

# **TROUBLESHOOTING GUIDE**

**THERMOPLASTIC COATINGS**

## TABLE OF CONTENTS

### **THERMOPLASTIC COATINGS**

Booth Recovery Equipment .....	4
Cleaning and Phosphating .....	5
Cured Film Appearance .....	7
Cured Film Physical Properties .....	10
Oven Problems .....	11
Powder Application .....	12
Powder Feeding .....	14

# THERMOPLASTIC COATINGS

---

Thermoplastic materials are one of many types of coatings known for their recyclability and versatility of application.

We stand behind our products, even when things don't go as planned. From cleaning and phosphating to the final appearance of the cured film, we are here to help you solve your problems with proven solutions.

## BOOTH AND RECOVERY EQUIPMENT

### Poor powder containment

CAUSE	SOLUTIONS
1. Primary collector filter media blinding	1a. Ensure correct "seasoning" of filters or cartridges 1b. Check filter pulse operation 1c. Clean or replace filter media 1d. Ensure clean, dry compressed air 1e. Control humidity
2. Final filters blinded or restricted	2a. Ensure correct "seasoning" of filters or cartridges 2b. Repair primary filter leaks 2c. Repair or clean final filters
3. Improper gun placement	3. Reposition guns
4. Cross drafts	4. Eliminate cross drafts
5. Inadequate booth draw	5. Maintain proper airflow (typical range is 80-150 fpm depending on booth size)
6. Too many guns, excessive powder output	6. Reduce number of guns or powder output

### Contamination in reclaim powder

CAUSE	SOLUTIONS
1. Inadequate equipment cleaning	1. Clean per supplier recommendations
2. Sieve problems	2. Repair or replace screen
3. Falling dirt or debris	3. Clean conveyor, hangers, or other overhead equipment
4. Loose debris on substrate	4. Ensure clean substrate
5. Airborne contaminant	5a. Isolate spray booth area 5b. Eliminate source of contamination

### Poor transfer efficiency or powder utilization

CAUSE	SOLUTIONS
1. Air turbulence	1a. Isolate spray booth area 1b. Locate source and eliminate
2. Excessive booth draw	2a. Maintain proper airflow (typical range is 80-150 fpm depending on booth size) 2b. Consult equipment supplier
3. Poor line density	3. Improve line density

## CLEANING AND PHOSPHATING

### Inadequate Cleaning

CAUSE	SOLUTIONS
1. Improper temperature	1. Adjust temperature to specs
2. Low solution concentration	2. Adjust cleaner concentration
3. Poor exposure to cleaner	3a. Improve part presentation 3b. Clean Spray nozzles 3c. Adjust spray pressure
4. Short dwell time in cleaner	4. Extend part exposure time
5. Wrong cleaner for soils	5. Change cleaner or metal
6. Depleted chemicals	6. Recharge chemicals

### Low phosphate coating weight (mg./sq.ft.)

CAUSE	SOLUTIONS
1. pH out of range	1. Adjust pH
2. Inadequate cleaning of substrate	2. See A: Inadequate cleaning
3. Low phosphate concentration	3. Increase concentration
4. Inadequate exposure	4a. Reduce line speed 4b. Clean plugged spray nozzles

### Cleaning and/or phosphate solutions foaming

CAUSE	SOLUTIONS
1. Solution temperature too low	1. Raise temperature
2. Spray pressures too high	2a. Clean plugged spray nozzles 2b. Use recommended pressures 2c. Use correct nozzles
3. Pump picking up air	3a. Eliminate leaks in pump packing 3b. Adjust solution level 3c. Mesh screens clogged up.
4. Cleaner concentration too high	4. Reduce concentration
5. Type of cleaning or phosphate solution	5. Use low foaming spray solutions

# Streaked or spotted phosphate, white patterns

CAUSE	SOLUTIONS
1. Poor rinsing	1a. Trace cause of deposit patterns 1b. Add halo misting rinse 1c. Increase rinse overflow 1d. Clean spray nozzles 1e. Adjust pressure 1f. Check rinse water solids level
2. Poor cleaning	2. See A: Inadequate cleaning
3. Phosphate % too high or low	3. Adjust phosphate concentration
4. High phosphate temperature	4. Reduce phosphate temperature

# Flash rusting of parts

CAUSE	SOLUTIONS
1. Phosphate coating weight too low	1a. Adjust phosphate temperature 1b. Extend part exposure time 1c. Increase phosphate concentration
2. Drying between pretreatment stages	2a. Reduce temperatures 2b. Apply water mist on parts between stages 2c. Increase line speed
3. Poor rinsing	3a. Extend exposure time 3b. Eliminate carry-over 3c. Check spray pressure/nozzles 3d. Check rinse water tanks/overflow
4. Low pH pickling of substrate	4. Increase pH to recommended level
5. Line stoppage	5a. Prevent line stoppage 5b. Apply water mist on parts between stages 5c. Run at lower temperatures
6. Dry-off too slow	6a. Increase dry-off oven temperature 6b. Increase dry-off oven air movement 6c. Ensure parts are draining well 6d. Increase final rinse temperature

## FLOWED FILM APPEARANCE

### Voids, craters or pinholes

CAUSE	SOLUTIONS
1. Inadequate cleaning of substrate	1. See cleaning and phosphating Trouble A
2. Airborne contaminants (silicone, oils, powders, etc.)	2. Locate source and eliminate
3. Oil in compressed air supply	3. Ensure clean, dry air
4. Incompatible powders	4a. Proper equipment cleaning 4b. Verify with your powder supplier

### Outgassing or blistering

CAUSE	SOLUTIONS
1. Castings, other porous substrate	1. De-gas at or above cure temperature
2. Low film thickness	2. Increase film thickness
3. Ash from burn-off oven	3. Ensure using clean hooks & parts
4. Plating	4. Consult with plater
5. Liquid paint under powder	5a. Remove paint 5b. Use appropriate liquid paint 5c. De-gas at or above cure temperature

### High orange peel or roughness

CAUSE	SOLUTIONS
1. Improper thickness	1. Adjust film thickness (thicker)
2. Back ionization	2. See Powder Application
3. Substrate profile	3a. Increase film thickness 3b. Modify substrate
4. Slow heat-up rate	4a. Increase cure temperature 4b. Preheat substrate
5. Powder stored at or exposed to elevated temperature	5a. Replace powder 5b. Store powder at or below recommended temperature

# Part surface contamination

CAUSE	SOLUTIONS
1. Contamination from oven interior	1a. Eliminate source of contamination 1b. Clean entire oven interior 1c. Clean or replace filtration 1d. Clean oven air handling equipment
2. Falling dirt or debris	2. Clean conveyor, hangers, or other overhead equipment
3. Inadequate cleaning	3. See Cleaning and Phosphating
4. Contamination from plant air	4a. Isolate spray booth areas 4b. Eliminate source of contamination
5. Compressed air	5. Ensure clean, dry air
6. Sieve	6. Repair or replace screen

# Inconsistent film thickness

CAUSE	SOLUTIONS
1. Manual spray technique	1a. Choose alternative gun tips to improve powder cloud diffusion 1b. adjust spray technique
2. Poor part ground	2. Ensure all ground contacts are not more than 1 megohm resistance in coating zone (as required by NFPA)
3. Improper gun placement	3a. Reposition gun 3b. Increase gun distance to part and apply final dusting layer
4. Plugged guns or defective spray equipment	4. See Powder Application
5. Reciprocators not synchronized	5a. adjust line speed 5b. Adjust reciprocator stroke sequence
6. Excessive directional air flow in booth	6. See Booth & Recovery Equipment

# Picture Framing

CAUSE	SOLUTIONS
1. Excessive film thickness	1. Reduce film thickness
2. Poor part grounding	2. Ensure ground contacts are not more than 1 1 megohm resistance in coating zone (as required by NFPA)
3. High gun Kv	3. Reduce gun Kv



# Off-color or yellowing

## CAUSE

## SOLUTIONS

1. Overbaking

1a. Reduce dwell time or temperature  
1b. Increase line speed  
1c. Calibrate oven  
1d. Check burner locations/baffles to eliminate hot spots

2. Line stoppages

2a. Eliminate line stoppages or reduce oven temperature stoppages  
2b. Leave gaps to provide for scheduled line stoppages

3. Heat-sensitive powder type

3. Consult with Protech Group

4. Inadequate oven exhaust

4a. Increase oven exhaust rate  
4b. Reduce line loading

# Low gloss

## CAUSE

## SOLUTIONS

1. Overbaking

1. Reduce dwell time or temperature

2. Incompatible powder in system

2. Clean application equipment before changing powder

3. Widespread microscopic pinholes

3. See trouble A: Voids, craters, or pinholes

# High gloss

## CAUSE

## SOLUTIONS

1. Undercured coating

1. Increase cure time or temperature

2. Slow heat-up rate

2a. Increase temperature  
2b. Preheat substrate

# Coating pulls away from corners or welds

## CAUSE

## SOLUTIONS

1. Inadequate metal pretreatment

1. See Cleaning & Phosphating

2. Contamination on surface of weld

2a. Grit blast weld  
2b. Increase chemical cleaning of weld  
2c. Change weld flux

3. Moisture retention in recess

3a. Increase time or temperature in dry-off oven  
3b. Fixture parts to improving draining  
3c. blow off water w/compressed air  
3d. Mask or plug recesses  
3e. Redesign part or drill holes for drainage

## FLOWED FILM PHYSICAL PROPERTIES

### Poor adhesion

CAUSE	SOLUTIONS
1. Inadequate substrate heat	1. Increase oven time or temperature
2. Inadequate cleaning of substrate	2. See Cleaning & Phosphating
3. Change in substrate or soils	3. Modify metal preparation for new metal or soils
4. Phosphate coating too heavy	4a. Reduce phosphate temperature 4b. Reduce phosphate concentration
5. Pretreatment process contamination	5. Find and eliminate sources of contamination (silicone, oils, etc.)

### Poor chemical resistance

CAUSE	SOLUTIONS
1. Inadequate substrate heat	1. Increase oven time or temperature
2. Improper chemistry for application	2. Consult powder supplier
3. Voids in coating	3a. Increase coating thickness 3b. See Cured Film Appearance

### Poor corrosion

CAUSE	SOLUTIONS
1. Inadequate substrate heat	1. Increase oven time or temperature
2. Inadequate metal pretreatment	2. See Cleaning & Phosphating
3. Voids in coating	3a. Increase coating thickness 3b. See Cured Film Appearance
4. Inadequate edge coverage	4a. Eliminate sharp edges 4b. Increase film thickness
5. Improper chemistry for application	5. Consult with Protech Group

### Poor impact or flexibility

CAUSE	SOLUTIONS
1. Inadequate substrate heat	1. Increase oven time or temperature
2. Inadequate metal pretreatment	2. See cleaning & Phosphating
3. Low film thickness	3. Increase Coating and thickness

## OVEN PROBLEMS

### Temperature does not equal set point

CAUSE	SOLUTIONS
1. Thermocouple/heat source fault	1. Check circuitry for continuity
2. Controller out of calibration	2. Calibrate or replace
3. Thermocouple/capillary failure	3. Replace thermocouple/capillary
4. Positive or negative pressure	4. Check surrounding area pressure
5. Air seal, relief, exhaust failure	5. Check air handling equipment
6. Air turbulence	6. Perform an air survey
7. Low gas pressure	7. Check inlet gas pressure
8. Exceeding mass loading capacity	8a. Reduce product mass loading 8b. Modify or replace oven
9. Fuel/air ratio incorrect	9. Adjust to specifications
10. Placement of temperature sensor	10. Relocate sensor in oven

### Pilot will not light

CAUSE	SOLUTIONS
1. Main gas valve closed	1. Open main gas valve
2. Safety controls open	2. Trace wiring, correct control
3. Gas pressure incorrect	3. Check manufacturer's specs
4. Ignition transformer fault	4a. Check igniter, clean, or replace 4b. Check ignition cable 4c. Check ignition transformer
5. Improper pilot setting	5. Check pilot orifice setting
6. Purge cycle not complete	6a. Complete cycle 6b. Check purge timer

# Main burner will not light

CAUSE	SOLUTIONS
1. Main valve closed	1. Open main valve
2. Manifold valve/circuits open	2. Trace wiring, look for fault
3. Pilot valve will no open	3. Inspect and replace if needed
4. Faulty signal from flame system	4. Monitor signal, adjust/replace
5. Incorrect gas pressure setting	5. Adjust to specifications
6. Full control motor failure	6. Repair and/or replace motor
7. Faulty air flow switch	7. Check switch settings/performance
8. Hi-temp lock-out activated	8. Correct cause of high temperature

# Coil won't energize (electric)

CAUSE	SOLUTIONS
1. Wiring fault	1. Check all wires and connections
2. Fuse/breaker fault	2. Correct cause of fuse fault
3. Low air flow through coil	3a. Check air flow sensor 3b. Check for adequate air flow

## POWDER APPLICATION

# Thin film

CAUSE	SOLUTIONS
1. Poor part ground	1. Ensure all ground contacts are not more than 1 megohm resistance in coating zone (as required by NFPA)
2. Poor charging	2a. Increase Kv. 2b. Clean or replace electrodes, cables, etc., as needed 2c. Decrease powder delivery rate
3. High humidity in ambient air	3. Control environment
4. Excessive fines	4. Add virgin powder
5. Low deposition rate	5a. Increase powder delivery air 5b. reduce line speed

# Poor penetration in Faraday areas

CAUSE	SOLUTIONS
1. Voltage not optimized	1. Adjust Kv
2. Powder delivery rate not optimized	2. Adjust delivery rate
3. Poor part ground	3. Ensure all ground contacts are not more than 1 megohm resistance in coating zone (as required by NFPA)
4. Poor gun replacement	4. Adjust gun position
5. Poor powder spray pattern	5. Consider alternate gun tips
6. Poor part presentation	6. Improve part presentation
7. Wrong type of gun nozzle	7. Change gun nozzle type

# Back ionization

CAUSE	SOLUTIONS
1. Gun voltage too high	1. Reduce Kv
2. Gun is too close to part	2. Increase gun to part distance
3. Poor part ground	3. Ensure all ground contacts are not more than 1 megohm resistance in coating zone (as required by NFPA)
4. Excessive powder build-up	4. Apply thinner film
5. Insulating first coat (recoating)	5a. Reduce kv, ensure good grounding 5b. Pre-heat part before coating

# Powder surging or spitting

CAUSE	SOLUTIONS
1. Powder delivery rate not optimized	1. Optimize powder delivery rate
2. Improper hose diameter	2. Use smaller diameter hose
3. Poor hopper fluidization	3. Optimize fluiding pressure
4. Improper air pressure or air volume	4. Optimize air pressure
5. Kinked or fattened hoses	5a. Eliminate sharp bends, kinks, or obstructions in or on hoses 5b. Replace if permanently deformed
6. Clogged/worn parts, tubes or hoses	6. Clean or replace worn parts, tubes or hoses, etc., as needed
7. Powder level too low	7. Ensure powder level is above bottom of pick-up tubes
8. Moisture in compressed air	8. Ensure clean, dry air
9. Excessive powder fines	9. Add virgin powder

## Poor spray pattern

CAUSE	SOLUTIONS
1. Powder delivery rate not optimized	1. Optimized powder delivery rate
2. Blockage	2. Clean hoses,pumps, etc.
3. Worn parts	3. Replace worn parts

## POWDER FEED

## Powder drifting out of hopper

CAUSE	SOLUTIONS
1. Fluidizing air too high	1. Reduce air pressure
2. Hopper too full	2. Reduce powder level
3. Poor hopper ventilation	3a. Remove obstructions in hopper vent 3b. Check vent assist device
4. Excessive fines	4. Add virgin powder

## No air percolating through powder in fluidizer

CAUSE	SOLUTIONS
1. No air pressure	1a. Check for crimped hoses 1b. Adjust air pressure
2. Plugged fluidizer membrane	2. Replace membrane

## Air channels through powder during fluidization

CAUSE	SOLUTIONS
1. Powder level too low	1. Increase powder level
2. Pack or moist powder	2a. Sieve powder and fluidize 2b. Ensure compressed air is clean and dry
3. Membrane conditions	3a. Remove membrane obstructions 3b. Replace plugged or broken membrane 3c. Ensure membrane seal is intact
4. Excessive fines	4. Add virgin powder
5. High humidity in ambient air	5. Control environment

# Restricted powder hoses and pumps

CAUSE	SOLUTIONS
1. Normal buildup	1. Clean or replace hoses or parts
2. Impact fusion	2a. Reduce air pressure(s) 2b. Ensure compressed air is clean and dry 2c. Clean hoses and parts 2d. Replace worn parts 2e. Eliminate exposure to heat 2f. Eliminate sharp bends, kinks, or obstructions in or on hoses 2g. Add virgin powder to increase particle size
3. Kinked or flattened hoses	3a. Eliminate sharp bends, kinks or obstructions in or on hoses 3b. Replace if permanently deformed

# Insufficient powder feed

CAUSE	SOLUTIONS
1. Powder level too low	1. Increase powder level
2. Powder not fluidizing	2. Refer to trouble: Powder drifting out of hopper, No air percolating through powder in fluidizer, and Air channels through powder during fluidization
3. Obstruction of powder delivery	3a. Clean feed tubes, pumps, hoses and guns 3b. Eliminate kinked or flattened hoses
4. Excessive hose length	4a. Reduce hose length 4b. Increase air pressure
5. Low delivery air	5. Increase air pressure
6. Worn pump parts	6a. Replace worn parts 6b. Reduce air pressure
7. Kinked or flattened hoses	7. See trouble related to Restricted powder hoses and pumps

## ASK AN **EXPERT**

Our coating experts can help you simplify the process, save you time and Our coating experts can help you streamline the process, saving you time and money by providing the right coating advice for your product or project.



### **AMERICAS**

[americas@protechpowder.com](mailto:americas@protechpowder.com)

### **ASIA-PACIFIC**

[asia@protechpowder.com](mailto:asia@protechpowder.com)

### **EUROPE, MIDDLE EAST & AFRICA (EMEA)**

[emea@protechpowder.com](mailto:emea@protechpowder.com)