

## STUD WELDING TOOL FOR ALUMINUM

There's more aluminum being used for body panels each model year. This is because of the advantages of aluminum, including higher strength with lower weight, natural corrosion resistance, and the ease of recycling aluminum. The increased use makes it more likely that collision repair facilities will have to work with aluminum body panels.

Methods for straightening aluminum are similar to the methods used to straighten steel, but the proper tools and equipment must be used. Conventional stud welders, for example, cannot be used. Aluminum dissipates heat much faster than steel. Therefore the current output on stud welders must be much higher.

There is equipment available designed specifically for the removal of dents in aluminum panels (see Figure 1). This dedicated electric dent removal stud welder is plugged into a conventional 110 volt outlet. There's an onboard capacitor to boost the current, enabling the stud to be welded onto an aluminum panel. The machine welds a threaded stud onto the panel. A washer with a threaded insert is then installed onto the stud. The washer is used for pulling out low areas.

### PULLING OUT A DENT

These are the steps to remove a small dent on an aluminum door panel using this tool. The first step is to protect sensitive electronic modules from the high current by disconnecting the battery. Plastic is used to prevent any damage to adjacent panels, and spark resistant paper is added to protect the glass from grinding and

welding sparks. The panel is then cleaned with wax and grease remover.

The area of damage is located and the finish removed using a dual-action sander (see Figure 2). The sander is held flat and moved continuously to prevent heat build-up on the panel. A plastic abrasive wheel is used to remove the remaining paint coatings from the dent.

Just like performing any weld, a practice stud weld must be performed on similar material to obtain the proper heat settings. An aluminum coupon can be used (see Figure 3). The ground clamps are then installed on the door shell mounting bolts. The area is wire brushed to remove any oxide barrier that has formed on the aluminum, and a stud is placed in the welding gun. The welding gun is pushed against the panel on the body feature line. As soon as the proper amount of pressure is achieved, an electrical current causes the stud to become welded to the panel. Two more studs are added to enable the pulling force to be spread out over the length of the damage on the body feature line (see Figure 4).

Washers with threaded inserts are attached so that a pull can be performed (see Figure 5). Heat is applied so that the aluminum will reach the repair temperature making it easier to straighten (see Figure 6). The temperature must be closely monitored when heating, since aluminum doesn't change color when heated. Heat monitoring strips or a noncontact thermometer are two methods that can be used to monitor the temperature of the surface. A steel rod and the equipment

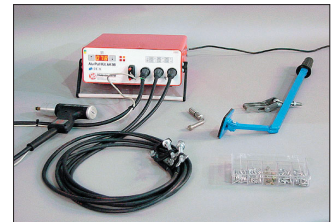


Figure 1—This stud welder is designed specifically for use on aluminum body panels.

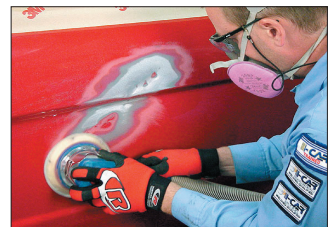


Figure 2—A DA sander is used to locate the damage and remove most of the paint coatings.



Figure 3—Perform a test stud weld on material of similar alloy and thickness as the panel on the vehicle that will be welded.



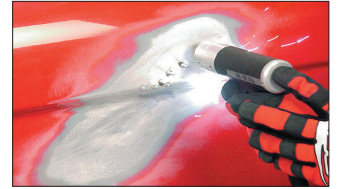
Figure 4—Multiple studs are attached to spread out the pulling force.

leverage bar are then attached to the washers to enable the damage to be restored to the original contour (see Figure 7). As outward pressure is used on the low areas, high spots are tapped down with a leather-faced slapper and a body hammer. The washers are then removed. If the dent is too low, more heat can be applied and a hand puller used to remove the remaining damage to the body feature line.

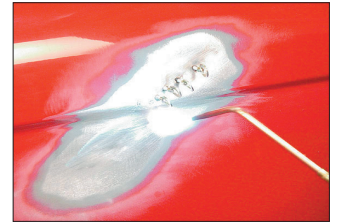
The studs are removed by twisting them with a side cutting pliers. The washers and studs are removed from the panel and the remaining stud is ground away with an angle grinder. The repair area is sanded in preparation for epoxy primer and/or body filler applications.

## CONCLUSION

Conventional steel stud welders cannot be used for damaged aluminum body panels. The high heat dissipation quality of aluminum requires a machine with a higher current capacity. The machine described in this article is an example of one type of equipment designed to perform this type of repair.



*Figure 5-The washers have threaded inserts that thread onto the attached studs.*



*Figure 6-Heat is applied to soften the aluminum for easier straightening.*



*Figure 7-A steel rod, anchored by the washers, is pulled by a leverage bar to pull out the dent.*