Test Project

Autobody Repair

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Introduction

All Competitors will be tasked to demonstrate a range of skills in Autobody Repair. There should be at least six (6) different project modules to include but not limited to the following: Diagnosis and Correction, Structural Part Replacement, Non-Structural Part Replacement, Panel Repairs steel and aluminum, Plastic repairs and Panel gap adjustment

Instruction to Competitor

These Competitor instructions must be read in conjunction with the following documents:

- Current version of Technical Description.
- Current version of Competition Rules A and B.
- Current version of Health and Safety Document
- Certain tasks need to be marked by Experts "while in progress", these are indicated in your Instructions where STOP is shown proceed with another task while marking takes place.
- Marks will be forfeited if the Competitor overlooks the "in progress marking" by Experts.
- Assistance with the removal and replacement of heavy parts such as doors, bonnet, etc can be given by any Expert other than the one from your country. (No help on side panel)

Safety

Competitors could be deducted marks or excluded from the Competition (as per Competition Rules and Health and Safety document) if they are identified working in an unsafe manner or create an unsafe workplace condition.

Examples of unsafe practices include:

- Not wearing the appropriate personal safety equipment, safety glasses, gloves, hearing protection, safety shoes etc.
- Not correctly positioning screens when MIG welding or grinding.
- Not using fume/smoke extractor.
- Realigning without safety cable correctly fitted.
- Poor/unsafe housekeeping.
- Endangering yourself or others.

Reckless or accidental damage caused to equipment or vehicle while performing repairs could result in loss of marks in any or all categories.

Important

It is crucial to the end result that you carefully review the task before you start work. The order of the tasks is determined. You begin on the task A, and follow the instructions given at the end of each task. The order will then be A1, A2, C1, B1, and so on. You must always complete each task before moving on to the next task, if not otherwise specified

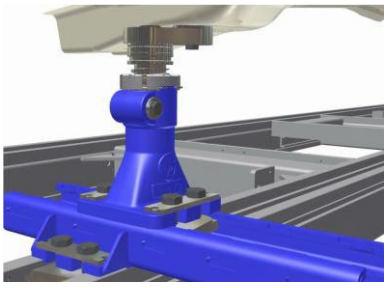
Module A – Diagnosis and correction Preparation

A1 – Diagnosis of Vehicle

- Observe safe work practices at all times.
- Remove related parts as necessary.
- Ensure that all the clamps and bench mountings are correctly fitted and tightened.
- Bench mountings and clamps must be tight, (100 Nm minimum torque).
- Ensure that the measuring bridge/ladder is correctly fitted and locked in place.
- Start up the Car-o-liner Vision X3 System and make a new work order.
- The order must be created and saved with:
- a. Name : <First Name>
- b. Work Order No.: <Your National Country>
- Select XX, data sheet No. XXXX
- Set-up and "center" the Car-o-liner measuring system, use measuring point with five (5) centering points given.
- Centering Point: Left X,X,X
  Right X,X
- Measure and report the extent of misalignment at the following locations.
- Underbody locations: Left X,X,X,X,X,X,X,X,X,X,X,X
  Right X,X,X,X,X,X,X,X,X,X,X,X,X,X
- Measure and report the extent of misalignment at the following locations.
- Upperbody locations: Left X,X,X,X,X,X,X
  Right X,X,X,X,X,X,X
- Save data sheet/damage report on computer.

A2 – Evo Setup

- Perform necessary steps to set up equipment for anchoring (EVO1-2 - Using point XX mount Evo to secure the car)



- Note: attached picture is for guidance. Refer tool list for Evo fixing in the Car-O-Tronic software.
- Torquelist EVO 1-2:
  Mounting to bench: 100 Nm
  Other bolts: 70 Nm
  Bolt to the car 30 Nm

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Important

DO NOT PULL THE CHASSIS MEMBER

- Attach the pulling tower correctly on the pulling bench.
- Attach the correct clamp or chain on to the area you would like to pull on the righthand side
- Align the puller tower and chain to the direction you desire to pull the chassis member as a remedial action.
- Mount up EVO 3 on point L6. Perform necessary steps and use tool list as in Car-O-Vision to set up equipment for anchoring. When it is fixed, make a new measurement trough the EVO3.

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Module B – Structure Part Replacement

- Safe work practices must always be adhered to and apply to host country's regulations.
- Remove all necessary bolt-on panels at the front end of the side body assembly.
- Remove the following parts from the side body assembely as per instruction given.



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Parts Details

New Parts

Front Cabin Crossbeam Reinforcement Assembly



A-Pillar Inner Panel





Front Wheel Housing

Need to Re-use the Part



A-Pillar Reinforcement

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B1 – Parts Removal

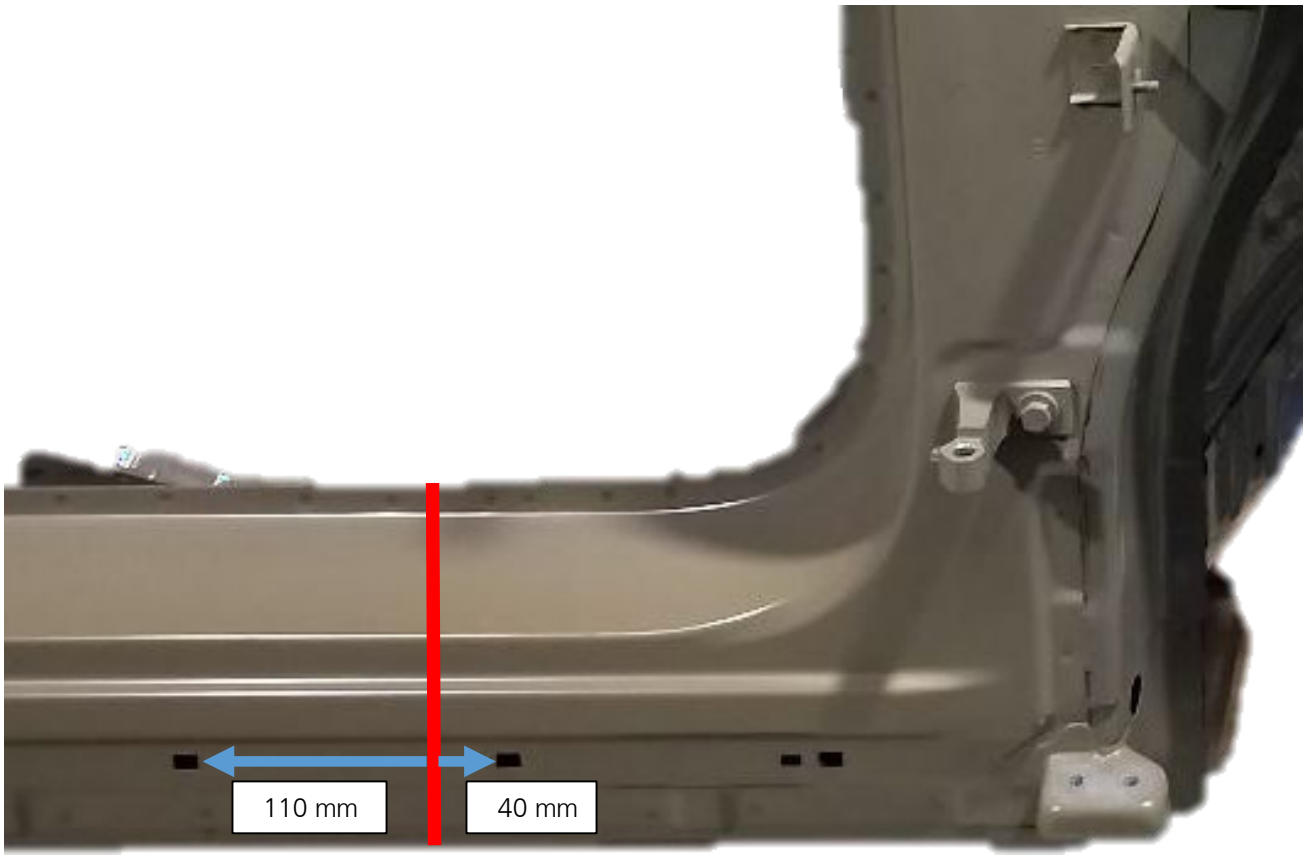
- Cut down the A piller outer panel as per measurement given.
- Mesurment are for reference, no marks for this measurment



Glass piller cutting lines



A piller lower cutting line measurement

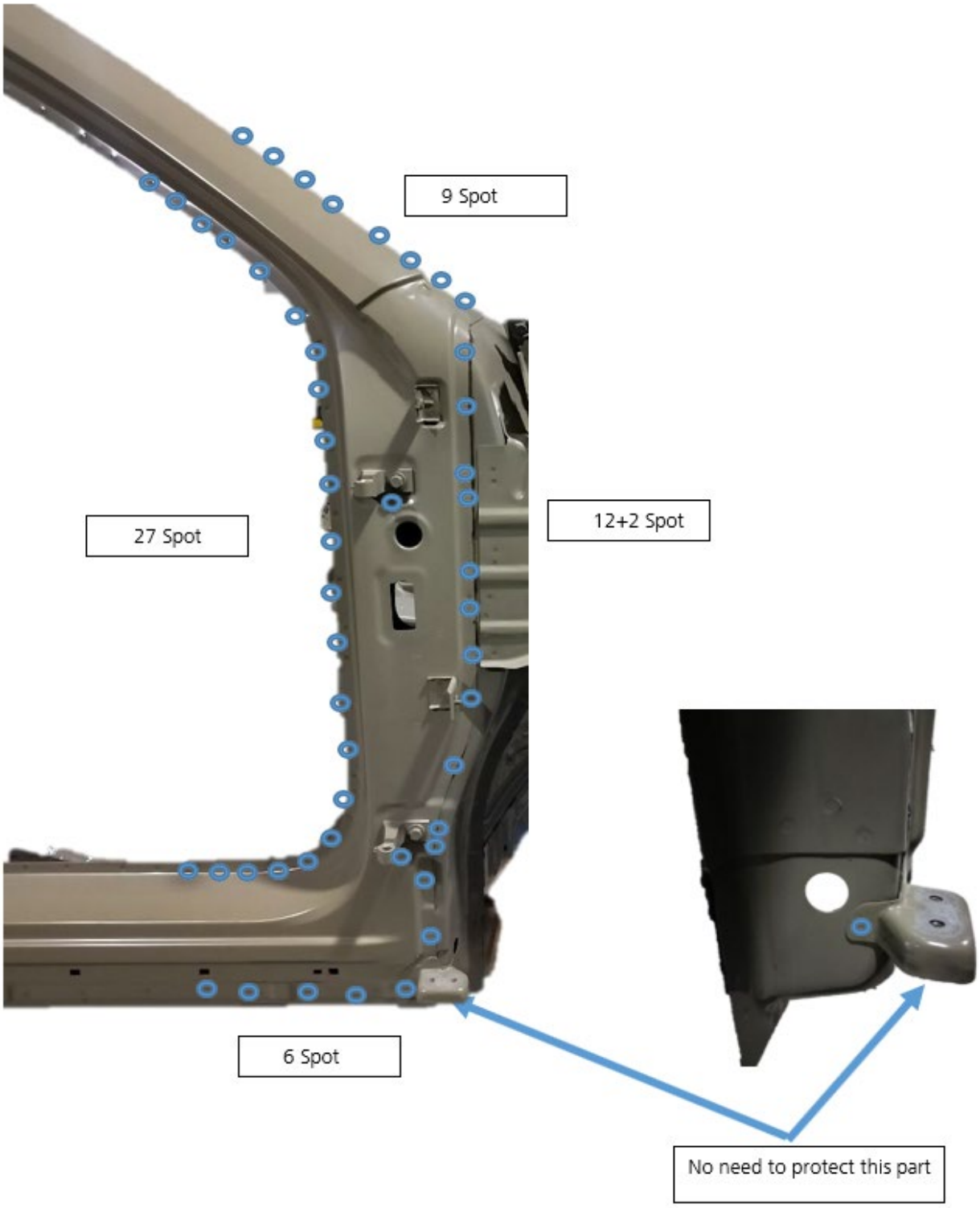


Important

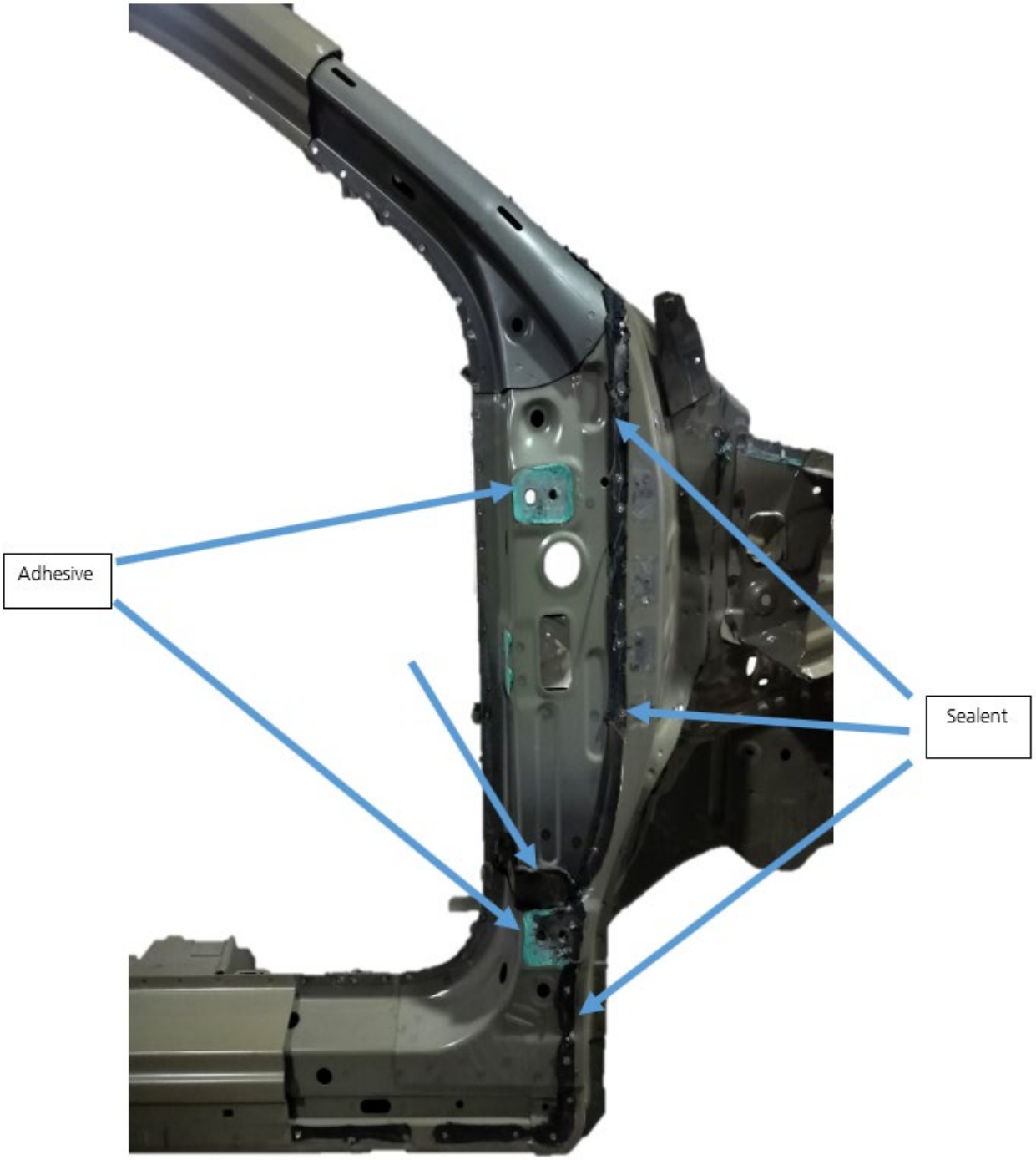
These measurments are only for refrence, you have to make straight cut line.

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Spot Cutting Details for A Piller



Sealant and Adhesive area

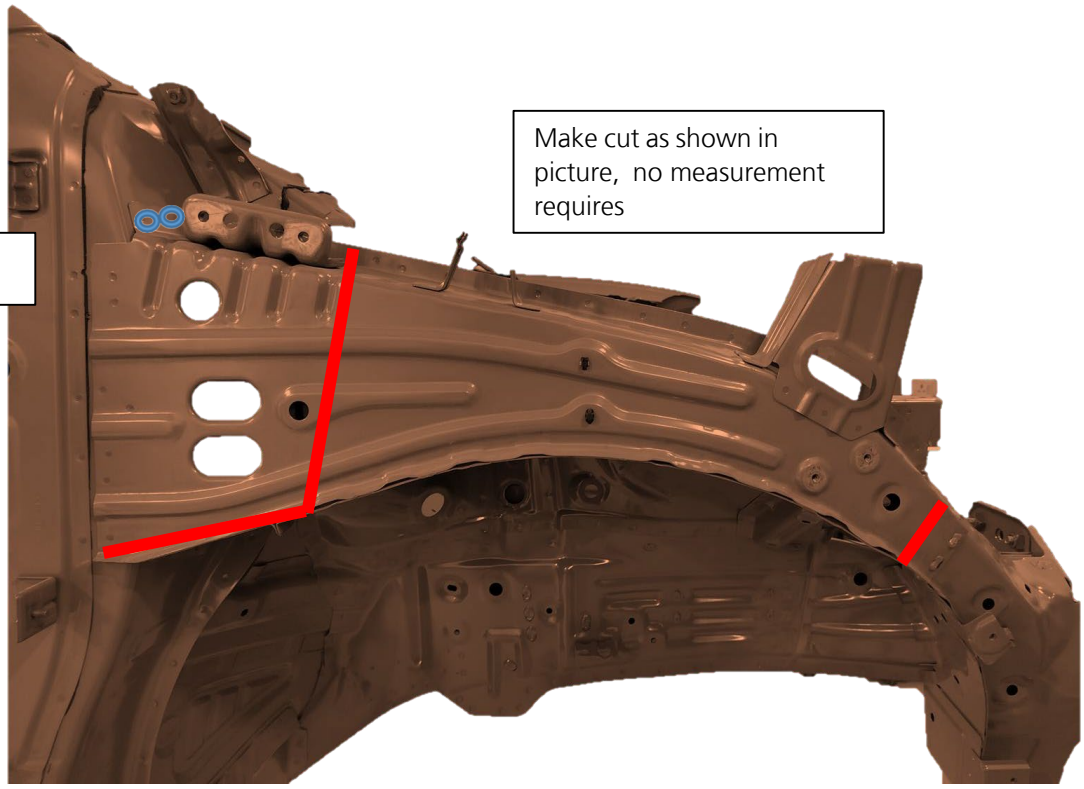


Foam Sealent

Use Hot air gun to remove the panlel from adhesive area

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- Remove Front wheel housing assembly with Front cabin crossbeam reinforcement as per instruction given below.



Cut down this piece to access back panel Spot

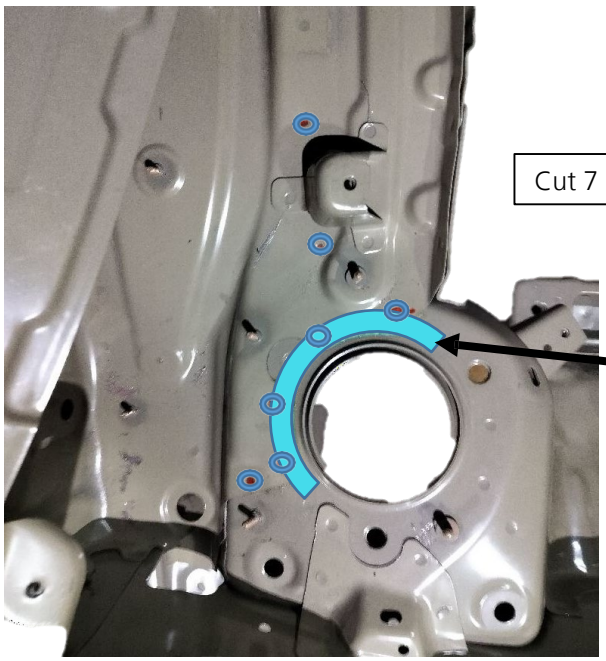


6+4 Spot



17+5 Spot

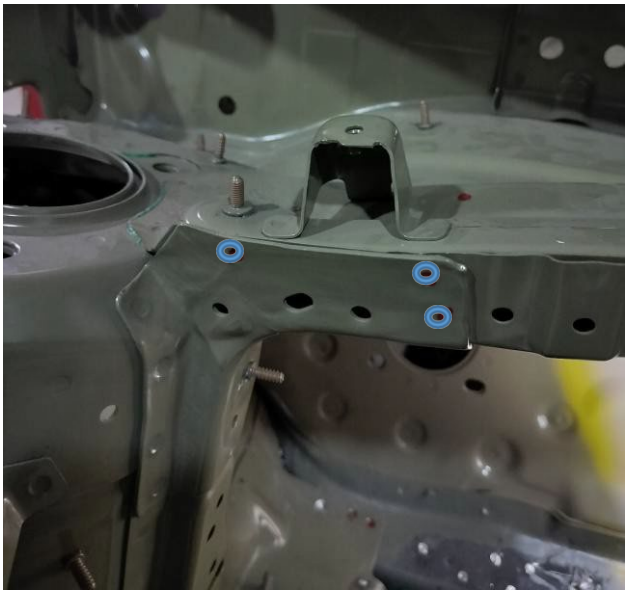
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Cut 7 Spot

Adhesive Area

Cut 3 Spot





Inside on fire wall cut 5 Spot

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Inside front wheel housing assembly cut 5 Spot

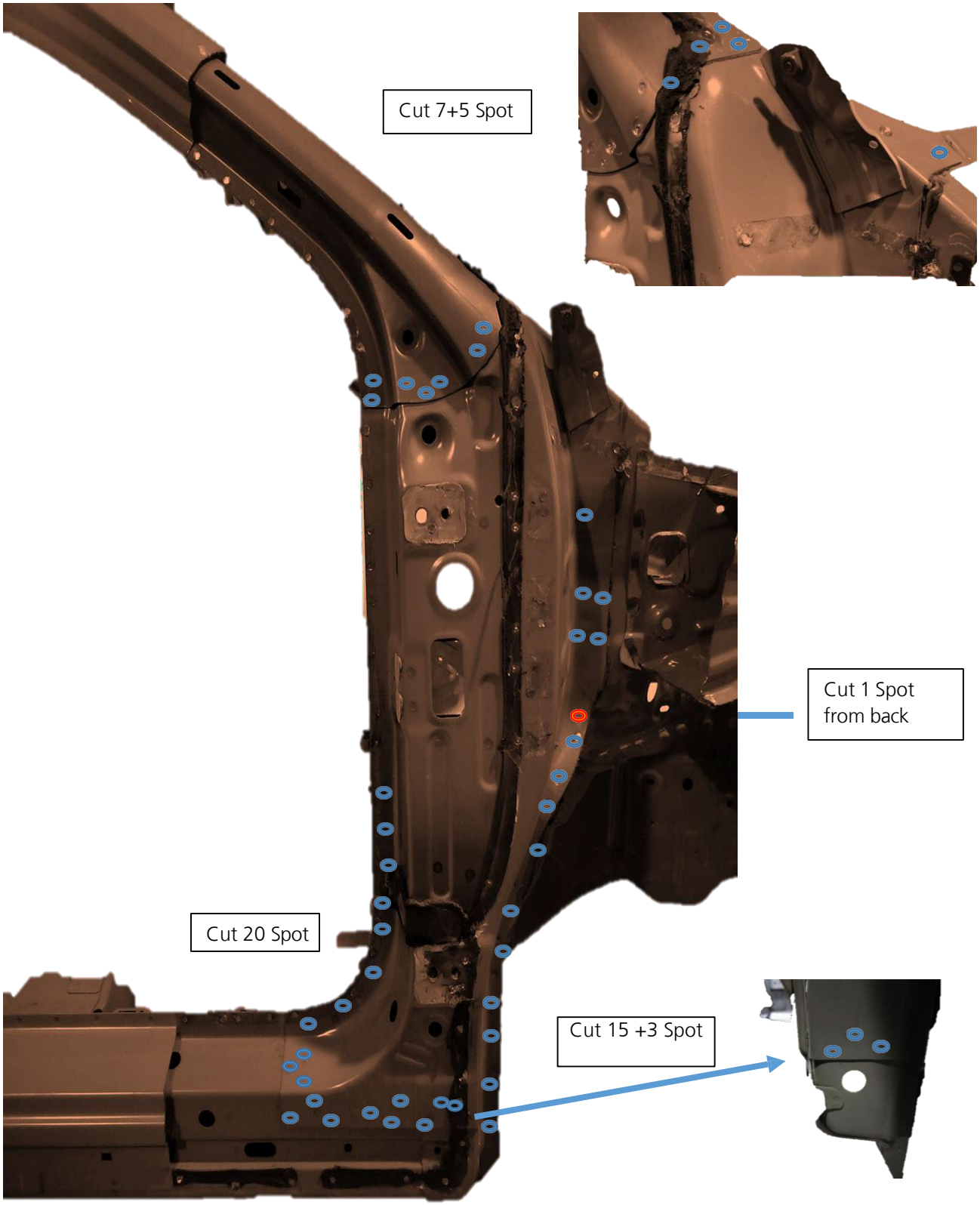
Front Cabin Crossbeam Reinforcement Assembly cut 3 Spot





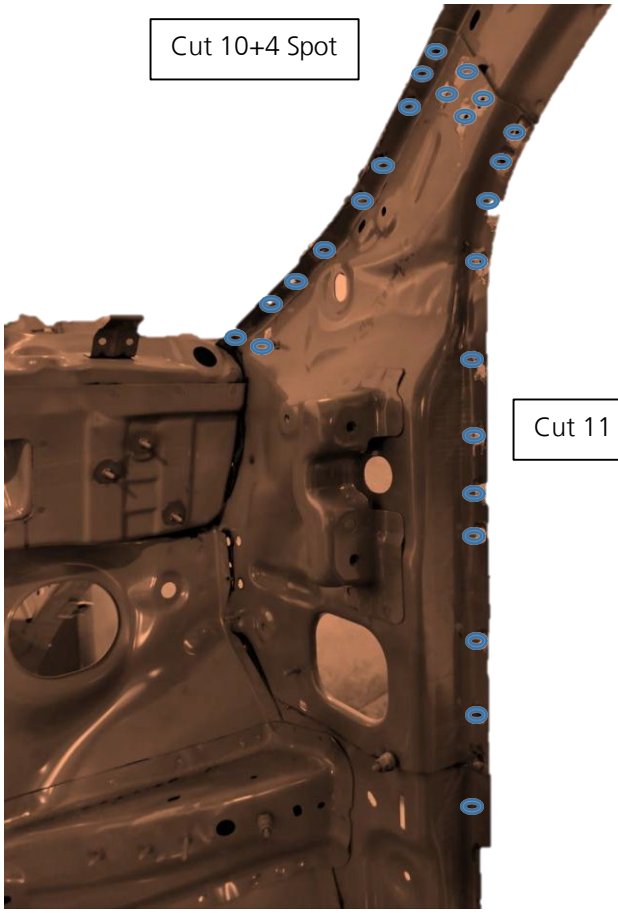
Cut 1+2 Spot

- Remove the A piller middle panel and protact it for re use



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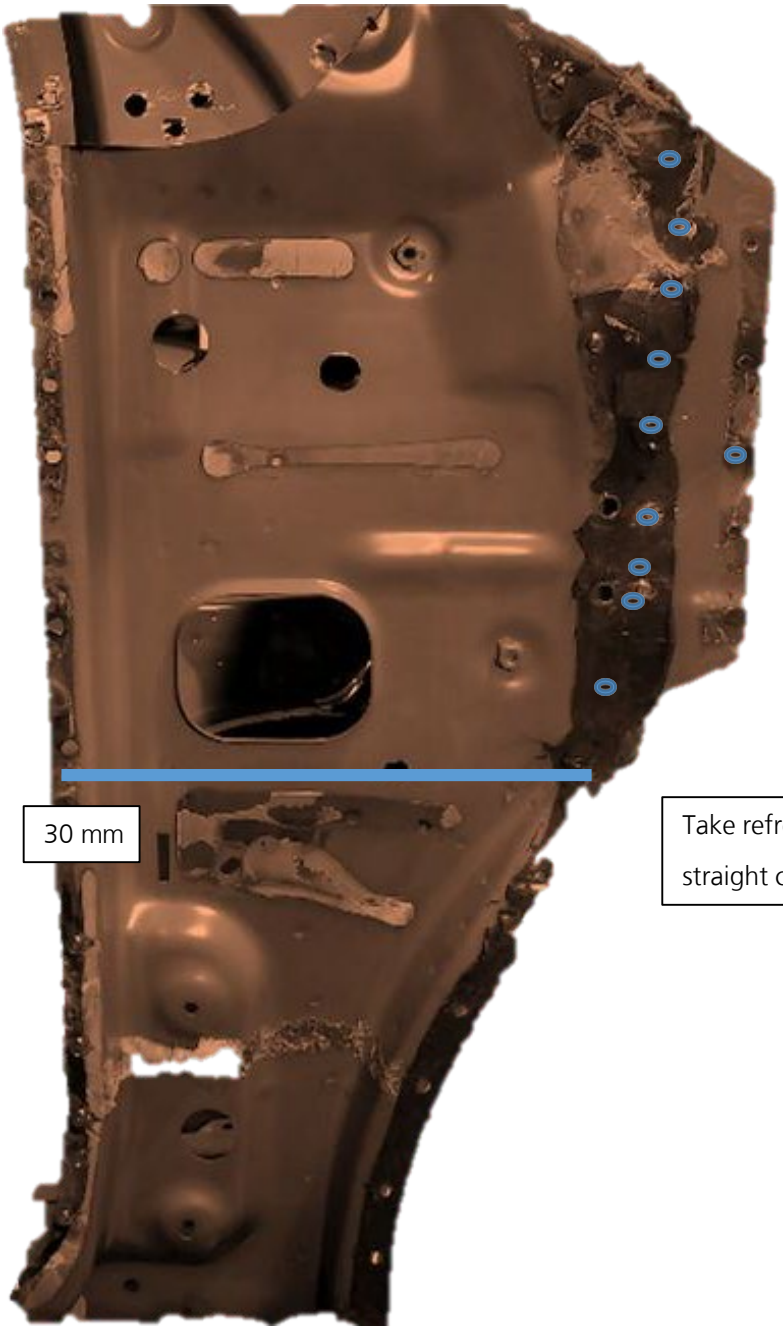
Cut 10+4 Spot



Cut 11 Spot

Sealent and Adhesive Area





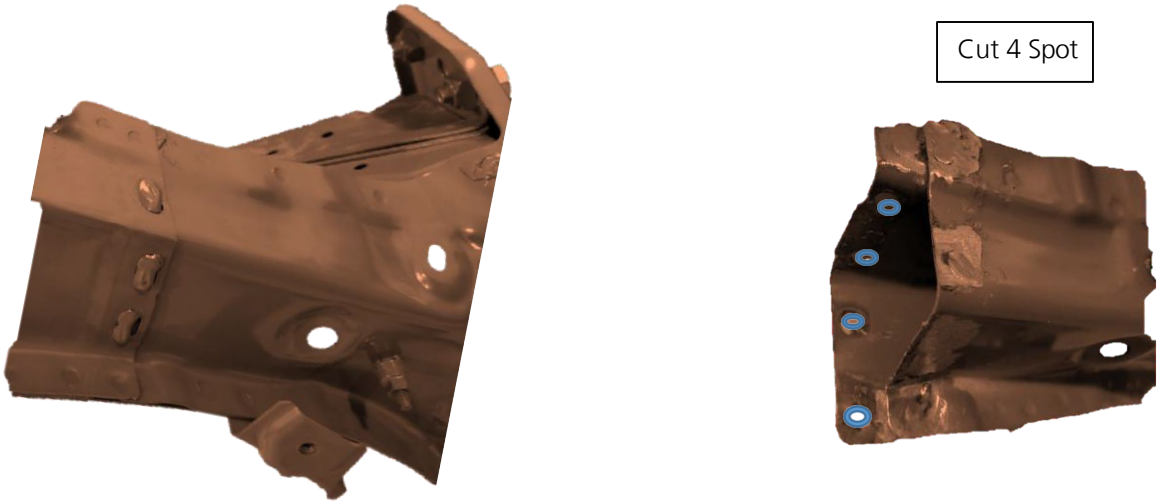
© WorldSkills International

Sealent and Adhesive Area



Cabin Crossbeam Reinforcement Assembly front end prepare by grind the weld and cut the spot

Cut 4 Spot



Prepare new and reuse part for joining

- Cut the new parts as per requirement and prepare it for installation
- Remove all paint/coating from areas for welding on flanges and joints, from the new replacement parts and the reuse part in preparation for welding.
- All four (4) sides for spot welding must be bare metal.
- All three (3) sides for plug welding must be bare metal.
- Minimum 10 mm around a hole for plug-welding and minimum 10 mm for spot-welding should be bare metal.
- For seam-welding 15 to 20 mm inside and outside must be bare metal - where possible.
- Clean the sealent and adhesive area properly, leave the foam sealent area as it is.
- Refer the Plug weld details and make hole accordingly
- Any accidental holes or tears to parts not to be replaced must not be welded until after inspection by Experts. If you do – you will lose all the points in this marking area.

B1 STOP

- Sign in on the "request for judging chart" mounted on wall the time of completion and for Experts to mark
- Experts will mark your parts removal, cutting, drilling, dressing, grinding and, making of plug weld holes to the body and/or spare parts.

Important information

- You will add primer when the Experts are done marking B1
- Apply primer on all surfaces which will be enclosed (No primer on adheshive and sealent area). This will be marked by a random sample (cut out) at the end of the Competition!
- Marks will be deducted unless Experts assess how the work is performed.

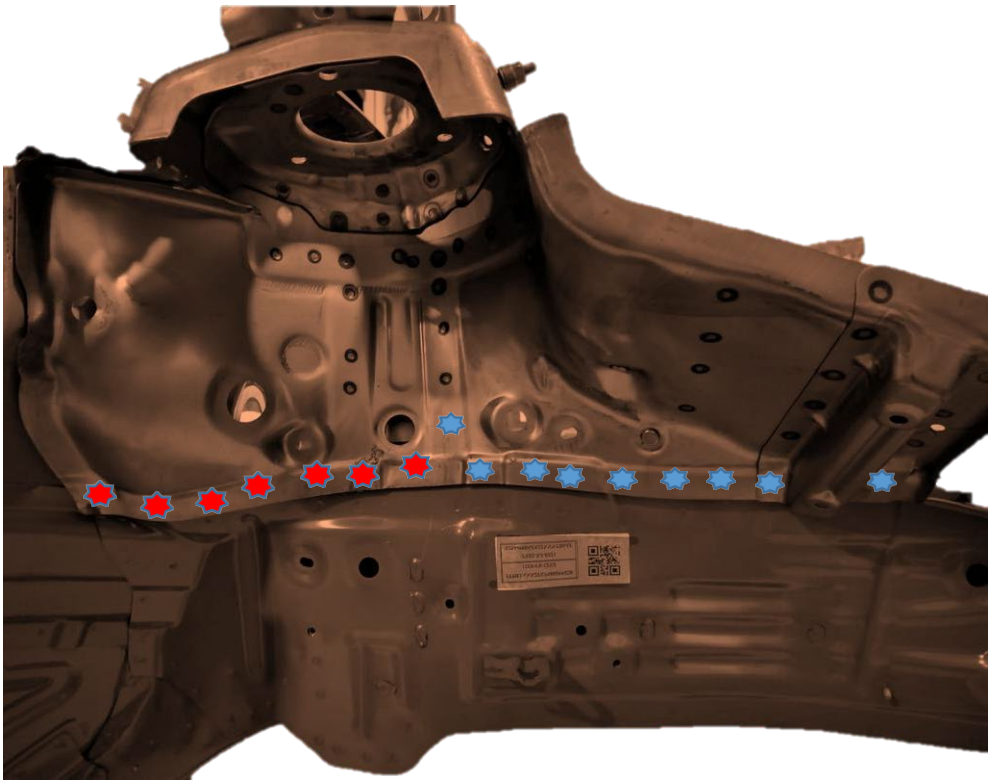
B2 – Primer Application

- You have to apply primer on all parts infront of Expert team.
- After applying primer Expert team may will guide you to continue with other work and after marking your work they will ask you to continue for B3

B3 – Re-install Parts - Front Wheel Housing Assembly

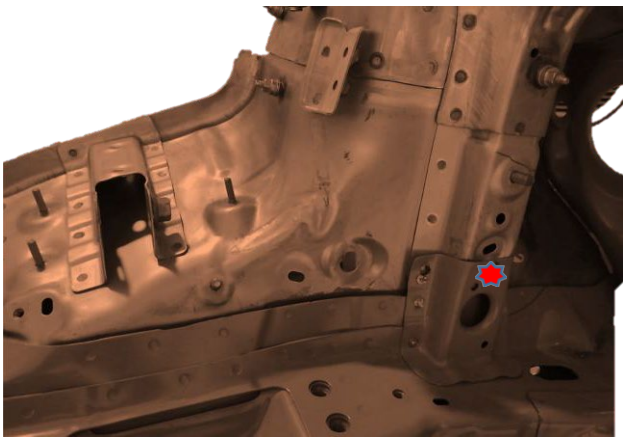
- Follow the instruction for spot and plug weld

9 Spot
7 Plug

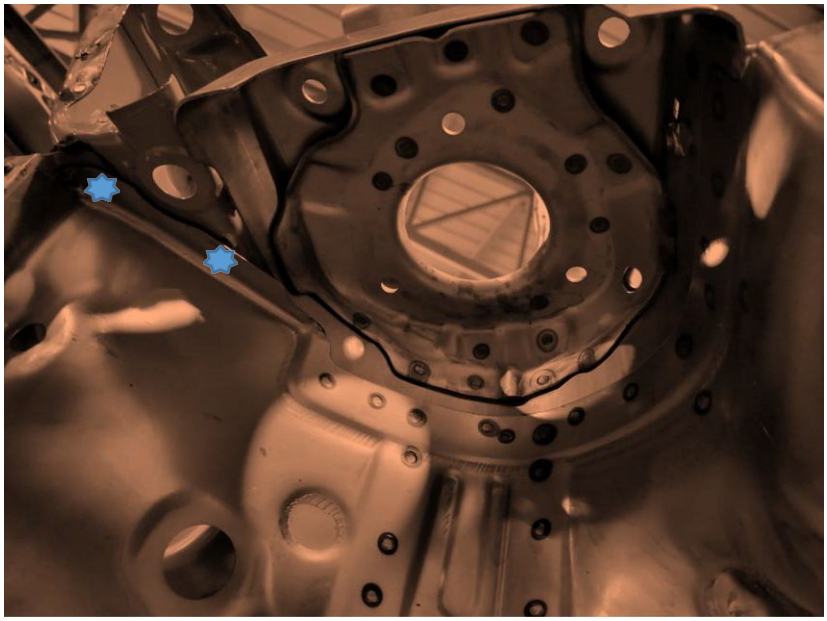




2 Spot

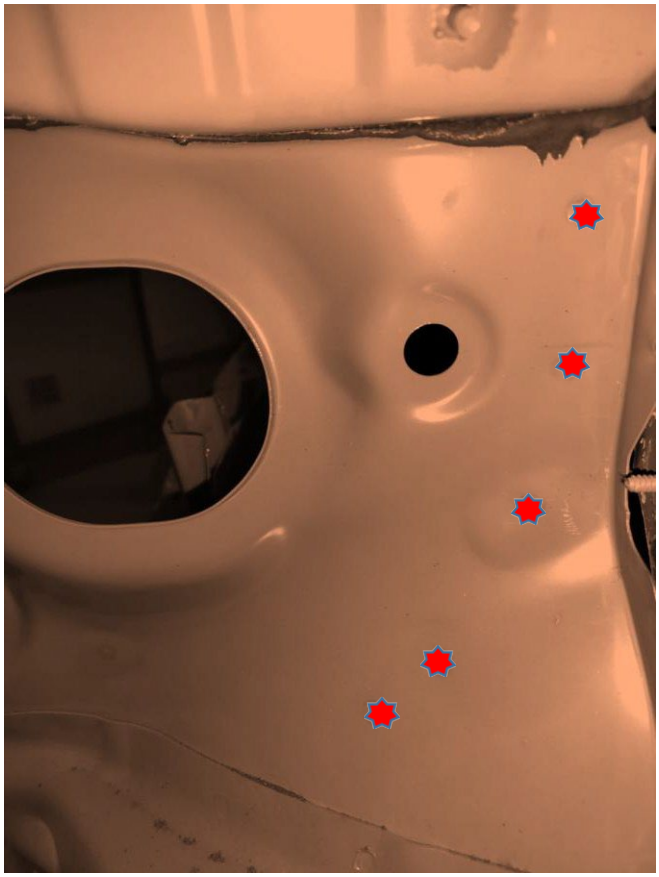


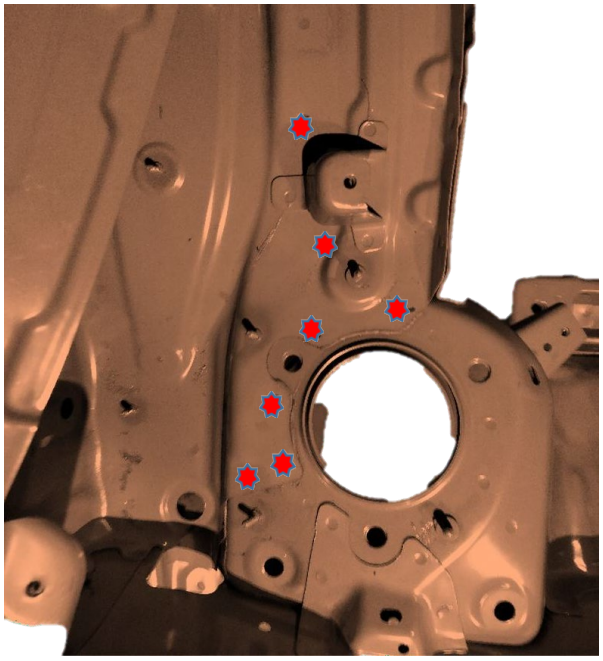
1 Plug



2 Spot

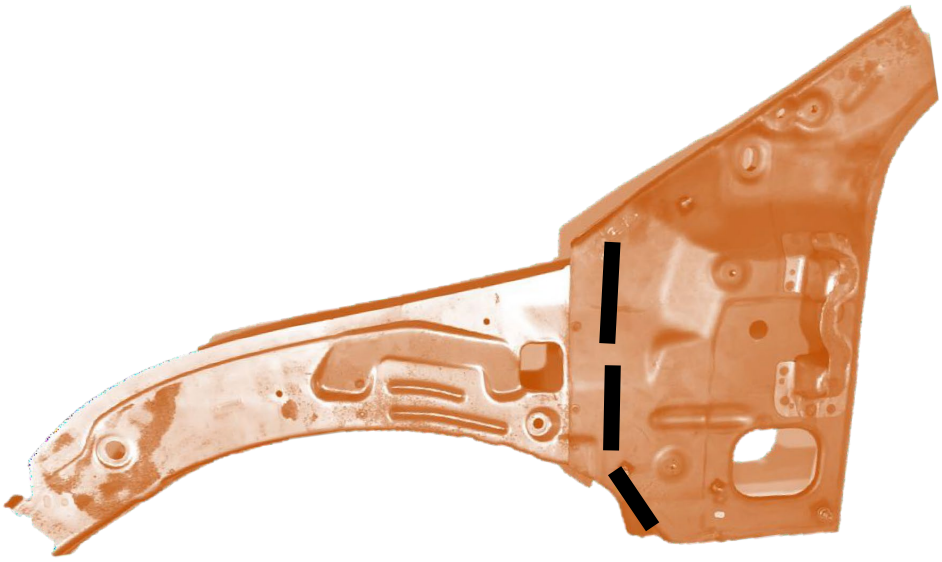
Inside on fire wall 5 Plug

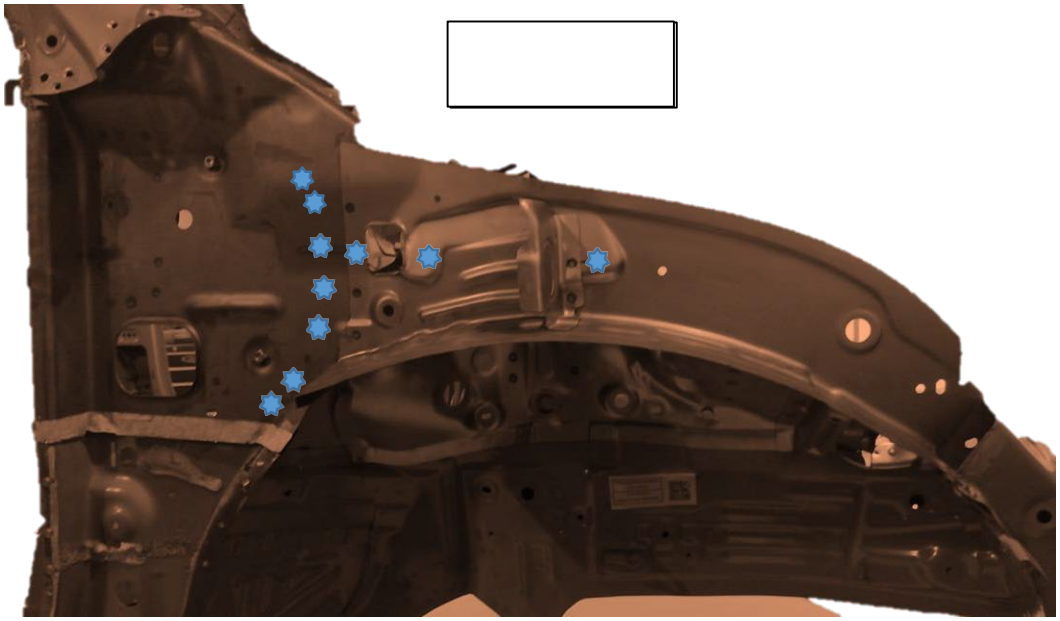


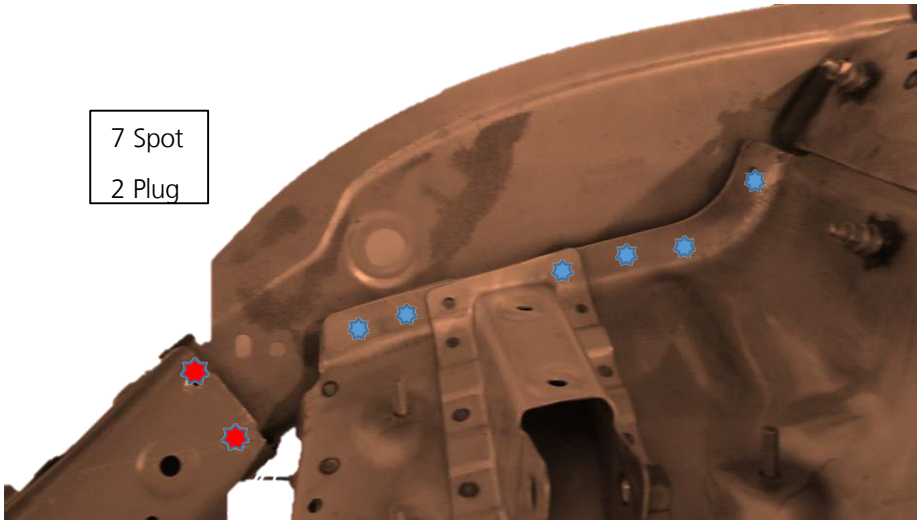


7 Plug

- Apply sealent on fire wall matining area.







7 Spot

2 Plug



2 Plug

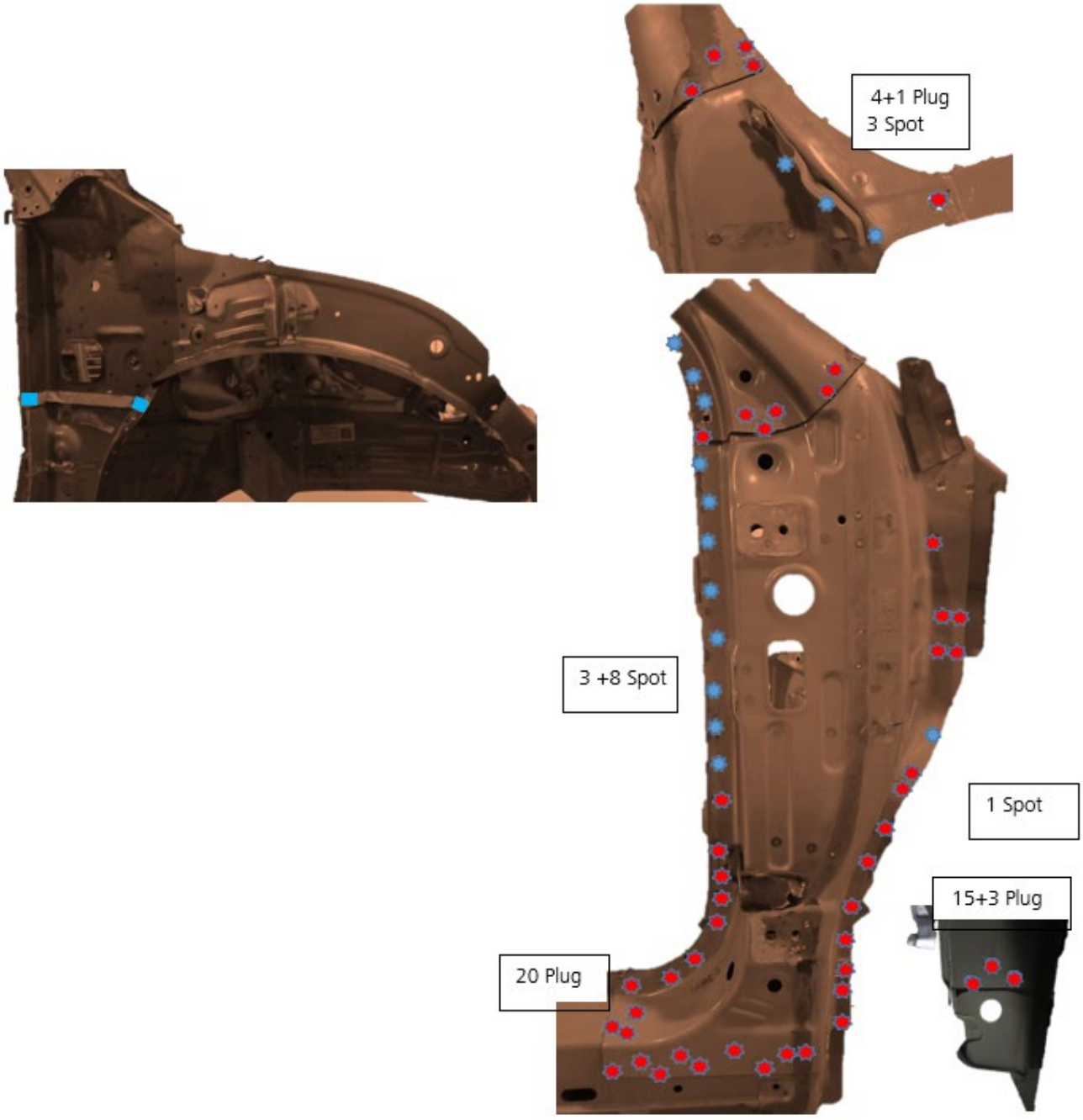
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B3 – Stop

- Sign in on the "request for judging chart" mounted on wall the time of completion and for Experts to mark
- Experts will mark your continuos weld, Spot weld and Plug weld.

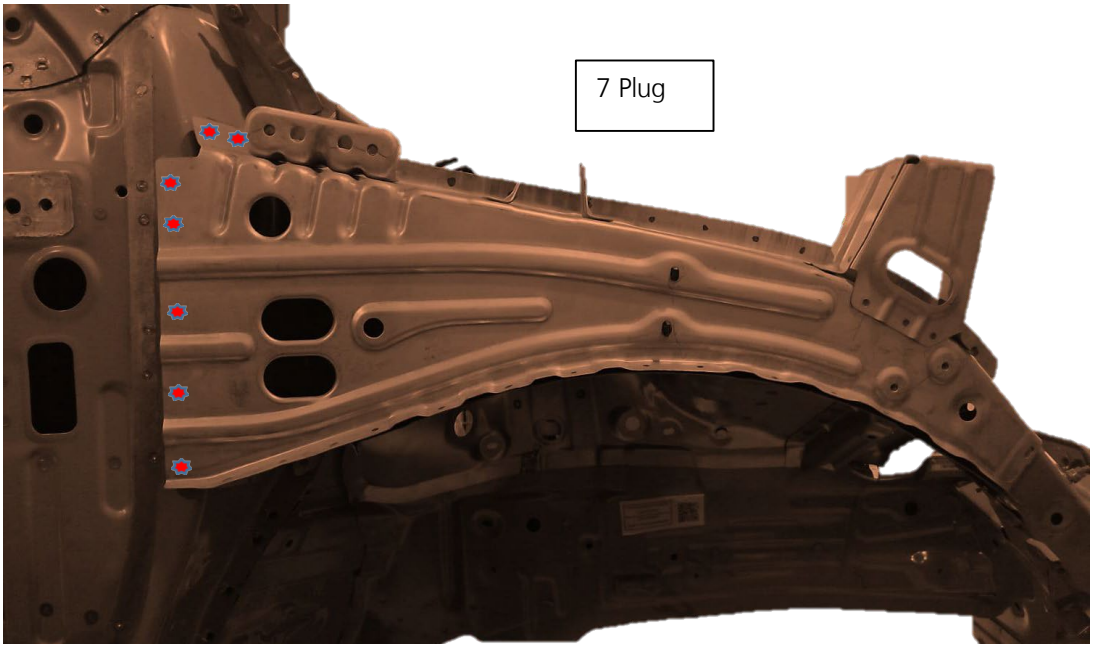
B4 – A-Pillar Reinforcement and Front Cabin Crossbeam Reinforcement Assembly Installation

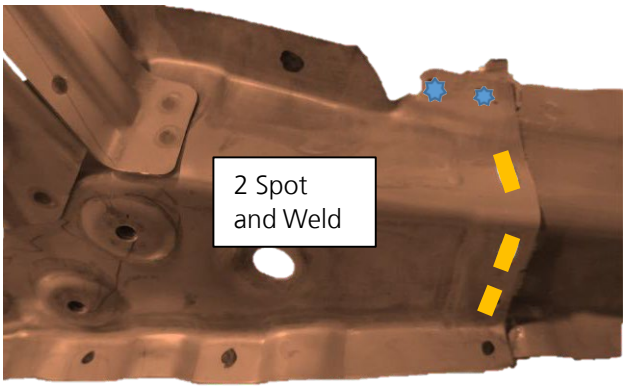
- Grind the weld from the edges of A-Pillar inner assembly

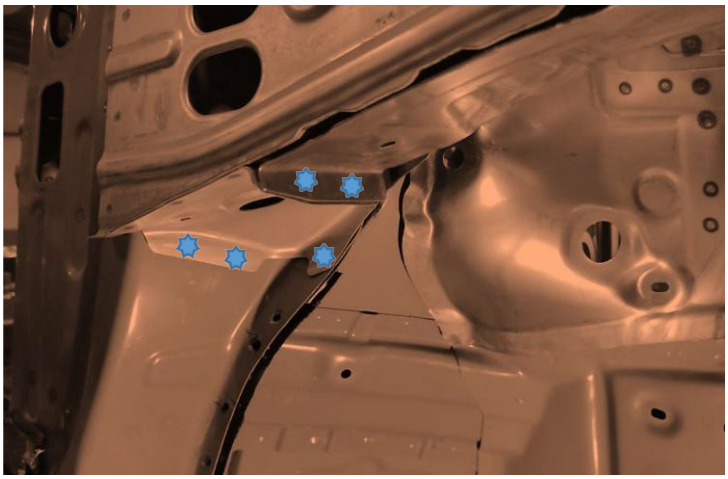


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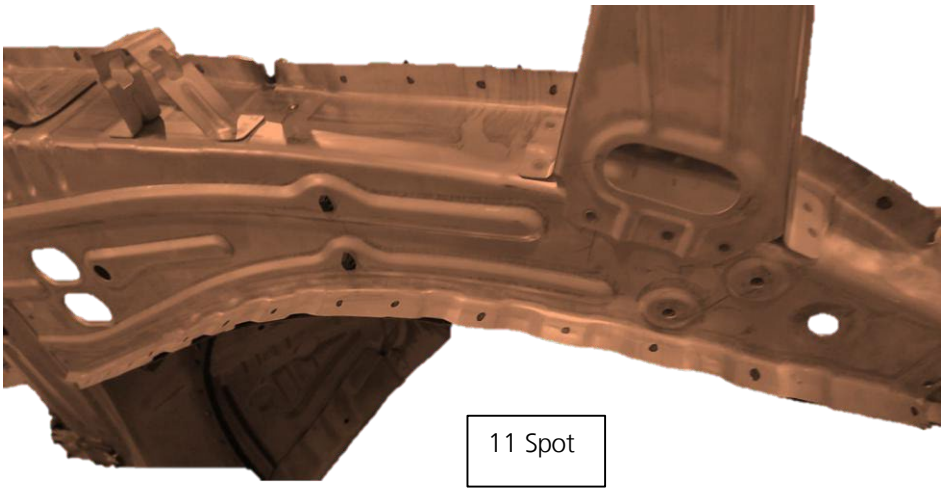
- Make Plug weld and Spot weld as per Guide line.





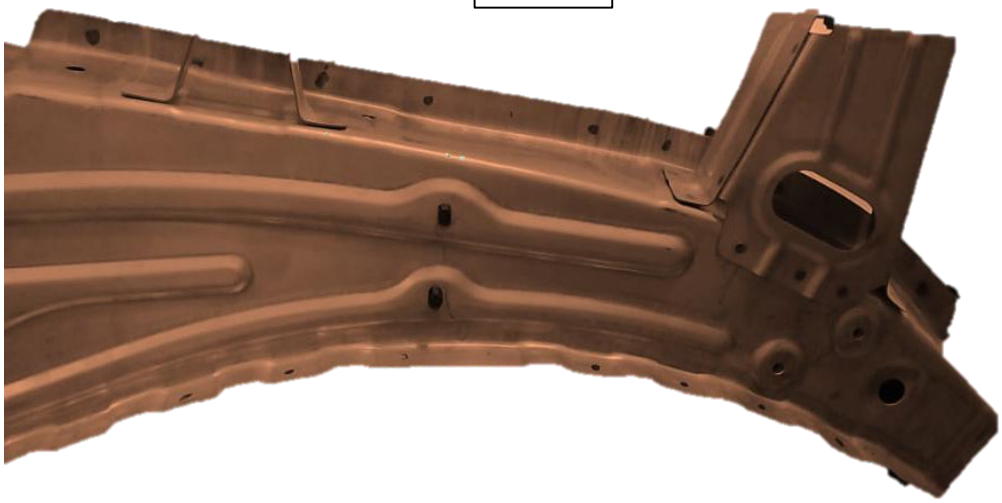


5 Spot



11 Spot

9 Spot

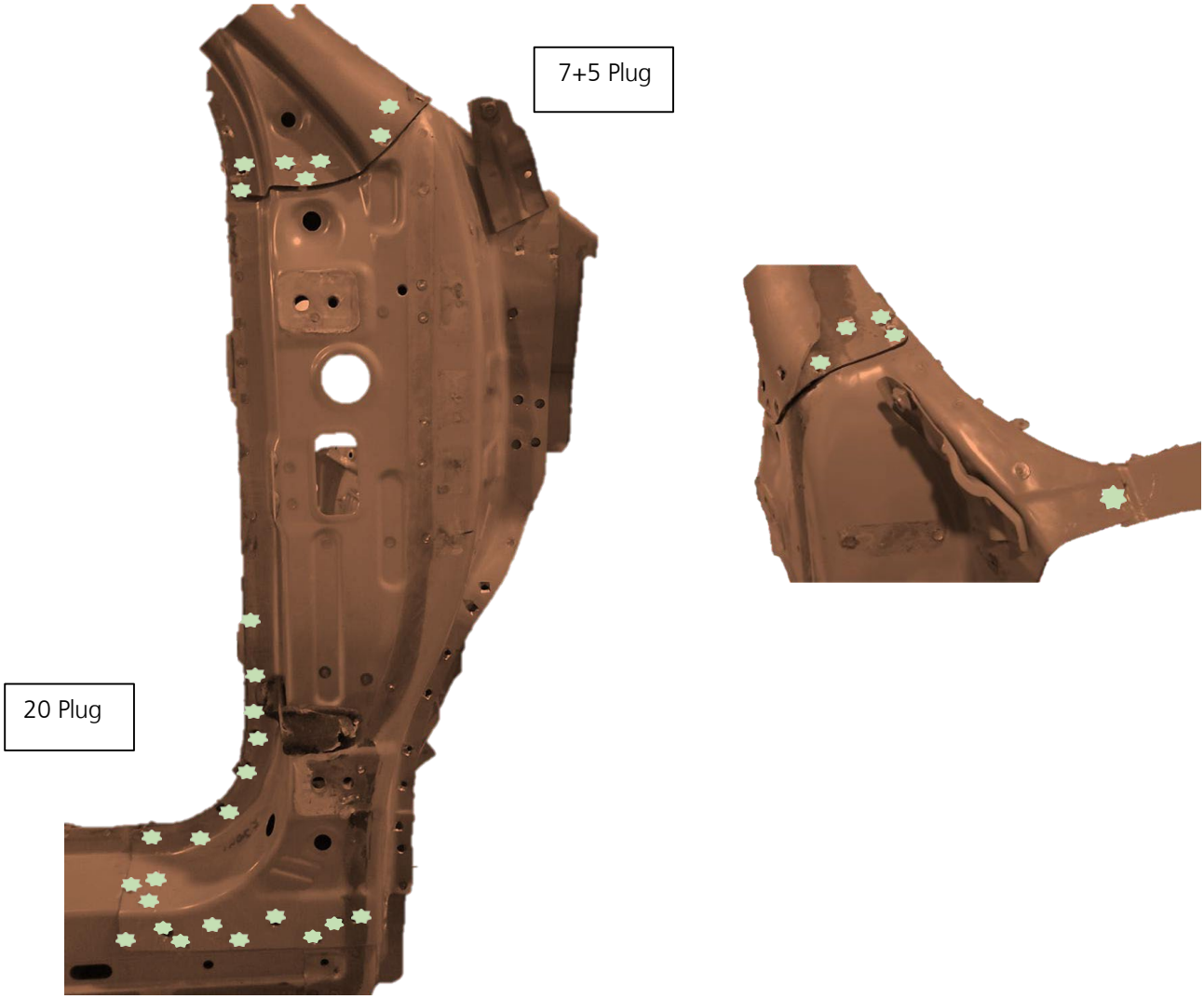


B4 – Stop

- Sign in on the "request for judging chart" mounted on wall the time of completion and for Experts to mark
- Experts will mark your welding, Spot weld and Plug weld.

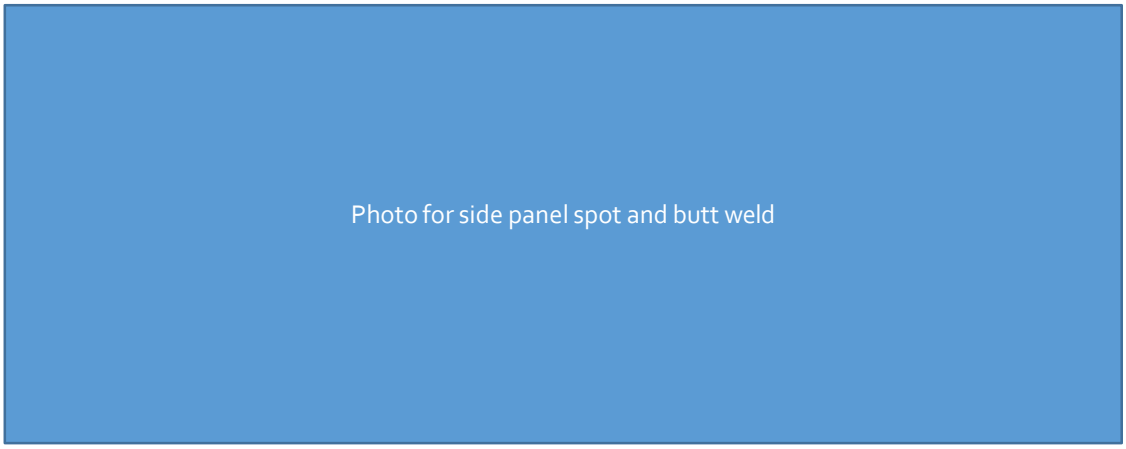
B5 – Dress/Grind/Sand Welds

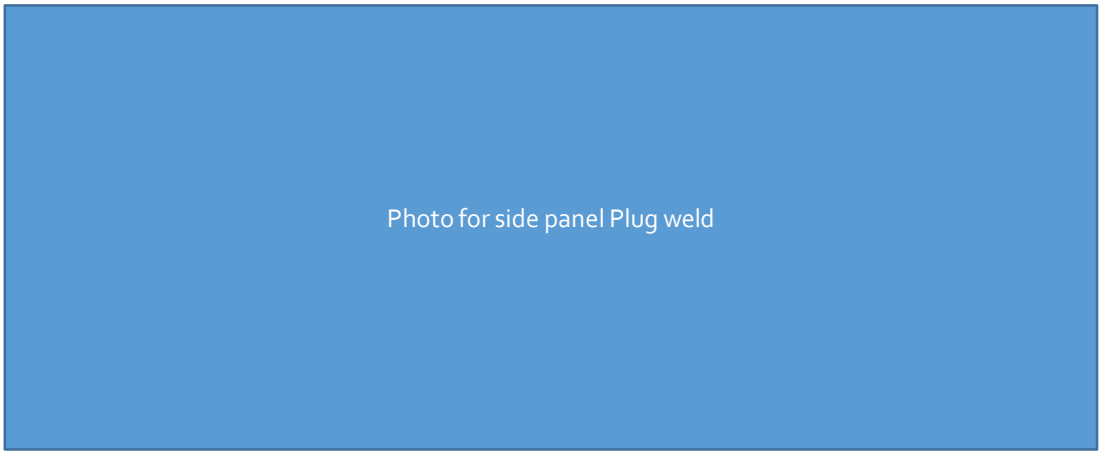
- Grind the below area Plug weld



B5 – Stop

- Sign in and write down the time of completion and for marking all your above dress/grind/welds.





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Module C – Non-Structural Part Replacement

Safe work practices must always be adhered to and apply to the Competition Rules. Replace the quarter panel from the side panel

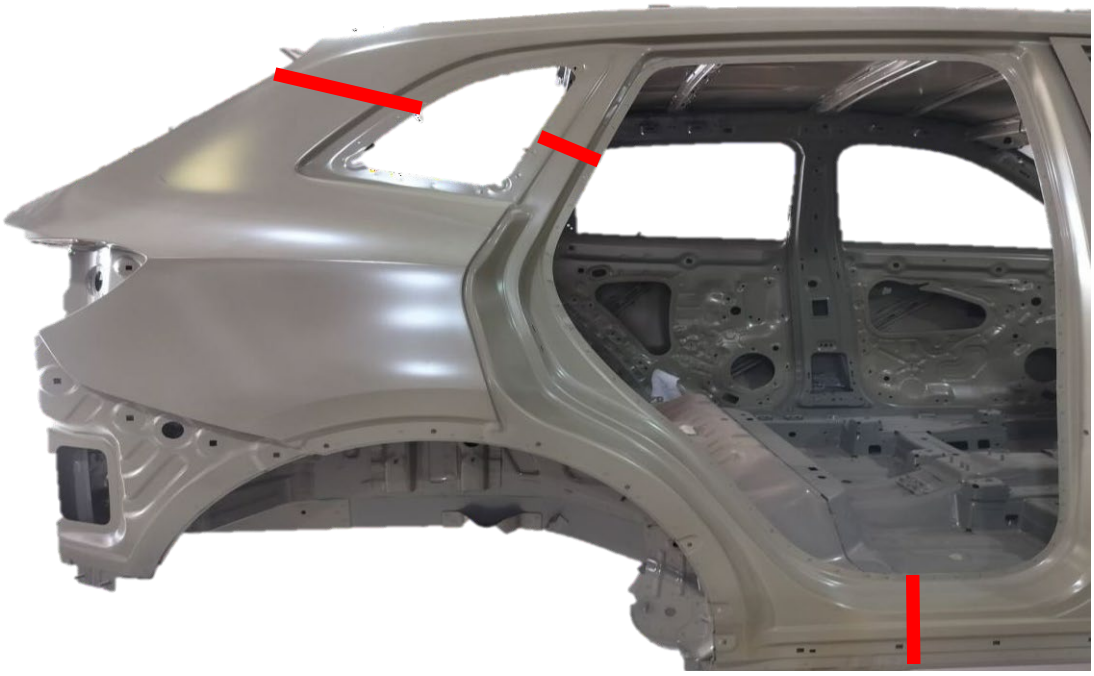
Open welded and seam-adhesive bond connections in all areas. Cut outer panel only.

C1 – Cutting, Remove and New Parts Preparation

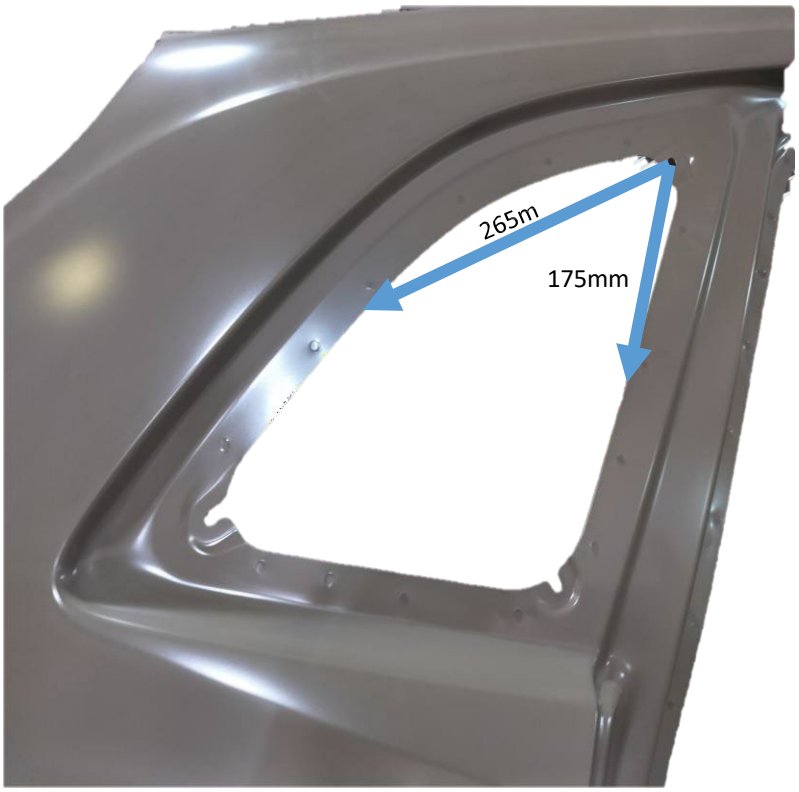
Cut the body and prepare new parts as the dedicated dimension



Cutting Line Dimensions Details

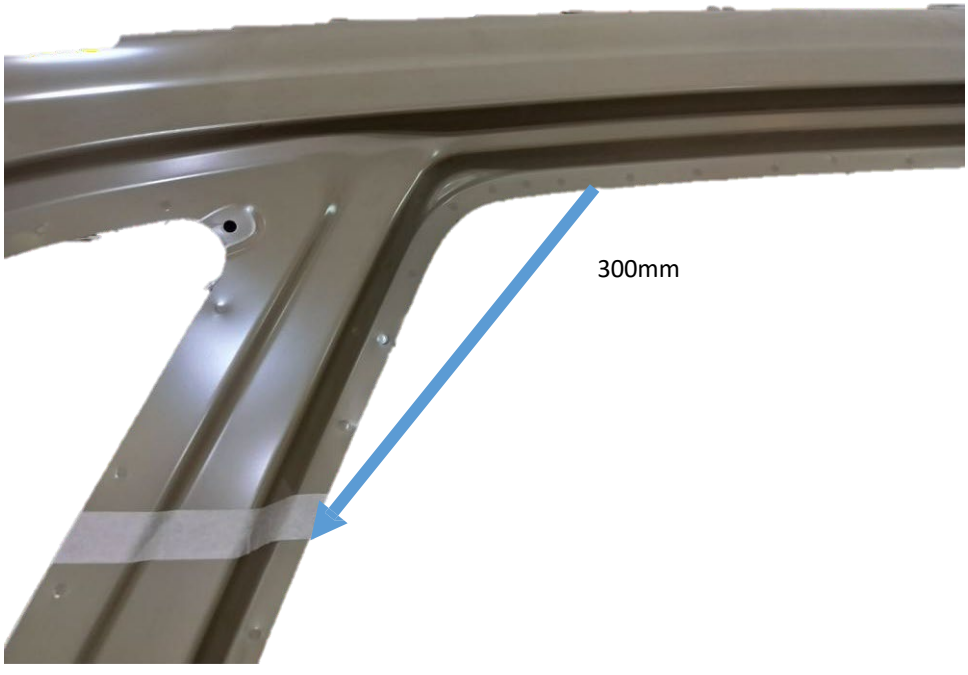


Perform the upper cut lines as specified here and shown in the photos below.





From the edge of hole

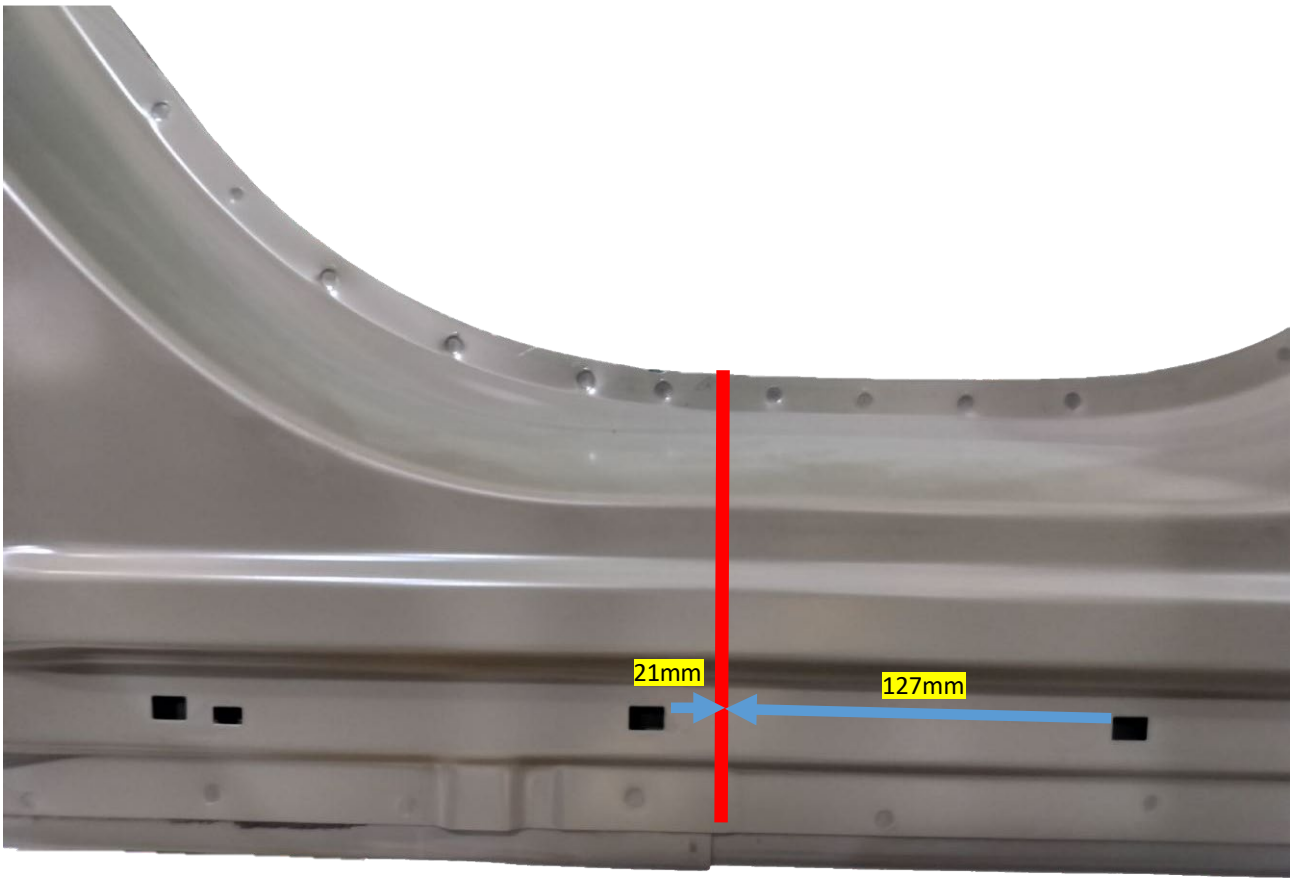


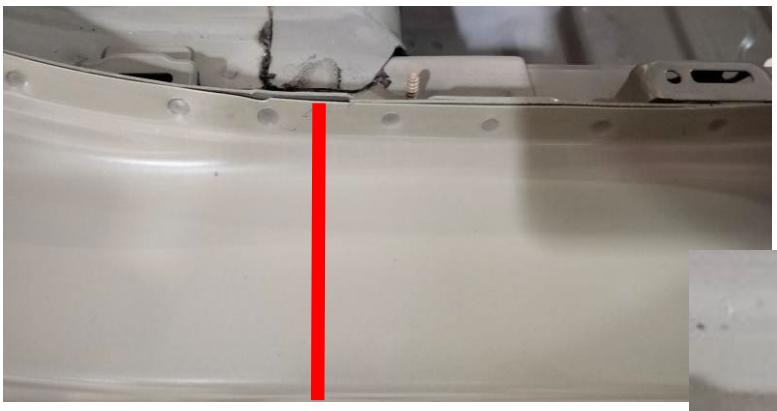


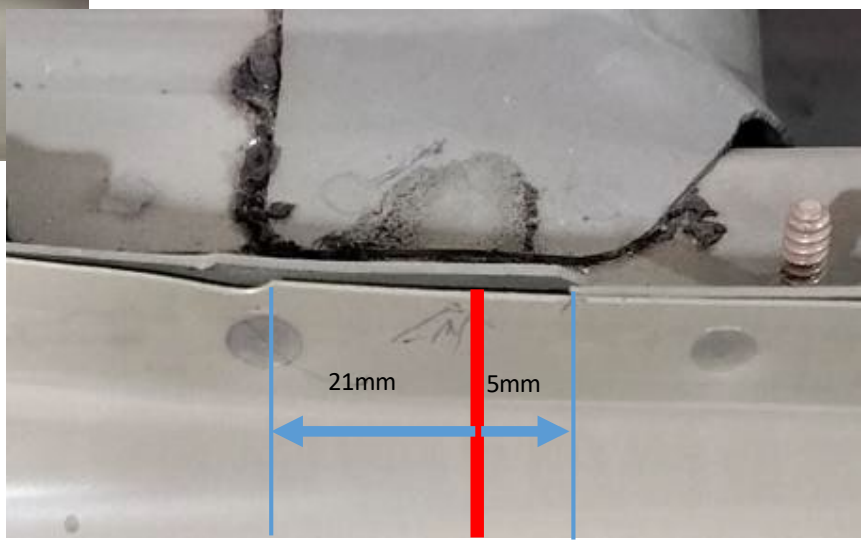
From the corner edge

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Perform the lower cut line as specified here and shown in the photos below.





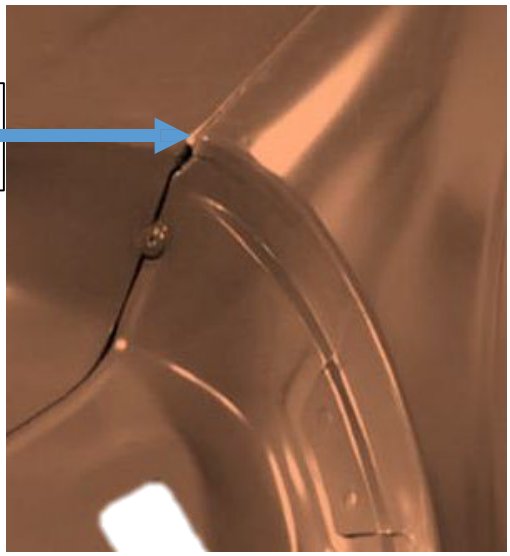


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Back side cutting line refrence point.

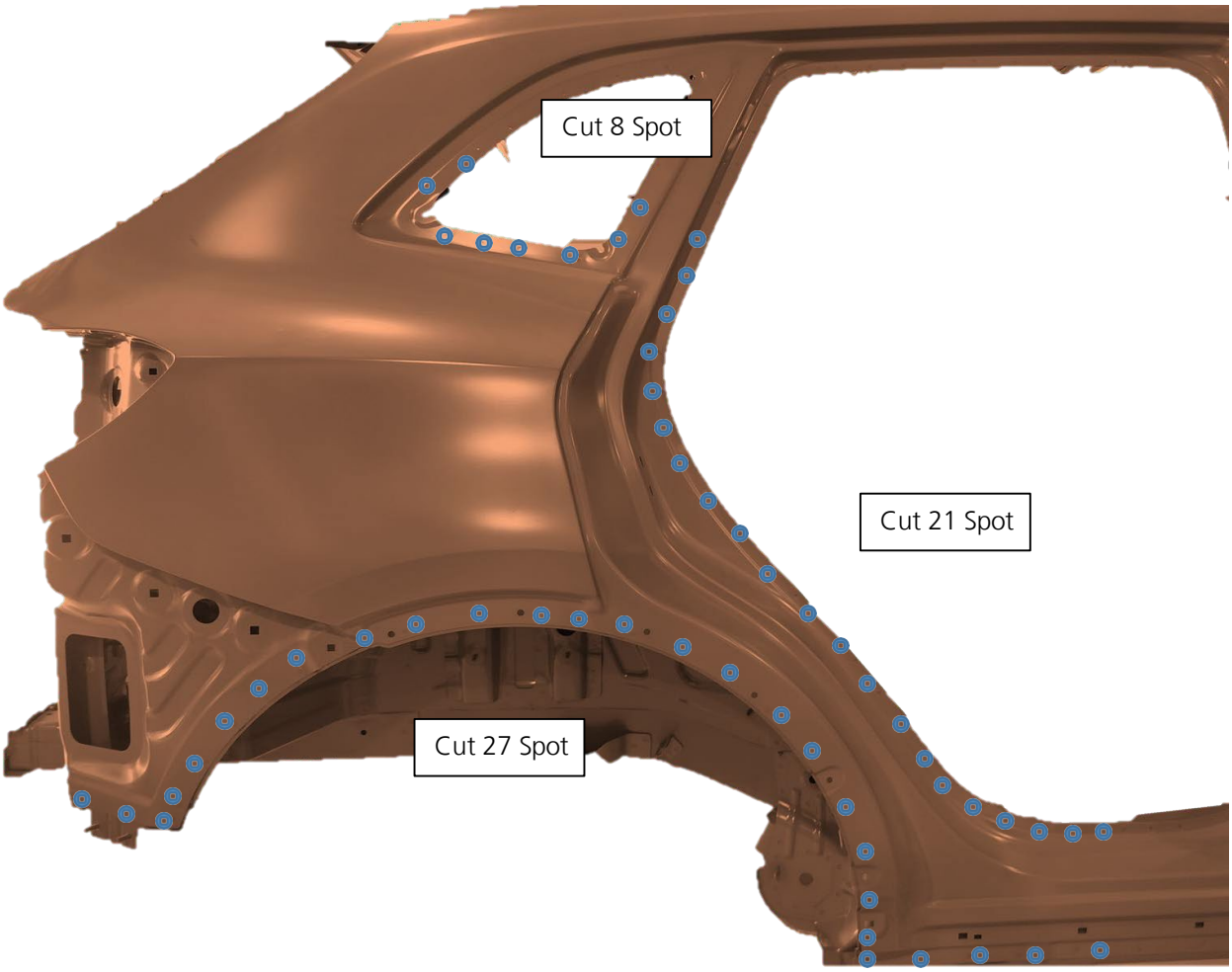


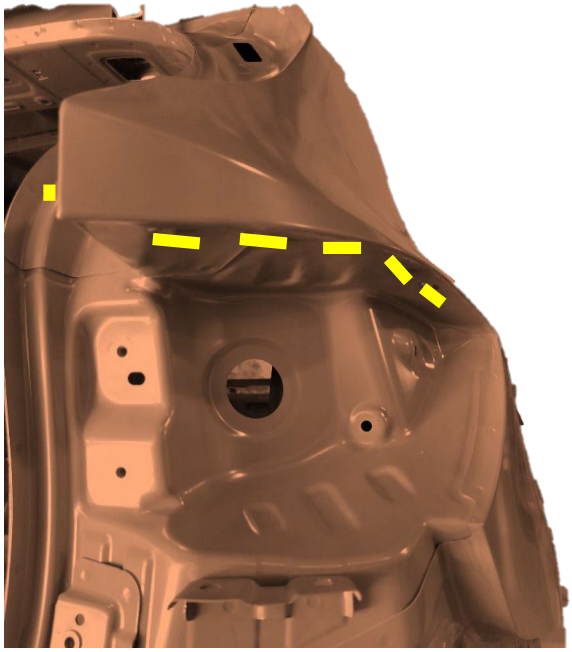
179 mm from the corner



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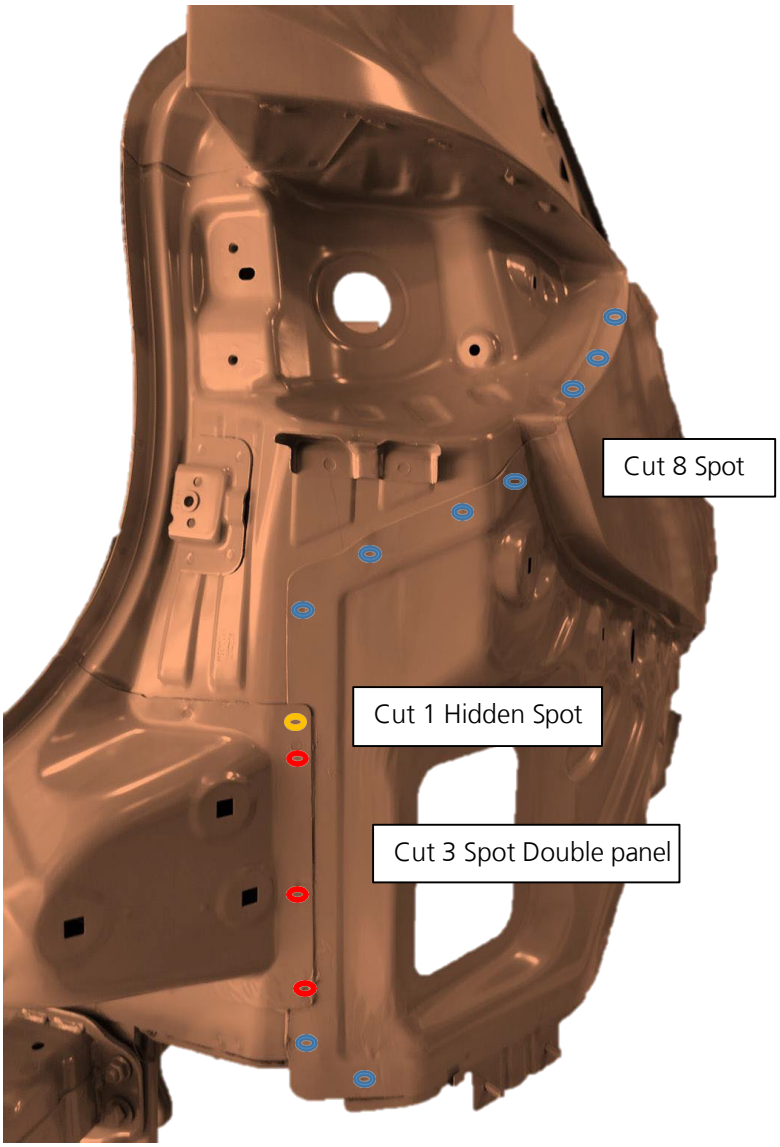
Spot Details on Panel



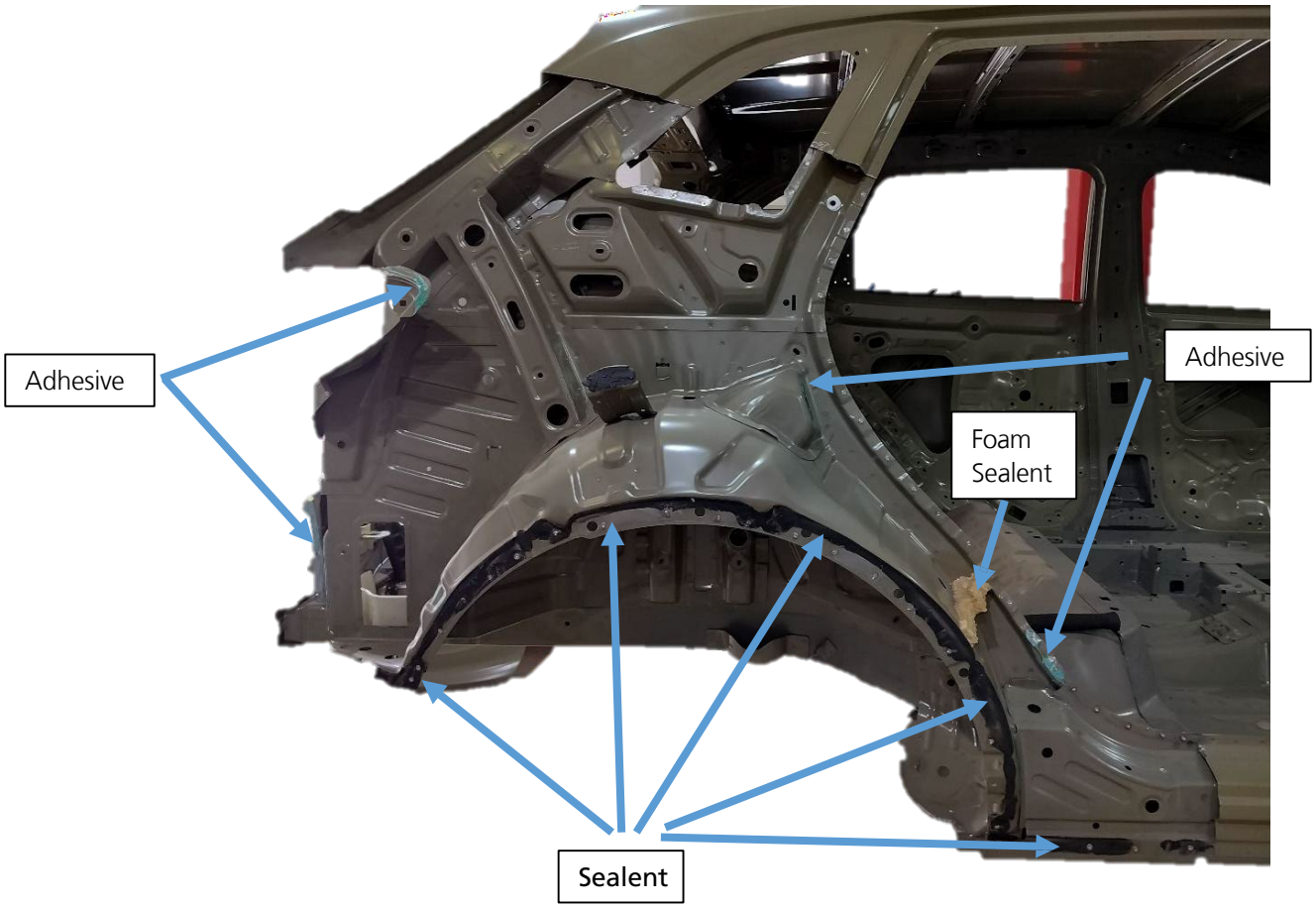


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Cut 8 Spot
Cut 1 Hidden Spot
Cut 3 Spot Double panel

Sealent and Adhesive area



Cut outer panel only.

- Remove side panel.
- Remove all glue and spot-weld remnants
- Straighten (repair) all deformation.

NOTE: Any accidental holes or tears to parts not to be replaced must not be welded and repaired

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Important

- Drill 6mm diameter holes for plug welding on new parts
- Install side panel, fit up only. No Glue, No Weld in C1
- Adjust and install new part to fit without excessive tension/stress.
- All the sill joint gap must be 0 mm – 1 mm
- Adjust new part to fit and secure with clamps
- Prepare all equipment and all the items you need to do the actual gluing and sealing process.
- Glue gun will be provid by Experts

C1 STOP

Sign in and write down the time of completion and for marking all your above operations: side panel removal, cutting, drilling, grinding, gap and new parts preparation.

Important

- You will be called for to add primer and glue when the Experts are done C1
- Apply primer on all surfaces which will be enclosed (on adhesive surfaces, no welding Primer). Marks will be deducted unless Experts assess how the work is performed.

C2 – Fitting, Gluing, and Sealing the side panel

- Safe work practices must always be adhered to and apply to the Competition Rules.
- You have to apply Adhesive and sealent infront of Expert team
- Make sure there is sufficient adhesive on bonding surfaces
- Fit, Seal, and Glue Quarter panel.
- Ensure alignment of swage lines at replacement part to existing vehicle part locations
- Prepare for welding (No welding in C2)

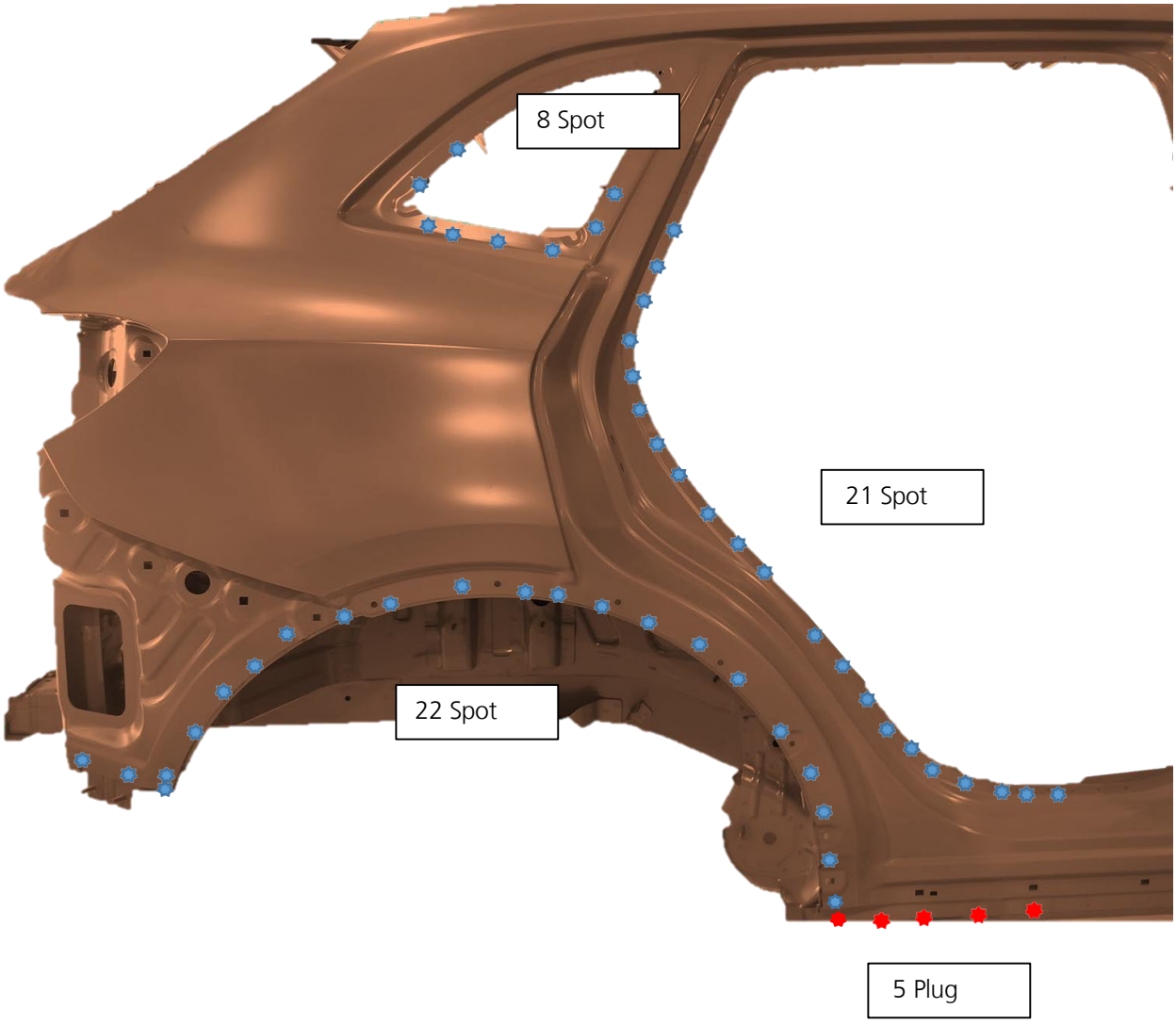
Don’t need to remove the Foam Sealing

For the glue Use 3M 08115, For the Sealing 3M 08684

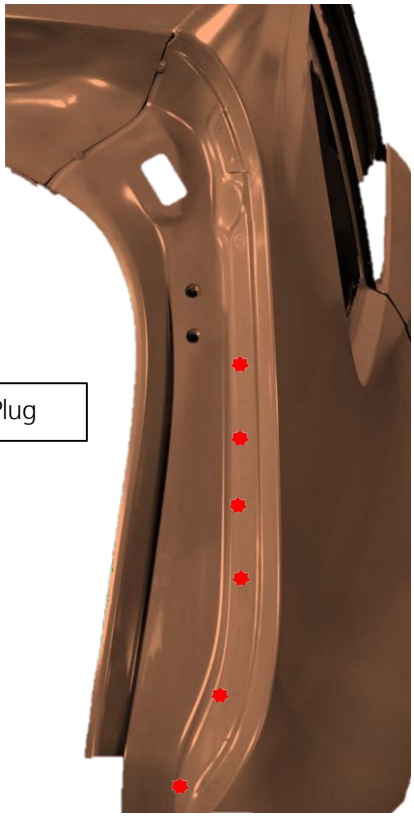
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C3 – Welding Side Panel

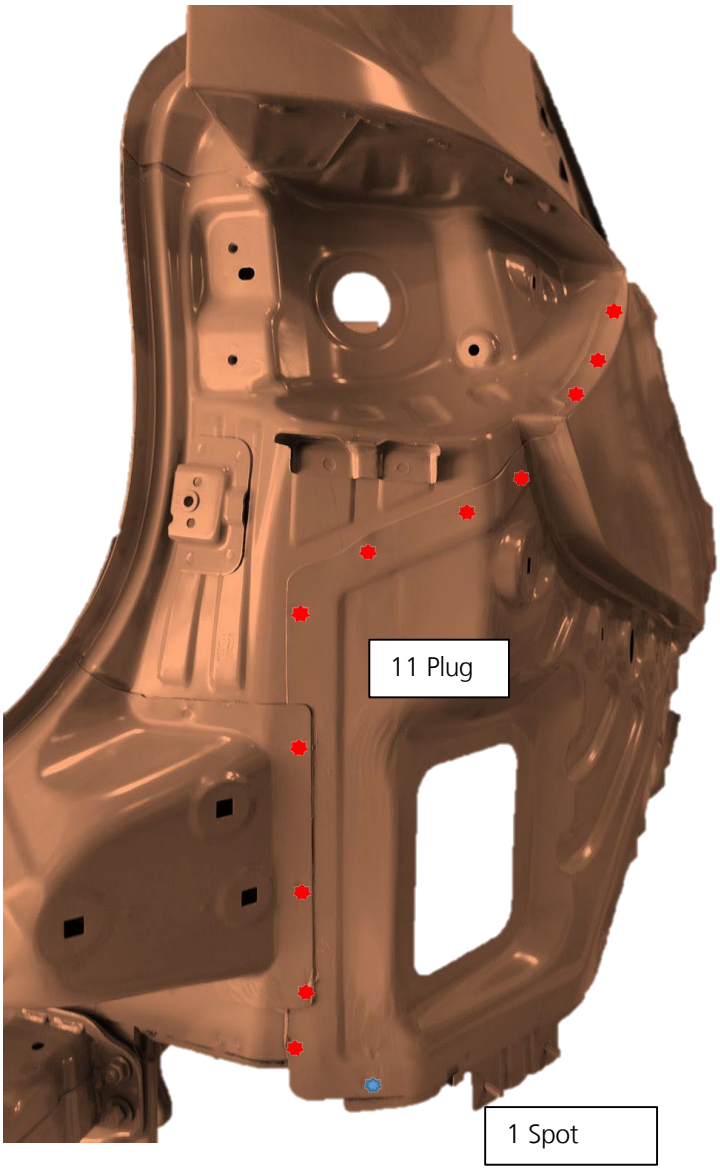
- Safe work practices must always be adhered to and apply to the Competition Rules.
- Fit and weld Quarter panel. The side panel's upside and downside weld must be a continuous weld or a step
- Welding, and all welds must have full penetration.
- All welds must be marked before grinding. Completed continuous welds must not be ground and re-welded.
- Welds will be tested for strength (random selection but the same weld for each Competitor-to be determined by Experts marking team). This will After be done by Experts at the end of the Competition. Butt welding and adhesive application will be marked after competition Completion.



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6 Plug



11 Plug

1 Spot

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C3 STOP

Sign in and write down the time of completion and for marking all your above completed operations

C4 – Grinding and Dressing

- Grind all the seam - and plug welds.
- Clean and finish all weld aras - sand to P120 or finer
- Paint edges feathered on seam weld area. (p120g-p240g)

C4 STOP

Sign in and write down the time of completion and for marking all your above completed operations. Marking of these tasks will typically after done at the end of the Competition

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Module D – Panel Repair

D1 – Door Repair (steel)

There are two (2) dents on the door to remove, you can see the position on the follow picture. All the other dents are already noted from the Expert group, documented and do not have to be observed.

You can repair the dents on the door at any time between the other tasks or if there are no other steps written in the manual.

Important

The door is positioned outside of your work area, as soon that you start to work on it the door has to stay in of your working place until it is completed. Once it is completed you can record it on the STOP table.

- Safe work practices must always be adhered to and apply to the Host Country's regulations.
- Restore repaired area to original contour and shape. The dent removal technique is up to you.
- Panel shrinking must be done with electrical equipment on your working place or cold shrinking.
- Repaired area is to be carried out without filler to a standard ready for chemical treatment and primer.
- Repaired areas must not have deep file or grinder marks/gouges.
- Sand your repair area to minimum P120 g.
- The panel repair area must not be damaged or over thinned by excessive filing or sanding (example, file or grind through body lines and fold.



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D2 – Bonnet Repair (aluminium)

There are three (3) dents on the bonnet to remove, you can see the position on the follow picture. All the other dents are already noted from the Expert group, documented and do not have to be observed.

Important

The repair will be in a separate workstation, together with the module E. The time limit in the shared area are for both Module D2 and Module E1 and E2 is 2 hours.

It is allowed to bring tools box and materials for the dent repair:

- Safe work practices must always be adhered to and apply to the Host Country's regulations.
- Restore repaired area to original contour and shape. The dent removal technique is up to you.
- Panel shrinking must be done with electrical equipment on your working place or cold shrinking.
- The repaired area is to be carried out without filler to a standard ready for chemical treatment and primer.
- The repaired areas must not have deep file or grinder marks/gouges.
- Sand your repair area to minimum P120. Grind your repair area to at least P120. If there is no damage to the surface after the repair (PDR), the repair area may also be un sanded.
- The panel repair area must not be damaged or over thinned by excessive filing or sanding (example, file or ground through body lines.



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Module E – Cosmatic Repair on Plastic

E1 – Cosmetic Repair on Plastic (Two-sided Bumper Repair)

E2 – Cosmetic Repair on Plastic (Flexible Patch Non- Structural Bumper Repair)

Important

You have to strat with both of task at same time and have to manage complete the task in given time. You also have to work on module E during the drying time of primer and glue.

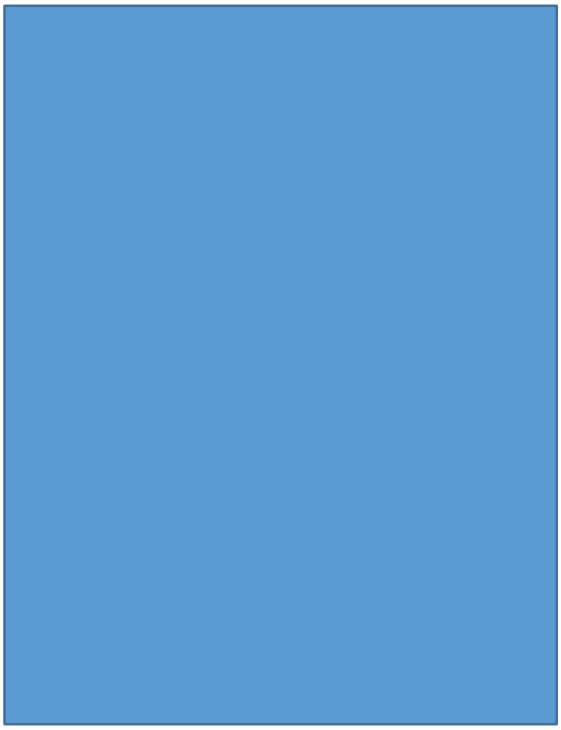
The total time for module D2 and modules E1 and E2 is two (2) hours.

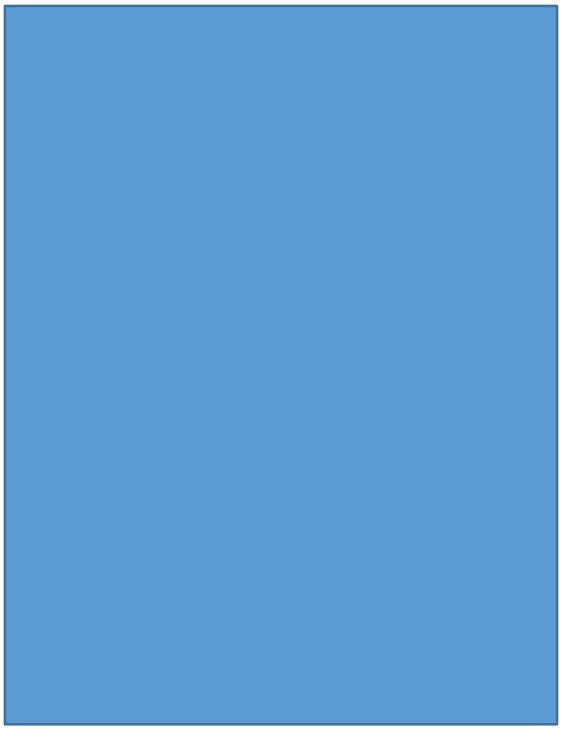
Provided tools and materials for Module E1

1. 3M manual for “Two-sided Bumper Repair”;
2. 3M surface cleaner VOC (08984);
3. Reinforcement Patch 04904;
4. 3M™ 05917TF – Polyolefin Adhesion Primer;
5. 3M™ 05901- Two-Part Epoxy Adhesive;
6. 3M™ 08190 - 3M™ Performance Manual Applicator, 50ml
7. Aluminum Tape

Provided tools and materials for Module E2

1. 3M surface cleaner VOC (08984);
2. 3M EZ Fix Flexible Patch Kit (05888);
3. 3M Automotive Adhesion Promoter (05888);
4. 3M™ 05917TF – Polyolefin Adhesion Primer;
5. 3M™ 05901- Two-Part Epoxy Adhesive





For Module E1

- Drill the hole at the end of the crack to relieve tension 3 mm - 5 mm
- Clean the damaged area with 08984
- Prepare the “Dish out” 15 mm - 20 mm on both side from the gap, the gap size is 1mm – 2 mm

For Module E2

- Bevel the front side of the repair area 20 mm from the edge leaving 1 mm of material at the inside edge
- Prepare the “Dish out” 15 mm - 20 mm on both

E1 and E2 STOP

You have to inform the Expert group about your stop and have to strat the work on module D2

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Module F – Panel Gap Adjustment

Competitors are requested to assemble and re-align the following vehicle body panels to the gap specifications also relayed below.

The designated parts to be assembled are as follows

- Assemble all the designate parts.
- Ensure that all the parts are correct position, correctly fitted and all bolts tightened.
- All the Gap must be adjusted as the standard value given.

See the relayed gap alignment values and continue to assemble the:

- Left and Right Front Doors
- Left and Right Rear Doors
- Front Hood
- The Gaps will be checked with the magnets placed in the positions relayed in the picture below.



Important

- The gap value is shown in the picture below and the tolerance will be +/- 1 mm.
- The gap will be measured at the point of the arrow.
- All bolts must be tightened
- Gap line consistency and panel flushness must be considered

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