I-CAR NEW ZEALAND

TECHNICAL REPORT

KEEPING PACE WITH "WELDING AND JOINING METHODS"

In the last few issues of PanelTalk the I-CAR Technical Reports featured the Which is What with ADAS, Calibration and Scanning. This proved to be a simple way of understanding new technology and helpful for many who read these articles, but sometimes we also need to catch up on stuff we do every day. So, for the next few Technical Reports we will look at the most important skill required when repairing a collision damaged vehicle, this is welding or MIG brazing, but can also include other joining methods. Welding is a crucial skill in collision repair. The welding equipment and techniques are dynamic, also other OEM methods like riveting or bonding are now common, we must keep pace with these vehicle technology advancements.

I-CAR's Repairability Technical Support (RTS) team continues to research and help the industry by sharing critical and relevant technical information.

Just like the ADAS, Calibration and Scanning articles I-CAR have compiled a list of some of the publications proven to be the most helpful when it comes to welding. From terminology to quality control, there's something for everyone. We've broken down the topics into easy-to-understand categories that will provide information you require.

Joining methods and terminology is the first, we will look at.

Factory Built vs. Repair Procedure

When a vehicle is produced at the factory, speed of production is a major factor for the OEM. This means that a lot of time and money is invested into machines that can produce a quality product in a short amount of time. However, the collision repair industry does not often have access to the same technology used on the factory floor. The OEMs recognize that a method used at the factory will not always be possible during repair.

Also, some vehicles have global platforms, and the OEMs know that certain products may not be available in all areas of the world. By taking this into account, OEMs create repair procedures to fit the collision repair industry while maintaining the safety and quality that the vehicle had from the factory. So, when looking at a repair procedure, the procedure may specify to use a material that was not originally used on the vehicle during assembly. Let's take a closer look at some of the differences.

Laser welds, laser-brazed welds, and laser-screw welds cannot be duplicated in a collision facility. These types of welds are created by precision robots and can't be done by humans. When doing a repair procedure on a vehicle that uses these types of welds, the procedure may be very different. Some procedures may specify that adhesive, spot welds, and/or plugs welds be used in place of these laser-welded areas.

Even some outer quarter panel replacement procedures differ from the factory. The factory may have used adhesive to attach a hem flange from the factory. However, the procedure may specify to use a seam sealer or urethane to replace the adhesive.

Some parts made of high-strength steels and ultra-high-strength steels, can be adversely affected by heat. These parts may not be able to be installed with traditional gas metal arc welding, due to the heat-affected zone (HAZ). Sometimes, using squeeze-type resistance spot welding (STRSW) in repairs may not be an option, due to location and access of the part. In these cases, the OEM might require rivet bonding or MIG brazing to attach the new part.

Aluminum vehicles normally use self-piercing rivets (SPR) for fasteners, at the factory. An SPR may not always be replaced by an SPR during repair. Sometimes, blind rivets may be used, while other times, plug welds will take the place of the SPR.

Though the repair procedures might be different than how the vehicle was originally built, the procedures were created and tested to ensure the vehicle performs as designed in the next collision. In the end, always follow the OEM part specific procedures at the time of the repair to ensure complete, safe, and quality repairs.

Is it MIG or is it MAG?

image sourced from blog.thepipingmart.com

Once people get used to calling something one thing, it's difficult to change it. To be technically accurate, whether it's MIG or MAG depends on the shielding gas.

When GMA (MIG) welding started its rise, it was often referred to simply as MIG welding. While this term is widely known, it's not technically accurate. MIG stands for "Metal Inert Gas" and is accurate when making welds using an inert shielding gas, such as 100% argon when welding aluminum. However, for most collision repairs on steel parts, we use a shielding gas that is 75% argon, 25% carbon dioxide (often called 75/25, or C-25). Because carbon dioxide is an active gas, the correct term would be metal active gas (MAG) welding.

Why is this important? When looking through some vehicle makers repair information, it may call out MAG welding as the recommended attachment method. Instead of taking time trying to figure out what MAG welding is, you can simply carry on with the repair process.

Regardless if a technician is doing MIG welding, or MAG welding, both processes are gas metal arc (GMA) welding methods. Therefore I CAR, and others, made the switch to GMA (MIG) when referring to the welding process – GMA, to be technically accurate, and MIG to help with its recognize ability.

What Is Pulse Welding?

There's some confusion in the industry about the term "pulse" welding - so let's take a closer look at it.

The correct term is pulse spray-arc transfer. This term is describing what happens to the welding wire inside the weld arc and how the melted wire is then transferred to the weld puddle. Pulse welding should not be confused with the process where a weld is stitched (sometimes called manual pulse). If a weld is made by pulling the trigger for a second or two, then letting the puddle cool, followed by striking an arc again - it is NOT pulse welding.

During pulse spray-arc transfer, the welder varies the electrical output of the welder (over 50 times a second) in order to form one droplet of the melted wire per pulse. Once the droplet is formed, the welder increases the electrical output to "push" the droplet into the weld puddle. The electrical output raising and lowering allows the welding process to be done at cooler temperatures making a quality weld without spatter or loss of penetration into the material.

Welders that have "pulse" capabilities can be set to weld in pulse spray-arc transfer method and typically will also be capable of welding in the short-circuit transfer method (traditional welding transfer method used for GMA welding on steel for decades). Also, note that the pulse spray-arc transfer method is typically required by the vehicle makers when aluminum welding and MIG brazing.

What Is A Synergic Welder?

Some are also confused around the term "synergic" welding machines in the industry, and we wanted to add some clarity to the subject.

When a welder is referred to as synergic it means that when a single setting is adjusted (voltage, or material thickness, most commonly) the other settings (current, or wire speed) also change. On a pulse capable welder, there are a multitude of pre-configured settings being changed by the computer inside the welder to provide the best possible weld.

While a pulse capable welder is typically where you will find the application of synergic welders, you also can see this on some machines that weld exclusively in the short circuit.