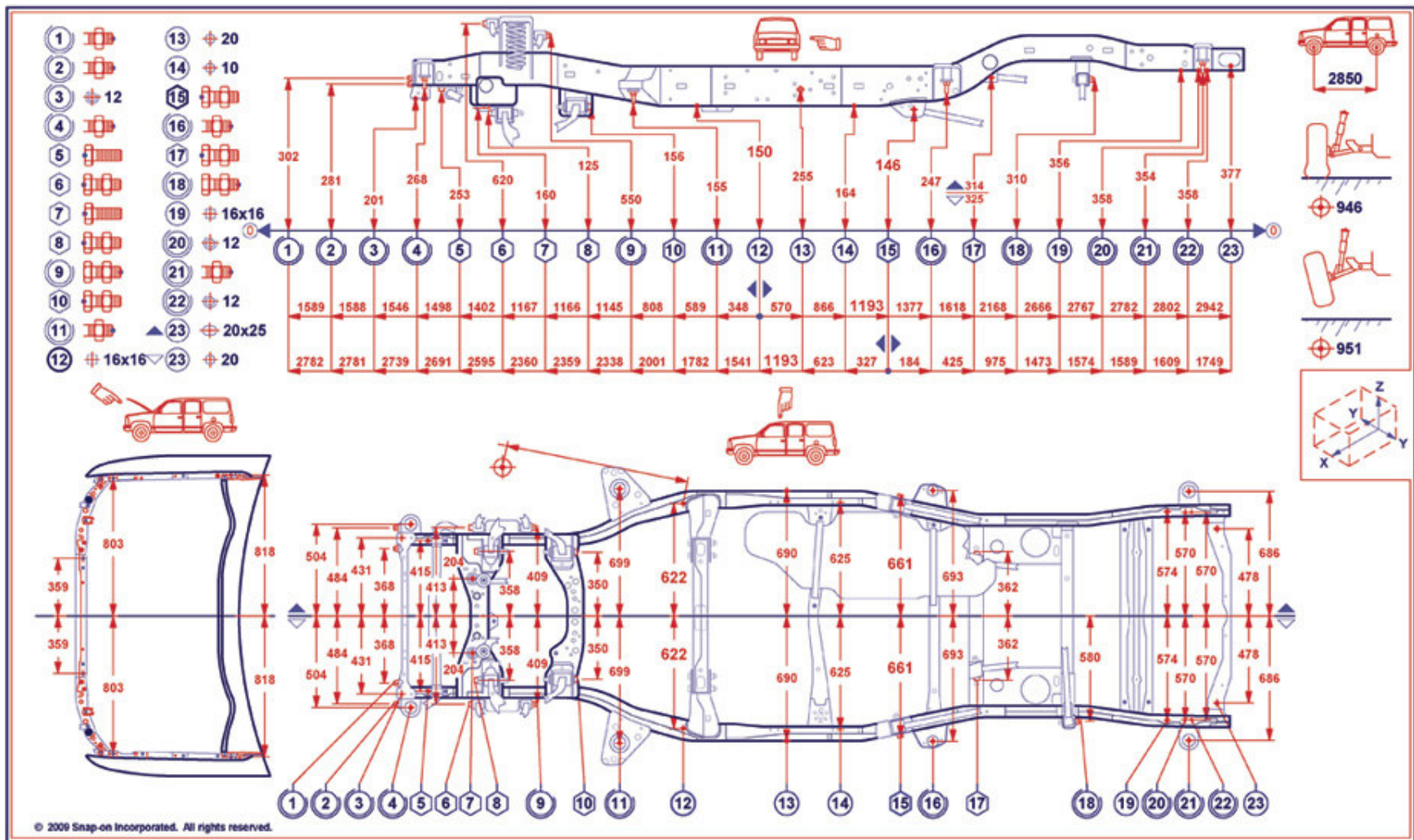


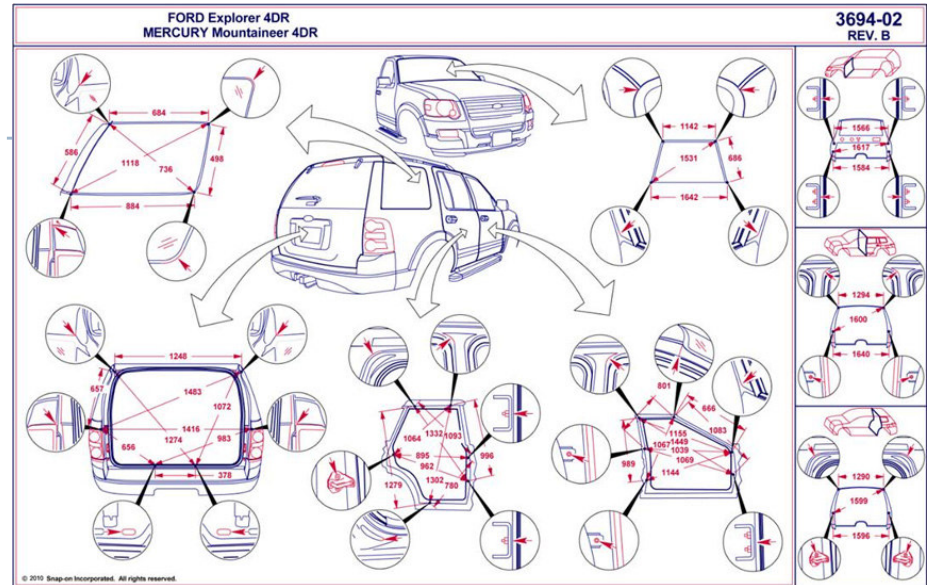
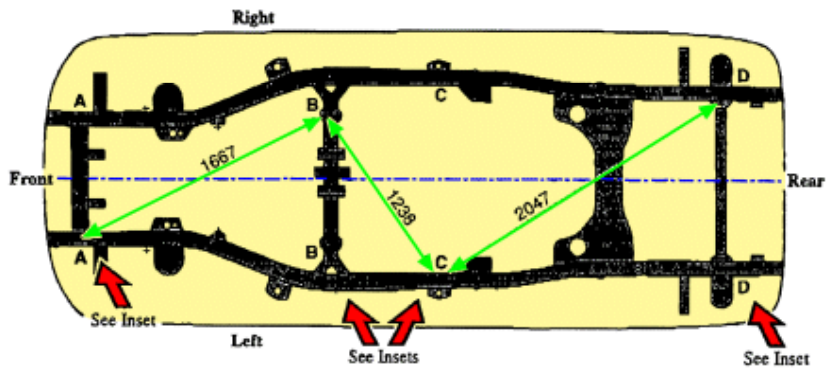
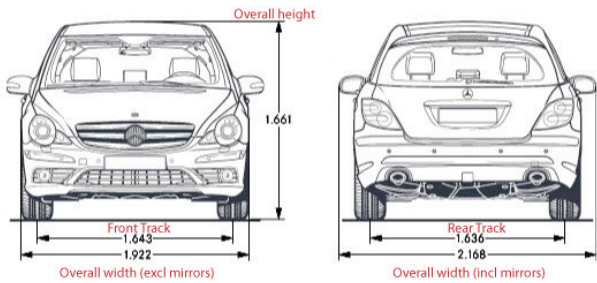
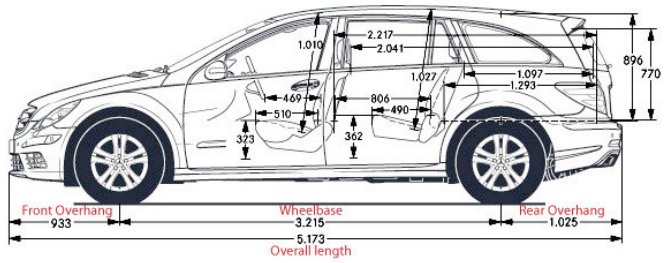
ish

Starting Lines

All measurements are taken from one of three planes on a car. The datum plane is the imaginary plane under the vehicle from which all height measurements are taken. It is needed to provide a common reference to measure any of the irregular points along the vehicle. Centerline width measurements are taken parallel to the datum. The zero point provides a reference plane for length measurements.



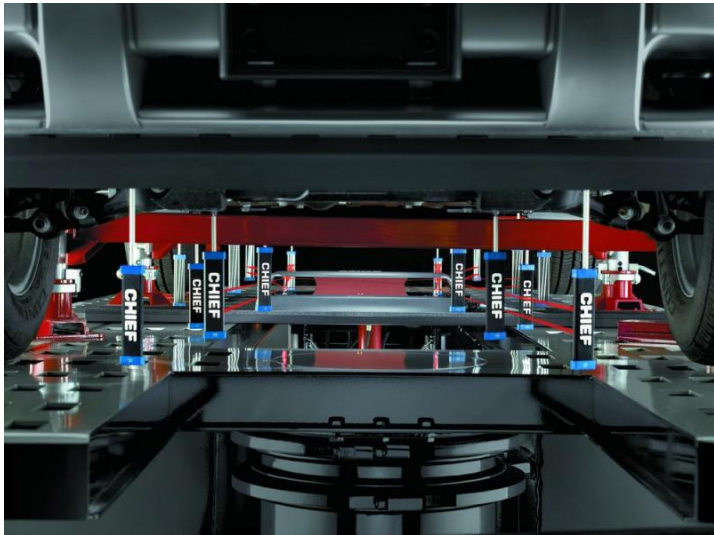




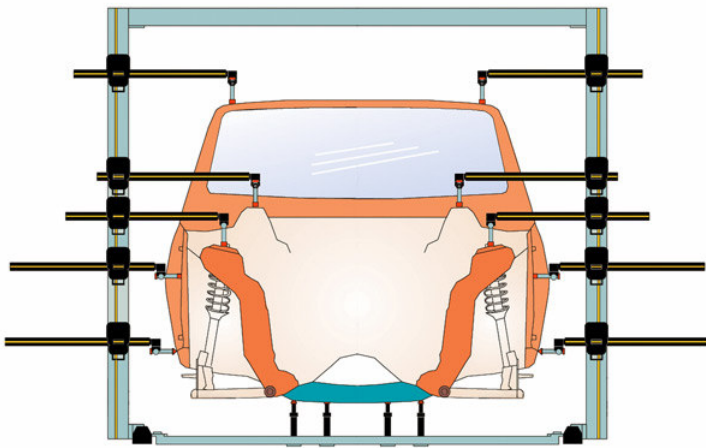
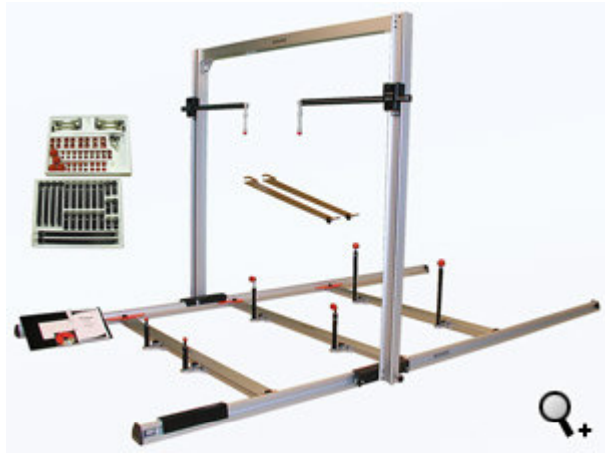
All Dimensions sh



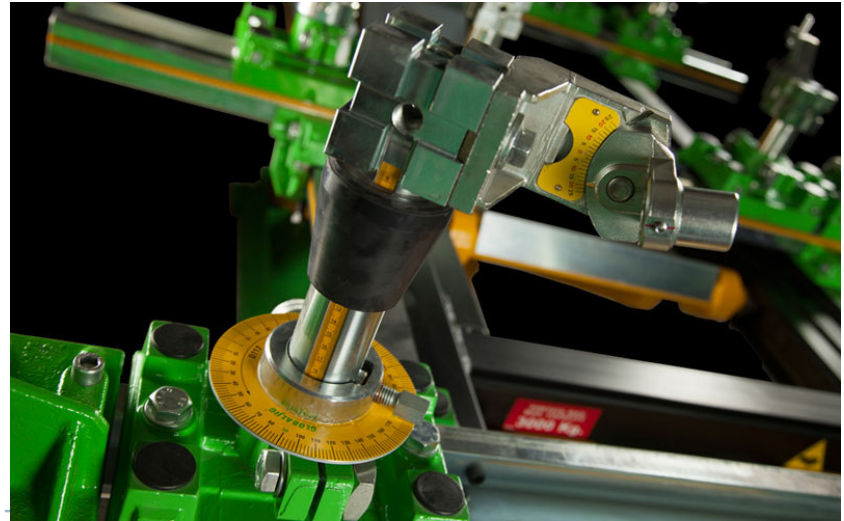
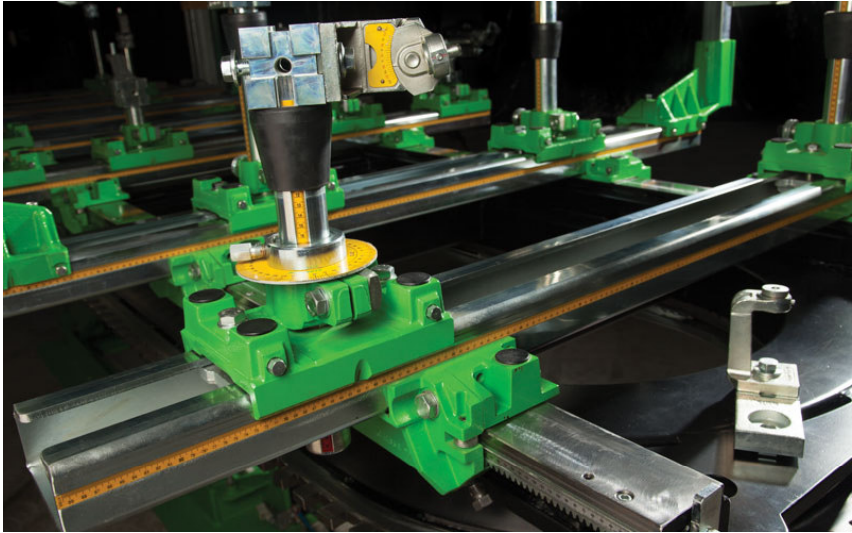
Electronic Measurement



Measurement gauge



Bracket Jig with Measurement



Reminder of the task under review:

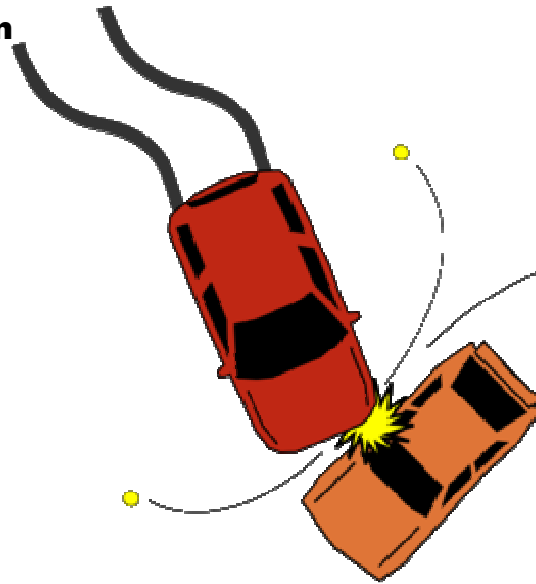
1. Collect the vehicle data and appraise pre-accident condition.

2. Assess the accident damage and collate a repair specification.



Matter to Be considered

- ▶ **Severity of damage**
- ▶ **Direction of impact**
- ▶ **Secondary or transmitted damage**
- ▶ **Likely areas of concern**
- ▶ **Previous poor repairs**



Die Zeichnung wurde online erstellt auf Unfallskizze.de

Eigenes Fahrzeug: Kennzeichen: BI-FA 9001
Gegnerfahrzeug: Kennzeichen: GE-FA 9002

Unfallskizze

Zeuge Müller

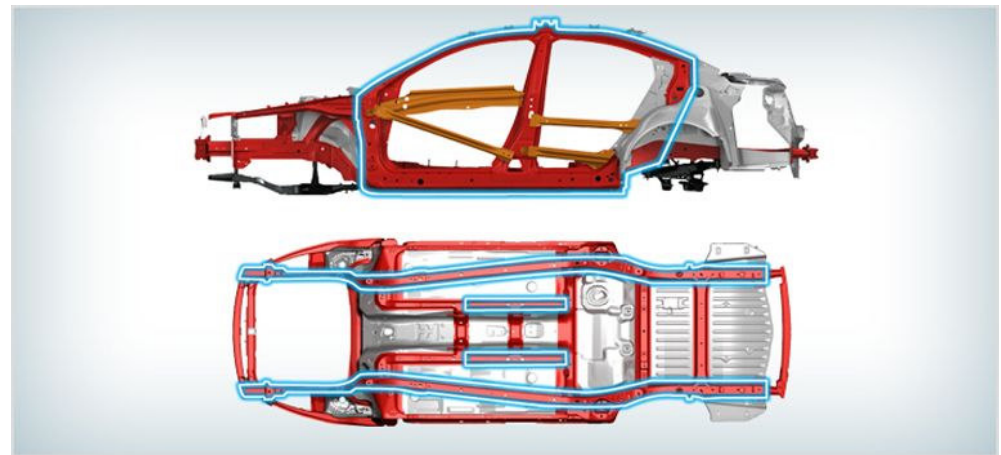
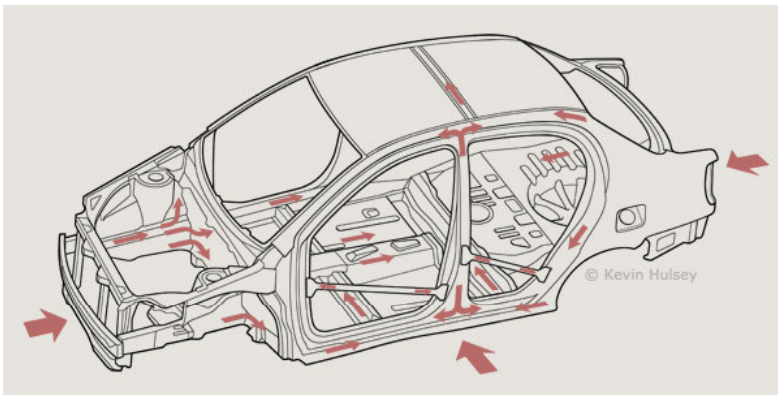
Die Fahrzeuge in Kollisionsstellung

Endstation eines Gegenfahrstranges

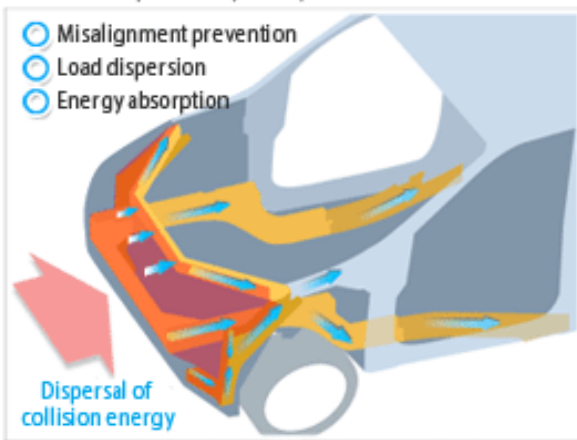
Endlage meines Fahrzeug

Reaction on Vehicle structure in Collision

- ▶ **Impact energy is absorbed into the vehicle structure**
- ▶ **The design of the vehicle is engineered to maintain passenger cell integrity by dissipating crash energy around the vehicle**



Crash-compatibility body



Identify the Accident Damage Parameter (First and Last Undamaged Panels)



Core Task and Supporting Operation

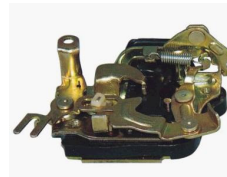
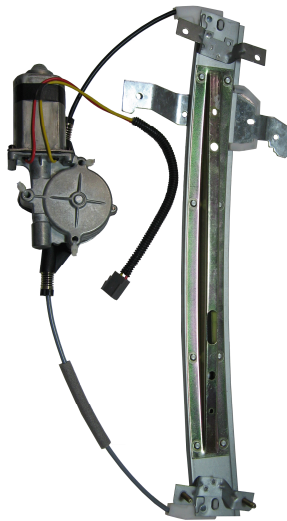
Core and supporting tasks:

- ▶ **List the main/core tasks.**
- ▶ **Then list the other operations required to complete the main/core task.**
- ▶ **Detail each core task followed by the supporting tasks before moving to the next area or panel on the vehicle.**



Core Task – Repair or Replacing Panel

Supporting Operation – Remove & Refit Parts



Merimen

- ▶ **M.E.T. (Mechanical, Electrical & Trim)**
- ▶ **Panel**
- ▶ **Paint**

Not all software systems break down into 3 areas

MET Labour Times				
	CBO000	Bonnet	Overlaps	Time (hrs)
1	CT0026	Bonnet Insulation		0.09511
2	CT0021	Bonnet Striker		0.04755
3	CZ0302	Dis/Con Trimmed Bonnet		0.06873
4	CT0204	Washer Jet Front		0.03130
	CBO000	* Single Panel MET Time		0.30
	CDP000	Dashboard Panel R & R	Overlaps	Time (hrs)
5	LT0036	A Post Upper Trim LH		0.07106
6	RT0036	A Post Upper Trim RH		0.07106
7	CE0048	Airbag Drivers side		0.15733
8	CE0049	Airbag Passenger side		0.20488
9	CCC000	Centre Console		0.12044
10	CZ0040	Dis/Con Battery		0.08998
11	CZV016	DV Air Bag Storage (Driver)		0.12500
12	CZV017	DV Air Bag Storage (Passenger)		0.12500
13	CE0031	Facia Panel Centre Panel		0.12958
14	CE0033	Facia Panel Fixings		0.27250
15	CT0441	Facia Panel SRS Blanking Cover		0.04389
16	CE0047	Facia Panel Storage Tray		0.11495
17	LT0087	Facia Panel Trim LH		0.02717
18	RT0087	Facia Panel Trim RH		0.02717
19	LT0217	Facia Panel Vent LH		0.01463
20	RT0217	Facia Panel Vent RH		0.07433
21	CE0020	Glove Compartment Lid		0.08386
22	CE0019	Heater Control Panel		0.30496
23	CE0013	Instrument Cluster		0.12371
24	CE0017	Instrument Cluster Surround		0.13652
25	CE0018	Radio/Cassette/CD Player		0.07540
26	CM0015	Steering Column		0.34183
27	CM0030	Steering Column Lower Joint		0.13356

PANEL Labour Times				
	CBO000	Bonnet	Overlaps	Time (hrs)
1	LM0043	Bonnet Hinge LH		0.06115
2	RM0043	Bonnet Hinge RH		0.06115
3	CZOU00	OU-Bonnet		0.18200
	CBO000	* Single Panel PANEL Time		0.40
	CFP005	Front Panel Assembly	Overlaps	Time (hrs)
4	CZV015	DV Health & Safety Preparation		0.15167
5	LPF002	LJF002 Left Joint Front		0.03057
6	LPF003	LJF003 Left Joint Front		0.18344
7	LPF018	LJF018 Left Joint Front		0.18506
8	LPF019	LJF019 Left Joint Front		0.18506
9	LPF020	LJF020 Left Joint Front		0.18506
10	CZPU00	OU-Front Panel		0.18200
11	LZJU00	OU-Wing Front LH		0.18200
12	RZJU00	OU-Wing Front RH		0.18200
13	RPF002	RJF002 Right Joint Front		0.03057
14	RPF003	RJF003 Right Joint Front		0.18344
15	RPF018	RJF018 Right Joint Front		0.18506
16	RPF019	RJF019 Right Joint Front		0.18506
17	RPF020	RJF020 Right Joint Front		0.18506
	CFP005	* Single Panel PANEL Time		2.30
	LFW000	Fender Front LH	Overlaps	Time (hrs)
18	LPF002	LJF002 Left Joint Front	Overlap - 5	0.03057
19	LPF003	LJF003 Left Joint Front	Overlap - 6	0.18344
20	LZJU00	OU-Wing Front LH	Overlap - 11	0.18200
	LFW000	* Single Panel PANEL Time		0.40
	LIF004	Fender Front Inner Upper LH	Overlaps	Time (hrs)
21	LPF009	LJF009 Left Joint Front		0.94127
22	LZFU07	OU-Wing Inner Front Upper LH		0.18200
	LIF004	* Single Panel PANEL Time		1.20

PAINT Labour Times

Paint-Type: 2METCOB

	Panel	Desc	Single Panel (hrs)	Comb Time (hrs)
1	LFW000	Fender Front LH (42 dm²)	6.400	12.4
2	RFW000	Fender Front RH (42 dm²)	6.400	
3	CBO000	Bonnet (124 dm²)	5.400	
4	CFA000	Bumper Front (112 dm²)	5.100	
5	CFP005	Front Panel Assembly (40 dm²)	2.800	
6	LMI000	Chassis Member Front & Inner Fender LH (43 dm²)	2.600	
7	LIF004	Fender Front Inner Upper LH (5 dm²)	2.200	
		** PAINT Overlap / Combination Time	18.50	12.40

Additional Paint Task/Blend Report

Paint Task List	Panels to Blend
<ul style="list-style-type: none"> ● 2stage metallic basecoat & Lacquer / Blend in / Off car external ● 2stage metallic basecoat / Engine compartment ● 2stage metallic basecoat / Off car external ● 2stage metallic basecoat / On car internal ● 2stage metallic basecoat / Plastic ● Etch primer / Engine compartment ● Etch primer / On car internal ● Lacquer / Engine compartment ● Lacquer / Off car external ● Lacquer / On car internal ● Lacquer / Plastic ● Primer / Engine compartment 	<ul style="list-style-type: none"> ● Front Pillar Outer LH ● Door Front LH ● Front Pillar Outer RH ● Door Front RH

E-claim

- Each of these elements will have work elements/ units allocated to them for the repair operations required.

Chassis Member Section Frt RH	
MET Detail	
Description	Mins
Fuel Charcoal Filter	6.28
Screen Wash Bottle Front	5.26
Wiring Loom Inner Wing RHF	8.06
Total	19.60
Panel Detail	
Description	Mins
RJF005 Right Joint Front	8.18
RJF006 Right Joint Front	7.31
RJF007 Right Joint Front	39.13
RJF011 Right Joint Front	81.77
RJF015 Right Joint Front	28.76
OU-Chassis Leg Sec. Front RH	10.92
DV Health & Safety Preparation	9.10
Total	185.17
Corrosion Protection	
OK	
Print	

Engine	
MET Detail	
Description	Mins
Exhaust Front Pipe	6.21
Engine Fixing Bolts	51.67
Dis/Con Hoses,Cables (Eng)	13.47
Dis/Con Wiring (R&R Engine)	26.84
Dis/Con Battery	4.95
Dis/Con Gear Linkage (R&R ENG)	3.48
Dis/Con Speedo Cable	1.82
Dis/Con P.A.S Piping	1.28
DV Evacuate- Bleed Brake Syst.	10.60
DV Drain- Refill Cooling Sys.	23.60
DV Geometry Check	37.80
DV R&R Power Unit	22.80
DV Start & Run up Engine	15.00
DV Load-Unload Veh to Ramp	7.00
Wheel Road LHF	10.36
Brake Flexible Hose LHF	8.10
Wheel Road RHF	10.36
Brake Flexible Hose RHF	8.10
Total	263.44
Panel Detail	
Description	Mins
Total	0.00
Corrosion Protection	



Work Operation Element

- ▶ **The operations required to dismantle and reassemble the vehicle when replacing or repairing its panels and structure.**
- ▶ **The operations required the vehicle when refinishing/ painting are required.**



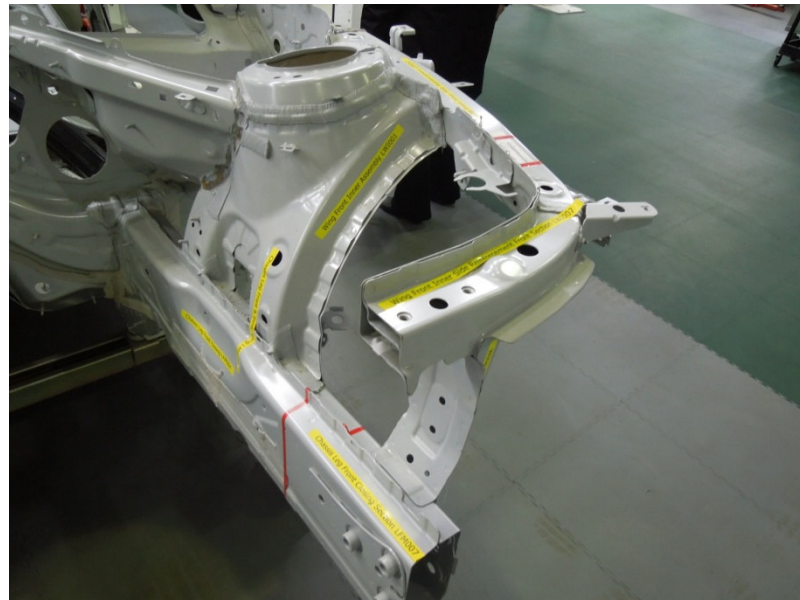
Work Operation - Point Of Interest

- ▶ **Dismantling the vehicle to repair.**
- ▶ **What's needed for the welding/ repair operations?**
- ▶ **What needs to be removed and why?**
- ▶ **Understanding basic engineering safety.**
- ▶ **Re-assembly of the vehicle after painting.**
- ▶ **What other supporting tasks are required (i.e. Evacuate and change air con, computer resets, geometry etc.)?**



These are the operations required to:

- ▶ **Replace the damaged panels.**
- ▶ **Repair damaged panels (opinion based with consideration to the material).**



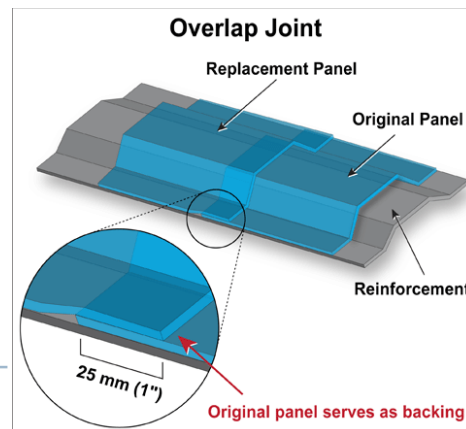
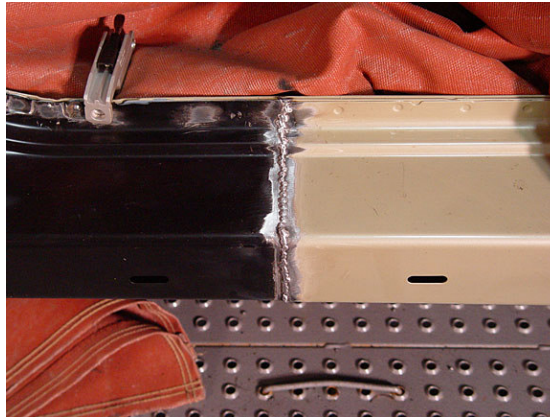
Universal Jig and Bracket jig

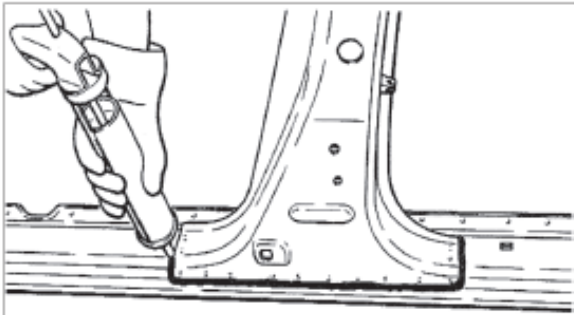
- ▶ **Mount and align/ measure the vehicle using a body jig system.**
- ▶ **Carry out any specialist repair of panels (i,e, the use of Flat liner/ Miracle pull systems etc.)**



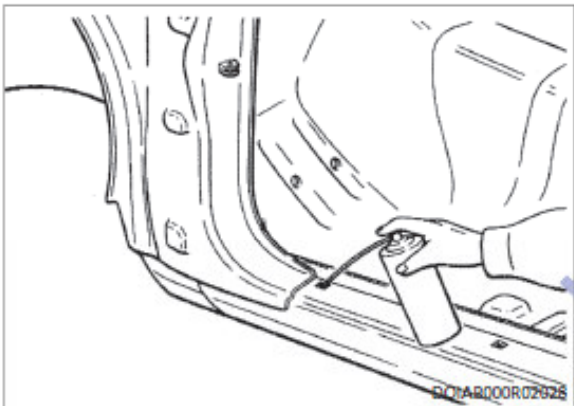
Joining Techniques

- ▶ **Understanding joining techniques.**
- ▶ **Why that joining technique is used.**
- ▶ **Understanding the use of different alloys, i.e. ultra high steel, boron steel, mild steel.**
- ▶ **Manufacturer's approval for repair.**
- ▶ **The use of light weight materials, aluminium, composite.**

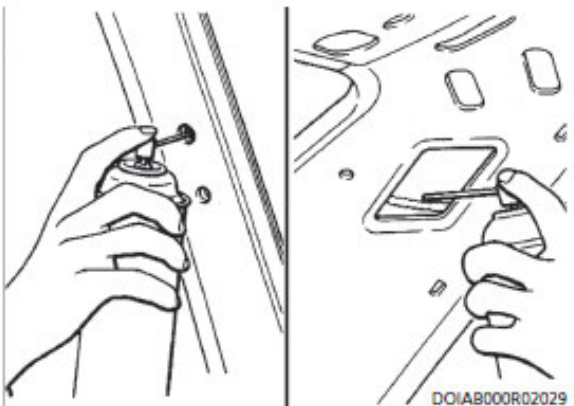




DOIAB000R02027



DOIAB000R02028



DOIAB000R02029

20. Application of body sealant

Apply an ample amount of body sealant so that there are no gaps, in accordance with the "Body Sealing Locations" section of the respective "Body Repair Manual" for the individual vehicle model.

NOTE

After sealant has been applied to any external surface, make it smooth in order to maintain a good external appearance.



21. Application of anticorrosion agent

Apply a sample amount of anticorrosion agent to any welded areas and to all surface from which the paint coat was removed. Heat may cause damage to paint coat welded areas

, so be sure to apply the anticorrosion agent to both the inner and outer surface of the panel.

Use an aerosol-type anticorrosion agent for application to the side sills, pillars and other similar parts which have a following construction, by utilizing the trim mounting holes, etc.

CAUTION

Wipe off any anticorrosion agent which oozes out onto the surface to be painted later. The presence of such anticorrosion agent will prevent correct application of the paint coat.



Core Task with Supporting Operation

Core task:

- ▶ **Mount/ measure/ dismount vehicle.**

Supporting tasks:

- ▶ **R/R sill skirts/ mouldings**
- ▶ **Initial pull**
- ▶ **Dimensions check/ remeasure**
- ▶ **R/R suspension components to mount.**
- ▶ **Refurbishment of sill flanges (if mounted here).**
- ▶ **R/R under trays for access.**

[PICTURE]



Plastic Repair Technique

- ▶ **Manufacturers use plastic parts and panels around the vehicle.**
- ▶ **The financial feasibility for repairing plastic is whether the cost is lower than replacing.**

This type of plastic can be repaired using heat to re-shape and rejoin (i.e. weld or fuse) – Common for bumpers and panels etc.



Spraying Operation

Operations required to restore the vehicle's finish after the fitting or repair of panels include:

- ▶ **Refinishing of new or repaired panels.**
- ▶ **Blending of adjacent panels.**
- ▶ **Texturing of trim parts (bumpers/ mouldings etc.)**
- ▶ **Polishing and de-ribbing.**



Spraying Process

- ▶ **Thatcham paint procedure (refer to *Thatchamnet*).**
- ▶ **Application of preparation materials.**
- ▶ **Application of color coats.**
- ▶ **Application of lacquer.**



Blending

- ▶ **When a blend is required.**
- ▶ **When a blend is required or a non metallic due to metamerism.**
- ▶ **When special coatings need to be applied.**



FRONT WHEEL ALIGNMENT CHECK AND ADJUSTMENT

1. Measure the wheel alignment with the vehicle parked on a level surface.
2. The front suspension, steering system, and wheels should be serviced to normal condition prior to measurement of wheel alignment

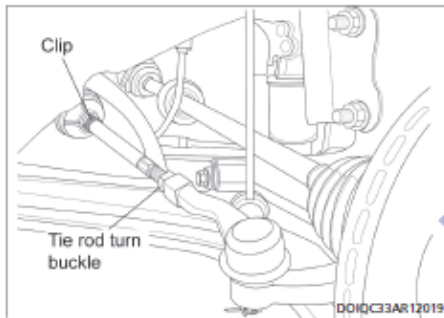
TOE-IN

Standard value :

Toe-in	$-0.05^\circ \pm 0.05^\circ$
--------	------------------------------

NOTE

- (1) If the toe-in is not within the standard value, adjust the toe-in by undoing the clips and turning the left and right tie rod turn buckles by the same amount (in opposite directions).
- (2) The toe will move out as the left turn buckles is turned toward the front of the vehicle and the right turnbuckle is turned toward the rear of the vehicle.
For each one turn of the left and right tie rods, the toe-in will be adjusted by approx. $1^\circ 05'$ (per wheel).



Negative Camber



Positive Camber



Toe In



Toe Out



Negative Caster



Positive Caster

STEERING ANGLE

Standard value:

Inner wheel :	$32.7^\circ \pm 1^\circ$	+ 0.5° - 1.0°
Outer wheel :	$38.9^\circ \pm 1^\circ$	+ 0.5° - 1.0°

CAMBER AND CASTER

Standard value:

Camber	$-0.4^\circ \pm 0.5^\circ$ (Allowed difference between right and left angle: 30')
Caster	$3.0^\circ \pm 1.0^\circ$ (Allowed difference between right and left angle: 30')

NOTE

- (1) Camber and caster are preset at the factory and cannot be adjusted.
- (2) If camber is not within the standard value,



Work Action:

Action

N (New)

S (Straighten)

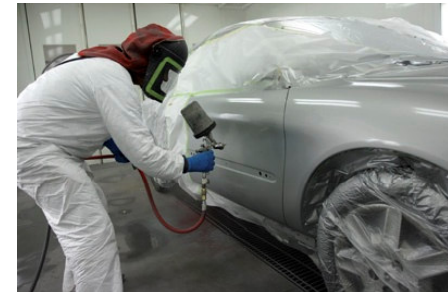
P (Paint)

B (Blend)

C/R (Check/ Report)

SC (Specialist Charge)

Opinion time



ESTIMATION SKILL and KNOWLEDGE

- ▶ Now apply your skills to carrying out a vehicle damage assessment on a car in the workshop.
 - ▶ **Capabilities and skill?**
 - ▶ **Facilities and equipment?**
 - ▶ **Acceptability? (customer's expectation)**
 - ▶ **Is the repair method approved by the manufacturer?**
 - ▶ **Does the repair compromise the safety of the vehicle?**
 - ▶ **Are the required parts available?**
 - ▶ **What advantages?**
 - ▶ **Is the cost effective to repair?**
 - ▶ **Is the repair a simple repair using traditional methods?**
 - ▶ **Can the repair be done with specialist tools which will keep the integrity of the vehicle intact?**
 - ▶ **Is the repair acceptable to the insurer/customer?**
-

