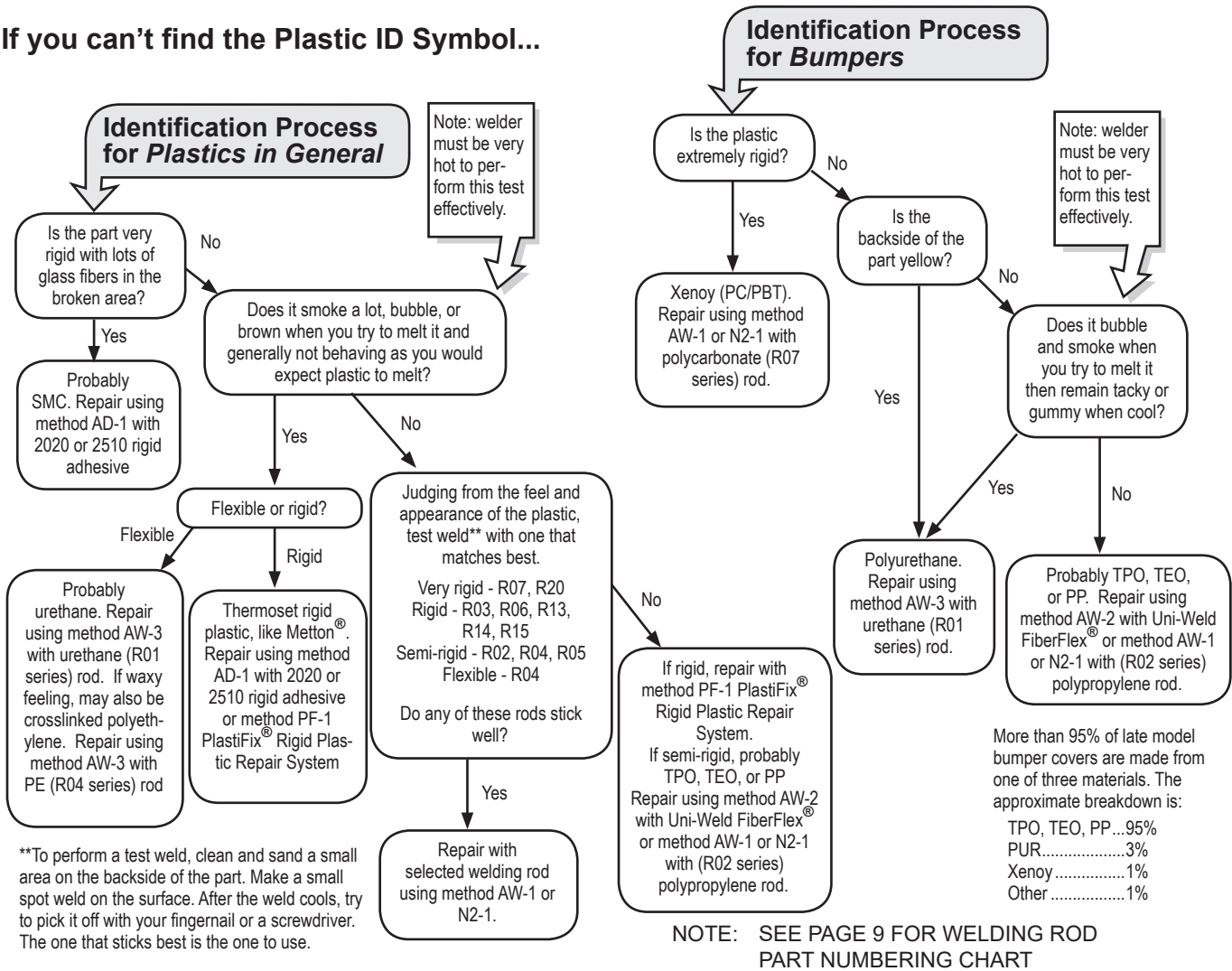


If you can't find the Plastic ID Symbol...



PREPARING PLASTIC FOR ALL REPAIRS

Clean Surface

In order to maximize strength any repair, thoroughly clean contaminants from the surface in the damaged area.

Step 1. Clean both sides with soap and water. Dry with a clean cloth or compressed air.

Step 2. Spray 1000 Super Prep or 1001-4 EcoPrep Plastic Cleaner onto the surface and wipe off while wet with a clean, lint-free cloth. Wipe in one direction to avoid spreading contaminants back over the clean area.

Align Damage, Remove Dents and Deformation

If the plastic is distorted, heat with a heat gun and reshape the distorted area. When heating plastic, it is important that the plastic be heated all the way through. Hold the heat gun on the area until the opposite side of the plastic is uncomfortable to the touch. Once heated, force the plastic back into position with 6148 Bumper Rollers or other appropriate tool, then cool the area with a damp cloth. Stretched areas can be shrunk with the bumper cold. Keep working until smooth, then sand overall with 80 grit to help identify remaining low spots. Push out remaining low spots and repeat the process.

Thermoset polyurethanes (PUR, RIM) have a "memory" that will often cause them to go back to their original position if held under a heat lamp or in a heated spray booth.

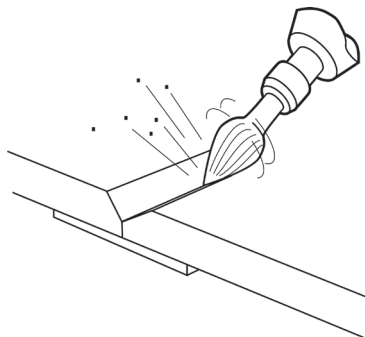
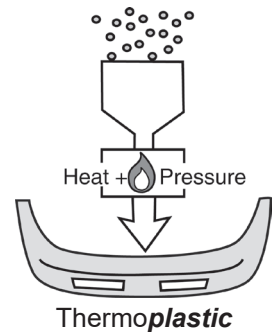
If the part is cut or torn to the edge, align the cosmetic surface with 6482 or 6485 Aluminum Body Tape and begin the repair process on the back. By aligning the outer surface, you minimize the amount of filler required to restore the proper profile to the part.

Repairing Thermoplastics with Fusion Welding using Airless Plastic Welder

Excluding urethane bumpers, all bumpers, and nearly all other plastics on automobiles and nearly everything else made of plastic, are made of thermoplastic materials. This means they can be melted with the application of heat. Thermoplastic parts are made by melting pellets of plastic and injecting the melted material into a mold, where it cools and solidifies. This means that thermoplastic parts can be melted.

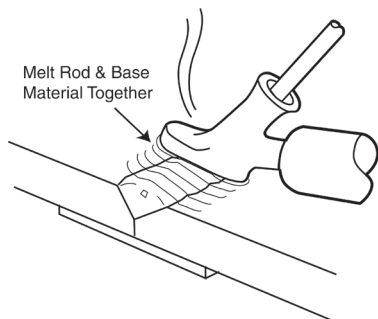
The most common thermoplastic automobile bumper material is TPO. TPO is fast becoming the most popular material for all sorts of interior and underhood plastics as well. TPOs can be welded using the fusion technique described on this page, but our FiberFlex® rod often makes an easier and stronger repair on TPO (see Repair Method AW-2, Page 6). The strongest way to repair any thermoplastic is with our nitrogen welding process (see Repair Method N2-1, Pages 9 - 12).

The least common bumper material, Xenoy, is best repaired using the following thermoplastic fusion technique.



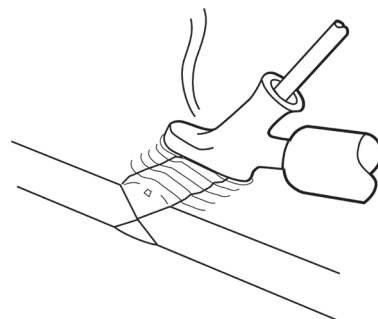
V-Groove Damaged Area

- Line up the outer surface of the tear with 6482 or 6485 Aluminum Body Tape or with clamps.
- V-groove halfway through the part with either the 6121-T Teardrop Cutter Bit and a rotary tool or the sharp edge of the plastic welding tip.
- Remove the paint in the area surrounding the v-groove and radius into the v-groove with coarse sandpaper.



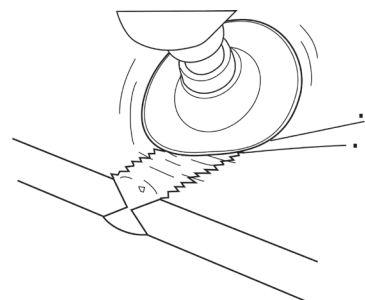
Melt the Rod Together with the Base Material

- Set the temperature setting of your airless plastic welder to the setting that's appropriate for the welding rod you selected in the identification process. In most cases, the welding rod should melt cleanly and not be discolored (the only exception would be nylon, where the rod should turn a light brown).
- Lay the welder tip on the surface of the plastic and slowly melt the rod into the v-groove. Pull the welder toward you so you can see the welding rod fill the v-groove as you make your pass.
- Lay down no more than 2 inches of welding rod into the v-groove at a time. Remove the rod from the welder tip, and before the melted rod has time to cool down, go back over it with the hot welder tip and thoroughly melt the rod together with the base material. It helps to press into the plastic with the edge of the welder tip to mix the materials, then go back and smooth it out. Keep the heat on it until you have a good mix between the rod and base.



V-Groove and Weld Opposite Side

- After the weld on the backside cools, repeat the v-grooving and welding process on the opposite side.



Grind Weld to a Smooth Contour

- If you need to refinish the plastic, grind weld to a smooth contour with coarse sandpaper. Grind the weld slightly flush so that filler can cover the welded area completely. Follow instructions for filler application. (Page 15)

Repairing with Uni-Weld FiberFlex® Universal Rod

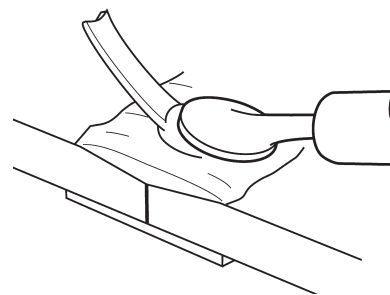
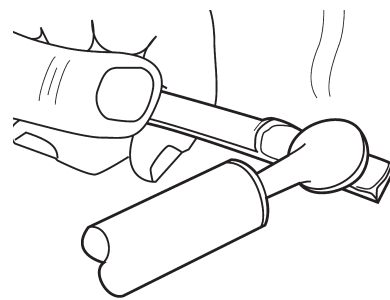
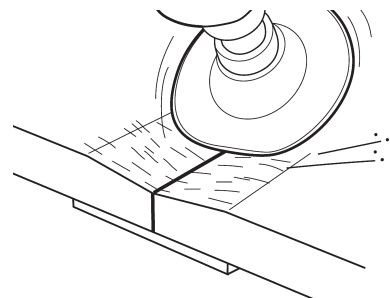
Uni-Weld FiberFlex® is a unique repair material in that it sticks to any plastic substrate. It is not a true welding rod, but rather a thermoplastic or hot-melt adhesive. When you do a repair with the FiberFlex®, you will actually be using the heat of the welder to apply an adhesive. FiberFlex® has a very strong bond and is reinforced with carbon and glass fibers for outstanding strength.

FiberFlex® is a popular way to repair TPOs (aka TEO, PP/EPDM, TSOP), the most common automotive bumper material. The reason is that there are no two TPOs that are exactly alike. As a result, our TPO (R05 series) welding rod will not match any TPO exactly.

FiberFlex® can also be used to repair virtually any plastic. It will stick to urethanes and Xenoy also. When you are not sure what type of plastic you are repairing, try FiberFlex®.

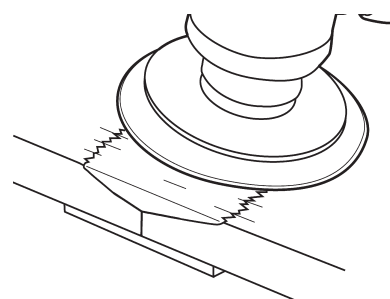
V-Groove Damaged Area

- Line up the outer surface of the tear with 6482 or 6485 Aluminum Body Tape or with clamps.
- Grind away plastic into the shape of a broad V-groove halfway through the backside of the part using a die grinder with the 6122 Heavy Duty Round Burr, 6125 Heavy Duty Tapered Burr or the 6134-R Round Cutter Bit. You'll want the v-groove to be about 1-1/2 inches wide when you get done.
- It is very important to put some "tooth" in the plastic by grinding the v-groove with 50 grit or coarser sandpaper. Use a low speed grinder. Grinding at high speed will tend to melt many thermoplastics.
- Using 80 grit in a DA sander, feather back the paint in the area around the v-groove and radius smoothly into the v-groove. This will give you a better featheredge when you get ready to sand the FiberFlex®.



Melt on the FiberFlex®

- With the airless welder set to the highest temperature setting, use the 6031 Teardrop Welding Tip to melt the (R10-04) FiberFlex® welding rod onto the surface. Best adhesion is achieved by pre-melting one side of the end of the rod, then flipping the rod over so that the melted portion sticks to the plastic. Cut the melted part of the ribbon off using the edge of the welder tip and spread the FiberFlex® into the v-groove. Do not attempt to melt the base material together with the FiberFlex®. Repairing with FiberFlex® is similar to a brazing process.



V-Groove and Weld Opposite Side

- After the FiberFlex® on the backside cools (you may force cool with water), repeat the v-grooving and welding process on the opposite side. Build the FiberFlex® slightly higher than the surface. FiberFlex® is also a sandable filler.

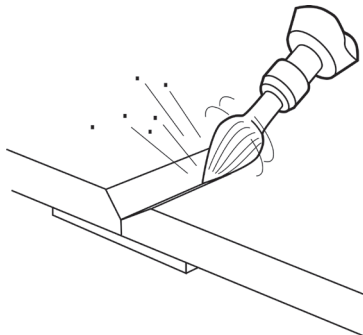
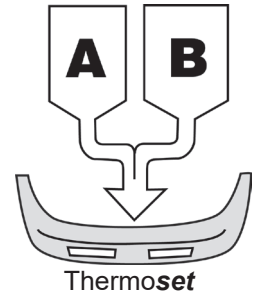
Finish Sand

- After allowing the FiberFlex® to cool completely, sand with 80 grit paper in a DA sander at low speed. Progress to finer grits, ending with 320 grit.
- Fill any low spots with more FiberFlex® or with a skim coat of 2000 Flex Filler 2 or 2020 Hardset filler.

Repairing Thermoset Urethanes

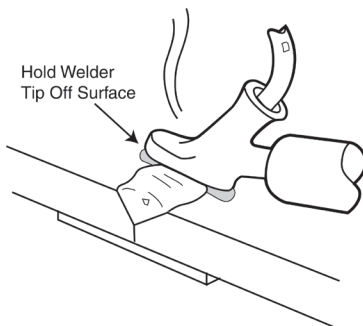
Automotive urethane, or PUR, is a “thermoset” material. Similar to what happens when mixing body filler and cream hardener, thermoset plastic is formed when two liquid chemicals come together in the mold to form a solid. The importance of this is that if polyurethane is “melted” the plastic decomposes and prevents adhesion of repair materials. **DO NOT TRY TO MELT URETHANE BUMPERS WITH THE WELDER!**

A positive way to identify urethane bumpers is to press a HOT welding tip into the backside of the bumper. If it's a urethane, the plastic will liquefy, bubble and smoke. (Note: welder must be extremely hot for this to happen). After the heated area cools off, it will remain gummy or tacky. This is an indication that the heat broke down the chemicals in the plastic. Thermoset urethanes can be easily repaired with the airless plastic welder, but the repair will be more like brazing rather than a true fusion weld.



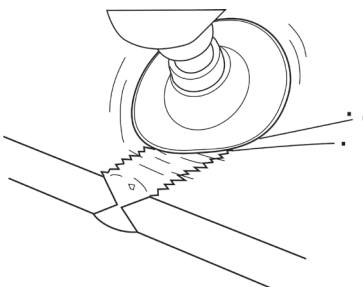
V-Groove Damaged Area

- Line up the outer surface of the tear with 6482 or 6485 Aluminum Body Tape or with clamps.
- V-groove halfway through the back side of the part with the 6121-T Teardrop Cutter Bit or the 6125 Tapered Burr. You cannot use a hot tool to melt the v-groove into urethane because it will decompose.
- Sand the v-groove with coarse sandpaper (80 grit or coarser) to put “tooth” into the plastic. Also, remove the paint in the area surrounding the v-groove and radius the edges of the v-groove for extra strength.



Melt the Rod into the V-Groove

- Turn the temperature of your airless plastic welder to the “R01” rod setting. Using the (R01 series) urethane welding rod, the rod should come out of the bottom of the welder’s shoe completely melted and clear, not discolored or bubbling. Turn your welder up or down as needed, until you get this result.
- Holding the welder’s tip slightly off the surface of the plastic, melt the rod into the v-groove. Don’t overheat the base material, simply melt the rod onto the surface. Again, you are NOT trying to melt the rod and the bumper together; the bumper material is NOT meltable!
- Lay down no more than 2 inches of welding rod into the v-groove at a time. Remove the rod from the welder tip, and before the melted rod has time to cool down, go back over it with the hot welder tip and smooth out the well. You can touch the bumper with the welding tip, but keep the tip moving so you don’t overheat the base material.

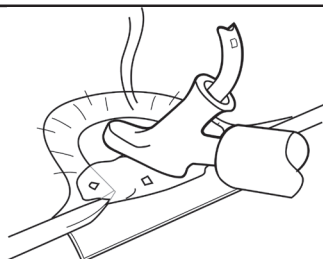


V-Groove and Weld Opposite Side

- After the weld on the back side cools, repeat the V-groove and welding process on the cosmetic side. V-groove deep enough to penetrate the welding rod on the back side.

Grind Weld to a Smooth Contour

- Using coarse sandpaper, grind the weld to a smooth contour. The urethane welding rod will not feather very well, so it will need to be covered with 2000 FlexFiller 2™ epoxy filler to refinish completely. Grind the weld slightly below flush so that filler can cover the welded area completely. Follow instructions for filler application. (Page 13)



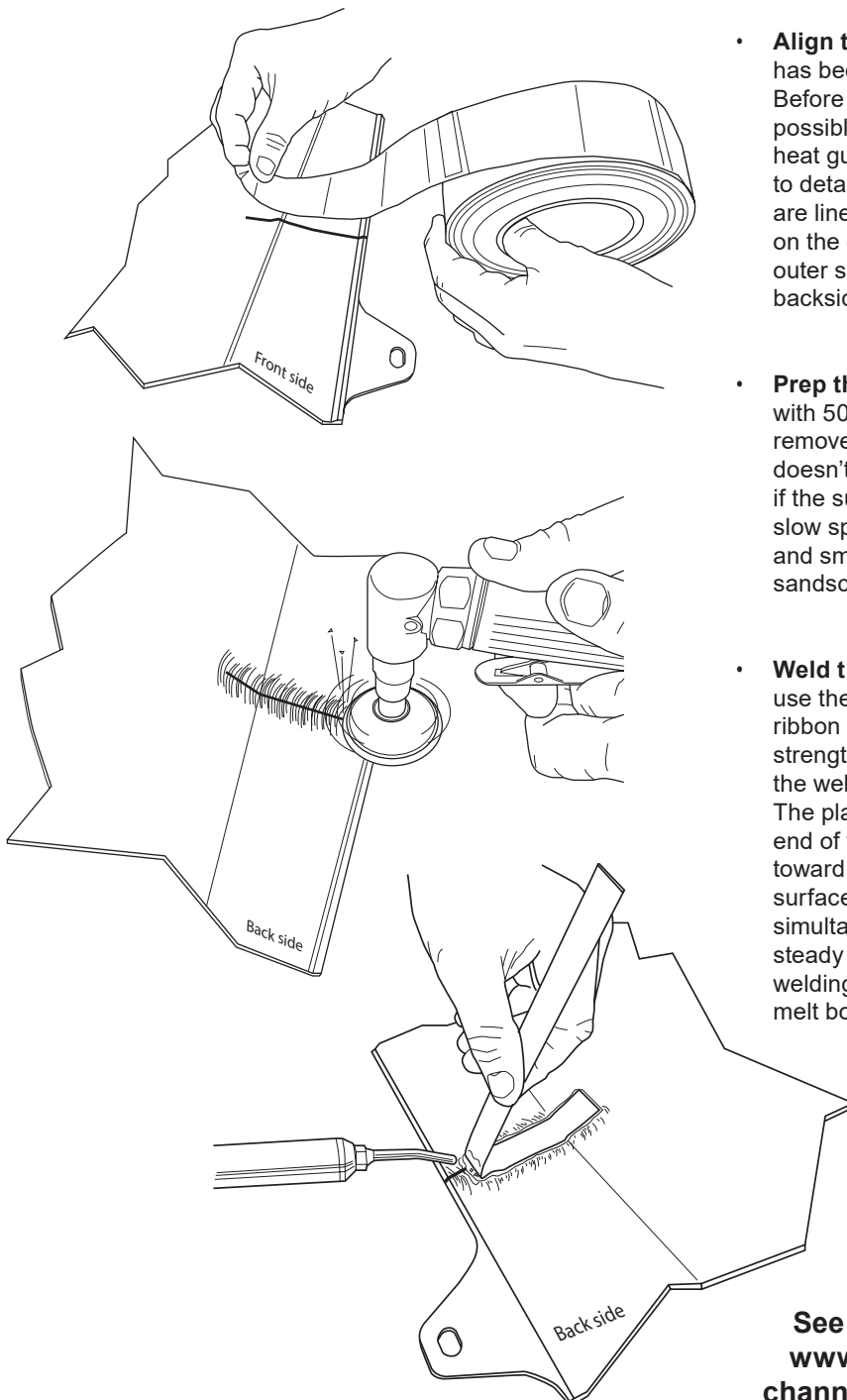
Repairing Torn Bolt Holes on Urethanes

- Taper the plastic all around the hole down to a point on both sides using a Roloc™ disc.
- Use 6482 or 6485 Aluminum Body Tape to create a bridge across the torn mounting hole. Melt (R01 series) urethane welding rod into the area. Drill out hole when finished.

Repairing a cracked bumper with a nitrogen plastic welder

Let's assume you have a PP/TPO bumper torn to the edge. This section will take you through the whole process—cleaning, prepping, and welding. This describes the basic repair technique that can be adapted to other speciality repairs on tabs and mounting holes.

- **Clean the bumper before you grind it.** Before you touch the bumper with sandpaper or a die grinder, make sure it's clean first. First, clean the entire bumper by washing with soap. Use a red scuff pad to spread the soap and scuff the plastic. This will put small sanding scratches into the bumper to help further improve adhesion. Rinse the soap off and allow the bumper to dry. Once dry, clean the bumper with Polyvance 1000 Super Prep Plastic Cleaner or 1001-4 EcoPrep Plastic Cleaner. This will remove all solvent-soluble contaminants like silicone, wax, mold release agents, etc. Spray on in a heavy, wet coat, let it sit on the surface for a few seconds, then wipe dry with a clean paper towel before it evaporates. Don't just soak a rag and wipe it around, that only moves the contamination around on the surface and does not remove it.

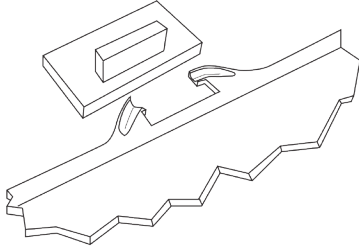


- **Align the outer (cosmetic) surface.** Often the plastic has been stretched or distorted in the damaged area. Before you weld, get the crack aligned as closely as possible. If the plastic is dented or stretched, heat with a heat gun and push the plastic back into position referring to detailed instructions on Page 4. Once the plastic pieces are lined up, use Polyvance's 6485 Aluminium Body Tape on the outer (cosmetic) surface. It's best to line up the outer surface to minimize the need for filler and weld the backside of the crack first.
- **Prep the backside of the crack.** Grind the back side with 50 to 80 grit sandpaper to roughen the surface and remove any paint overspray. Grind the surface flat if it doesn't need to be smooth on the back. Grind a v-groove if the surface needs to be flat when finished. Grind at a slow speed; if you go too fast the friction heat will melt and smear the plastic. You want to put a good, rough sandscratch in the plastic, not melt it.
- **Weld the backside of the crack.** For maximum strength, use the R02-05 wide ribbon on the backside. This wide ribbon spreads the load over a large area for maximum strength. To do the weld, start by preheating the end of the welding rod and the bumper at the end of the crack. The plastic will start to turn glossy. At this point, push the end of the ribbon rod down into the plastic and bend it toward the welder. Make your pass by melting the bottom surface of the rod and the top surface of the bumper simultaneously, forcing the melted plastics together with steady downward pressure on the welding rod. The proper welding pace is 4" to 6" per minute. It is most important to melt both the rod and the bumper at the same time.

See our plastic repair training videos at www.polyvance.com or on our YouTube channel www.youtube.com/urethanesupply.

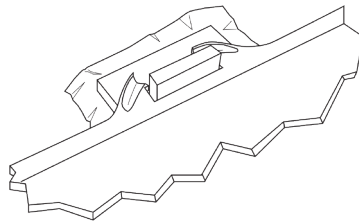
Welding a broken bumper slot tab with a nitrogen plastic welder

Because of the strength provided by the nitrogen welding system, you can make strong repairs even when you don't have a lot of surface area to weld to. "Slot tabs" are a common feature on bumpers which are difficult to repair with two-part adhesives or FiberFlex®. This repair sequence shows how to repair a broken slot tab with the nitrogen plastic welder and Polyvance's 6146 Bumper Pliers Kit.



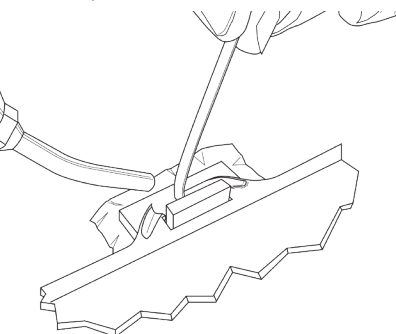
1. Find Matching Die

Find the forming die which most closely matches the width of the broken rectangular slot tab. Select the matching numbered die and pick the pliers that match the forming die. Prepare the plastic for welding by cleaning with 1000 Super Prep or 1001 EcoPrep then taper each side with a grinder or sander at least 1/2" back from the broken edges.



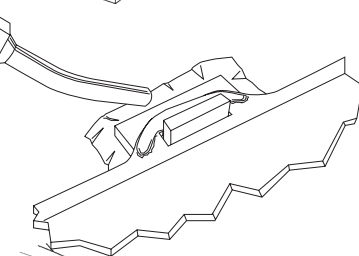
2. Tape Forming Die Into Position

Insert the selected forming die into the broken hole and line up the outer edges of the tab and slot. Tape into position with a piece of 6485 aluminum tape.



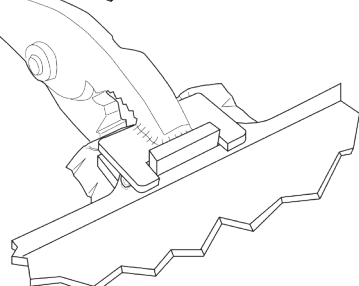
3. Weld

Use your preferred plastic welding rod and weld from one side to the other in a continuous pass, locking the plastic welding rod into the bumper on both sides. As always, make sure to melt both the substrate and the plastic welding rod at the same time. A second, or even third pass of welding rod is often needed to fill out the missing plastic.



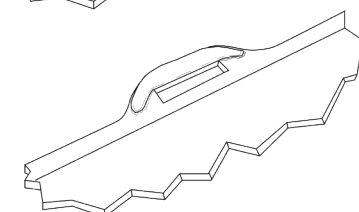
4. Reheat

Immediately after welding, reheat the welding rod using hot nitrogen gas until the plastic turns translucent (or glossy black if you are welding with the black welding rod).



5. Flatten With Pliers

Immediately squeeze the melted plastic with the matching forming pliers. Apply gentle pressure and hold for about 10 seconds to cool plastic. This will flatten the weld on top, pinch it to the same thickness as the original flange, and quench the heat out, so when you remove the pliers, you will see the finished shape. If you have any remaining low spots, apply more welding rod to fill them.



6. Remove Die, Shape as Needed

Allow the die to cool completely, then remove aluminum tape and push the die out of the hole. Shape the repaired area as needed with the airless plastic welder, utility knife, grinder, and/or sander until desired dimensions are restored.

See video of this process at:
www.polyvance.com/video/products-tools