GREAT DESIGNS IN STEEL

TWENTY YEARS

ADVANCED JOINING TECHNIQUES IN COLLISION REPAIR

Scott VanHulle

I-CAR

ABOUT I-CAR AND VISION

About I-CAR

I-CAR®, the Inter-Industry Conference on Auto Collision Repair, is an international not-for-profit organization dedicated to providing the information, knowledge and skills required to perform complete, safe and quality repairs.

Vision

That every person in the collision repair industry has the information, knowledge and skills required to perform complete, safe and quality repairs for the ultimate benefit of the consumer.

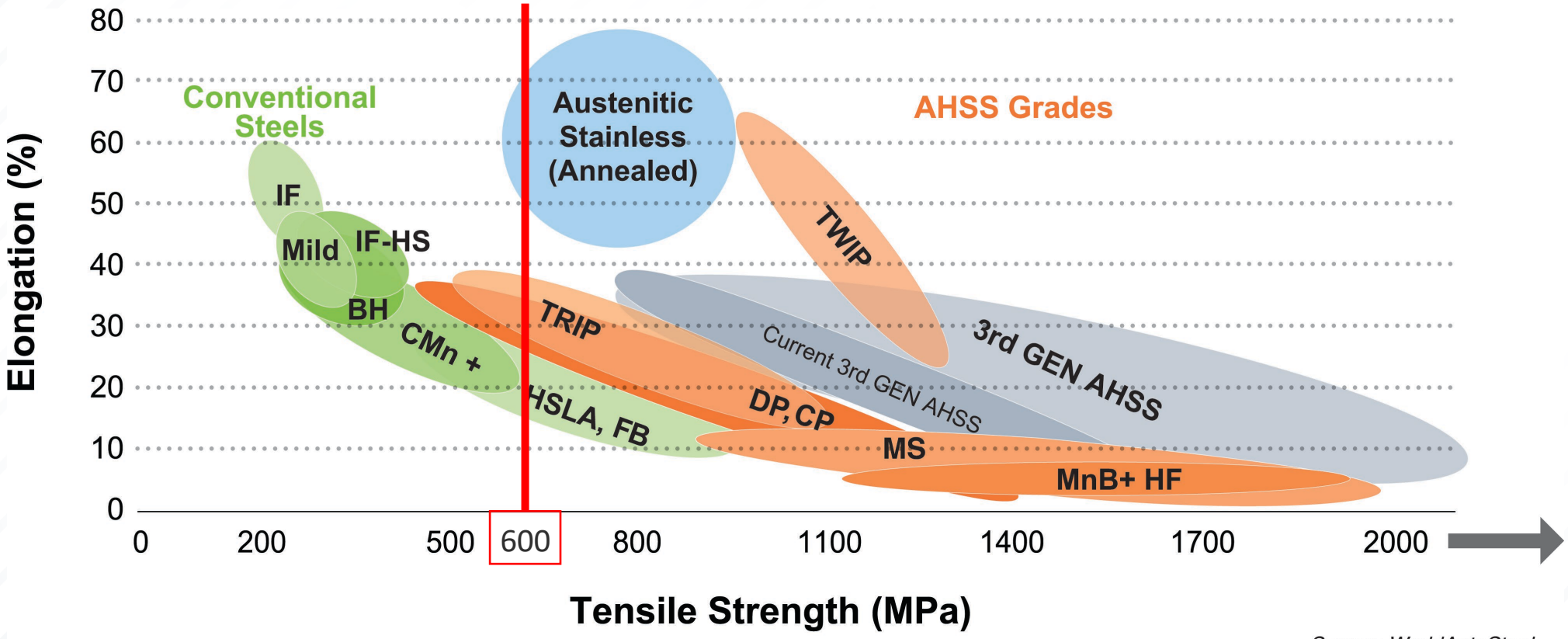
WHY THIS INFORMATION IS VITAL

Marcia & Matthew Seebachan - the consumer!

https://youtu.be/WhilpT13I9E

REPAIRABILITY IS ALL ABOUT MPa

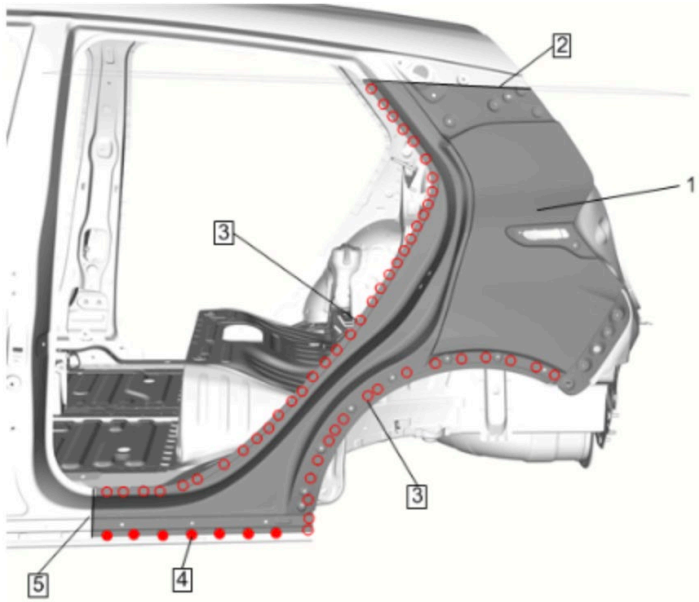
- 600 MPa and higher is not repairable regardless of composition
- Provide repairability documentation for below 600 MPa
- Provide a “do not straighten” statement for over 600 MPa



Source: WorldAutoSteel

MIG/MAG WELDING

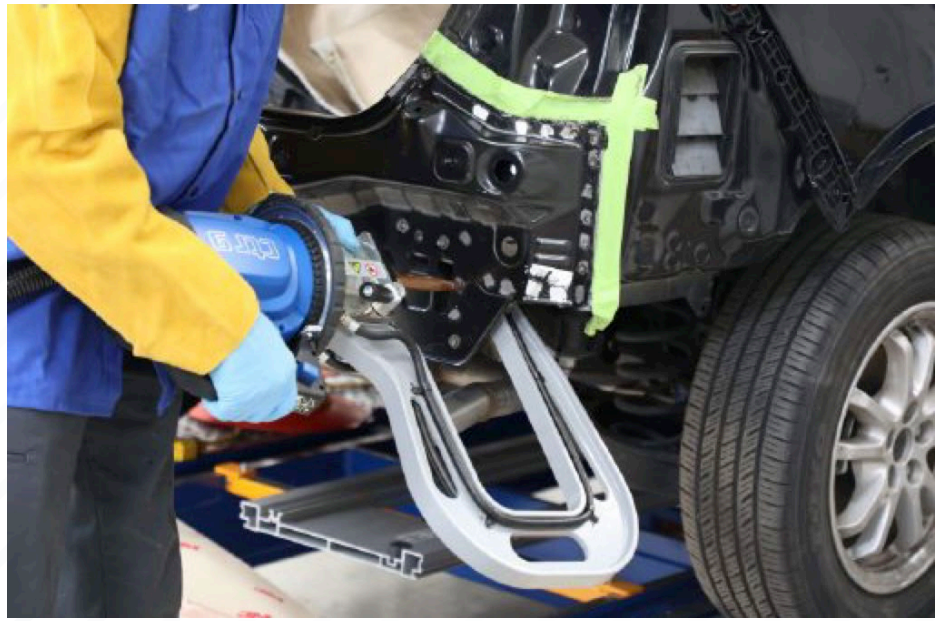
- HSS welding wire 980 MPa
- Weld nugget size charts
  - Dependent on panel stack
- Distinct weld symbols
- Used where spot-welding arms cannot reach

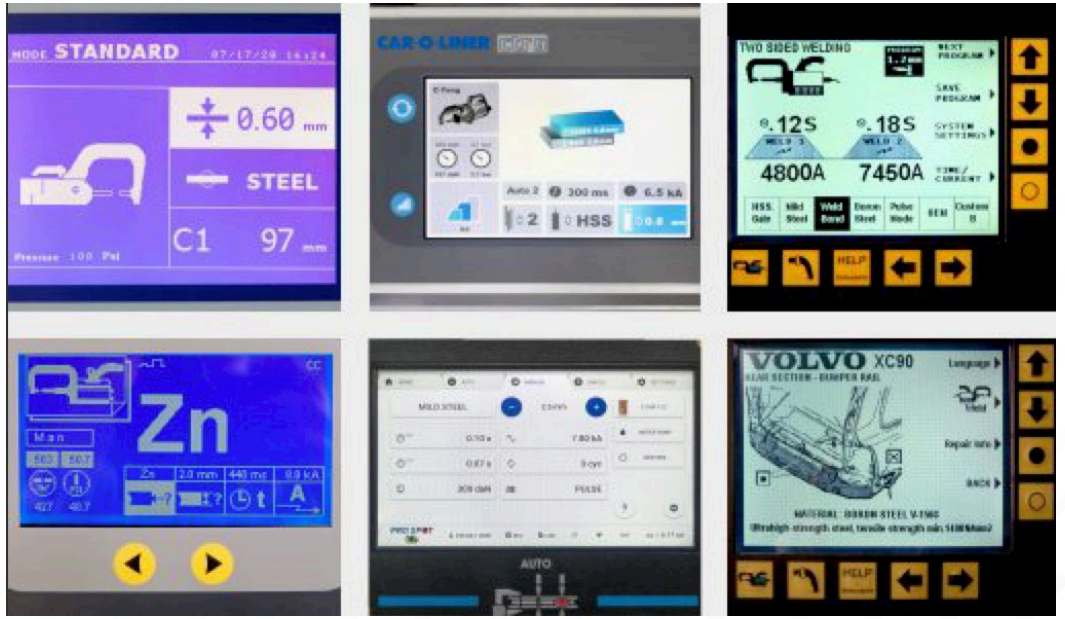


5. Install the quarter panel (1) accordingly.
   - **450 mm** braze seam (2)
   - 53 spot welds (3)
   - 7 plug weld (4).
   - **156 mm** braze seam (5)

SQUEEZE-TYPE RESISTANCE SPOT WELDER (STRSW)

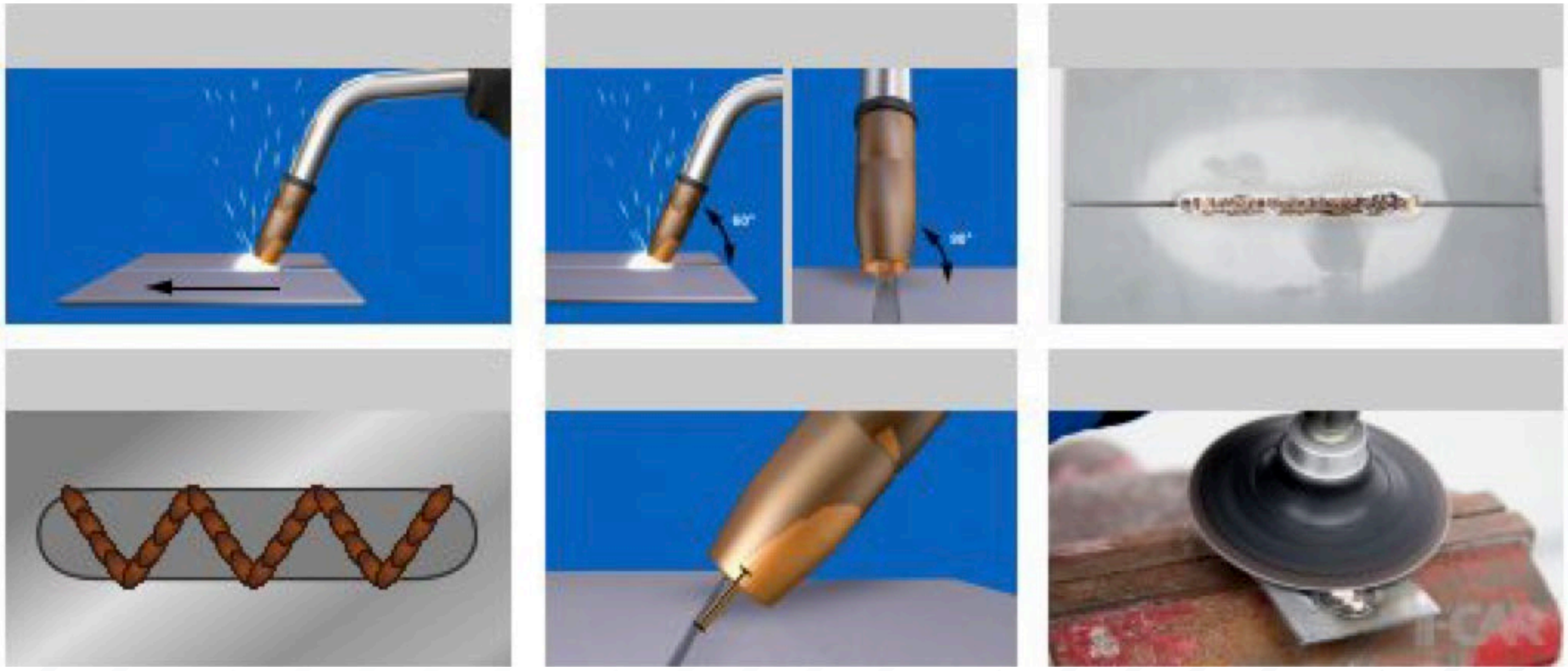
- Some auto set features
  - Specific welder settings on UHSS
- Current generation STRSW
  - 10,000 amps+
  - 990 lbs or 540 daN+ at the tips





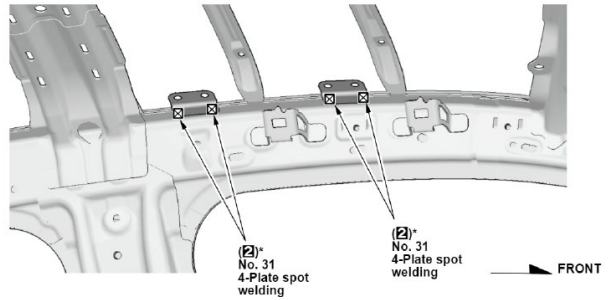
MIG BRAZING

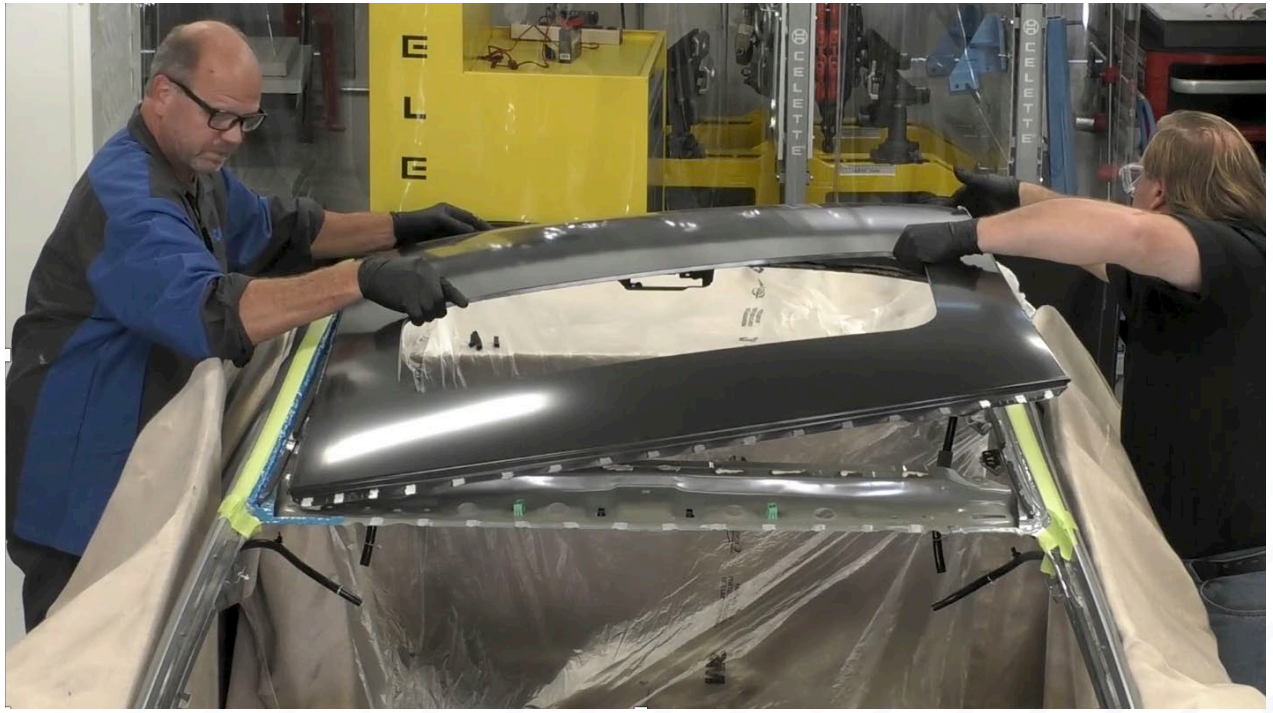
- Pulse capable machines
- Short-circuit and pulse welding currently used
  - Open butt-joint, lap joint, plug, slots, and double hole
- Attachment to UHSS and outer body panels



WELD BONDING

- Weld Bonding
  - Structural Adhesive
  - Panel Bonding Adhesive
  - Urethane Adhesive
    - sometimes used for roofs as a replacement for laser welded/brazed solutions



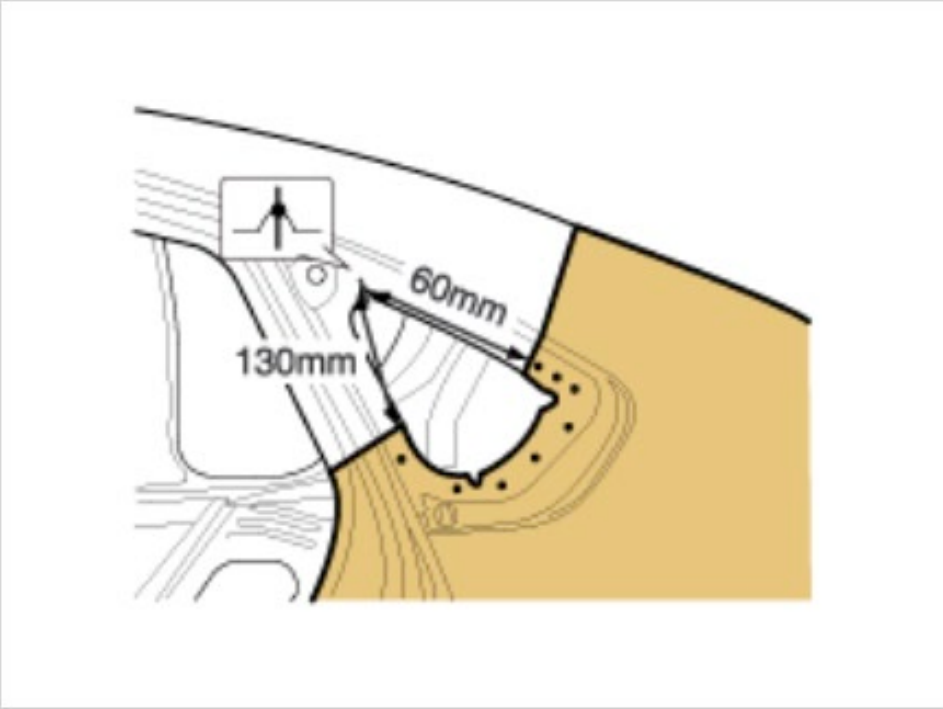


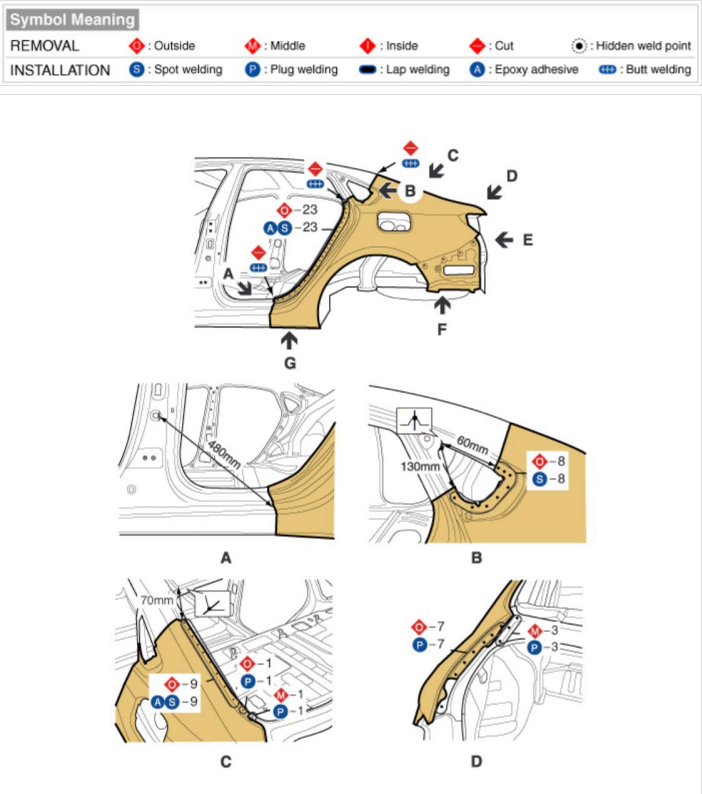
RIVET BONDING

- SPR
  - Repair facilities with this equipment have increased greatly
- Blind
  - Structural rivets
  - Used where STRSW cannot be used and HAZ is an issue

DETAILED REPLACEMENT PROCEDURES

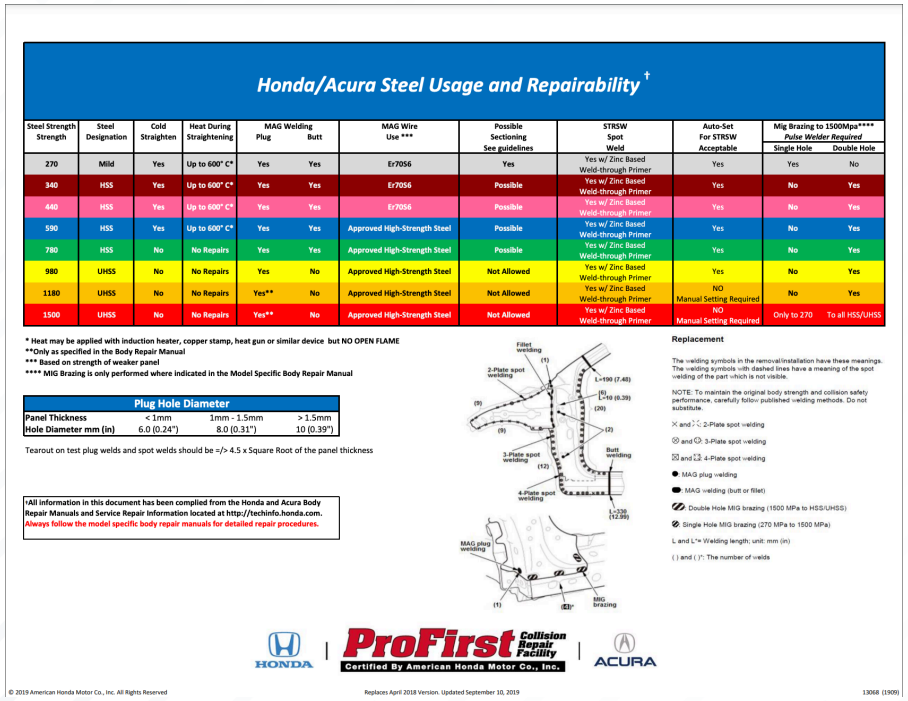
- Exact number of attachment points
- Repair attachment method can be a different method
- The more details that can be provided the better, that is:
  - Which parts need to be removed for access?
  - Can a removed part be reused?





DON'T FORGET ABOUT GENERAL INFORMATION

- Every collision is different
  - Give the collision repair professional guidance
  - Can't be a repair procedure for every situation
  - Can a bracket be removed?
  - Can a tear be welded below a certain MPa?
- Identification of the MPa using a detailed graphic



Honda/Acura Steel Usage and Repairability †

Steel Strength Strength	Steel Designation	Cold Straighten	Heat During Straightening	MAG Welding Plug	MAG Welding Butt	MAG Wire Use ***	Possible Sectioning See guidelines	STRSW Spot Weld	Auto-Set For STRSW Acceptable	Mig Brazing to 1500Mpa**** *Pulse Welder Required* Single Hole	Mig Brazing to 1500Mpa**** *Pulse Welder Required* Double Hole
270	Mild	Yes	Up to 600° C*	Yes	Yes	Er70S6	Yes	Yes w/ Zinc Based Weld-through Primer	Yes	Yes	No
340	HSS	Yes	Up to 600° C*	Yes	Yes	Er70S6	Possible	Yes w/ Zinc Based Weld-through Primer	Yes	No	Yes
440	HSS	Yes	Up to 600° C*	Yes	Yes	Er70S6	Possible	Yes w/ Zinc Based Weld-through Primer	Yes	No	Yes
590	HSS	Yes	Up to 600° C*	Yes	Yes	Approved High-Strength Steel	Possible	Yes w/ Zinc Based Weld-through Primer	Yes	No	Yes
780	HSS	No	No Repairs	Yes	Yes	Approved High-Strength Steel	Possible	Yes w/ Zinc Based Weld-through Primer	Yes	No	Yes
980	UHSS	No	No Repairs	Yes	No	Approved High-Strength Steel	Not Allowed	Yes w/ Zinc Based Weld-through Primer	Yes	No	Yes
1180	UHSS	No	No Repairs	Yes**	No	Approved High-Strength Steel	Not Allowed	Yes w/ Zinc Based Weld-through Primer	NO Manual Setting Required	No	Yes
1500	UHSS	No	No Repairs	Yes**	No	Approved High-Strength Steel	Not Allowed	Yes w/ Zinc Based Weld-through Primer	NO Manual Setting Required	Only to 270	To all HSS/UHSS

* Heat may be applied with induction heater, copper stamp, heat gun or similar device but NO OPEN FLAME
**Only as specified in the Body Repair Manual
*** Based on strength of weaker panel
**** MIG Brazing is only performed where indicated in the Model Specific Body Repair Manual

Plug Hole Diameter			
Panel Thickness	<1mm	1mm - 1.5mm	> 1.5mm
Hole Diameter mm (in)	6.0 (0.24")	8.0 (0.31")	10 (0.39")

Tearout on test plug welds and spot welds should be =/> 4.5 x Square Root of the panel thickness

†All information in this document has been complied from the Honda and Acura Body Repair Manuals and Service Repair Information located at http://techinfo.honda.com. Always follow the model specific body repair manuals for detailed repair procedures.

Replacement

The welding symbols in the removal/installation have these meanings. The welding symbols with dashed lines have a meaning of the spot welding of the part which is not visible.

NOTE: To maintain the original body strength and collision safety performance, carefully follow published welding methods. Do not substitute.

- ✕ and ⨯: 2-Plate spot welding
- ⊗ and ⊛: 3-Plate spot welding
- ⊠ and ⧈: 4-Plate spot welding
- ●: MAG plug welding
- ⬬: MAG welding (butt or fillet)
- ▨: Double Hole MIG brazing (1500 MPa to HSS/UHSS)
- ▨: Single Hole MIG brazing (270 MPa to 1500 MPa)

L and L'= Welding length; unit: mm (in)

( ) and ( )': The number of welds

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Replaces April 2018 Version. Updated September 10, 2019

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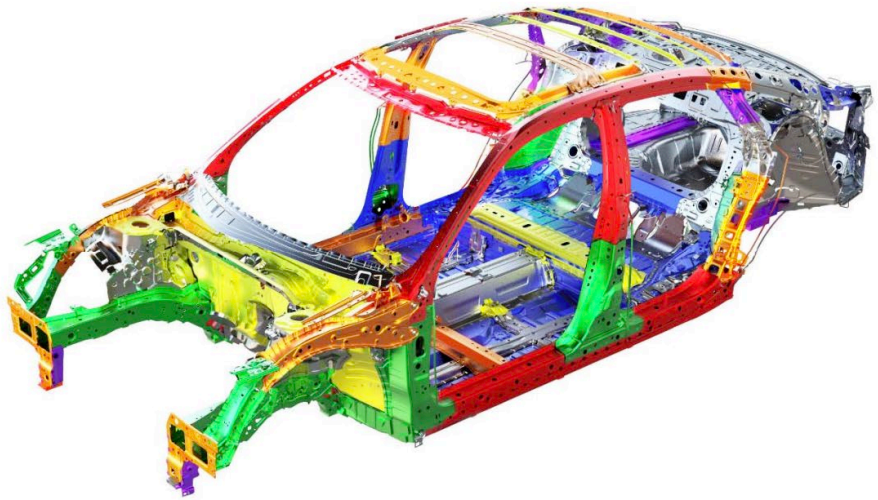
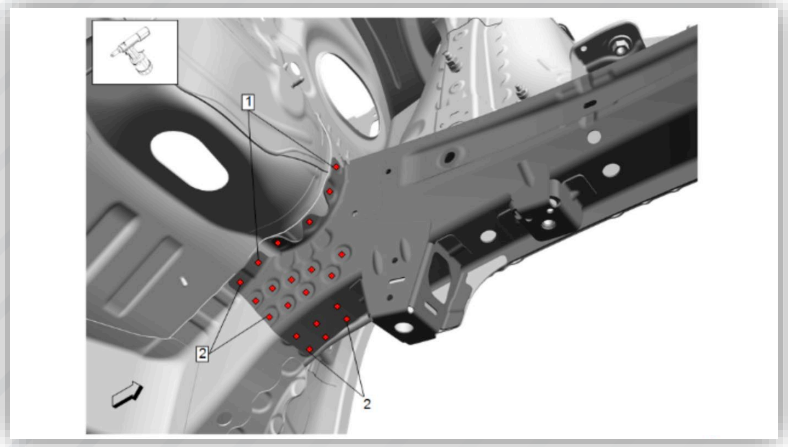
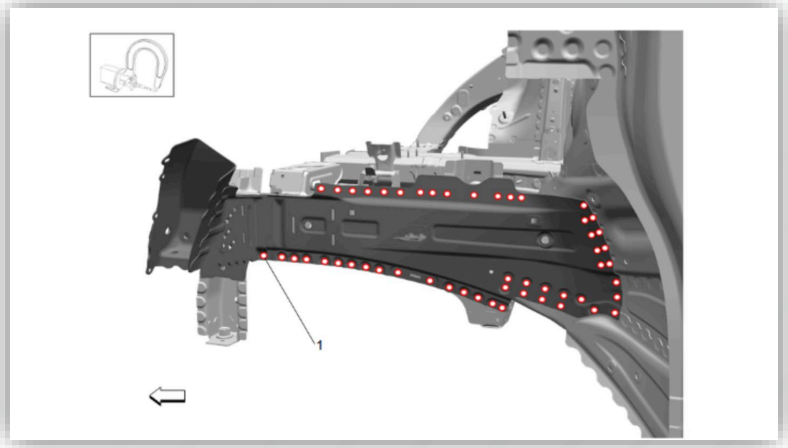
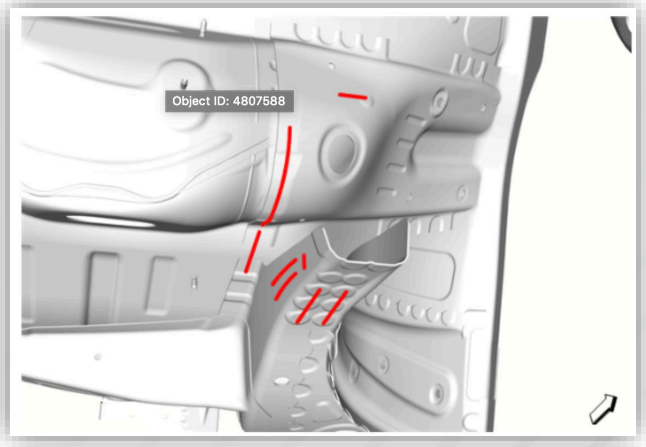


WHAT DOES THE FUTURE HOLD

- Alternate repair strategies
  - Attachment brackets that hold reinforcements in place
  - Part assembly replacement
  - More adhesive repairs
  - Different fasteners
  - More combinations of all attachment methods

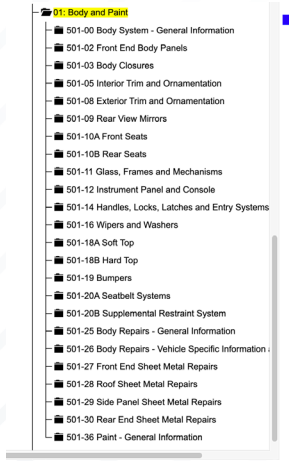


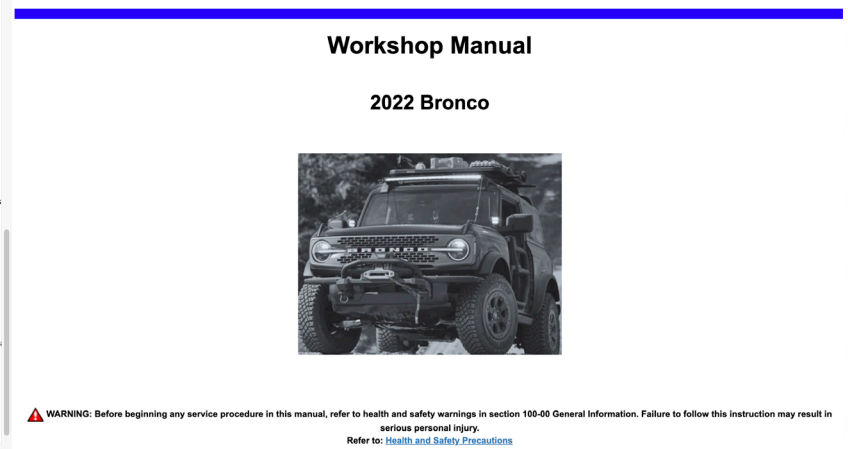


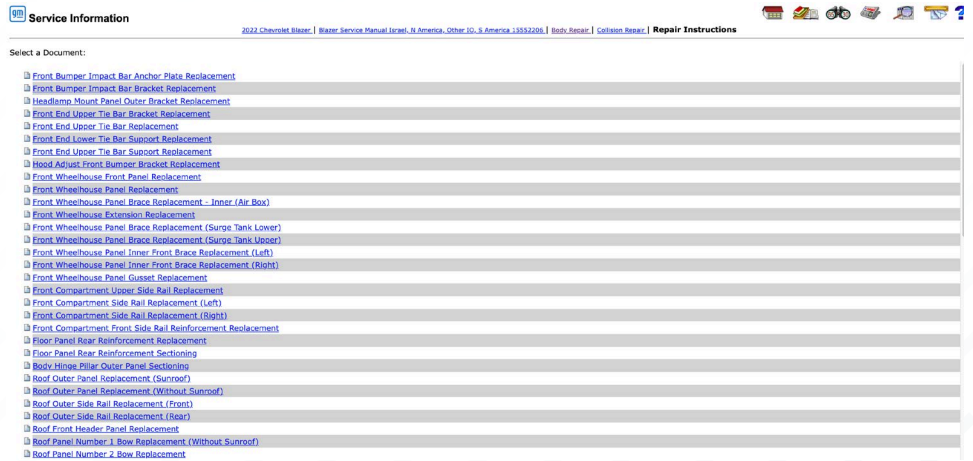


INFORMATION IN TECHNICIAN'S HANDS

- Alternate strategies than traditional path
  - QR code on parts to grant access to procedures?
  - Vehicle graphic that links to the procedure for each part?
  - Apps?
  - Collaborations with various information companies?







FOR MORE INFORMATION

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