

Solving Common Coating Problems

Using this chart

Whitford has been solving coating problems for customers since our founding in 1969. One fact has stood out during our years of trouble-shooting: When a coating fails, the chances are it is *not* the coating that is at fault — but the application process.

There are so many variables in applying coatings that can lead to failure. The purpose of this chart is not to cast blame, but to explain what can go wrong and how to put it right.

Following are the most common complaints we hear from customers all over the world, illustrated with enlarged photographs to show the problem clearly. Each complaint is covered in three parts:

1. Appearance: what the problem looks like.
2. Probable causes of the problem.
3. Suggested solutions.

If the problem still persists, call Whitford (see below) and we will do our best to solve it for you.



Blisters



Appearance

Small blister-like bumps on the coating surface.

Probable causes

1. Coating has been applied too thickly.
2. Rapid evaporation of solvents (using a solvent that is too volatile), or increasing part temperature too rapidly.

Suggested solutions

1. Remove coating and reapply a thinner coat.
2. Remove coating, preheat parts, then recoat and cure immediately.
3. Add small amount of slow-evaporating solvent.

Bubbles, pinholes



Appearance

Many small pockmarks or tiny holes in the coating.

Probable causes

1. Excessive agitation, causing coating to foam, trapping gas or air in bubbles.
2. Excessive pumping or a leaking pump.
3. Rapid evaporation of solvent.

Suggested solutions

1. Reduce agitation in tank and check pumping process.
2. Add slow-evaporating solvent.
3. Warm parts more gradually, flash briefly before curing.

Cobwebbing



Appearance

Small strands of coating resin on the surface.

Probable cause

Fluid coating is drying (as it is sprayed) before it reaches the surface to be coated.

Suggested solutions

1. Reduce the air pressure in the delivery system to prevent premature drying.
2. Change to a solvent that dries more slowly.
3. Reduce viscosity.

Dry spray



Appearance

A rough, mottled surface, similar to orange peel.

Probable cause

The coating is losing too much solvent as it is propelled toward the surface by the spray gun.

Suggested solutions

1. Move the spray gun closer to the surface; reduce the velocity of the spray; or increase the ratio of coating to air in the spray.
2. Change to a solvent that dries more slowly.

Eruptions in die-cast parts



Appearance

Occasional, random eruptions and/or small pockmarks.

Probable cause

Microcavities containing air in the metal. The air expands during curing, erupting (outgassing) and leaving either a small eruption or a crater.

Suggested solutions

1. Force eruptions prior to coating by preheating the parts to a temperature above the cure temperature. If no blisters appear, let parts cool, then coat and cure. If blisters still appear, the die-caster must make adjustments.
2. Select coating with lower cure temperature.

Fish eyes



Appearance

Round, crater-like holes that penetrate to the substrate.

Probable cause

Contaminants that prevent coating from wetting out the surface (such as grease from fingerprints or oil in the compressed air).

Suggested solutions

1. Review the handling, cleaning and surface preparation procedures to assure surface is free from contamination prior to coating.
2. Check for possibility of silicone contamination.
3. Install/check efficiency of oil/water trap.

Hazing, low gloss



Appearance

Dull, low reflective appearance of coating.

Probable causes

1. Film of material such as PTFE that rises to the surface (does not harm performance), low cure temperature/time.
2. Presence of moisture (humidity) during coating, leaving a rough, low-gloss surface.
3. Oven fouling. Low film thickness or rough substrate.

Suggested solutions

1. Rapid cooldown may improve gloss, increasing cure temp./time may eliminate hazing. Check oven, substrate.
2. Check water traps for moisture. Check DFT.

Mud cracking



Appearance

Thousands of tiny splits or cracks in the coating surface resembling dried mud.

Probable cause

1. The coating has been applied too thickly. (Note: this condition most often occurs in waterborne coatings.)
2. Coating flashed too quickly or too high a temperature.

Suggested solutions

1. Reduce the application viscosity.
2. Apply a thinner film.
3. Check flashing process (see Product Data Sheet).

Orange peel



Appearance

Textured coating surface resembling skin of an orange.

Probable causes

1. High viscosity of the coating material.
2. High temperatures causing rapid solvent loss.

Suggested solutions

1. Decrease the viscosity and lower air pressure.
2. Reduce the temperature of the part.

Overspray cratering



Appearance

Small particles of coating that reach a surface not intentionally sprayed (such as overspray from an interior non-stick reaching the exterior of a pan).

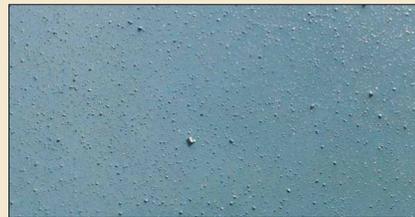
Probable cause

Too much overspray in application process.

Suggested solutions

1. Move the spray gun closer to the surface; reduce the velocity of the spray; or increase the ratio of coating to air in the spray.
2. Mask part to avoid overspray reaching other surfaces.
3. Increase air exhaust around parts to remove spray.

Particulate contamination



Appearance

Hard bits (particles) on surface of coated parts.

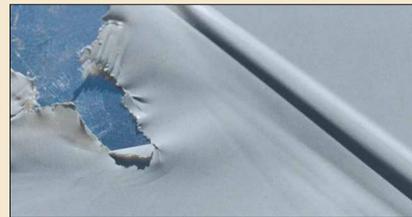
Probable causes

1. Dried coating inside container falling back into coating.
2. Airborne particles either in spray area or oven.

Suggested solution

1. Filter coating before using.
2. Keep spray area clean and free of dust.
3. Vacuum particulate matter from oven.

Peeling, flaking



Appearance

Sections of coating that lift easily off the substrate.

Probable causes

1. Contamination, improper surface preparation.
2. Insufficient mixing.
3. Improper cure.

Suggested solutions

1. Improve process of cleaning substrate to assure no forming oils or previous coatings remain.
2. Mix according to Product Data Sheet.
3. Check curing procedure with Product Data Sheet.

Sagging



Appearance

Coating that runs before drying, leaving raised rivulets.

Probable causes

1. Low viscosity of coating material.
2. Incorrect thinning solvent used.
3. Coating is applied too thickly.

Suggested solutions

1. Avoid reducing coating or use solvent with higher evaporation rate (check Product Data Sheet).
2. Apply thinner coats.
3. Apply to pre-heated parts.

How to contact Whitford

Whitford manufactures and/or maintains offices in all major markets of the world. Whitford makes the world's largest, most complete line of fluoropolymer coatings.

To find the Whitford office nearest you, please contact us via email or by visiting our website (see addresses below).

We'll be happy to give you as much information as you may need and, if you wish, to set up a meeting.

If you would like more copies of this problem-solving chart, we will send those, too.

Email: sales@whitfordww.com.

Website: whitfordww.com.

