



2027 Aerospace Maintenance Competition

PPG Paint Procedures ****IMPROVED FOR 2027****

The paint portion of the contest will require only one team member, however, there will be two separate challenges, each allowing 7.5 minutes for completion. Two teams will be at the station at the same time, so for the first 7.5 minutes, the competitor from Team A will perform the Virtual Reality Spray portion of the challenge, while the competitor from Team B will work on Paint Defect Identification. After 7.5 minutes, the competitors will swap places to complete the other half of their individual challenge.

Paint Defect Identification

- A) Double check your team name/number on the provided scoresheet (correct or request a new sheet if necessary) and write your own name at the top of the sheet.
- B) Match the fourteen lettered panels A through K to the paint defect from the provided list that best matches their respective appearance. There will be one panel to represent each of the following 11 defects:

Poor Hiding	Poor Sanding	Craters/Fish Eyes	Mottling/Striping
Tape Lines	Orange Peel	Sagging/Running	Solvent Pop/Micro-blister/Haze
Poor Adhesion	Dry Spray	Dirt/Inclusions	

- C) Clearly write the CAPITAL letter from each defect panel on the line next to the matching defect name on the scoresheet.
- D) Leave your scoresheet with the judge for evaluation.

Performance results are calculated based on accuracy of defect assignments. Competition scoring will then convert that to a time score in seconds according to the following table:

# Correct	SCORE (sec)	# Correct	SCORE (sec)	# Correct	SCORE (sec)
0	900	4	573	8	245
1	818	5	491	9	164
2	736	6	409	10	82
3	655	7	327	11	0

Virtual Paint Spray

Be sure the PPG Judge has your team name/number, as well as your name, and optionally disinfect your hands using the provided alcohol gel dispenser.

- A) Approach the flat screen display and accept the VR paint gun from the PPG operator.
- B) Spray the panel on the VR display using good painting techniques to achieve a consistent target film thickness of 3 – 7 wet mils while minimizing overspray.
- C) Each participant will be allowed 7.5 *total* minutes to spray one panel for practice, receive the evaluation of that panel, and then spray a second panel to earn a Performance Result.
- D) The scored test panel can be reattempted from scratch up to two times, but each retry subtracts 2 points from your Performance Result, and you **MUST** use the final retry score. You *do not* get to choose the highest score of all your attempts.
- E) Tell the operator when you are finished.

VR Paint Spray Performance results are calculated using a weighted average of 90% target film coverage and 10% transfer efficiency. Competition scoring converts the performance result to a time format according to the following formula:

$$\text{Final time in seconds} = (100 - \text{Performance Result}) * (30 \text{ sec})$$

*Example: Where the Performance Result is **86.0** (the 2023 average score),
SCORE = (100 – **86.0**) * (30 sec) = 420 seconds*

FINAL PPG PAINT SCORING

Final Paint Event score for each individual will be the average of their VR Paint Spray score (in seconds) and their Paint Defect Identification score (in seconds).

Defect: Dirt and Inclusions

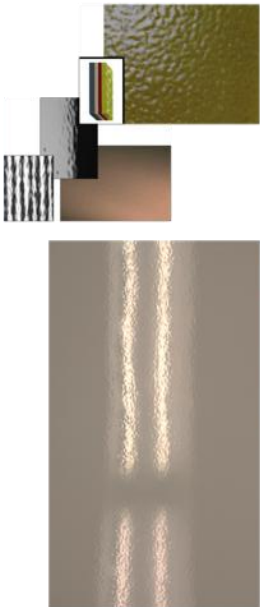
Solid, physical contamination either in the paint as mixed, or deposited on the surface after spraying from the local environment



Potential Cause	Resolution
Poor cleaning before starting to paint	Ensure that parts are clean before entering the paint booth
Contamination in the paint	Test fresh paint with off-line equipment, convert to that equipment if good - test system paint in a different environment
Overspray from other products on the line	Increase distance between products, improve booth air flow
Contamination in the painting environment	Test system paint in a different environment - remove contaminant from the process if identified
Equipment maintenance introduced contaminant	Clean/flush equipment until dirt is gone - use a large amount of good flush solvent since flushing lines can cause previous material to come loose
Over aircraft structure and / or ceiling are dirty	Clean over aircraft structure / ceiling to minimize falling dirt
Booth air is contaminated	Ensure booth air is filtered adequately and balanced correctly so only filtered air enters booth - ensure proper booth maintenance

Defect: Orange Peel

Excessively rough paint appearance - similar to the skin of an orange



Potential Cause	Resolution
Poor atomization	Adjust balance fluid ratio versus atomization air pressure
Material too thick	Add compliant solvent to the paint for adequate break up
Paint temperature too low	Ensure paint is in ambient conditions for 24 hours
Used wrong solvent for reduction	Mix fresh material using TDS to determine correct solvent for environmental conditions - dispose of improper material
Paint needs increased flow on part	Add small amount of solvent, too much will cause sags
Needle / nozzle / tip / equipment choice or condition	Change the needle, nozzle or tip for proper atomization - verify painting equipment set up

Defect: Poor Adhesion

Paint does not have adhesion to previous paint layers or substrate



Potential Cause	Resolution
Improper substrate preparation	Ensure substrate is free of contaminants, follow preparation guidelines in TDS, use only recommended undercoats
Area reworked too many times, film build too high	Ensure thickness to spec limit
Contamination in the paint	Test fresh paint with off-line equipment, convert if good
Contamination in the painting environment	Test system paint in a different environment - remove contaminant from the process
Equipment maintenance introduced contaminant	Clean/flush equipment until contaminant is gone
Primer induction time or overcoat window incorrect	Ensure induction time and overcoat window from TDS are followed
Poor cleaning before starting to paint	Ensure that parts are clean before entering the paint booth

Defect: Mottling / Striping

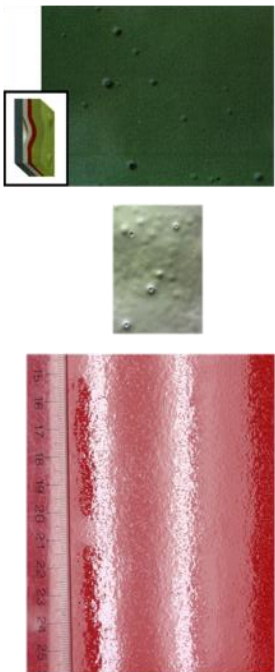
Paint shows different color / gloss / appearance in different areas



Potential Cause	Resolution
Variable paint film thickness	Adjust spray pattern and trigger points to get even film
Low paint viscosity (dry nodule)	Add slow solvent or more unreduced paint to the system
High paint viscosity (wet nodule)	Add fast solvent to get a drier spray
Excess atomization air (dry nodule)	Return atomization and fan pressures to standard
Inadequate atomization air (wet nodule)	Return atomization and fan pressures to standard
Improper fan	Check equipment - adjust fan and test pattern on scrap substrate
Improper gun distance from surface	Adjust gun distance - if distance is too short, can result in heavy material transfer or mottling
Clear coat applied too soon	Increase time between base and clear until there is little to no transfer before applying clear coat - follow TDS recommendations
Improper tack time between coats	Increase time between coats - refer to TDS for recommended tack times

Defect: Solvent Popping / Microblister / Haze

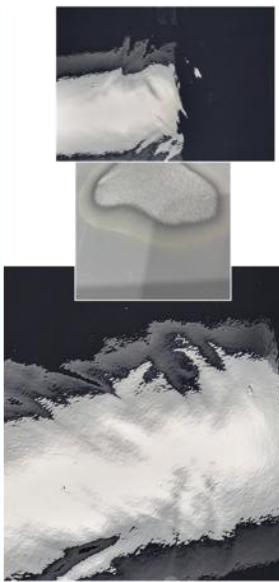
Bubbles become trapped in the paint film which may or may not actually pop at the surface



Potential Cause	Resolution
Paint too thick	Lower fluid flows or increase applicator speed
Oven heats painted surface too fast	Lower the oven temperature, slow the air temperature ramp up speed, increase flash off time before heating starts
Ambient temperature too high	Adjust paint solvent blend per TDS - use slow solvent for hot temperatures and fast solvent for cold temperatures
Atomization pressure is too low	Reset atomization and fan pressures to normal
Used wrong solvent for reduction	Dispose of improperly mixed material - mix fresh paint using TDS to determine correct solvent for environmental conditions
Excess air flow	Examine air flow in hangar or area of hangar with the defect - reduce or redirect as necessary

Defect: Poor Sanding

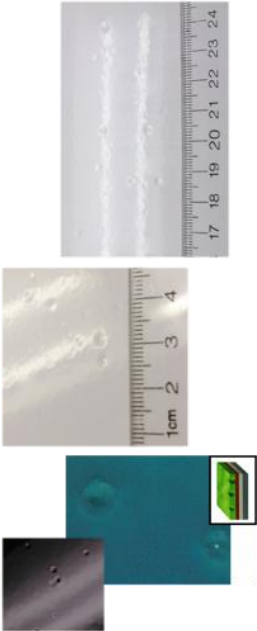
Sanding marks (either from substrate or prior coating) show through to the cured topcoat, or layers don't feather properly



Potential Cause	Resolution
Incorrect (too coarse) choice of sanding media	Use proper sanding products (specified in work instructions)
Poor sanding technique	Use proper technique - avoid excess pressure to one edge of sander
Moving too quickly	Take the necessary time to do a thorough job
Poor interlayer adhesion	Fix stick-up problems (cure issues, induction times, product compatibility, etc.)

Defect: Craters / Fish Eyes

A contaminant causes craters / dimples / holes to form in the film as it flows out before drying



Potential Cause	Resolution
Contamination in the painting environment	Test system paint in a different environment – identify and remove contaminant from the environment
Poor surface cleaning	Ensure cleaning process is running normally – check cleaning technique, condition of chemicals, frequent rag changes, etc.
Equipment maintenance introduced contaminant	Clean/flush equipment until craters are gone
New items introduced to environment	Remove new items, different gloves, new cleaners or even personal products like perfumes and deodorants, consult PPD Tech Service for guidance
Contamination in the paint	Test fresh paint with different equipment, convert if good
Solvent container contaminated by foreign elements	Ensure solvent container is fully cleaned – do not use wax-lined cups

Defect: Sagging / Running

Running, sagging finish resulting from too much paint applied to a localized area



Potential Cause	Resolution
Paint film too thick	Lower fluid flows or increase applicator speed
Paint is too thin	Add unreduced paint to the system or add thickening agent
Ambient temperature is low	Increase ambient temperature if possible
Paint temperature is low	Increase paint temperature
Used wrong solvent for reduction	Dispose of improper material. Mix fresh material using TDS to determine correct solvent per environment conditions
Atomization air is too low	Increase atomization and fan pressures to normal settings
Needle / nozzle / tip bad	Change the needle, nozzle or tip so paint receives proper atomization
Paint gun too close to surface	Adjust to recommended gun distance

Defect: Poor Hiding

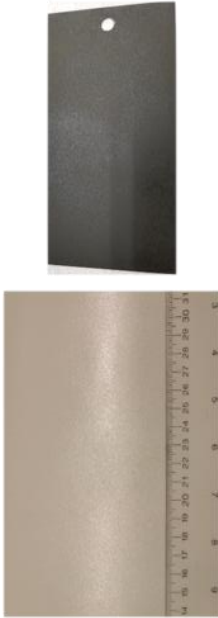
See-through topcoat that does not completely cover the underlying layer or colors



Potential Cause	Resolution
Improper base mixing	Stir all materials thoroughly to ensure a uniform mixture
Overthinning of the paint, causing thin film build	Follow recommended mix and thinning ratios
Insufficient DFT	Use correct spraying technique and apply recommended film build
Settling of mixed paint	Ensure uniform mixed paint during application

Defect: Dry Spray

Most solvent in the paint has evaporated by the time droplets arrive at the part



Potential Cause	Resolution
Improper spraying technique	Adjust application process
Wrong spray gun setup – air pressure too high and/or fluid rate too low	Increase fluid rate or reduce air pressure
Paint too thick	Check viscosity and adjust if possible – apply freshly mixed paint to minimize impact of pot life

Defect: Tape Lines

Lines are visible in the basecoat after removal of masking tape or stencils



Potential Cause	Resolution
Tape applied before end of Dry-To-Tape window	Check TDS, temperature and reducer type – follow specified Dry-To-Tape window for that set of conditions
Unapproved tape or masking material	Discard wrong masking – only use approved materials
Change in ambient conditions extending work window	Track ambient conditions during application – adjust process times if needed
Improper mixing of paint	Double check mix ratios and choice of reducer and thinner, discard or slowly work off improperly mixed product