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1. Pretreatment [Back to Table of Contents](#)

1.1 Chromating of aluminum, zinc, magnesium	
Problem: Rinse beads off, insufficient wetting	
Possible causes	Corrections, testing, procedures
Degreasing action not sufficient (example: hard to remove fabricating oils, pressed in extrusion greases)	Increase temperature in degreasing unit Increase chemical concentration Increase duration Increase agitation

Problem: Conversion layer (chromating) uneven or spotty	
Possible causes	Corrections, testing, procedures
Degreasing not sufficient, unit parameters incorrectly adjusted, spray perspective not in order	Increase temperature in degreasing unit Increase chemical concentration Increase duration Increase agitation
Inorganic layers (oxides) not sufficiently removed, including un-removed chromate or anodizing layers (after coating removal)	Check adjustments, check nozzles, increase temperature or concentration of acidic solution, increase duration
Partial drying	Increase lifting times in dipping unit. Check side nozzles in spray units

1.2 Phosphating of steel and zinc plated steel	
Problem: Rinse beads off, insufficient wetting	
Possible causes	Corrections, testing, procedures

Degreasing action not sufficient (example: hard to remove fabricating oils, pressed in extrusion greases)	Increase temperature of chemical concentration in the degreasing unit, increasing dipping duration, increase agitation, use appropriate molding additive.
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Problem: Conversion layer (phosphate) not closed, rust	
Possible causes	Corrections, testing, procedures
Bath formulation not appropriate	Correction (concentration, ph level, accelerator)
System parameters incorrectly adjusted	Adjust Renew chemicals
Rinse tanks overburdened (carried into the acidic solution, ph levels too low)	Increase dripping time over active baths Increase rinse water amounts
Rinse results not sufficient (carried into the acidic solution)	Increase mechanical action (nozzle pressure, formation, movement in dipping units) Increase rinse cycle
Lapses in movement prior to layer formation	Ensure even movement

Problem: Conversion layer (phosphate) too thick, dusty layers	
Possible causes	Corrections, testing, procedures
Treatment duration too long	Observe recommended duration, avoid inactive zones

Accelerator levels too high	Observe recommended levels
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Problem: Conversion layer (phosphate) too uneven or spotty	
Possible causes	Corrections, testing, procedures
Degreasing not sufficient	Increase temperature or chemicals in degreasing unit Increase dipping duration, increase agitation Use suitable molding additive.
Inorganic layers (scale, rust, oxide, hydroxide) insufficiently removed	Increase temperature and chemical concentration Increase treatment time Adjust nozzle systems
Drying	Decrease lifting time in dipping units Use side nozzles with spray units
Spray distribution insufficient	Adjust nozzles
Pre-phosphate	Test rinse water Check procedure
Activation not sufficient (with zinc phosphate)	Check correct tank adjustments Renew chemicals

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2.1 Poor Fluidization

Problem: Powder is supposed to flow like water in the fluid container (boil). Poor fluidization is recognizable in a slow and non-continuous transportation of the powder coating from the fluid container to the guns. No homogenous powder cloud is achieved.	
Possible causes	Corrections, testing, procedures
Fluidizing air too low or too high	Change pressure Use larger hose diameter
Fluidizing plate defective	Exchange plate
Fluidizing plate clogged	Clean plate
Oil remnants in compressed air	Check filter in front of coating booth
Powder too fine (reclaim), high over spray ratio	Add virgin powder, change powder
Powder in carton very hard or lumpy	Strain Do not set fluidizing plate to continuous operation
Excessive temperatures in the coating system	Correct condition Provide circulation Cool Reconstruct

2.2 Clogging of the powder feed hoses

Problem:
 Deposits (agglomerates) form in the powder feed hoses, which sporadically are freed by delivery air and appear as powder puffs on the work pieces. After curing these powder puffs appear as faulty surface elevations.

Possible causes	Corrections, testing, procedures
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Feed air pressure too high/too low	Reduce/increase pressure
Delivery air moist or oil in pressurized air	Check in-line filters and moisture traps
Inappropriate hose mounting	Establish appropriate hose mounting, no kinks
Particle size distribution of powder coating too fine	Note appropriate particle size Optimize virgin powder plus reclaim ratio
Venturi nozzle worn	Exchange nozzle
Feed hose diameter wrong	Adjust hose diameter to appropriate powder flow
Feed hose too long	Minimize feed hose length
Inappropriate hose material	Exchange hose type, use appropriate type (silicone, polyurethane, Teflon)

2.3 Powder does not adhere to substrate	
Problem: The powder coating, which should electrostatically adhere to the substrate, falls off—no relevant coating thickness can be achieved.	
Possible causes	Corrections, testing, procedures
Insufficient grounding	Test contacts and transport mechanism (especially booth) and hooks (< 1 MO). Insulation from lubricants and residues in transport

Voltage too low or no voltage	Gun, test high voltage, cable and cable lead
Not enough charging	Increase voltage, reduce powder flow
Wrong particle size distribution	If reclaim is involved add virgin powder Contact powder manufacturer
Chain does not run smooth, vibration too strong	Check conveyor system
Film build too high	Check geometry of part Reduce powder flow
Insufficient wetting	Check pretreatment
Airspeed blow of air too high	Optimize controls
Too much powder output	Reduce air flow and/or powder flow
Gun distance to part too close, blast off effect	Adjust distance
Unsuitable geometry of the part	If possible change geometry or hanging position

2.4 Poor Wrapping

Problem:

With one-sided gun positioning only minimal film thickness can be achieved on opposite side.

Possible causes	Corrections, testing, procedures
Powder flow too low or too high	Optimize system parameters, adjust air flow
Insufficient grounding	Use clean hooks, test transfer resistance (< 1 MO), check diameter of hooks
Temperature of the part too high after dry-off oven or pre-heating	Allow adequate time for cooling (less than 40 °C /104 °F]
Supplemental air flow is too high or too low	Adjust air speed and powder cloud
Unsuitable particle size distribution	Consult powder manufacturer
Gun voltage too high	Adjust voltage to suit part geometry
Gun voltage too high	Adjust voltage to suit part geometry
Insufficient charging of the powder - gun defective	Adjust high voltage; Consult equipment and powder manufacturer
Insufficient charging of the powder - gun defective	Adjust high voltage; Consult equipment and powder manufacturer
Poor or wrong positioning of the parts	Adjust hanging configuration

2.5 Powder lumping in the hopper

Problem: Coal shaped lumping in the powder coating in powder box	
Possible causes	Corrections, testing, procedures
Inappropriate storage (temperature too low/too high, in excess of shelf life)	Strain before use, use fresh powder
Box feeding	Avoid continuous vibratory operation
Transport too slow or too warm	Strain powder before use, consult powder manufacturer

2.6 Poor penetration into recesses	
Problem: Despite the physical conditions (faraday cage), it is possible to achieve a minimum coating thickness in the corners. With poor penetration procedures penetration depth is very limited. Extreme film thickness variations are noticeable	

Possible causes	Corrections, testing, procedures
Feed supplemental or tribo air too high	Change of lower pressure
Air speed too high	Adjust equipment controls
Powder flow too high	Adjust equipment controls to suit part
Not enough powder flow	Adjust/optimize equipment parameters

Inappropriate application, unsuitable nozzle	Utilize flat spray nozzle or deflector; Adjust nozzle
Insufficient charging of powder, defective gun	Adjust voltage (increase, test) Contact equipment manufacturer
Voltage too high	Adjust/reduce voltage
Faraday cage effect due to electric field	Use tribo equipment and powder; Reduce voltage
Insufficient grounding	Use clean hooks, test transfer resistance
Powder spray too wide	Use different gun nozzle or deflector
Unsuitable particle size distribution	Optimize through testing; Contact powder manufacturer
Distance from gun to part is too big or too small	Increase or decrease distance

2.7 Film Thickness too high	
Problem: Powder coat layer shows uneven surface prior to curing, after curing shows orange peel, wavy flow, or pinholes	
Possible causes	Corrections, testing, procedures
Parts are too hot coming from dry-off oven	Allow longer cooling time (less than 40 [°C] / 104 [°F]) for parts

Preheat temperature too high	Lower preheat temperature or allow for cooling (less than 40 [°C] / 104 [°F])
Powder flow too high	Lower powder feed
Coating time too long	Lower coating time
Unfavorable geometry of parts	Change hanging or gun configuration
Gun-to-part distance too close	Increase gun-to-part distance

2.8 Film thickness too low	
Problem: Substrate shows through and powder coat has grainy flow	
Possible causes	Corrections, testing, procedures
Insufficient charging of powder	Test and adjust voltage
Inappropriate particle size distribution/percentage of overspray too high	Continuous and even introduction of virgin powder to reclaim powder Patio adjusted to actual consumption Optimize particle size distribution through testing

Powder flow too low	Increase powder flow
Powder delivery hose too long	Shorten hose; Change hose diameter; Change injector

Fluid characteristics of powder not optimal	Check fluidization (see 2.1 poor fluidization)
Residence time of parts in front of gun too short	Slow down line speed of conveyor; Increase number of passes of gun in front of part Add more guns Suction of reclaim system too high Lower suction capacity
Suction of reclaim system too high	Lower suction capacity
Booth draft too strong to allow powder cloud to deposit on its own	Change system configuration Consult with booth supplier Slow down line speed
Changed powder supply due to powder deposits in the transport system, injectors, hose and nozzle	Cleaning of the transport system components, coordinate feed and atomized air, check fluidization
Plugged transport system due to foreign materials (e.g. fibers, cleaning residues)	Commit to cleaning cycles and regular maintenance
Inappropriate hanging of parts	Check and adjust hanging configuration
Insufficient grounding	Use clean hooks Avoid thin hooks (note voltage loss) Check transfer resistance if system
Processing of non Tribo powders in Tribo systems	Use Tribo powder
Low level of powder in fluid hopper	Replenish powder Check minimum indicator
Particle size too fine due to circulation in system	Increase virgin to reclaim ratio

Too much overspray in booth due to cleaning cycles	Regular transport of overspray from booth to reclaim system
Intermittent back pulse of filter too long, sudden shift of powder particle size (too fine)	Keep back pulse of compressed air short (e.g. 20 seconds)
Insulation of base coat too strong	Reduce voltage for second coat and lower powder flow Use tribo powder coatings
Gun-to-part distance too high	Reduce distance
Powder hose causes friction charge of opposite polarity to charge generated in gun	Change hose material or ground hose

2.9 Film build varies	
Problem: Substrate shows through and powder coat has grainy flow. Or powder coat shows uneven surface prior to curing – orange peel after curing, wavy flow, pinholes. These appearances vary on the surface of the work piece.	
Possible causes	Corrections, testing, procedures
Wrong positioning of guns in an automated system	Empirical determination of proper gun positioning. Optimize interval curve of automatic guns. Check conveyor/lift speed
Inappropriate insulation of base coat	Adjustment of hanging or gun configuration Additional grounding
No continuous, even introduction of virgin powder to reclaim powder based on actual consumption	Assure proper functioning of recovery system Adjust virgin to reclaim ratio
Sliding of powder film (in an improperly fused condition) due to conveyor vibration	Inspect conveyor and chain Test grounding/charging

Flapping/swinging of the work pieces	Adjust hanging configuration Test fastening method
Uneven powder transport	Test powder transporting devices for clogging due to foreign particles or plugs Test for air pressure variations
Unfavorable geometry of parts (Faraday Cage)	Change hanging configuration or gun positioning Use flat spray nozzles
Geometry of parts varies greatly	Optimize device and gun adjustments to suit work piece
Excessive manual touch-up	Adjust automatic guns or possible pre-coat
Uneven manual touch-up	If possible pre-coat Train personnel

3 Surface Defects [Back to Table of Contents](#)

3.1 Powder puffs on the work piece	
<p>Problem: Powder puffs are powder clusters that in an improperly fused condition are visible as powder hills in the powder film. After curing these powder puffs appear as disturbing elevations on the surface.</p>	
Possible causes	Corrections, testing, procedures
Poor fluidization	See section 2.1 (poor fluidization)
Powder hose too long or diameter too large	Change hose diameter Shorten hose Change configuration

Powder too fine (reclaim)	Add virgin powder
Uneven transport	Test air pressure Check for pressure variations
Clogging of the feed hoses	Note hose path, see section 2.2. (clogging of the powder feed hoses)
Powder falls off booth ceiling	Adjust/increase frequency of booth cleaning intervals
Powder falls off hanging devices	Remove/ reduce powder coat layer, check grounding
Powder build-up on deflector plate	Check atomized air
Powder falls off work piece	Test grounding Check diameter of hoses
Catch nozzle worn	Change nozzle
Air pressure variations in power supply system	Adjust air pressure
Level in powder supply container varies greatly	Reduce distance between minimum and minimum level
Gun nozzle defective	Check nozzle, replace

Powder moist	Use dry powder; Check for condensation (temperature difference from powder storage area to coating area), Check air filter and moisture traps in compressed air system
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3.2 Craters	
Problem: Defect – blank area in the powder coat, which extends all the way to the substrate (diameter up to 2 mm)	
Possible causes	Corrections, testing, procedures
Insufficient pretreatment (e.g. oil and grease residues)	Test pretreatment if necessary, contact pretreatment supplier
Chemical residue, faulty pretreatment	Test pretreatment, if necessary contact pretreatment supplier
Rust, white rust on parts	Assure clean surface, apply recommended pretreatment, possibly buff or sandblast (sweep) surface
Oil in feed and/or atomizing air	Check in-line filters and moisture traps in air system
Silicones from chain lubricants or welding sprays	Use product without silicon content, educate line operators
Incompatibility with powder coatings from other manufacturers	Cleaning of coating and application equipment, contact powder coating supplier
Outgassing from substrate	Pre-heat work pieces, use OGF additive
Surrounding air contaminated	Balance air flows in plant, avoid cross drafts

Work piece moist/wet	Increase drying time/temperature Note material thickness especially with anodized parts
Liquid and powder paint in same plant	Definitely avoid - reconfigure plant
Body filler or other compounds not compatible	Forced drying, test suitability
Base coat was cleaned with solvents	Preheat work piece or avoid solvents
Blasting media decontaminates surface	Do not reclaim blasting media
Back ionization effect	Adjust application, use tribo if possible
Instead of rough texture effect only penetration-to metal and craters visible	Insufficient coating thickness
Instead of rough texture effect only penetration-to metal and craters visible	Insufficient coating thickness

3.3 Pin Holes	
Problem: Surface defects – development of fine pores on the surface, also leads to change in gloss level	
Possible causes	Corrections, testing, procedures
Moisture content of powder too high	Testing through drying of powder/test storage conditions In cold climates, watch for condensation in powder (cold storage area to warm coating area)

Pre-reaction of powder coat	Check storage parameters, storage time exceeded Consult powder manufacturer
Trapped air	Check heat up curve Possible slow heat up curve Modify powder coating
Film build too high	Note recommendations of powder manufacturer Minimize film thickness
Incompatible with other powder coatings	Clean equipment/booth Consult powder manufacturer (if necessary change)
With rough textures, instead of effect development only pinholes develop	Film thickness too low (see 2.8 film thickness too low)
Very porous work pieces	Check for satisfactory work pieces, possible surface is too rough from sand blasting
Out-gassing from porous work pieces (cast parts, zinc galvanized material, magnesium castings, anodized materials)	Preheat parts Modify powder coating Cast anodized materials not scaled and dried

3.4 Picture framing effect	
Problem: Higher film build of coating on the edges of the part due to wrap, therefore uneven flow.	
Possible causes	Corrections, testing, procedures
Powder particles too rough/unsuitable for particular application	Strain powder to optimize particle distribution Consult powder coating manufacturer
Voltage too high	Adjust voltage to suit part

Distance from gun to work piece too low	Adjust/increase distance
Feed air/powder flow too high	Adjust powder flow

3.5 Contaminations	
Possible causes	Corrections, testing, procedures
Contamination through conveyor chain or chain lubrication etc.	Cleaning of the equipment/check sieve for contamination or tears
Contamination of powder surface due to airborne dirt from outside of booth (e.g. surrounding air, floor, polishing area, blasting area)	Isolate booth area, clean surroundings with vacuum Avoid cross drafts Balance air flows in plant Avoid polishing in booth and oven area
Fibers from broom and cleaning cloths	Use suitable cleaning apparatus and materials
Insufficient polished welding areas, metal shavings, welding drops, milling flaws	Control finishing process- repeat if necessary Improve polishing stage and pretreatment
Contamination from equipment cleaning	Vacuuming is more effective than compressed air (powder is not airborne)
Deposits from dust and powder particles in the oven (too much convection inside, powder that doesn't adhere, is blown onto work pieces of different colors)	Reduce air speed Install pre-gelling curing stage Do not cure other colors at the same time in oven
Deposits of dust and powder on cured work pieces	Dust free cooling zone Avoid drafts

Dirt and color particle transfer between adjoining booths	If possible reconfigure area Enclose booths
Contamination from warehousing	Assure orderly warehousing Close powder bags and boxes Separate by powder type

3.6 Blistering	
Problem: Elevations of differing size in the powder coat, no adhesion due to enclosures at the part surface	
Possible causes	Corrections, testing, procedures
Water on work piece	Check dryer and hanging configuration
Water in scooping type of work pieces	Note geometry, drying time and temperature or change hanging configuration Air blast work pieces
Corrosion, oil and grease residues	Optimize pretreatment
Over coating	Assure flawless first coat
Over coating of liquid paint	Check suitability of base coat
Over coating of filler areas	Dry or cure filler Check suitability
Salt residues or chemical remnants on the work piece surface, insufficient wetting	Check pretreatment, final rinse stage, and drying of media/chemicals during transport inaction

Film thickness too high, powder accumulations, powder drizzles off work piece on edges and corners	Check system parameters Reduce film thickness
Break in zinc layer, double zinc layer, corrosion under the zinc layer	Avoid double zinc layers Ensure flawless zinc layer

3.7 Drip Developments	
Problem: Running or dripping of the gelling powder coat off the work piece	
Possible causes	Corrections, testing, procedures
Film thickness too high (with wire or sheet metal parts)	Reduce film thickness
Powder slides to the edge	Increase voltage Check grounding
Substrate temperature is too high (from preheating or dryer), therefore film build too high	Increase cooling time (max. 40 [°C] / 104 [°F]) between dry-off oven and booth Optimize film thickness
Heat up rate too high or inappropriate	Reduce heat up speed Control oven temperature
Powder accumulation on inside corners from drizzled off powder coating	Optimize system parameters and blast off effect.

3.8 Orange peel	
Problem: Poor flow (orange peel look), short or long waviness of powder coat layer, noticeable only after curing.	
Possible causes	Corrections, testing, procedures

Heat up cycle of parts too slow	Determine heat up curve and increase (especially with parts of high wall thickness)
Substrate temperature exceeds the melt temperature of the powder, causing excessive film build	Check substrate temperature (max. 40 [°C] / 104 [°F]) Increase cool down phase
Powder coating material too reactive	Consult powder manufacturer
Shift in particle size distribution, portion of reclaimed powder too high	Optimize deposit results of powder guns Increase lift intervals
Unsuitable particle size distribution	Optimize particle size distribution Consult powder manufacturer
Film thickness too high or too low	Check system parameters
Incompatibility with other powder coatings	Clean booth, check compatibility Consult powder manufacturer
Powder stored too long/pre-reacted	Check storage. If powder is too old, exchange
Voltage too high	Optimize voltage Change to low ionizing application or tribo guns
Uneven wall thickness (thick to thin)	Optimize oven temperature
Back ionization effect	Reduce voltage Increase distance from work piece to gun

Textured work piece surface	Optimize texture, check work piece surface
Air speed too high at oven entrance	Reduce air speed (max. 0.5 [m/sec] / 1 ½ [ft./sec]), change air flow guides

3.9 Insufficient wet out of the substrate	
Problem: Poor or no adhesion of powder coat to the parts surface, large area lifting of cured powder coat	
Possible causes	Corrections, testing, procedures
Gummed oils, greases or separating compounds, insoluble extrusion oils	Check pretreatment or change, use different extrusion oils or separating compounds
Pretreatment residues	Final rinse de-ionized water
Encumbrance from sweaty hands or soiled gloves	Do not handle pretreated parts with bare hands or soiled gloves
Displaced oils or greases in pretreatment	Pretreatment Check oil separator
Conveyor halt during pretreatment, dried on chemicals	Avoid conveyor halts, possibly mist

4. Surface Variations in the Powder Coat [Back to Table of Contents](#)

4.1 Color Deviations
Problem: Continuous or suddenly appearing changes in color or effect compared to original sample part or compared to first parts coated

Possible causes	Corrections, testing, procedures
Film thickness varies greatly	Assure constant film thickness
Differing substrates and substrate colors (steel, aluminum, brass, glass)	Use substrates of same type for comparisons
Film thickness too thin (not covering)	Apply higher film thickness (same as samples)
Not sufficient or wrong pigmentation in the formulation	Consult powder coating manufacturer
Color deviations due to curing technique or oven atmosphere (example: direct fired gas oven, IR oven), use of room air for burner!	Use suitable powder coatings Control oven Use outside air supply for burner
Over curing of powder coating (especially with organic pigments)	Observe curing parameters of powder manufacturer
Differing curing parameters with same parts	Observe powder manufacturers curing parameters
Differing curing parameters with greatly varying parts (different wall thickness)	Observe curing parameters of powder manufacturers and adjust to wall thickness
Several powder manufacturers/suppliers	Use powder coatings from the same manufacturer or check the compatibility
Varying film thickness with over coating	Assure even film thickness
Bleeding of first coat with over coating	Check suitability of first coat when over coating

During over coating extensive color deviations from first coat	Avoid over coating of strongly deviating colors
Uneven pretreatment of parts	Assure more even pretreatment of parts
Mesmerism, color deviations with differing light sources	Judge work pieces in daylight (not direct sunlight) Use day light cabinet
Rough texture too pronounced	Use suitable powder coat
Powder transport directly from the powder box	Use fluid container

4.2 Cloud Formation	
Problem: Uneven light to dark or matte to glossy effect of the coating on the work pieces	
Possible causes	Corrections, testing, procedures
Gun distance from part too great or small	Test distance
Reciprocator operation parameters inappropriate for line speed and part configuration	Adjust lift speed to chain speed
Uneven powder transport line speed and part configuration	Introduce sufficient virgin powder Test for deviations in air pressure
Manual touch-up	If possible pre-coat

Uneven charging	Test application
Uneven grounding of parts	Test grounding
Strongly varying film thickness (especially with matte finishes)	Optimize film thickness
Separation of matte finish powders in reclaim system, uneven parts of virgin and reclaim powder	Assure consistent powder quality Adhere to the recommended percentage of virgin and reclaim powder

4.3 Poor Coverage	
Possible causes	Corrections, testing, procedures
Film thickness to low	Assure appropriate film thickness, especially with critical colors (example: red, orange, yellow)
Film thickness varies greatly from part to part	Optimize system parameters
Reciprocator operation parameters inappropriate for line speed and part configuration	Adjust lift speed to chain speed
Differing materials and material colors (steel, aluminum, brass, glass)	Use same materials for comparison
Differing surfaces and reflections (polished, blasted, chromate)	Use same surfaces for comparison

Mechanical treatment shows through (example: polishing)	Use finer grain materials for polishing
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4.4 Loss of Gloss Yellowing, Discolourations	
Problem: Difference between suggested gloss level and color and the gloss level and color of the original sample or parts coated at the beginning of the job	
Possible causes	Corrections, testing, procedures
Cure parameters of manufacturer were not observed	Optimize curing parameters Adhere to powder manufacturers suggestions
Oil, soluble materials in oven	Do not use oil or soluble materials in oven area
Incompatibility with other powders, poor flow	Clean system Distribute incompatible powders to other booths
Film thickness too high or too low	Optimize job parameters
Powder coating is not temperature stable	Use temperature stable powder coatings Consult powder manufacturer
Over curing in oven	Adjust oven temperature and speed to parts being coated Lower temperature during conveyor halts
Incompatibility of powder coating in the oven	Do not use powder coatings from different manufacturers at the same time in one oven
Direct fired ovens and IR ovens	Adjust powder coating to oven parameters Adjust oven temperature to powder coating

Powder coating pre-cured or too old	Check warehouse parameters Use fresh powder coatings
Unsuitable cleaning agents for example prior to silk screening	Check suitability of cleaning agents for powder coat, pre-testing necessary
Separation of 2 component matte powders	Check reclaim system for uneven suctioning of over spray
Uneven gloss level due to different wall thickness of work piece	Lower oven temperature Increase duration time Re-construct system
Components of the powder formula migrate to the surface causing haze and lower gloss	Discuss possible changes with powder supplier and consider trade-off between performance parameters and better stability Optimize oven parameters Re-construct system
Binder in powder coating poorly dispersed	Consult powder manufacturer

5. Mechanical and Chemical Deficiencies [Back to Table of Contents](#)

5.1 Poor mechanical properties and chemical resistance	
Problem: Insufficient compliance with the necessary technical properties of the powder coating (mechanical and chemical)	
Possible causes	Corrections, testing, procedures
Too high/too low heat up temperature or time	Observed curing parameters of powder coating manufacturer
Oil, grease, extrusion oils, dust on the surface	Optimize pretreatment

Insufficient pretreatment	Optimize pretreatment
Incompatible pretreatment and powder coating	Adjust pretreatment method Consult chemical and powder supplier
Inappropriate powder coating	Use appropriate powder coating Consult powder manufacturer
With transparent top coats slow deterioration of the powder coating (chalking)	Over coating of interior grade powder coatings with exterior grade transparent powder coatings does not result in a UV resistant coating system, therefore adhesion problems of the top coat

5.2 Greasy Surface	
Problem: Haze like film on the surface, which can be wiped off	
Possible causes	Corrections, testing, procedures
Blooming effect (white film on the powder coating surface, which can be wiped off)	Change powder coating formula Increase curing temperature
Insufficient air circulation in the oven	Increase air circulation
Contamination on the surface because of incompatible powder coatings from different manufacturers	Use only powder coatings from one manufacturer at the same time in an oven Consult powder manufacturer
Wrong powder coating choice	Use suitable powder coatings Consult powder manufacturer

Powder coating not sufficiently cured	Observe curing parameters
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5.3 Poor Adhesion	
Possible causes	Corrections, testing, procedures
Under or over curing of the powder coating film (for example in IR oven)	Observe curing parameters
Insufficient/inappropriate pretreatment	Adjust pretreatment to job at hand
Basic material too thick or unevenly thick	Observe curing parameters, use slower or faster curing powder coatings
Scale, surface rust on the work pieces	Use “fresh” work pieces or store in dry environment; mechanical pretreatment
Oxide layer on the work pieces, white rust on zinc plating	Store work pieces in dry environment or use “fresh” work pieces Use suitable pretreatment materials Use mechanical pretreatment (sweeping) if necessary
No adhesion on laser cut edges	Treat edges mechanically (brush, polish, sweep)
Purpose and powder coating properties are not suited for each other	Use suitable powder coatings
Film thickness too high	Reduce film thickness or use more flexible powder coatings

No adhesion to base coat	If possible lightly polish base coat or partially edge with suitable solvent
No adhesion to liquid base coat, electro coat or coil coating	Test suitability, lightly abrade base coat
Break in zinc, conversion or primer layer	Adjust pretreatment to work piece and powder coating
Double zinc layers, corrosion under zinc layer	Consult with H.D.G. supplier
Transport residues on work pieces (salt, dust etc.), which have not been removed by pretreatment	Assure flawless surfaces and protected transportation, suitable pretreatment

5.4 Abrasion resistance too low	
Problem: Insufficient resistance of the powder coating against abrasive media	
Possible causes	Corrections, testing, procedures
Insufficient curing	Observe curing parameters
Packaging causes abrasion to powder coat surface	Use suitable packaging/foils to wrap work pieces (tissue paper, bubble wrap, foam, fleece)
Powder coating scratches too easily/too soft	Select suitable powder coating for purpose Consult powder manufacturer
Abrasion during further mechanical treatments (profiles)	Carefully handle work piece in further manufacturing steps

Unsuitable transport containers	Avoid sliding Transport bundled and restrained on pallets or in boxes
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6. Special Characteristics of Application with Reclaim [Back to Table of Contents](#)

6.1 Contamination of the Powder Coating (additional to section 3.5)	
Problem: Foreign or powder particles of a different color are enclosed in powder film	
Possible causes	Corrections, testing, procedures
Powder remnants or dirt in coating booth, cyclone or filter	Clean system Constantly clean screen
Powder remnants in application, powder accumulation from injector, hose or gun	Clean application Check screen
Contamination of reclaim	No sieve or insufficient screen Use proper screen size (mesh size approx. 200 [µm] / 8 [mils]) Check screen for tears or dirt
Final filter defect, powder is blown into coating area	Check and repair final filter
Chafing of carpet material in carpet systems	Use suitable carpet or replace carpet

6.2 Poor Processing Characteristics (additional to section 2.1 to 2.6)	
Problem: Continuously or suddenly deteriorating application while processing parameters are unchanged	
Possible causes	Corrections, testing, procedures

A change in particle size distribution due to reclaim, powder too fine	Continuously add virgin powder and ensure proper ratio of virgin to reclaim powder (max. 1:1) Reduce over spray Change rack configuration Introduce reclaimed powder continuously
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6.3 Continuous Shade Variations	
Problem: Continuous or sudden changes in color/shade or effect compared to sample or originally coated parts	
Possible causes	Corrections, testing, procedures
Separation or particle size distribution changes through reclaim	Add virgin powder
Powder remnants in reclaim system	Clean reclaim system
Detraction due to several booths being located next to each other	Reconstruct coating area layout Cover booth during downtime, since powder or dirt may transfer and contaminate area
Powder transfer due to uneven air flow or performance of booths next to each other	Reconstruct/reconfigure area
With powder extraction from box feeder no even ratio of reclaim and virgin powder is next to each other	Use fluid container Ensure even ratio of virgin to reclaim powder
Addition of reclaim powder is inconsistent, virgin powder ratio is too high or too low	Add sufficient virgin powder Ensure consistent ratio

7. Special Characteristics of Application of Metallic Powders [Back to Table of Contents](#)

7.1 Color shift from color chart or original sample

Possible causes	Corrections, testing, procedures
Inconsistent batches	Coat each job with powder from a single batch Consult powder manufacturer
Varying application (Corona, Tribo, Corona modified with ion catch)	Use only one type of application equipment Consult with powder manufacturer
Defective application, gun short circuits	Check application Use proper application
Object related coating jobs	With several applicators for one coating job, colors and systems have to be checked against each other. Use original samples, and warn customers of risks involved
Differing work pieces	For comparison always use a single work piece with its particular substrate color (aluminum, steel, zinc plated steel, glass, wood)
Poor grounding	Check ground and contacts
Wrong RAL chart used or effect difference between RAL chart and powder coating	Use proper RAL chart (GL or HR), inform customer

7.2 “Graying” of the Surface	
Problem: Disappearance of the metallic or non-metallic effect components (drowning)	
Possible causes	Corrections, testing, procedures
Powder coating is tribo suitable, or metallic effect appears different	Use Corona gun, always conduct pre-tests

Varying application methods (Corona, Corona modified with ion catcher or Tribo) and inappropriate gun settings	Adjust KV setting and gun-to-part distance: the higher the KV setting, the lesser the metallic appearance; the lower the KV setting, the more metallic effect will appear
Varying deposition of effect pigments gives rise to color/effect changes	Use one suitable application method

7.3 Color Variations during Coating	
Problem: Continuous or sudden change of color or effect from original sample or begin of coating job	
Possible causes	Corrections, testing, procedures
Powder extraction from box feeder	Use fluid container
Powder separation	Check reclaim Spray to waste
Separation of powder in cyclone or in reclaim Read metallic application guidelines datasheet system	Check Cyclone Check reclaim
Batch change during coating job	Use only one batch for each coating job
Colour change between manual and automatic application	Touch-up difficult to spray areas before automatic application

7.4 Cloud Formation	
Problem: Uneven light to dark effect of the coating on the work piece	
Possible causes	Corrections, testing, procedures

Gun distance to work piece to big or too small	Check distance
Reciprocator operation parameters inappropriate	Check lift and chain speed
Uneven powder transport	Add sufficient virgin powder Check compressed air for variation
Manual touch-up	Position manual touch-up before automatic booth
Uneven charging (defective gun)	Check application
Uneven grounding of work pieces	Check grounding
Extremely varying film thickness (especially with matte coatings)	Optimize film thickness
Powder extraction from box feeder	Use fluidizing hopper