

## ***Per-Fix Flaw Repair Overview***

### **Why Choose Flaw Repair Coatings**

Reduce scrap, eliminate rework and improve quality with Per-Fix specialty polymer flaw repair coatings. Salvage costly parts with surface imperfections with our permanent flaw repair touch-up coatings. Per-Fix instantly repairs the most common part defects knit / flow lines, gloss imperfections, splay and many others highlighted in this document.

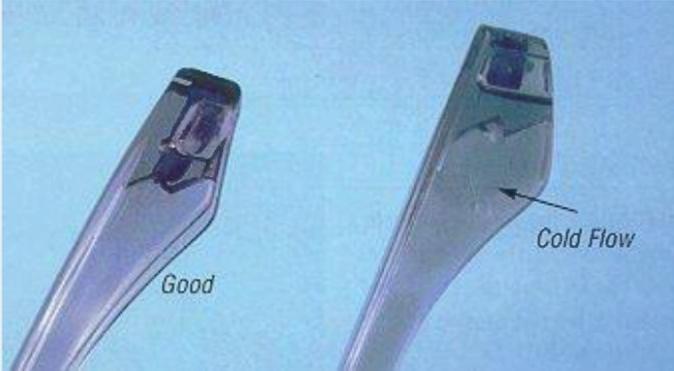
Complex part designs, poorly manufactured or designed tooling, worn out tooling and injection process controls are all factors contributing to flaws. These issues can be very expensive and time consuming to address and lead to reductions in productivity, labor, and overhead. Per-Fix flaw repair is an economical and quick solution allowing the injection molder to keep production moving without any loss of parts or reduction in quality. Chem-pak has many customers who cannot get parts off the line without Per-Fix. As a stocked product with quick distribution, Per-Fix provides a just in time solution for molders trying to meet production demands.

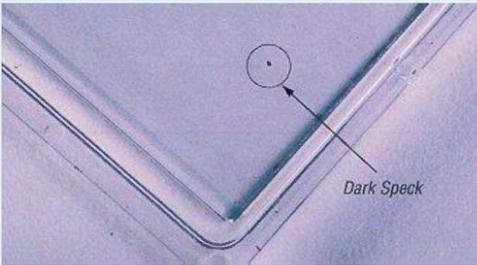
Aerosol products are easy to use, provide a consistent coating and require no expensive equipment to purchase or maintain. As a sealed container, it cannot be contaminated or spilled. In addition, the use of aerosols can eliminate time consuming bulk spray equipment set-up, changeover, and cleaning time. Using our state of the art onsite lab, our technicians have identified the ideal spray tip for our coatings, which can equal the functionality, quality, and flexibility of bulk spray equipment.

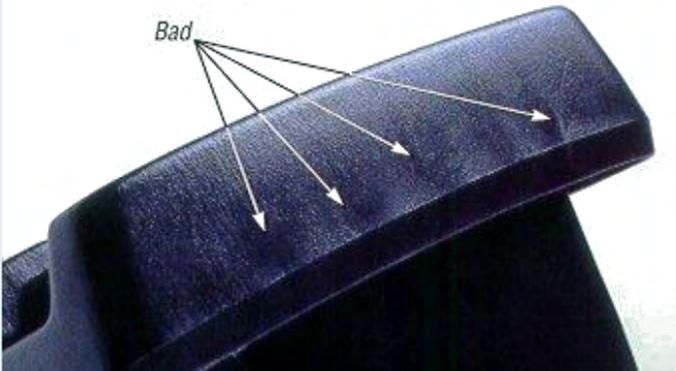
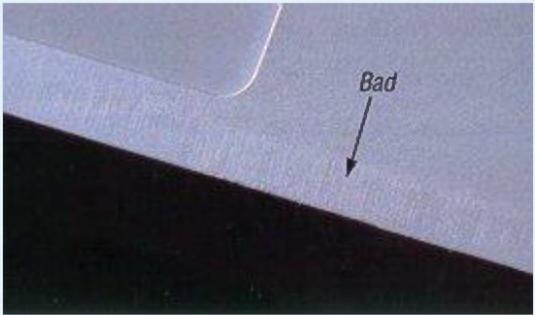
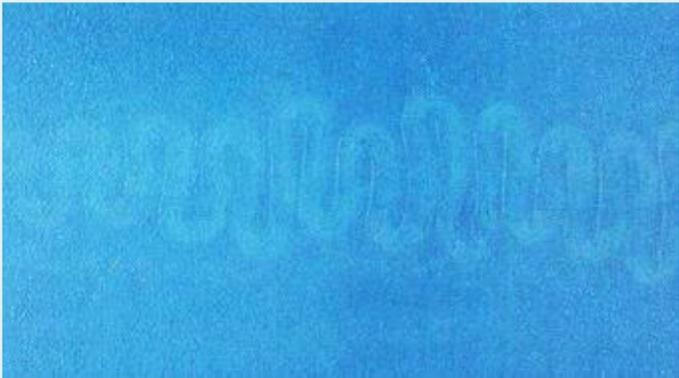


## Common Types of Flaws - Opportunities for Per-Fix & Color Match

<p>Flow Lines</p>	<p><b>Description:</b></p> <p>Flow lines are streaks, patterns, or lines - commonly off-toned in color - that show up on the part as a consequence of the physical path and cooling profile of the molten plastic as it flows into the injection mold tooling cavity. Injection molded plastic begins its journey through the part tooling via an entry section called a “gate.” It then flows through the tool cavity and cools (eventually hardening into a solid).</p>  <p><b>Causes:</b></p> <p>Flow line defects are caused by the varying speed at which the molten plastic flows as it changes direction through the contours and bends inside the mold tool. They also occur when the plastic flows through sections with varying wall thickness, or when the injection speed is too low causing the plastic to solidify at different speeds.</p>
<p>Knit Lines</p>	<p><b>Description:</b></p> <p>A line where the molten polymer flow fronts meet in the mold. Incomplete adhesion occurs along the knit line and causes a weak point in the plastic part.</p>  <p><b>Causes:</b></p> <p>Cold fronts meeting in the tool where molten plastic fronts meet.</p> <p><b>Location:</b> Cold fronts meeting in the tool where plastic flows around obstacles or over raised areas in the metal. It is guaranteed that you will have a knit line as the plastic flows around any opening in the part. Recessed text or icons can also cause small cosmetic knits.</p>

Blush	<p><b>Description:</b></p> <p>Dull discolored or whitish area on the surface of the part, usually at the gate.</p> <p><b>Causes:</b></p> <p>Shear stress between polymer molecules during injection. The gate may be too small or injection speed too fast.</p> <p><b>Location:</b></p> <p>Usually at the gate. May also occur where there is a sudden change in part thickness.</p> 
Cold Flow	<p><b>Description:</b></p> <p>Wavy or streaked appearance on part surface. Looks like a fingerprint or small waves like you would see on the surface of water.</p> <p><b>Causes:</b></p> <p>Low melt temperature, low injection speed or low injection pressure.</p> <p><b>Location:</b></p> <p>Hard to fill or last to fill areas.</p> 

<p>Contamination</p>	<p><b>Description:</b> Foreign particles embedded in the part.</p> <p><b>Causes:</b> 1. Burned material in the press barrel. 2. Contaminated regrind. 3. Grease or particles that have not been cleaned from the mold.</p> <p><b>Location:</b> Anywhere.</p>	 <p>A close-up photograph of a mold part's corner. A small, dark, circular particle is circled in black. An arrow points from the text 'Dark Speck' to this particle.</p>
<p>Splay</p>	<p><b>Description:</b> Splay can be defined as a splash-like appearance (or spray pattern) on the surface of a molded part. Splay is sometimes called silver-streaking.</p>	 <p>A close-up photograph of a surface showing a splash-like or spray pattern. Four red arrows point to the streaks. The text 'silver streak' is written at the bottom of the image.</p>
<p>Discoloration</p>	<p><b>Description:</b> Deviation from the original intended color of the material as compared to the manufacturers color chip.</p> <p><b>Causes:</b> 1. Contaminated resin. 2. Overheated resin. 3. Incorrect regrind ratio. 4. Incorrect color mixing or blending.</p> <p><b>Location:</b> Entire part</p>	 <p>Two dark blue plastic parts are shown. The parts are L-shaped with a hole. They exhibit a lighter, yellowish-brown discoloration, particularly in the recessed areas and corners.</p>

<p><b>Gloss</b></p>	<p><b>Description:</b> Smooth shiny areas on the part surface.</p> <p><b>Causes:</b> 1. Underpacking 2. See section on plate-out below.</p> <p><b>Location:</b> Hard to fill areas.</p>	
<p><b>Drag</b></p>	<p><b>Description:</b> Fine, straight lines scraped in the line of draw.</p> <p><b>Causes:</b> 1. Cavity side happens during mold opening and is usually from insufficient draft for the texture used or from overpacking. 2. Core side drag happens during ejection and is usually from inadequate draft, rough core, or overpacking.</p> <p><b>Location:</b> May be in opening direction or side action direction. Cavity, core, slide, or lifter.</p>	
<p><b>Jetting</b></p>	<p><b>Description:</b> Squiggly line in part pointing to gate. Looks like a worm in the part.</p> <p><b>Causes:</b> 1. Incorrect gate placement or size. The gate is positioned in such a manner as to aim the plastic straight into an open area. The plastic launches out into the open mold cavity like a piece of "silly string" and then stacks up in squiggles.</p> <p><b>Location:</b> Near gate.</p>	

## Standard Per-Fix Clear & Black Flaw Repair Coatings:

Clear	<p>For lighter flaws and gloss imperfections –</p> <p>Per-Fix Clear offers a transparent coating designed to work with any color and with most plastic substrates and gloss levels.</p>												
Black	<p>For more drastic imperfections on black surfaces -</p> <p>Per-Fix Black is specially formulated to fix even the most troublesome defects. Per-Fix Black provides extra coverage when Per-Fix Clear is just not enough.</p> <p>Formulated specifically for black molded parts with heavy visual defects that are too severe for Per-Fix Clear products to fully repair. Chem-Pak has formulated a specialized Per-Fix product series with blends of black masking pigments, which provide an outstanding and permanent repair. Per-Fix Black provides an excellent color match to many standard molded black parts of typical resins. Per-Fix Black uses the same high-performance repair systems as used in our clear formulations but with maximum repair efficiency.</p>												
Product Listing / Pricing	Please contact us for more details												
Gloss / Substrates	<table border="1"> <thead> <tr> <th>Gloss Levels</th> <th>COMPATIBLE SURFACES</th> </tr> </thead> <tbody> <tr> <td>AAA = 1.5 ± 0.3 Triple Matte</td> <td>Polypropylene</td> </tr> <tr> <td>AA = 3.0 ± 0.3 Double Matte</td> <td>ABS</td> </tr> <tr> <td>A = 5.5 ± 0.3 Matte</td> <td>Styrene/ Polycarbonate</td> </tr> <tr> <td>B = 9.5 ± 0.3 Egg Shell</td> <td>Vinyl</td> </tr> <tr> <td>C = 12.5 ± 0.3 Satin</td> <td>Nylon</td> </tr> </tbody> </table> <p><i>*Please refer to Quick Glance Sheet for other compatible substrates</i></p> <p><i>**Custom gloss levels are available - refer to price guide for details</i></p>	Gloss Levels	COMPATIBLE SURFACES	AAA = 1.5 ± 0.3 Triple Matte	Polypropylene	AA = 3.0 ± 0.3 Double Matte	ABS	A = 5.5 ± 0.3 Matte	Styrene/ Polycarbonate	B = 9.5 ± 0.3 Egg Shell	Vinyl	C = 12.5 ± 0.3 Satin	Nylon
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Sample Kits	Kits contain a full-size sample of each gloss level and are available for all Per-Fix aerosol products.												

## Custom Color Match Flaw Repair:

Summary	Offering the highest flaw repair coverage, Chem-Pak’s Color Match coating is custom designed in the lab to specifically match the customer’s part color and gloss level.
Process	To achieve a perfect color match, our in-house lab will require a sample part. Using a spectral analysis, we can determine the exact color and gloss level. Once we have identified a match, a custom coating is developed and tested to ensure proper adhesion, color, and gloss levels for the customer’s part. Refer to the 4-step development process below.
Product Listing / Pricing	Contact Chem-pak for more details
Development Process	<p style="text-align: center;"><b><u>4 Easy Steps to Create Your Custom Order</u></b></p> <ol style="list-style-type: none"> <li>1. Contact Chem-Pack® to ensure that Color Match is right for your part</li> <li>2. Send in a sample part for lab analysis</li> <li>3. You will receive a prototype sample to trial and approve</li> <li>4. Once approved, this custom product can be manufactured in as little as four weeks</li> </ol>
Substrates	<p>Polypropylene, ABS, Nylon, TPO, TPU, Vinyl, PC, Styrene, Polycarbonate</p> <p><i>*Contact us for a full list of compatible substrates</i></p>



WHERE QUALITY, INNOVATION,  
AND INTEGRITY MEET

242 Corning Way,  
Martinsburg, West Virginia 25405  
304.262.1880 • Toll Free: 800.336.9828  
Fax: 304.262.9643  
chem-pak.com  
info@chem-pak.com