



August 4, 2021

**PREPARED FOR: Daimler Trucks North America
ATTN: Chris Blake**

RE: Evaluation of Potential Use of Electrostatic Application For Chassis Paint Line

Background:

Condition 28 of the Daimler Trucks North America (DTNA) Title V permit for the Portland Truck Manufacturing Plant (PTMP) requires that no later than August 19, 2021, a report be submitted to DEQ evaluating the use of electrostatic painting technology for chassis surface coating. This report addresses that requirement.

Description of Chassis Painting:

Chassis painting is a critical aspect of preparing a truck for sale and use as the coating applied to each chassis by the supplier is not of high enough quality and many of the connectors (e.g., phosphate bolts) require coating at PTMP in order to provide corrosion resistance. The ultimate paint film thickness must be a minimum of 2.4 mils with no bare substrate or primer showing.

Description Of Electrostatic Painting:

Electrostatic painting is a type of spray coating that is used to efficiently coat a metal substrate by inducing an electrical charge to the paint particles that make up the spray, causing the paint to adhere to the metal's oppositely charged surface. Electrostatic painting does not work well in situations where non-metallic components or connectors are an element of the item to be painted.

Requirements For Electrostatic Painting:

- 1) In order to conduct electrostatic painting, the surfaces to be coated have to present the right qualities to ensure safe application. Ground is the most important aspect of electrostatic safety. Electric arcing is a high possibility without the part being adequately grounded, which is a great safety concern and potential hazard for the operator. In order to limit the build-up of static electricity when handling flammable products, all components being painted must be grounded by a common return path for electrical current, or have a direct physical connection to earth. The ground is

measured with a Mega Ohm meter and must show that there is continuity between the part being painted and ground.

Ideally, a ground should be of **zero ohms resistance**. There is not one standard ground resistance threshold that is recognized by all agencies. However, the NFPA and IEEE have recommended a ground resistance value of 5.0 ohms or less.

- 2) Because electrostatic painting involves using an electrical charge to attract the paint to the metal surface to be painted, the paint being used must have a conductivity rating between 0.01 – 25 Mega Ohms. If the paint's conductivity is outside this range, then proper adhesion will not occur and paint film quality/consistency can be materially affected.

Ground Testing:

Dave Gandara, a Senior Technician at Advanced Finishing Systems, conducted a grounding test on DTNA truck chassis on Friday, July 16th at 10:00 am. Present for the assessment were Chris Blake from DTNA and Justin Kisamore from Axalta Paint.

Mr. Gandara measured the ground with a Mega Ohm meter. The measurements demonstrated that there was no continuity between the chassis and components. It is necessary when applying the surface coating to a chassis that the paint adhere evenly to the metal of the chassis as well as the components attached to the chassis. The failure to establish continuity between the chassis and the associated components is fatal to the ability to apply a quality coating that would meet all applicable specifications. In addition, if a chassis presents any insulation properties, there is a significant health and safety risk presented as the painter could become the preferred ground rather than the chassis resulting in electrical shock.

The failure to establish continuity appears to be the result of two causal phenomena:

- a. The existing chassis are powder coated by the manufacturer both to protect the chassis during shipment to the PTMP as well as to impart important protections (e.g., UV protection) to the chassis itself. The presence of this powder coating creates a ground issue that makes it both impractical to apply a consistent high quality surface coating across the chassis as a whole. The insulating properties of the protective powder coating make it unsafe to electrostatically apply paint to the chassis.
- b. The majority of the components that are attached to the chassis are attached via "thru bolts" with washers and locking nuts. These components prevent continuity between the chassis and component. As all components attached to the chassis must match with the final chassis color, the presence of insulated components prevents the usage of electrostatic application of paint.

Coating Conductivity

As explained above, in addition to having proper continuity across the chassis, it is also necessary for the paint itself to have a conductivity rating within the required range of between 0.01 – 25 Mega Ohms. As part of the electrostatic painting evaluation, the paint used for chassis coating was tested for conductivity. The reading was 0.001 Mega Ohms

which is not in the acceptable range for efficient electrostatic painting. While it may be possible to adjust the conductivity by adding additional solvent to the paint, the environmental benefits of electrostatic painting would be greatly diminished, if not eliminated, and flammability and potential workplace exposure would increase. In addition, extensive testing would be required to ensure that thinning of the chassis paint through solvent addition would not affect the quality of the coating and the corrosion and UV protection imparted by the paint. In the absence of such studies, the thinning of the paint to improve conductivity cannot be implemented.

CONCLUSION: The combination of poor continuity across the chassis and the poor conductivity of the chassis does not allow for the use of electrostatic paint application in an efficient and safe manner that meets DTNA's exacting quality and performance specifications.

If you have any questions, please don't hesitate to call.

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