I-CAR NEW ZEALAND

TECHNICAL REPORT

DON'T SECTION ULTRA-HIGH-STRENGTH STEEL

I-CAR Repairability Summit Identifies Best Practices

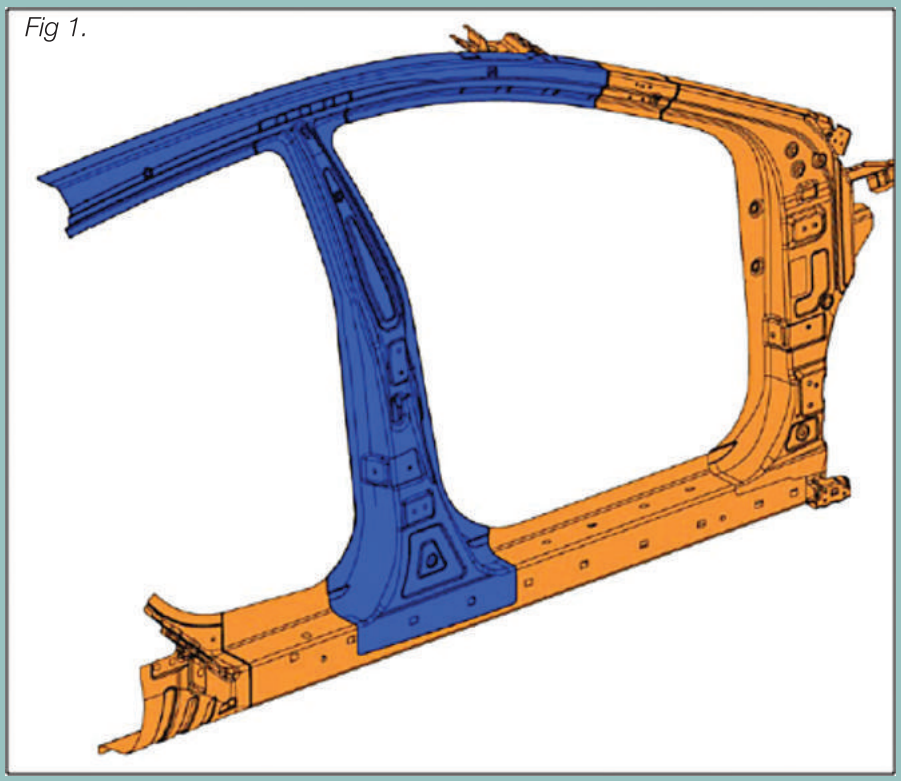
As vehicle manufacturers advance with new body designs that continue to increase the use of higher strength steels, so does the need for those repairing them to understand what can and cannot be done with these steels. Understanding is easy if the information is available, however this is not always the case and that's when you hear the comment "repair to the industry standard" or use "best practice" this raises the issue of what is best practice for these advanced steels?

Unless specifically recommended by the vehicle maker, parts with a tensile strength over 600 MPa should only be replaced at factory seams. This was just one of the "best practices" identified at a Repairability Summit hosted by I-CAR. Summit attendees consisted of subject matter experts from vehicle makers, tool and equipment makers, collision repair facilities, insurance companies, and the American Iron and Steel Institute.

The primary intention of the summit was to identify best practices for working with ultra-high-strength steels (UHSS) and the new construction methods found on late model vehicles. Examples of this are the steels now commonly used for front rails, A pillar, cross beam supports and sill panel reinforcements. The need to now replace the full B Pillar UHSS reinforcement panel *(see Figure 1)* is common in many vehicle models when in the past this could most often be sectioned. *Figure 2* shows the cut-out from the cant rail that is required to fit the full B Pillar reinforcement panel on the Hyundai i40. *(See Figure 3)* As a result of the many issues and concerns addressed at this summit the Best Practices for High-Strength Steel Repairs (SPS09) course was developed, this course highlights the issues covered during the Summit and the outcomes for best practices. This course was introduced by I-CAR New Zealand in 2013.

Summit attendees discussed various tests the technician can perform in the repair facility that help identify if the steel is mild, HSS, or UHSS.

Fig 1.



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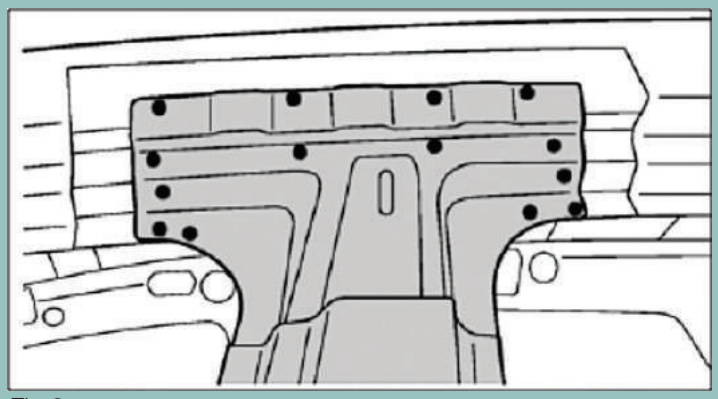

Fig 2.

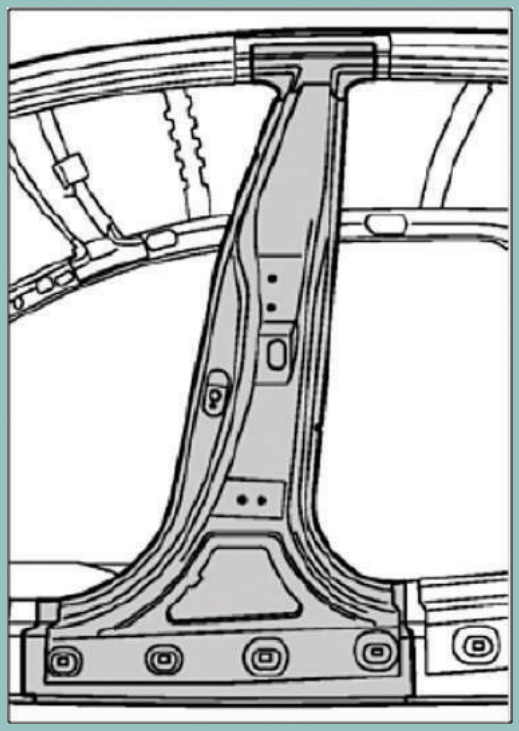

Fig 3.

INDUSTRY KNOWLEDGE

To prepare what information would be discussed at the summit, I-CAR conducted a survey of technicians in the field, asking what kind of information they would like to see from I-CAR in a future course on the subject of advanced construction. The survey revealed a lack of information among technicians actually making the repairs, and a definite need for a course addressing the subject. It's for this reason I-CAR New Zealand is giving this brief overview of this topic in hope that we can broadcast this message about repairing HSS and UHSS steels.

SUMMIT DISCUSSIONS

The agenda for the summit was laid out like a repair plan. After the discussion on steel strength identification, the group discussed best practices for anchoring and pulling and different removal methods. The created heat-affect zone from heating and removal methods was a major discussion point. A discussion on attachment methods focused on GMA (MIG) welding heat-effect on UHSS, the changes in spot weld machine settings, and how destructive testing of spot welds differs on UHSS panels compared to HSS or mild steel. Somewhat new attachment methods like MIG brazing and self-piercing rivet bonding were discussed, including the applications where they are recommended and possible future uses *(see photo below).*

To facilitate the conversation, I-CAR brought in two vehicles with similar side damage. The vehicles were of the same make and model, and even though separated by only one model year, the later model contained significantly more UHSS compared to the previous model. The two vehicles were used to identify the necessary changes in repairs due to more use of UHSS.

SUMMARY

Although many have attended the SPS09 course and now understand the cautions when working on these new model vehicles, the concern is that those who don't attend this or any other I-CAR course may still be repairing these vehicles as they have always done and that is likely not to be the correct method for a safe repair. It became clear during the I-CAR Repairability Summit that most new vehicles cannot be repaired using the same repair methods that were acceptable just a few years ago. Industry experts that attended the Summit addressed these issues and agreed on a list of best practices that can be used when vehicle maker repair information does not exist. The list of the issues addressed is the content of the Best Practices for High-Strength Steel Repairs (SPS09) course.