I-CAR NEW ZEALAND

TECHNICAL REPORT

KEEPING PACE WITH "WELDING AND JOINING METHODS"

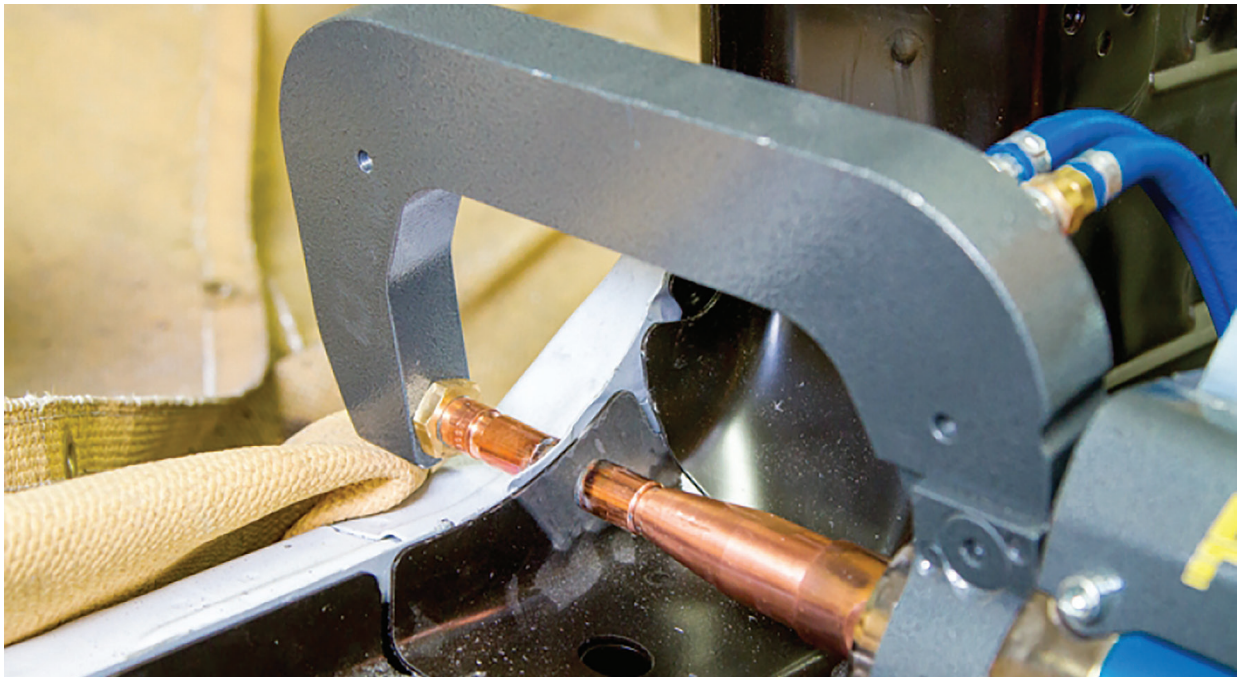
Following on again from the last I-CAR NZ Technical Report of "Keeping pace with welding and joining methods" we will look at some more examples that I-CAR have addressed.
The, "What is Inverter a GMA Welder," "Is a Spot Welder Required," and "MIG Brazing" topics following will hopefully answer a few questions.

What Is An Inverter GMA Welder?

When it comes to GMA welders, the term "inverter" is often used to describe the new GMA welders, but what is it and why does it matter to you? Let's find out.

You may have heard of inverter technology in the past in regards to squeeze-type resistance spot welding (STRSW), and really the technology is applied in the same way on GMA welders. Basically, the inverter increases the voltage frequency that comes into the welder. This higher frequency allows the welder to operate at a higher current output in a smaller machine with smoother, more efficient operation.

Is A Spot Welder A Required Tool?



On today's vehicles, you are going to run into high-strength steel (HSS) and ultra-high-strength steel (UHSS) which will affect the attachment method that will be required when replacing body panels.

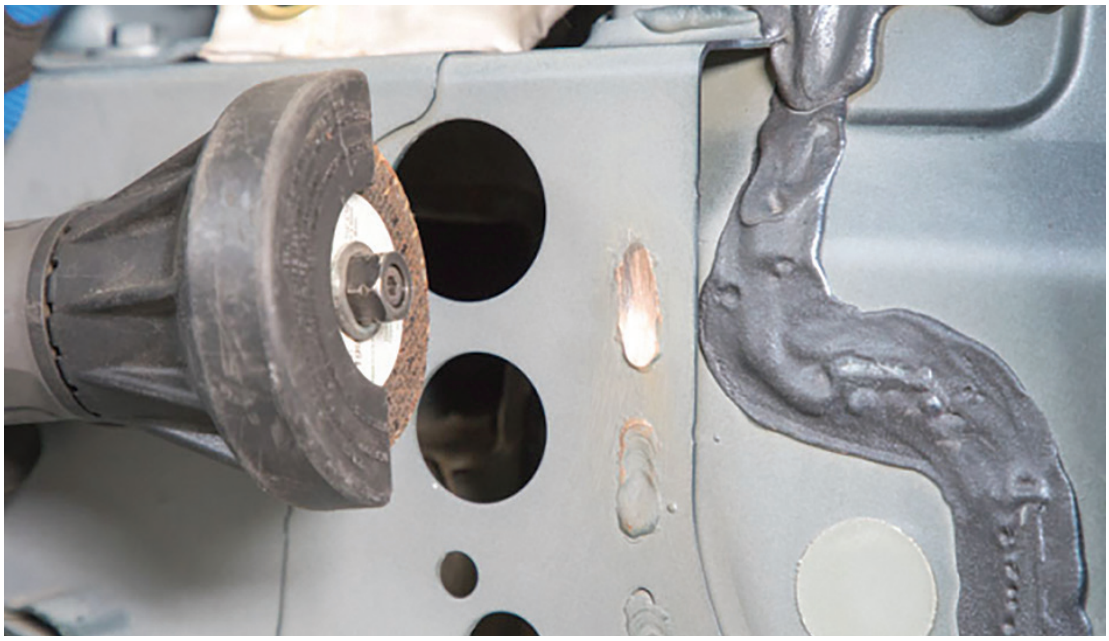
Most vehicle makers prefer the use of squeeze-type resistant spot welding (STRSW) for panel attachment due to the use of HSS & UHSS. The number of OEMs that allow conventional GMA welding on advanced vehicle structures will continue to decrease for many panel attachment applications. However, GMA welding will most likely continue to be used for sectioning, where allowed.

If the OEM requires/recommends the use of spot welds, a spot welder will be a necessary piece of equipment for the collision repair facility.

MIG Brazing: What, Where, When, And Why?

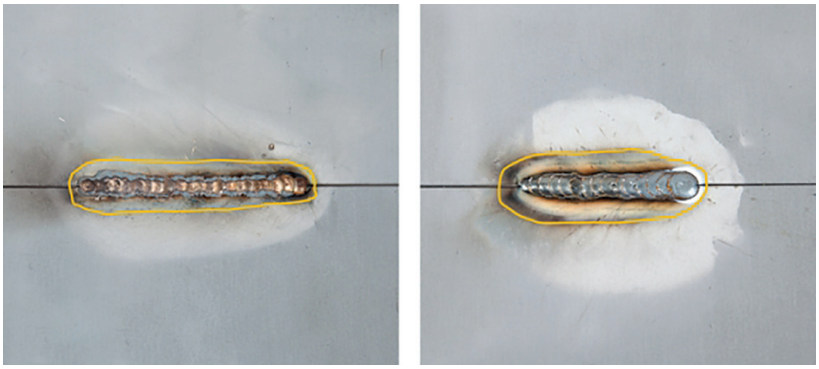
MIG brazing is becoming more popular than ever before. Different steel properties make them sensitive to the high temperatures that welding creates. MIG brazing solves the heat problem that welding creates by using a lower temperature to attach materials. MIG brazing comes with its own set of rules for use. Panel prep, technique, and machine setup all play major roles when it comes to using MIG brazing.

The following information is a just brief overview of MIG Brazing, so you should always consult the vehicle-specific body repair manuals and get the correct training before using MIG brazing. Remember, MIG brazing is a great attachment method, however, there is a great deal of OEM engineer analysis used to identify the correct attachment method for each procedure. So, using MIG brazing as a substitute for a weld should never be done without documentation from the OEM.



Why MIG Brazing?

It is widely known that GMA welded; fully galvanized steel will lose some of its properties, including corrosion protection, due to the heat created during welding. OEMs are starting to counter this problem by using MIG brazing along with "stitch" and "skip" methods to control the heat. However, MIG brazing should only be done in areas specified by an OEM procedure. With MIG brazing, the lower heat input burns away a minimal amount of the zinc corrosion protection (galvanizing) adjacent to the weld.



Generally, the melting temperature of the GMA welding electrode wire is higher than the evaporation temperature of zinc 910°C (1,670°F), causing the zinc to vaporize both in and around the weld zone. However, by reducing the welding temperature, less zinc will vaporize adjacent to the weld bead and the zinc disturbed by the process will "return."

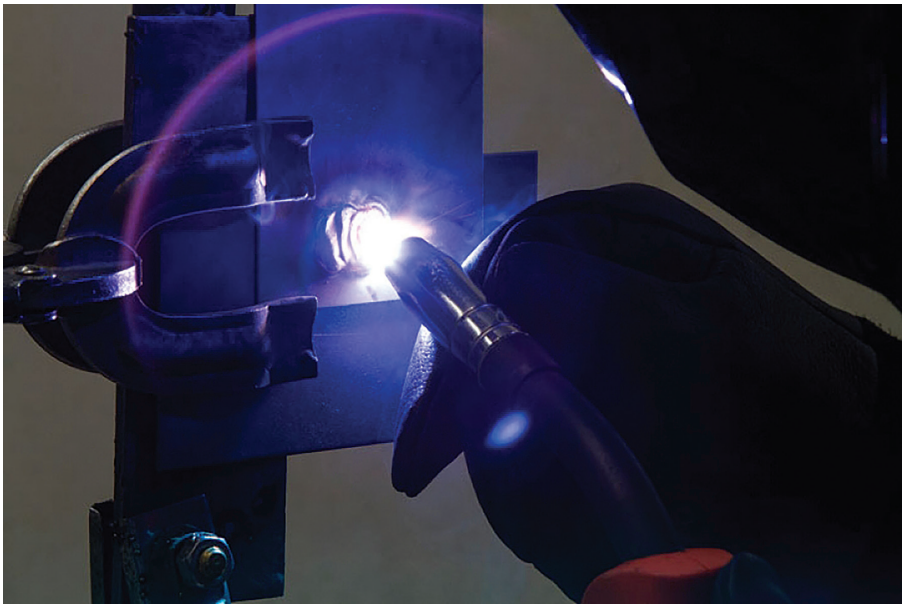
In addition to protecting the galvanized coating, the low heat involved in MIG brazing does not compromise the strength of the steel. A number of other characteristics associated with MIG brazing include:

- Less welding spatter. The material is transferred into the weld pool without any short-circuiting. As a result, the arc is almost entirely free of spatter.
- Easier finishing of the welded joint. The bronze bead is soft.
- Less potential for panel warpage when the weld heat is lowered.
- Reduced potential for burn-through.
- A good seal along the joint. Cathodic corrosion protection next to the weld bead (cathodic corrosion protection prevents rust "creep" between zinc and steel along cut edges of the panel).

Adhesion vs. Fusion

During GMA welding, the base metal melts and fuses with the melted filler metal at a temperature of approximately 1,650°C (3,000°F). This is considered a fusion process. When brazing, however, the temperature is considerably less, with a welding temperature of 1,940°F. Therefore, only the filler metal melts. It does not melt the surrounding metal in the weld zone, rather it lies on top without penetrating the base metal.

Common Mistakes: When MIG Brazing



When it comes to MIG brazing, there are some common mistakes that are easily avoidable and can have a huge effect on the durability of the repair joint.

The first common mistake that people make is selecting MIG brazing in areas that do not have any OEM supporting documentation. This may not sound like a big mistake, but keep in mind that MIG brazing is not fusing metal, it's only adhering two metals with silicon bronze. Because MIG brazing is not a fusion process, it often requires a larger surface area on the backside than when plug welding using traditional GMA welding. This is because there needs to be room for enough filler metal to give the weld its strength. This is the reason that double holes or slot welds are typically required instead of a plug weld. You should also only be using MIG brazing in areas where approved by an OEM or with a specific repair procedure.

The next mistake that technicians tend to make is, making MIG brazed open butt welds the same way as GMA welds. There is a tendency to turn up the heat and try to get the MIG brazed seam to look like a GMA weld. This not only defeats the purpose of using a welding wire that melts at a lower temperature, it also will not make a strong joint when capillary action is not achieved.

The moral of the story is, that everything you may have learned about GMA welding doesn't necessarily apply to MIG brazing. It is a different process and has specific techniques, machine setup, and panel preparation that must be learned and followed to achieve a complete, safe, and quality repair.