PMI Trouble-Shooting Suggestions For Film Faults

Film Faults	Probable Cause	Suggested Corrections
1.) Runs Or Sags	Improper Spray Technique	A.) Sprayers, who are unfamiliar with airless, tend to deposit a much heavier film than is necessary.
	Excessive Deposit A. Gun too close to work B. Gun not triggered properly C. Have excessive lapping	B.) The airless spray gun should be held at an 8 to 10 in. distance for general work. The pattern should not be lapped more than one-third and the gun should be triggered at surface interruptions.
		C.) In addition to the above suggestions, check spray nozzle for excessive wear or improper nozzle selection.
	"Slow " Solvent Balance	D.) Start without reduction and gradually reduce with fast solvents. If material is still to slow, reformulate with faster solvents.
	Excessive Reduction	E.) Every material has a value of viscosity in solids content below which it cannot be reduced and still hold a reasonable film.
	Object Being Painted Is Too Cold	F.) It is not advisable to paint work that is below 30°F unless thin coats are used. Some materials will not build on cold surfaces.
2.) Streaks	Faulty Nozzle	A.) Damaged nozzle. Check nozzle to see if it is chipped or cracked or if there is a build up of foreign material in or on it. If it is damaged in any way, the nozzle must be replaced.
3.) Orange Peel-Small Crater-Like Formations	Poor Atomization	A.) Increase temperature to lower the viscosity.
		B.) Increase pressure to properly atomize material.
		C.) Reduce viscosity.
		D.) Solvent balance wrong, pigment content too high. Increase ratio of "fast" solvent.
		E.) Use smaller flow rate. Wider pattern nozzle to increase atomization.
	Poor Flow Out	F.) Add retardant or slow solvent so wet surface will flow.
		G.) Distance of spray gun from work. Too close causes material to be driven into wet surface. Too far causes rapid solvent evaporation and surface hardening of the film.
	Droplet Impingement	H.) Use larger flow rate nozzle to decrease fine atomization and retard solvent evaporation.
		I.) Check pump pressure to see if it is too high or too low. Too high causes material to be driving into wet surface. Too low cause poor atomization.

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4.) Failure To Attain Increased Mileage	Film Is Heavier Than Required	A.) A painter will usually apply excessively heavy coats until they become accustomed to the airless process. Use smaller nozzle. Also see comments in “Runs or Sags”.
	Improper Technique	B.) See suggestions under “Runs or Sags”. Hold gun at right angles to paint surface.
	Excessive Over-spray	C.) In addition to checking technique, investigate exhaust air velocities. Usually one-third of the conventional booth velocities is sufficient. Cross wind and down draft booths are usually troublesome in this regard.
		D.) Decrease pressure and/or temperature.
	Porous Surface	E.) Airless spray tends to fill surface pores with material to achieve a level film surface.
5.) Dry Over-Spray	Excessive Atomization	A.) Reduce pressure and/or temperature. Use slower solvent balance.
	Nozzle Too Small	B.) Use a narrower fan pattern for coarser atomization or use a higher flow rate nozzle with wider fan width.
	Improper Technique-	C.) Hold gun closer to work. Triggering gun at edges of work might help also. Spray at right angles to work.
6A.) Pin Holes- Air Dry Finishes (Very small circular voids formed when solvent is released to atmosphere)	Nozzle Flow Rate Too Low	A.) Use a larger nozzle to apply a wetter coat.
	Film Too Heavy	B.) Apply thinner coats to allow proper solvent release.
	Too Much Heat	C.) Less heat will slow down the fast evaporation of solvent from the atomized particles.
	Improper Formulation	D.) Use slower evaporating solvents to get better flow out.
6B.) Pin Holes- Boxed Finishes	Not Enough Flash Time Before Entering Oven	A.) Give more flash time before entering oven.
	Dry Spray	B.) Improve spray technique. Keep gun at proper distance from work piece.
	Solvent Balance Wrong	C.) Add retardant to promote flow. Fast solvents boil and cause pinholes the film is surface hardened and does not re-flow.
	Coarse Atomization	D.) Use proper nozzle and restrictor. Check pump pressure.
	Too Much Heat	E.) In an oven where there is a gradual increase in heat, this fault in not common. Check oven temperature

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7.) Cob Webbing	Coating Material Is Too Viscous	A.) Cob webbing occurs on highly cohesive materials. Increase temperature and/or pressure. Add solvent to increase viscosity. Add slow solvent to retard drying. This condition is impossible to overcome in some cases with certain materials.
8.) Bridging	Coating Material Is Too Viscous	A.) Same as above.
9.) Flotation Of Pigments	Film Is Too Heavy	A.) Use smaller, wider nozzles. Increase ratio of fast solvents.
	Film Is Too Wet	B.) Increase gun distance.
10.) Crazing- Fine Cracking In The Surface	Film Too Heavy, Improper Formulation	A.) Apply lighter coats. Reformulate coating material. Very often the drier content must be altered.
11.) Poor Or Low Gloss	Dry Spray	A.) Reduce viscosity by adding slower evaporating solvents or lowering the temperature settings of the heater.
	Incompatible Solvents, Wrong Solvent Combination, Or Wrong Reducer. (Wrong reducer may cause formula separation)	B.) Check solvents. If this is the condition, change to correct solvent.
	Too Much Reducer (Can promote incompatibility)	C.) Check recommendation of material supplier about amount of reducer to use.
	Spraying Over A Primer Not Completely Dry Or Where Primer Is Of A Different Product From Top Coat	D.) Allow more time for drying of primer.
	Oven Temperature Too High Causing Scorching, Burning, or Discoloration	E.) Check oven temperature and correct if necessary.
	Poorly Ventilated Oven (Foul Oven)	F.) Check ventilation in oven and correct if necessary. May be caused by cross drafts in areas surrounding the oven.

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12.) Poor Adhesion	Improper Cleaning, Dirt On Work Surface	A.) Investigation of the cleaning method. Cleaning solution may be contaminated.
	Dry Spray	B.) Dry spray does not have enough wetting properties to promote flow so material will adhere to the part.
		C.) Check distance of spray gun from work piece and move closer if necessary.
		D.) Check nozzle size. (See Film Faults No. 5)
		E.) Temperature setting at heater may be too high causing rapid solvent evaporation.
		F.) Higher flow rate and/or narrower fan pattern will decrease atomization and result in wetter film.
	Incorrect Formulation Of Material	G.) Check with material supplier for proper formulation for metal adhesion or formulation for adhesion to your particular part.
	High Gloss Surface	H.) Provide a tooth for each coat of material. Sand between coats. In the case of nitrocellulose lacquer, formulation is at fault. There may not be sufficient amount of active lacquer solvents to re-soften previous coats to form a bond.
13.) Rough Finish	Dry Spray	A.) Use lower heat, lower pressure, and use slower evaporating solvents. Selection of proper nozzle and restrictor combinations. (As in Film Faults 12, Suggested Corrections B – F).
	Spraying Over A Primer Not Thoroughly Dry Or Cured, Causing Lifting	B.) Check bake time or the air-dry time of the primer to be sure it is properly cured before recoating.
	Dirt On Surface Or In Finishing Material	C.) Agitate material thoroughly before using.
		D.) Strain material thoroughly and use proper filter. Check cleaning procedure.
	A Coarse Grind Of the Paint Itself	E.) Check grind of material with material supplier.
	Separation Of The Formula Through The Use Of Improper Solvents In The Manufacture Or Reduction Of A Coating Material	F.) Check formulation with material supplier. Incompatible solvents or reducers, or too large quantity of solvent may be the cause.

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14.) Crawling- Adhesion Of Coating Material To Work Surface Is Not Enough To Let Coating Material (while still wet) Hold Together, Leaving Uncoated Areas	Grease Or Dirt On The Part	A.) Check proper cleaning procedures before painting.
	Water In The Finish Or On The Part	B.) Same as above.
	Contaminated Cleaning Solutions	C.) Check the last time cleaning solution was changed. Solvent can become contaminated and form an acid in the cleaning tank. Unless corrected by neutralizing agent, it is possible to deposit these acids on the work in the cleaning process.
		D.) Improper rinsing prior to entering the spray area may leave oily cleaning solutions on the work.
	Wiping The Work With Wiper Rags That Have Not Been Properly Cleaned	E.) Be sure to use properly cleaned rags. It is better to use new rags.
	Silicones In The Vicinity Of The Finishing Operations	F.) Exhaust air draws silicone vapors over to work being painted. Thoroughly check to find source of silicone contamination and/or consult material supplier for proper procedures to take with formulation of material.
15.) Fish Eyes And Craters- Finish Having Appearance Of Craters (Is very similar to crawling but occurring in definite patterns)	Presence Of Silicones	A.) Check to find source of silicone contamination and check with material supplier to see if reformulation is possible. Sometimes the addition of a small amount of silicone to the coating material will overcome this cratering.
	Water In The Formula Or Moisture On The Surface	B.) Check cleaning procedures.
		C.) Cold parts brought into warm atmosphere may cause condensation to form. Allow longer holding time before finishing.