Common Coating Problems

Introduction

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. This is often unintentional and the purpose of this section is not to cast blame, but to explain what can go wrong and how to put it right.

Following are the most common complaints nonstick coating manufacturers have to address with coaters and manufacturers, 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 cause of the problem.
3. Suggested solutions

If you or your vendors/coaters experience any of these problems with your application, contact your coating manufacturer for assistance. Some coating manufacturers even have support programs, such as free testing of the coating and how it is applied, that can help prevent problems early on, saving time and money.

<table>
<thead>
<tr>
<th>Bubbles, Pinholes</th>
<th>Blisters</th>
<th>Cobwebbing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Spray</td>
<td>Eruptions in Die Cast Parts</td>
<td>Fish Eyes</td>
</tr>
<tr>
<td>Hazing, Low Gloss</td>
<td>Mud Cracking</td>
<td>Orange Peel</td>
</tr>
<tr>
<td>Overspray, Cratering</td>
<td>Particulate Contamination</td>
<td>Peeling, Flaking</td>
</tr>
<tr>
<td>Sagging</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Common Coating Problems

Bubbles, Pinholes

Appearance:
Many small pock-marks or tiny holes in the coating.

Probable Causes
1. Excessive agitation, causing coating to foam, trapping gas or air bubbles.
2. Excessive pumping or a leaking pump.

Suggested Solutions
1. Reduce agitation in tank and check pumping process
2. Add small amount of slow-evaporating solvent.
3. Warm parts more gradually, flash briefly before curing.
Common Coating Problems

Blisters

Appearance

Small, blister-like bumps on the coating surface.

Probable Causes

1. Coating has been applied too thick.
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.
Common Coating Problems

Cobwebbing

Appearance
Small strands of coating resin on the surface.

Probable Causes
Fluid coating is drying as it is sprayed before it reaches the surface to be coated.

Suggested Solutions
1. Reduce the pressure in the delivery system to prevent premature drying.
2. Change to a solvent that dries more slowly.
3. Reduce viscosity.
Common Coating Problems

Dry Spray

Appearance
A rough, mottled surface, similar to orange peel.

Probable Causes
The coating is losing too much solvent or water 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 pock marks.

**Probable Causes**

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 the 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, advise your customer.
2. Select coating with lower cure temperature.
Fish Eyes

**Appearance**

Round, crater-like holes that penetrate the substrate.

**Probable Causes**

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.
Common Coating Problems

**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 temperature/time may eliminate hazing. Check oven, substrate.
2. Check water traps for moisture. Check DFT.
Common Coating Problems

Mud Cracking

Appearance

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

Probable Causes

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

Suggested Solutions

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

Orange Peel

Appearance

Textured coating surface resembling the 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 the air pressure.
2. Reduce the temperature of the part.
Common Coating Problems

Overspray Cratering

Appearance

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

Probable Causes

Too much overspray in application process.

Suggested Solutions

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

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

Peeling, Flaking

Appearance

Sections of coating that lift easily off the substrate.

Probable Causes

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
Common Coating Problems

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.

This information has been created by the Retail Marketing Team at Whitford. The Product Knowledge Network (PKN) offers you everything you need to know about nonstick-coated housewares products — all for FREE.

For more information, contact us at retail@whitfordww.com, visit us online at productknowledge.com or scan this QR code.