THE BOOK OF PLASTIC REPAIR

A comprehensive guide to identifying, repairing and refinishing virtually any plastic.

10th Edition

Copyright 2016 © Polyvance All Rights Reserved
Every step of the way, Polyvance has what you need!

Born as Urethane Supply Company in 1981, Polyvance has been at the forefront of automotive plastic repair technology ever since. We introduced the industry's first and most popular airless plastic welder back in 1983. Since then, our list of plastic repair innovations has continued to grow. In 1999, we developed Uni-Weld FiberFlex; a universal rod that eliminates the need to identify plastic while being very strong with its fiber reinforcement. In 2000, we introduced the PlastiFix Rigid Plastic Repair Kit, a revolutionary method for repairing rigid plastics like ABS and polycarbonate. In 2002 we introduced the revolutionary line of Bumper and Cladding Coat paint and in 2006 we introduced the world to welding plastic with nitrogen gas, a quantum leap in plastic repair. Through our continual quest to innovate, we have created products to make plastic repair easier, stronger and more profitable for the user, year after year!

---

### Plastic ID Reference Chart

<table>
<thead>
<tr>
<th>Plastic ID Reference Chart</th>
<th>Page 3</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Unidentified Plastic ID Flow Chart</th>
<th>Page 4</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Preparing the Repair Area</th>
<th>Page 4</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Thermoplastic Fusion Weld Repair</th>
<th>Page 5</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Uni-Weld FiberFlex Repair</th>
<th>Page 6</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Thermoset Urethane Repair</th>
<th>Page 7</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Repairing Broken Tabs and Torn Bolt Holes</th>
<th>Page 8</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Padded Dash Repair</th>
<th>Page 8</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Nitrogen Welding - overview</th>
<th>Page 9</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Welding Rod Part Number Chart</th>
<th>Page 9</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Nitrogen Welding - crack repair</th>
<th>Page 10-11</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Nitrogen Welding - bumper slot repair</th>
<th>Page 12-13</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Nitrogen Welding - living hinges and tabs</th>
<th>Page 13-14</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Two-Part Adhesive Repair</th>
<th>Page 15</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>PlastiFix Rigid Plastic Repair</th>
<th>Page 16</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Texturing Plastic</th>
<th>Page 17</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Applying Epoxy Filler</th>
<th>Page 17</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Priming and Top Coating</th>
<th>Page 18-20</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Additional Repair Resources</th>
<th>Page 20</th>
</tr>
</thead>
</table>

---

### Plastic Repair Quick Reference Chart

#### Repair Method

<table>
<thead>
<tr>
<th>Repair Method</th>
<th>AW-1, N2-1</th>
<th>AW-2</th>
<th>AW-3</th>
<th>AD-1</th>
<th>PF-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>AW-1</td>
<td>Airless Welding</td>
<td>Thermoset Polyurethane</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N2-1</td>
<td>Airless Welding</td>
<td>Thermoset Polyurethane</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PP</td>
<td>PP, TPO, TEO, TPE, PE, or other</td>
<td>PP, TPO, TEO, TPE, PE, or other</td>
<td>PP, TPO, TEO, TPE, PE, or other</td>
<td>PP, TPO, TEO, TPE, PE, or other</td>
<td>PP, TPO, TEO, TPE, PE, or other</td>
</tr>
<tr>
<td>HDPE</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
</tr>
<tr>
<td>LDPE</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
</tr>
<tr>
<td>PA-6 (nylon)</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
</tr>
<tr>
<td>PBT</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
</tr>
<tr>
<td>PC</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
</tr>
<tr>
<td>PP</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
</tr>
<tr>
<td>PVC</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
</tr>
<tr>
<td>TEO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
</tr>
<tr>
<td>TPE</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
</tr>
<tr>
<td>TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
<td>ABS, HDPE*, LDPE*, PA-6 (nylon), PBT, PC, PP, PVC, TEO, TPE, TPO</td>
</tr>
</tbody>
</table>

* Polyethylenes cannot be painted without special preparation. Go to [www.polyvance.com](http://www.polyvance.com) for complete instructions.
### Thermoplastic Thermoset

<table>
<thead>
<tr>
<th>Symbol &amp; Type</th>
<th>Description/How to Identify</th>
<th>Typical Applications</th>
<th>Suggested Repair Method</th>
<th>Repair Tips</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUR, RIM, RRIM</td>
<td>Thermoset Polyurethane</td>
<td>Usually flexible, may be yellow or gray, bubbles &amp; smoke when heated or melted.</td>
<td>Flexible bumper covers (esp. on domestic,) filler panels, rocker panel covers, snowmobile cowls.</td>
<td>Method AW-3 w/ urethane (R01) rod or method AW-2 with Uni-Weld FiberFlex</td>
</tr>
<tr>
<td>Fiberglass</td>
<td>Rigid, polyester matrix reinforced with glass fibers, sands finely.</td>
<td>Rigid body panels, fenders, hoods, deck lids, header panels, spoilers.</td>
<td>Method AD-1 Two-part adhesive repair with fiberglass reinforcement</td>
<td>Backing plate over holes, layer in fiberglass cloth for extra strength.</td>
</tr>
<tr>
<td>DCPD, Metton®</td>
<td>Rigid material, no fibers, gray in color.</td>
<td>Large truck and tractor panels and hoods.</td>
<td>Method AD-1 w/ 2510 PlastFix two-part methacylate adhesive</td>
<td>Use backing plate over holes, layer in fiberglass cloth for extra strength.</td>
</tr>
<tr>
<td>XPE, XLPE, PE-XB, PEX, Crosslinked Polyethylene</td>
<td>Semi-flexible, waxy or greasy feel, softens when heated or melts.</td>
<td>Gas tanks, kayaks, canoes, trash cans, use is declining.</td>
<td>Method AW-3 with polyethylene (R04) rod, use as hot melt adhesive</td>
<td>Applying filler or painting is difficult or impossible. Bwoks when heated.</td>
</tr>
<tr>
<td>ABS</td>
<td>Acrylonitrile Butadiene Styrene</td>
<td>Instrument panels, grilles, trim moldings, consoles, armrest supports, street bike fairings, canoes, aircraft wing tips and interiors.</td>
<td>Method AW-1 or N2-1 with silvers cut from scrap</td>
<td>Crystalline type plastic. Has low coefficient of friction.</td>
</tr>
<tr>
<td>PBT</td>
<td>Polybutylene terephthalate (polyester)</td>
<td>Automotive panels, electrical connectors, under-hood parts.</td>
<td>Method AW-1 or N2-1 w/ nylon (R06 series) rod</td>
<td>Preheat plastic with heat gun before welding, mix completely with base mat.</td>
</tr>
<tr>
<td>PA, PA-6 Polyamide (Nylon)</td>
<td>Semi-rigid or rigid, sands finely.</td>
<td>Radiator tanks, head lamp bezels, exterior trim parts, mirrors, plastic engine parts.</td>
<td>Method AW-1 or N2-1 w/ nylon (R06 series) rod</td>
<td>Preheat plastic with heat gun before welding.</td>
</tr>
<tr>
<td>PC + ABS Pulse</td>
<td>(Polycarbonate &amp; ABS)</td>
<td>Door skins (Saturn), instrument panels, street bike fairings.</td>
<td>Method AW-1 or N2-1 w/ PC (R07 series) rod or methods PF-1 or AD-1</td>
<td>Preheat plastic with heat gun before welding.</td>
</tr>
<tr>
<td>PC + PBT Xenoy</td>
<td>(Polycarbonate blend)</td>
<td>Bumper covers (84-95 Ford Taurus, Aerostar, some MB &amp; Hyundai).</td>
<td>Method AW-1 or N2-1 w/ PC (R07 series) rod or methods PF-1 or AD-1</td>
<td>Preheat plastic with heat gun before welding.</td>
</tr>
<tr>
<td>HDPE Polyethylene</td>
<td>Semi-flexible, melts &amp; smears when grinding, usually semi-translucent, waxy or greasy feel.</td>
<td>Overflow tanks, inner fender panels, ATV fenders, RV water storage tanks, gas tanks, kayaks, canoes, playground equipment.</td>
<td>Method AW-1 or N2-1 with high density polyethylene (R12 series) rod</td>
<td>Applying filler or painting is impossible.</td>
</tr>
<tr>
<td>PE/LDPE Polyethylene</td>
<td>Semi-flexible, melts &amp; smears when grinding, usually semi-translucent, waxy or greasy feel.</td>
<td>Overflow tanks, inner fender panels, ATV fenders, RV water storage tanks, gas tanks, kayaks, canoes, trash cans.</td>
<td>Method AW-1 or N2-1 with polyethylene (R04 series) rod</td>
<td>Applying filler or painting is impossible.</td>
</tr>
<tr>
<td>PP Polypropylene</td>
<td>Semi-flexible, melts &amp; smears when grinding, usually semi-translucent, waxy or greasy feel.</td>
<td>Bumper covers (usually blended w/ EPDM), inner fenders, radiator shrouds, gas tanks, battery cases, pallets.</td>
<td>Method AW-1 or N2-1 w/ (R02 series) or method AW-2 with (R10 series) Uni-Weld FiberFlex</td>
<td>Use 1060FP Filler Prep before applying two-part epoxy filler.</td>
</tr>
<tr>
<td>PPE, PPE+PS Polyphenylene Ether</td>
<td>Semi-rigid, sands finely, usually off-white or black in color.</td>
<td>Fenders, exterior trim, rear hatch panels.</td>
<td>Method AW-1 or N2-1 with silvers cut from scrap-AD-1 or PF-1</td>
<td>Preheat plastic with heat gun before welding.</td>
</tr>
<tr>
<td>PPO+PA, PPO+PA</td>
<td>Noryl GTX (Nylon blend)</td>
<td>Fenders (Saturn &amp; GM), exterior trim.</td>
<td>Method AW-1 or N2-1 with GTX (R15 series) rod or nylon (R06 series) rod</td>
<td>Preheat plastic with heat gun before welding.</td>
</tr>
<tr>
<td>PVC Polyvinyl chloride</td>
<td></td>
<td>Pipe, siding, window frames, decking, gutters, speed bumps.</td>
<td>Method AW-1 or N2-1 with PVC (R09 series) welding rod or AD-1 or PF-1</td>
<td>Use 1060FP Filler Prep before applying two-part epoxy filler.</td>
</tr>
<tr>
<td>TPE</td>
<td>Thermoplastic Elastomer</td>
<td>Bumper covers, filler panels, underhood parts.</td>
<td>Method AW-2 with (R10 series) Uni-Weld FiberFlex</td>
<td>Use 1060FP Filler Prep before applying two-part epoxy filler.</td>
</tr>
<tr>
<td>TPO, TEO, PP, EPDM, TSOP Thermoplastic Olefin</td>
<td>Semi-flexible, usually black or gray, melts &amp; smears when grinding.</td>
<td>Bumper covers, air dams, grilles, interior parts, instrument panels, snowmobile cowls.</td>
<td>Method AW-1 or N2-1 w/ PP (R02 series) rod or TPO (R05 series) rod or method AW-2 w/ (R10 series) FiberFlex rod.</td>
<td>Use 1060FP Filler Prep before applying two-part epoxy filler.</td>
</tr>
<tr>
<td>TPU, TPUR Thermoplastic Polyurethane</td>
<td>Flexible, sands finely.</td>
<td>Bumper covers, soft filler panels, gravel deflectors, rocker panel covers.</td>
<td>Method AW-3 w/ (R01 series) rod or method AW-2 w/ (R10 series) FiberFlex rod.</td>
<td>Use 1060FP Filler Prep before applying two-part epoxy filler.</td>
</tr>
<tr>
<td>PETA, PET Polyethylene Terephthalate</td>
<td>Flexible, strong.</td>
<td>Soda bottles, various yarn fibers, headliners, fuse boxes, door panels.</td>
<td>Method AW-1 or N2-1 with PET (R13 series) rod</td>
<td>Can’t make as strong as original part; manufactured in crisscrossed layers and can’t be duplicated.</td>
</tr>
</tbody>
</table>
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 1020 Scuff Magic soap and water. Dry with a clean cloth or compressed air.

Step 2. Spray 1000 Super Clean or 1001-4 EcoClean 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 a screwdriver handle or other blunt 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 6481 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.

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

**To perform a test weld, clean and sand a small area on the backside of the part. Make a small spot weld on the surface. After the weld cools, try to pick it off with your fingernail or a screwdriver. The one that sticks best is the one to use.

Identification Process for Plastics in General

Is the part very rigid with lots of glass fibers in the broken area?

Yes

- Probably SMC. Repair using Method AD-1 with 2020 or 2510 rigid adhesive

No

- Does it smoke a lot, bubble, or brown when you try to melt it and generally not behaving as you would expect plastic to melt?

Yes

- Thermoset Rigid Plastic, like Mettalon. Repair using Method AD-1 with 2020 or 2510 rigid adhesive or Method PF-1 PlastiFix Rigid Plastic Repair System

No

- Flexible or Rigid?

Rigid

- Polyurethane. Repair using Method AW-3 with Urethane (R01 series) Rod.

Flexible

- Is the plastic extremely rigid?

Yes

- Xenoy (PC/PBT). Repair using Method AW-1 or N2-1 with Polycarbonate (R07 series) Rod.

No

- Is the backside of the part yellow?

Yes

- Polyurethane. Repair using Method AW-3 with Urethane (R01 series) Rod.

No

- Does it bubble and smoke when you try to melt it, then remain tacky or gummy when cool?

Yes

- Probably TPO, TEO, or TPE. Repair using Method AW-2 with Uni-Weld FiberFlex or Method AW-1 or N2-1 with (R02 series) polypropylene rod.

No

- Judging from the feel and appearance of the plastic, test weld** with one that matches best.

- Very Rigid - R07 Rigid - R03, R06, R13, R14, R15 Semi-Rigid - R02, R04, R05 Flexible - R04

- Do any of these rods stick well?

- Repair with selected welding rod using Method AW-1 or N2-1.

Identification Process for Bumpers

More than 95% of late model bumper covers are made from one of three materials. The approximate breakdown is:

- TPO, TEO, PP ...95%
- PUR ...................3%
- Xenoy ................1%
- Other .................1%

Note: welder must be very hot to perform this test effectively.

NOTE: SEE PAGE 9 FOR WELDING ROD PART NUMBERING CHART

preparing plastic for all repairs
Repairing Thermoplastics with Fusion Welding

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 - 14).

The third most 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 6481 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 17)
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.

The 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 the FiberFlex.

V-Groove Damaged Area

- Line up the outer surface of the tear with 6481 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.
- You may also apply the 3/16” dia. round FiberFlex Round Rod (R10-02) with the 6030 Speed Welding Tip for faster application.

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 SMC Hardset epoxy 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 6481 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 setting of your airless plastic welder to the “clear” or “R01” rod position. Using the (R01 series) Polyurethane 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 Flex-Filler 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 17)

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 6481 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 Torn Tabs

Rough grind the area surrounding the crack with a coarse Roloc disc. Cut 2045W Stainless Steel Wire Mesh to size to fit in the corner areas. Using the hot welder tip, bury the mesh directly into the plastic. After you’ve melted the mesh into the plastic, scuff the melted plastic with coarse sandpaper to remove the gloss. Melt on a thin layer of FiberFlex over the mesh just to cover. In this repair, the mesh provides the strength and flexibility while the FiberFlex just gives a cosmetic covering.

• Repairing Flexible Tabs on TEO Plastics

Many TEO bumpers have mounting tabs that have to flex during installation. These can be repaired very durably with the mesh and FiberFlex. First, rough grind the area with a coarse sandpaper disc. Cut 2045W Stainless Steel Wire Mesh to size to fit in the corner areas on both sides of the tab. Using the hot welder tip, bury the mesh directly into the plastic. After you’ve melted the mesh into the plastic, scuff the melted plastic with coarse sandpaper to remove the gloss.

After you’ve melted the mesh into the plastic, scuff the melted plastic with coarse sandpaper to remove the gloss. Melt either the FiberFlex or the matching standard plastic rod over the mesh. If using the standard rod, keep the heat on the plastic to make sure the rod melts thoroughly with the base material. Keep adding more rod to make a bigger fillet and increase strength.

• Repairing Torn Bolt Holes in TPO with FiberFlex

Taper both side of plastic to a point with a coarse sandpaper disc. Grind and taper around the edges of the entire bolt hole. Taper back about 1 inch on all sides. Remove paint and radius into taper with 80 grit in a DA. Apply 6481 Aluminum Tape across the gap to support the melted rod while it’s hot.

Melt 2045W Stainless Steel Reinforcing Mesh into the plastic across the gap if desired for extra strength. This step is often not necessary because FiberFlex is blended with glass fibers for strength.

Apply FiberFlex to area using the instructions on Page 6. After cooling, remove aluminum tape and repeat on opposite side.

Allow FiberFlex to cool completely. Open the hole with a die grinder or drill bit, then sand with 80 grit in a DA at low speed to finish the repair.

• Padded Dash Repair

Clean the damaged area with 1000 Super Clean or 1001-4 EcoClean Plastic Cleaner. Bevel the edges of the area to be welded with a drum sander on an electric die grinder and open up a cavity at least 1/4" deep in the foam backing and vinyl cover. Sand and bevel the vinyl cover around the cavity to allow for featheredging of filler.

Using the (R01 series) Urethane Welding Rod, start your weld at the bottom of the cavity using your Airless Plastic Welder. Fill the cavity up with melted plastic and spread it out so that it overlaps the edges of the vinyl cover about 1/4".

After allowing the weld area to cool, grind the weld area smooth with a drum sander. Rough up the surrounding area to improve adhesion of the filler. Mix 2050-9 Padded Dash Filler and apply with plastic squeegee. Cover an area larger than the weld in order to feather out the repair to a smooth contour.

Allow the filler to cure at least 15 minutes, then sand to a smooth contour. Finish sand with 220 grit paper. Retexture the panel with 3803 Flextex VT texture material according to directions on Page 17. Do not try to spot retexture. Retexture and blend the leading edge or most visible area of the pad all the way across. If there is a noticeable difference in texture, retexture the entire pad.
Basic nitrogen welding process

Welding with nitrogen involves the coordination of both hands, one controlling the torch and the other feeding the rod. When you weld, you just want to melt the bottom surface of the rod and the top of the bumper. You don’t “puddle” the rod like you do in metal welding. This makes for a stronger repair because it leaves the basic structure of the rod intact. When you’re making your weld, make sure you melt both the bumper and the rod at the same time and fuse them together with the downward pressure on the rod. Remember the four important factors for plastic welding: “T.F.P.A.S.”, an acronym for Temperature, Flow, Pressure, Angle, and Speed.

- For temperature, set the temperature on the nitrogen welder’s dial to the proper setting. For example, the PP/TPO setting will generate an air flow of about 700°-800°F.
- The flow should be set between 8 to 15 liters per minute depending on the plastic’s thickness; less for thinner plastics, more for thicker.
- An angle of 45° between the torch and the bumper is optimum. Aim the stream of hot air a little in front of the rod; for thick rod like the 06 profile, focus a little more heat on the rod.
- Put as much downward pressure on the rod as possible to help the rod fuse with the bumper. Keep a steady downward pressure on the rod and keep the rod moving slowly. Don’t overheat the rod and let it fold over backwards.
- The speed of your weld should be about 4 to 6 inches per minute. With thin rod like the 03 profile, it’s difficult to go this slow. With thick rod like the 06 profile, it may go even slower. The important thing is to move steadily while keeping proper downward pressure on the rod while making sure the bumper and the bottom surface of the rod are both melted before they come together.

Welding Rod Part Numbering System

<table>
<thead>
<tr>
<th>Material</th>
<th>Rod Profile</th>
<th>Package Size/Qty</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>R01 Urethane</td>
<td>01 1/8&quot;</td>
<td>01 5 ft.</td>
<td>BK Black</td>
</tr>
<tr>
<td>R02 Polypropylene</td>
<td>02 3/16&quot;</td>
<td>03 30 ft.</td>
<td>BL Blue</td>
</tr>
<tr>
<td>R03 ABS</td>
<td>03 7/16&quot; x 1/16&quot;</td>
<td>04 1 lb.</td>
<td>GN Green</td>
</tr>
<tr>
<td>R04 Polyethylene</td>
<td>04 3/8&quot; x 1/16&quot;</td>
<td>05 Small spool</td>
<td>GY Gray</td>
</tr>
<tr>
<td>R05 TPO</td>
<td>05 5/8&quot; x 1/16&quot;</td>
<td>08 Bulk*</td>
<td>NT Natural*</td>
</tr>
<tr>
<td>R06 Nylon</td>
<td>06 1/2&quot; x 3/32&quot;</td>
<td></td>
<td>OR Orange</td>
</tr>
<tr>
<td>R07 Polycarbonate</td>
<td>07 13/64&quot; x 1/16&quot;</td>
<td></td>
<td>RD Red</td>
</tr>
<tr>
<td>R09 PVC</td>
<td>08 1/4&quot; x 1/4&quot;</td>
<td></td>
<td>TN Tan</td>
</tr>
<tr>
<td>R10 Fiberflex</td>
<td></td>
<td></td>
<td>YL Yellow</td>
</tr>
<tr>
<td>R12 HDPE</td>
<td></td>
<td></td>
<td>WH White</td>
</tr>
<tr>
<td>R13 PET</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R14 ASA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R15 GTX</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Not all rod profiles are available in all plastic types

* Sold by the pound. (10 lb min.)
* No pigment added.
Repairing a cracked bumper

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 1020 Scuff Magic soap using 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 Urethane Supply 1000 Super Clean plastic cleaner or 1001 EcoClean. 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 Urethane Supply’s 6481-1 or 6485 aluminium 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.youtube.com/polyvance
• **Weld a “Tee”**. Upon completing the weld down the crack, it is advisable to make another cross stitch weld at the end of the crack along the edge to reinforce the repair. Use the R02-04 ribbon for the edge reinforcement. Because the original extruded structure of the ribbon is not disrupted in the welding process, trying to tear the bumper is like trying to tear the rod in two. As long as the rod is welded solidly to the bumper, this will provide a lot of extra strength.

• **Prep the front side for welding**. After the backside weld is cool, peel the aluminum tape off the front side. Using a 6121-T or 6125 cutter bit in a rotary tool, grind out a v-groove down the crack in the plastic about 1/16” to 3/32” deep. The width of the v-groove should match the kind of rod you want to use on the front side. Most of the time the R01-01 1/8” diameter round rod is the best choice because it is easier to finish being a narrow rod. In this case, grind the v-groove about 1/8” wide. For stressed areas or anywhere you want some extra strength, you may choose to use a ribbon on the frontside. In that case, grind the v-groove a little wider than the width of the ribbon. Sand off the paint immediately adjacent to the v-groove with 80 grit in a DA sander.

• **Weld the front side of the crack**. Using your selected welding rod or ribbon, perform the weld in the prepared v-groove the same way you did on the back side. Refer to the basic nitrogen welding process on Page 9 for complete info.

• **Finishing the weld**. Once the weld is completely cool, sand with 50-80 grit paper in a grinder or DA. Be careful not to sand too fast; this will just melt and smear the plastic. It’s best to use a sharp, new piece of paper and slow the sander down a bit to keep the plastic from melting. Sometimes the repair may be finished out and feathered with the welding rod, but most often you’re going to need some filler to fill in the low spots. Refer to Page 17 in this book for more information on how to apply filler on plastic parts.

Inquire about our I-CAR ® Industry Training Alliance ® Course on Nitrogen Plastic Welding. Hands-on training in your shop!
Welding a broken bumper slot

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. A perfect example is the slots on the edge of the bumper where the bumper snaps into the quarter panel, like on a Honda bumper. These often seem to break out when the bumper is removed. There’s not enough surface area to make a good repair with either a two-part system or with the FiberFlex. Here’s how you fix a torn-out bumper slot.

- **V-groove or taper the edges.** Depending on the design of the flange, you can use the -01 profile round rod or the -07 profile narrow ribbon. The round rod needs to be used on bumpers where the flange is contoured around the slots. For straight flanges, like the one shown here, you can use the -07 ribbon since it doesn’t have to curve. In either case, use a 6121-T or 6125 die grinder bit to grind a channel into the bumper at least 1/2” long on both sides of the broken slot. Taper the plastic down almost to a point at the broken-out area. Remove any paint in the immediate area with sandpaper.

- **Apply tape to support rod during weld.** Use the 6481-1 or 6485 aluminum body tape underneath the hole to support the melted plastic welding rod. You can also clamp a strip of sheet metal or wood along the edge if that works better.

- **Weld across the gap.** Use the R02-01 1/8” diameter polypropylene welding rod. Starting on one side, preheat the bumper and the end of the welding rod at the start of the prepared v-groove. When both plastics are preheated, touch the end of the rod down to the bumper and apply downward pressure to fold the rod toward the torch. When you get to the gap, continue heating the rod just as if you were melting to the bumper. Continue at the same pace, spanning across the gap and picking up the process on the other side. Continue welding until you reach the end of the prepared v-groove, at which point focus the hot nitrogen on the rod and twist the rod to break it.

See our plastic repair training videos at www.youtube.com/polyvance
Recreating a tab with a “living hinge”

Many times you'll see bumpers that have a flexible tab, usually at the bottom of the bumper. These tabs have a “living hinge”, which is a thin line in the plastic where it naturally wants to flex. These living hinges are very weak and are easy to tear. You can’t repair it at the hinge line because it won’t be flexible there anymore. To do this, you need to recreate the tab using our polypropylene sheet using the following method.

• **Heat until rod turns clear then compress with a hand seamer.** If you’re using our white polypropylene rod, you can see that it turns clear when it gets to the proper melting temperature. Heat up the ribbon you just laid down with the nitrogen welder until it all turns clear. (If you’re using the black rod, heat it until it all turns glossy black.) Immediately use the 6145 hand seamer to gently press the melted ribbon down into the plastic. This also aligns the repaired section with the rest of the bumper. If necessary, weld another pass to build up the plastic’s thickness.

• **Restore slot dimensions.** Let the weld cool and remove the tape or metal support. Restore the original slot dimensions using either a rotary tool with a 6120 or 6123 straight burr, an airless plastic welder, or a utility knife. This is easier to do when using the white rod as you can see the underlying plastic’s original profile.

• **Weld opposite side.** For maximum strength, repeat the welding process on the opposite side. Usually the tape or metal support is not needed, but it can make the process easier. After welding, press the repaired area flat and straight again using the hand seamer.

• **Restore slot dimensions and finish repair.** After letting the weld cool, restore the final dimensions of the slot and bumper edge using a rotary tool, airless welder, or knife. Finish sand the outer surface with 180 then 320 grit paper to prepare it for paint.

• **Trace out the tab in the polypropylene sheet.** If you have the old tab, lay it down on the 5010 polypropylene sheet and trace the edges and any holes with a marker. Put a dotted line where the hinge line is supposed to be. Then create a notch back into the bumper about 1/2” deep and extend the tab about 1/2” on each side of the tab. Cut the tab out of the PP sheet with a jigsaw, and drill out the mounting hole.

Inquire about our I-CAR ® Industry Training Alliance ® Course on Nitrogen Plastic Welding. Hands-on training in your shop!
• **Create hinge line.** To create the hinge line, put the tab in a vise and fold it back and forth several times along the dotted line you drew on the tab. Take it out of the vise, then fold it over double a few times to make it more limber. This is flexible and much stronger than the original bumper’s hinge. If there’s a hook or fold in the tab, you can create it by folding it in the vise one time.

• **Notch back the bumper.** Place the new tab in position on the bumper and mark the cut line on the bumper with a black marker. Cut out the notch with a jigsaw.

• **Prep the bumper** by removing paint and applying sanding scratches the bumper on the backside.

• **Tape the tab in position** using 6481-1 or 6485 aluminum tape on the outer surface.

• **Weld the backside of the tab** using the R02-04 or R02-05 profile PP rod. Start by focusing the stream of hot nitrogen about 1/2” beyond the tab until the bumper turns glossy. Stab the rod down and start making your pass using the same technique as described earlier.

• **Prep the outer surface** by grinding a shallow v-groove about 3/8” wide along the seam. Feather back paint and put down some sand scratches with 80 grit in a DA. Blow dust free.

• **Weld the front side of the bumper** with the R02-04 profile PP rod. Lay one strip down along the long seam, then weld each end and wrap the welding rod around the edge. If you have an airless welder, you can melt and burnish everything down and make it easier to sand flush.

• **Let cool and finish the repair** by sanding smooth with 80 grit in a DA. Use filler if necessary to fill out any low spots, then sand with 180 and 320 grit to prepare for primer.
Repairing Plastics with Two-Part Adhesives

- Clean both sides of the plastic in the damaged area with 1000 Super Clean or 1001-4 EcoClean plastic cleaner. Fixture the front side with clamps or aluminum tape to hold the part together while the adhesive on the backside cures.

- Sand the backside of the area to be repaired with 50 grit sand paper or coarser. A v-groove is not required unless you need to sand the backside flat for cosmetic reasons. Remove paint in the surrounding area with 80 grit in a DA. Heavy grooving of the plastic is desirable to maximize the mechanical strength of the bond. Blow dust free with clean, dry compressed air.

- If the material is TEO, TPO or PP, apply 1060FP Filler Prep or 1050 Plastic Magic Adhesion Promoter. Brush or spray onto the sanded area and allow to flash off.

- Choose a two-part adhesive system to match the hardness of the substrate per the table:

<table>
<thead>
<tr>
<th>Adhesive</th>
<th>Substrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000 Flex Filler</td>
<td>flexible substrates, polyurethane, soft TPO</td>
</tr>
<tr>
<td>2020 SMC Hardset Filler</td>
<td>rigid substrates, semi-rigid TPO, SMC, fiberglass</td>
</tr>
<tr>
<td>2510 PlastiFix two-part</td>
<td>rigid substrates, Metton®, SMC, fiberglass, metals</td>
</tr>
</tbody>
</table>

- Select a reinforcing method for the backside of the part. For flat areas, it is often easiest to cut a backing plate out of scrap material. For contoured areas, use fiberglass cloth or drywall tape.

- Prepare reinforcement by cutting 1 to 3 pieces of glass cloth to cover the damaged area about 2”-4” wide. If using a backing plate, make sure it extends at least 2” beyond damage in all directions. Rough grind the side of the backing plate that will be applied to the surface.

- Mix the two-part adhesive according to package directions. Spread a generous amount on the backside with a body spreader. If using a backing plate, press the plate firmly into the adhesive, allowing a small amount of adhesive to squeeze out from the edges. If using fiberglass cloth, lay the cloth into the adhesive and wet the fibers using a 2042-R saturation roller. Apply more adhesive over the area and embed another layer of fiberglass cloth if desired.

- Once the adhesive on the backside is cured, peel the aluminum tape off the front and grind a v-groove about 1”-2” wide with a die grinder and/or a coarse sanding disc. Sandscratch the inside of the v-groove coarsely. Round off any sharp edges and feather the paint back with 80 grit in a DA.

- If the material is TEO, TPO, or PP, apply adhesion promoter as was done on the backside.

- Mix the two-part adhesive and apply into the v-groove with a body spreader. Slightly overfill the v-groove so that it can be sanded flush when finished.

- When the adhesive on the front side is fully cured, sand with 80 grit in a DA sander, then progress to finer grits to finish.
Repairing Plastics with PlastiFix® Rigid Plastic Repair Kit

The PlastiFix® Rigid Plastic Repair Kit is a revolutionary plastic repair system that allows you to repair cracks, fill gaps, rebuild tabs, and fix stripped threads. The most unique feature of the PlastiFix® Rigid Plastic Repair Kit is the FlexMold flexible molding bar. The FlexMold bar allows you to replace a broken tab by forming a mold from an undamaged piece, then casting your new part using the PlastiFix acrylic adhesive system. This system is ideal for ABS, acrylic, polycarbonate and other hard plastics, however it does not work on olefinic plastics like PE, PP, or TEO. See our PlastiFix training videos at www.youtube.com/polyvance.

Kit Components:

- **Getting Ready**
  - Dispense powder into cup.
  - Use pipet to dispense liquid into dropper bottle.
  - Insert dropper tip into bottle and place applicator needle onto dropper tip.

- **Application**
  - Squeeze one drop of liquid into powder.
  - Pick up liquid/powder mix with tip of needle.
  - Squeeze bottle to apply liquid/powder mix to repair area.

- **FlexMold Molding Bar Use**
  - Place FlexMold bar in very hot water until it softens.
  - Shape FlexMold bar over pattern. Caution! Very hot!
  - When FlexMold bar cools, position in repair area.
  - Fill mold with PlastiFix powder/liquid mix, allow to cure 30 min., remove mold.

- **Reinforcing**
  - Cut fiberglass cloth to cover damage on backside.
  - Cover fiberglass cloth with thin layer of PlastiFix powder.
  - Saturate powder with PlastiFix liquid.
  - Cover with plastic sheet, press to shape, allow to cure.

- **Repairing Threads**
  - Drill or file threads from hole.
  - Apply lubricant to screw threads.
  - Apply PlastiFix powder/liquid mixture to screw threads.
  - While adhesive is wet, insert into hole.
Using 3803 Flextex VT

Flextex VT is a tough, durable variable texture material formulated to simulate textured automotive plastics and metal. It can be used over or under most finishes and may be topcoated with Bumper and Cladding Coat paint, base/clear or single stage systems. Flextex VT has excellent durability and may be used as the finish coat where black texture is needed.

a. Clean surface to be textured with 1020 Scuff Magic Prep Soap and water. Rinse thoroughly and wipe dry with a clean cloth or towel.

b. Spray on a heavy wet coat of 1000 Super Clean Plastic Cleaner or 1001-4 EcoClean over a 1 - 2 square foot area. Wipe dry with a clean cloth.

c. Sand surface with 180-240 grit sand paper to remove gloss. Blow dust free with clean, dry air.

d. For repairs on textured TPO plastics, it is difficult to blend the Flextex with the original texture due to the “fuzz” generated when TPO is sanded. It is often best to sand the entire textured area and apply two coats of 3043 waterborne primer over the area to fill the texture and bury the fuzz first, then respray the entire area with Flextex. To do so, apply one medium coat of 1050 or 1051 Plastic Magic adhesion promoter. Allow to dry. Apply 2-3 coats of 3043 All Seasons waterborne primer surfacer, sanding with 320 grit between coats. Once the TPO fuzz is buried, you may apply the Flextex according the the following steps.

e. Choose your desired texture using the “texturing reference” box above. Using the suggested gun setup, build texture by applying 3 to 5 light coats of Flextex allowing for flash time between coats. Reduce fluid flow at gun for light coats. Once you achieve your desired texture, let dry 30 minutes if light coats are applied or 2 to 3 hours for heavier applications before topcoating. Flextex VT can be topcoated at any time after the minimum dry time.

f. After Flextex VT has completely dried, (if desired) topcoat with a light coat of 3700-series Bumper and Cladding Color Coat followed by one or two more wet coats. If another type of topcoat is needed, use a lacquer compatible top coat system.

Applying Epoxy Filler

a. Grind area to be filled with coarse sandpaper. Slightly v-groove away from the damaged area. All gloss on the surface should be removed to maximize filler adhesion.

b. If the material is a polyolefin (PP, TEO, or TPO), apply 1060FP Filler Prep or 1050 Plastic Magic Adhesion Promoter.

c. Choose a two-part epoxy filler system to match the hardness of the substrate. Use 2020 Hardset Filler for rigid plastics, like SMC, fiberglass, ABS and others. For flexible plastics like urethane, PP, TEO, and TPO use 2000 Flex Filler.

d. On a mixing board, mix equal parts of epoxy filler until a uniform gray color with no streaks is obtained. Apply with a body spreader. Build up slightly higher than the surface to allow for sanding. Sandable in 30 minutes, but for best featheredging results, allow the epoxy to cure completely before sanding. Complete cure requires 24 hours at room temperature or two hours at 130°F. Allow epoxy to gel before applying heat and to cool completely before sanding. Contour and smooth the surface with 80 and 180 grit paper. Finish sand and apply a high build primer surfacer such as our 3041 or 3043 All Seasons Waterborne Primer Surfacer.
**New Replacement Bumpers**

**RAW TPO Bumpers**
- Toyota, Nissan, Kia and Subaru are usually raw, unprimed TPO. ID symbol is PP, PP/EPDM, TSOP, TPO, TEO, or TPE. Usually black with dull finish, sometimes non-uniform in appearance, may have tacky mold release agent on surface. When sanded lightly with 400 grit sandpaper, virtually no dust is produced.

**OEM Primed Bumpers**
- Domestic bumpers (GM, Ford, Chrysler) usually have OEM primer. Color is usually black with high sheen and uniform appearance. Occasionally gray. Sanding the surface lightly with 400 grit sandpaper will produce fine dust. The color or appearance of the painted side is different or if overspray is visible on the inside of the bumper. NOTE: Sometimes the inside is primed also.

**RAW PUR Bumpers**
- May be PUR if Toyota or Lexus with light gray color. All yellow plastic bumpers are PUR. ID symbol is PUR. When lightly sanded with 400 grit sandpaper will produce virtually no dust.

**Surface Preparation**
- Clean entire surface to be primed with 1000 Super Clean or 1001-4 EcoClean plastic cleaner. Spray heavy, wet coat over a 1 to 2 square foot area, wipe dry with a clean cloth, exposing clean surface to plastic with each wipe. Repeat until the entire surface has been cleaned.

**NOTE:** Scuff or sanding is not required!

**Product Selection**
- 3611, 3612, 3601, or 3602 Bumper & Cladding Coat Adhesion Primer
- 3050, 3051, or 3052 ALL SEASONS Waterborne Sealer
- 3050, 3051, or 3052 ALL SEASONS Waterborne Sealer

**Repaired Bumpers**
- High Gloss. Color matches body color. Base material different color than top coat.

**Surface Preparation**
- Clean Bumper with 1020 Scuff Magic Prep Soap and a gray scuff pad. Allow to Dry.
- Clean entire surface to be primed with 1000 Super Clean or 1001-4 Clean plastic cleaner. Spray heavy, wet coat over a 1 to 2 square foot area, wipe dry with a clean cloth, exposing clean surface to plastic with each wipe. Repeat until the entire surface has been cleaned.
- Clean Bumper with 1020 Scuff Magic Prep Soap and a gray scuff pad. Allow to Dry.
- Sand overall with 320 grit sand paper. Blow dust free. Remove remaining dust with a tack cloth.

**Identify Bumper Types of Bumpers**
- Toyota, Nissan, Kia and Subaru are usually raw, unprimed TPO. ID symbol is PP, PP/EPDM, TSOP, TPO, TEO, or TPE. Usually black with dull finish, sometimes non-uniform in appearance, may have tacky mold release agent on surface. When sanded lightly with 400 grit sandpaper, virtually no dust is produced.

- Domestic bumpers (GM, Ford, Chrysler) usually have OEM primer. Color is usually black with high sheen and uniform appearance. Occasionally gray. Sanding the surface lightly with 400 grit sandpaper will produce fine dust. The color or appearance of the painted side is different or if overspray is visible on the inside of the bumper. NOTE: Sometimes the inside is primed also.

- May be PUR if Toyota or Lexus with light gray color. All yellow plastic bumpers are PUR. ID symbol is PUR. When lightly sanded with 400 grit sandpaper will produce virtually no dust.

- High Gloss. Color matches body color. Base material different color than top coat.

**3043 Black Jack ALL SEASONS Waterborne Primer Surfacer**

**3041 E-Z Sand ALL SEASONS Light Gray Waterborne Primer Surfacer**

**continued on next page...**
### New Replacement Bumpers

<table>
<thead>
<tr>
<th>RAW TPO Bumpers</th>
<th>OEM Primed Bumpers</th>
<th>RAW PUR Bumpers</th>
<th>OEM Painted Bumpers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shake or stir Bumper and Cladding Coat. Pour appropriate amount into gun to meet job requirements.</td>
<td>Stir ALL SEASONS Waterborne Sealer, do not shake. Mix the appropriate shade of ALL SEASONS Waterborne Sealer using the 3050, 3051, and 3052 toners. If using the optional catalyst, catalyze only the amount of sealer needed for immediate use. Once catalyzed, pot life is about 8 hours.</td>
<td>Stir ALL SEASONS Waterborne Sealer, do not shake. Mix the appropriate shade of ALL SEASONS Waterborne Sealer using the 3050, 3051, and 3052 toners. If using the optional catalyst, catalyze only the amount of sealer needed for immediate use. Once catalyzed, pot life is about 8 hours.</td>
<td>Stir waterborne primers, do not shake. If desired, ALL SEASONS primers may be thinned with water up to 5% by volume to optimize spray viscosity. If using the optional catalyst, catalyze only the amount of sealer needed for immediate use. Once catalyzed, pot life is about 8 hours.</td>
</tr>
<tr>
<td><strong>Paint Preparation</strong></td>
<td><strong>Catalyst Mix Ratio</strong></td>
<td><strong>Dry Time</strong></td>
<td><strong>Application</strong></td>
</tr>
<tr>
<td>Bumper &amp; Cladding Coat does not use a catalyst.</td>
<td>If desired, mix 3104 catalyst with ALL SEASONS Waterborne Sealer 4% to 6% by weight. For example, if you are using 100 grams of sealer add 4 to 6 grams of 3104 catalyst. If no scale is available, then mix 4 to 6 teaspoons of catalyst per pint of ALL SEASONS SEALER. Mix thoroughly. Do not shake. Use as soon as possible. If thinning is required, up to 5% by volume of water may be added to optimize viscosity.</td>
<td>If desired, mix 3104 catalyst with ALL SEASONS Waterborne Sealer 4% to 6% by weight. For example, if you are using 100 grams of sealer add 4 to 6 grams of 3104 catalyst. If no scale is available, then mix 4 to 6 teaspoons of catalyst per pint of ALL SEASONS SEALER. Mix thoroughly. Do not shake. Use as soon as possible. If thinning is required, up to 5% by volume of water may be added to optimize viscosity.</td>
<td>If desired, mix 3104 catalyst with ALL SEASONS Waterborne primers 4% to 6% by weight. For example, if you are using 100 grams of sealer add 4 to 6 grams of 3104 catalyst. If no scale is available, then mix 4 to 6 teaspoons of catalyst per pint of ALL SEASONS SEALER. Mix thoroughly. Do not shake. Use as soon as possible. If thinning is required, up to 5% by volume of water may be added to optimize viscosity.</td>
</tr>
<tr>
<td>Base coat gun with a 0.8 mm to 1.3 mm nozzle.</td>
<td>Base coat gun with a 1.3 mm to 1.5 mm nozzle.</td>
<td>Base coat gun with a 1.3 mm to 1.5 mm nozzle.</td>
<td>Base coat gun with a 1.3 mm to 1.5 mm nozzle for smoother finish or a primer gun with a 1.8 mm to 2.0 mm nozzle for high build.</td>
</tr>
<tr>
<td><strong>Paint Gun</strong></td>
<td><strong>Application</strong></td>
<td><strong>Dry Time</strong></td>
<td><strong>Application</strong></td>
</tr>
<tr>
<td>Apply one light coat. Immediately apply second light coat if needed to hide thin areas. If second full coat is desired, allow Bumper and Cladding Coat to flash off before applying second full coat. Flash time varies depending on temperature and humidity. Flash time is usually between 5 and 10 minutes.</td>
<td>Apply one medium coat. If needed, apply second coat to hide thin areas. Allow sealer to flash off between coats. Flash time varies depending on temperature and humidity. Flash time is usually between 10 and 30 minutes.</td>
<td>Allow at least 60 minutes dry time at room temperature or 15 minutes at 130°F. Dry time will vary depending on temperature and humidity. Bumper and Cladding Coat must be completely dry before topcoating. Any unused paint may be returned to the can for future use.</td>
<td>Allow to dry completely at room temperature or allow to flash off then force dry at 180°F for 20 minutes or 30 minutes at 120°F. Dry time will vary depending on temperature and humidity. ALL SEASONS Waterborne Sealer must be completely dry before topcoating. The crosslinking process takes six hours at room temperature or one hour at 120°F. Because drying and crosslinking are independent processes, ALL SEASONS Waterborne Sealer may be topcoated before crosslinking is complete as long as it is completely dry.</td>
</tr>
<tr>
<td>Allow at least 60 minutes dry time at room temperature or 15 minutes at 130°F. Dry time will vary depending on temperature and humidity. Bumper and Cladding Coat must be completely dry before topcoating. Any unused paint may be returned to the can for future use.</td>
<td>Allow one medium coat. If needed, apply second coat to hide thin areas. Allow sealer to flash off between coats. Flash time varies depending on temperature and humidity. Flash time is usually between 10 and 30 minutes.</td>
<td>Allow to dry completely at room temperature or allow to flash off then force dry at 180°F for 20 minutes or 30 minutes at 120°F. Dry time will vary depending on temperature and humidity. ALL SEASONS Waterborne Sealer must be completely dry before topcoating. The crosslinking process takes six hours at room temperature or one hour at 120°F. Because drying and crosslinking are independent processes, ALL SEASONS Waterborne Sealer may be topcoated before crosslinking is complete as long as it is completely dry.</td>
<td>Allow at least 30 minutes dry time at room temperature or 15 minutes at 120°F before dry sanding. ALL SEASONS primers may be wet or dry sanded after 6 hours dry time at room temperature or after 60 minutes at 120°F. Dry time will vary depending on temperature and humidity. ALL SEASONS primers must be completely dry before topcoating. The crosslinking process takes six hours at room temperature or one hour at 120°F. Because drying and crosslinking are independent processes, primer may be topcoated before crosslinking is complete as long as it is completely dry.</td>
</tr>
</tbody>
</table>

**continued on next page...**
New Replacement Bumpers

- **RAW TPO Bumpers**
  - No sanding required before applying topcoat. Although sanding Bumper and Cladding Coat Adhesion Primer is not recommended, trapped debris may be removed with very light sanding using 600 grit paper. Apply any approved Base/Clear system according to the manufacturer’s instructions. Topcoating window does not close. Bumper and Cladding Coat Adhesion Primer may be topcoated at any time once fully dry.

- **OEM Primed Bumpers**
  - No sanding required before applying the topcoat. If required, surface may be lightly scuffed or sanded to achieve desired smoothness. If sanded, blow or wipe dust off surface before applying topcoat. Apply any Base/Clear or single stage topcoat system according to the manufacturer’s instructions. Topcoating window does not close. ALL SEASONS Waterborne Sealer may be topcoated at any time once fully dry.

- **RAW PUR Bumpers**
  - No sanding required before applying the topcoat. If required, surface may be lightly scuffed or sanded to achieve desired smoothness. If sanded, blow or wipe dust off surface before applying topcoat. Apply any Base/Clear or single stage topcoat system according to the manufacturer’s instructions. Topcoating window does not close. All SEASONS Waterborne Sealer may be topcoated at any time once fully dry.

Repaired Bumpers

- **OEM Painted Bumpers**
  - Finish sand with 400 to 600 grit sand paper. Apply any sealer, Base/Clear or single stage topcoat system according to the manufacturer’s instructions.

---

**Website** - If you’ve got an internet connection, you’re a keystroke away from a wealth of information about plastic repair on our website. We have tons of instructional videos, the latest edition of The Book of Automotive Plastic Repair, MSDS’s, and many other resources.

**YouTube** - Subscribe to our YouTube channel to get notifications every time we upload a new instructional video. Go to www.youtube.com/urethanesupply

**DVD** - This fast-paced, professionally-produced 50 minute DVD on plastic repair is the best in the industry. Train your whole crew in less than an hour and start making profits with plastic repair!

**Book** - “How to Repair Plastic Bodywork” is the world’s most comprehensive publication printed related to plastic repair. Owning this book will not only teach you how to perform virtually any plastic repair, but it also explains why. You’ll find this to be a truly valuable addition to your library.

**Technical Support** - Free technical support from our friendly staff is available at our toll free number. We’ll be happy to help you identify a type of plastic, the best repair procedure, or help you to solve any problem you might be having with plastic repair. Give us a call, we will help!

**Social Media** - Sign up on one or all of our social media accounts for the latest product information and repair tips! Our “friends” get the latest information first!

---

**Technical Support & Ordering Information:** 800-633-3047

1128 Kirk Rd.
Rainsville, AL 35986-6028 USA
phone: 256-638-4103
fax: 256-638-8490

www.polyvance.com