

The Faraday Cage Effect

INTRODUCTION

Faraday Cage is an area on a part or a piece of metal with at least a 90-degree angle. Coating the inside of a box has lots of faraday cages.

The “Faraday Cage effect” sounds like a trap for catching animals, but in reality, it is a phenomenon that occurs when coating parts with sharp inside corners or recesses during an electrostatic coating process. The “effect” prevents powder from a gun from getting into the corners and recesses because they do not hold a charge. The difference in charge causes the charged powder particles above the corners and recesses to create resistance to incoming powder—the Faraday Cage—making it difficult to coat these areas.

Michael Faraday, born in Sept of 1791 and died in August of 1867 discovered that electricity will move in the path of least resistance, which is precisely what happens when you are spraying powder in a corner, the powder will attract to the edges and walls and before penetrating deep in the recessed area.

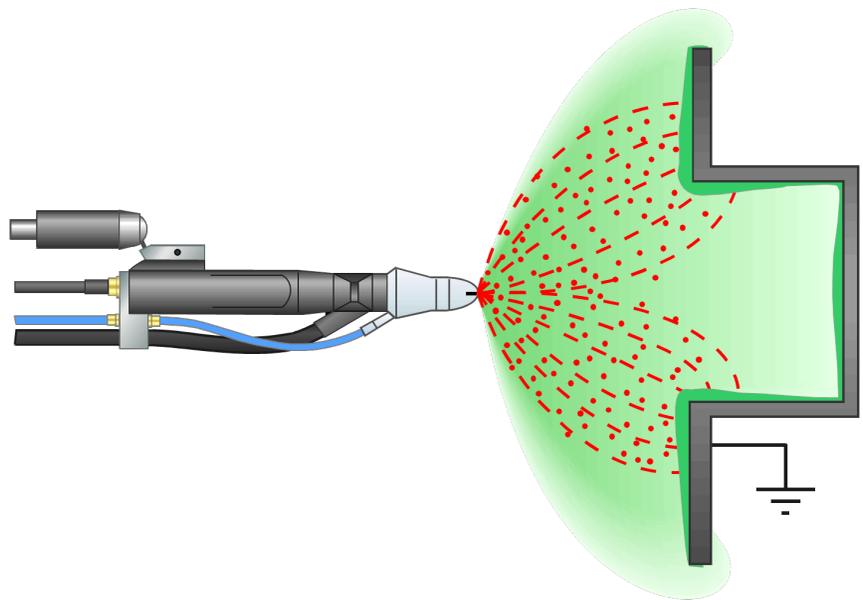


Illustration of Faraday cage effect compliments of Nordson Corporation.

RECOMMENDATIONS

While it might be impossible to prevent the Faraday Cage effect from occurring completely, there are ways to overcome it. Here are several “levels” of strategies and tips that will help you better coat inner corners, recesses, and many parts with odd geometries.

- » **One – Overpower Faraday Cage effect:**
 - Use a slotted tip to concentrate the spray.
 - Blast powder into recesses.
 - Increase the powder flow rate.
 - Maximize the gun to part distance.



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Tradeoffs – These strategies can use excessive amounts of powder, have higher film thicknesses than desired, and could result in an uneven film build.

» **Two – Fine-tune the gun settings:**

- Use a slotted tip to concentrate the spray.
- Decrease powder gun flow rates.
- Reduce gun voltage to 40-60 Kv.
- Maintain a gun-to-part distance of 8-10 inches.

Tradeoff – These gun settings could mean slower application times.

» **Three – Modify spray technique for unavoidable Faraday Cage:**

- “Finesse” the powder into corners and recesses
- Spray corners and recesses of a part at obtuse angles
 1. Reduces air turbulence.
 2. Allows for deeper penetration.
 3. Minimizes early back ionization.
 4. Utilizes more lines of force.

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