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Ask Joe Powder™

The Best Time to Get a Touch-up

Q Hi Joe,
We have an automatic spray booth with eight automatic and two manual (touch-up) guns. When is it best to use manual touch-up; before automatic guns or after? Also, we heard that charging is negative. Why? Would it be better if it is positive? What is the difference?

Regards,

Veselin K.
Serbia

A Hi Veselin,
One of the challenges with electrostatically applying powder coatings is penetrating tight inside corners and other hard to reach areas. The electrostatic field created by the ions generated in a powder gun sets up a Faraday Cage, which repels the approaching powder particles. This is exacerbated by the insulative effect of powder already deposited on the part. What I have found is it is much easier to coat the tight corners and recesses on a part before applying powder on the easy to coat areas. Hence it is better to manually touch up these tough to coat areas before the triggering the automatic spray guns.

As for negative versus positive charge, I think creating negative charge is easier and more efficient than generating positive charge. Negative charge consists of electrons whereas positive charge relies on protons. Protons are 2,000 times the weight of electrons. In addition, generating electrons is quite easy and controllable using the well-known corona

discharge technique.

That said, tribo charge technology does create a positively charged powder particle through frictional charging. This involves conveying a powder coating through a specially fabricated spray gun with a PTFE (Polytetrafluoroethylene) lining that robs the powder particles of their electrons, thus resulting in a net positive charge on the particle. The output of these guns is somewhat less than the delivery of a conventional corona discharge gun, but the charging efficiency is greater with less free ions generated. The Swedes developed this technology in the 1980s and it is still quite commonly used in Scandinavian powder application systems. I hope that this helps.

Best regards,

— Joe Powder

Bringing Powder Coating In-House Reboot

Q Dear Joe,
I have recently discovered your articles, and I have decided to contact you hoping that you could help with my powder coating issues. First of all, we are considering bringing powder coating in-house, which means creating a new powder coating line, so most of my questions are related to that.

1. Regarding the pretreatment process, it seems a 5-stage iron phosphate process is a good choice. However, I am interested in alternatives. We are coating electric bike frames, and since we have to provide good corrosion protection, we use a zinc primer. Researching this topic led me also to applying the phosphate through spraying. According to you, what would be the best pretreatment option? I would be grateful if you could introduce me to any kind of literature in this area, so I could investigate this topic further.

2. We are facing strict requirements when it comes to the quality of our products. The powder coated surface should have no defects (or at least as little as possible). Currently we are facing the issue of small, dotted inclusions, tiny hairs and holes (whose origin we are still trying to investigate). We are solving this problem through polishing, but that requires a large amount of time, so I would try to avoid this step. Is it possible that the charged metal surface attracts those things? If it is, is there any way

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to avoid that? Could it be that the powder coated area is not clean enough? I would be grateful if you could help me find the root cause of these problems.

3. We have also noticed that the clear coat we apply is quite susceptible to damage (after cleaning with a piece of cloth, scratches remain on the surface). Is the problem within the powder itself? What kind of powder clear coat could be used in this case?

4. One of the issues we encountered is the lack of gloss after the parts have been packaged. So, the gloss is ok after curing, but it seems like there is a sort of reaction between the paper we use for the packaging and the coating. Is that possible?

Hope to hear from you soon and thank you in advance.

Best regards from Bosnia,

Senka C.
Bosnia

A

Hi Senka,

Greetings from Columbus, Ohio. I hope everything is good in Bosnia. Thank you for your message. Your questions are really good. I will try my best to answer them. Since you are considering bringing the powder coating process in-house, you may want to use our September/October issue as a reference to see how other companies have handled the process. You may find some good tips in there.

1. Regarding pretreatment, iron phosphate is probably the easiest option as it is very common and easy to control. If you want to avoid phosphate because of effluents and issues with environmental impact, then you have other options. Zirconium-based pretreatments have been around for a while and are a good option. They require more precise control of the chemicals and process; however, they have a significantly better environmental impact profile. Visit www.powdercoating.org for a list of pretreatment vendors.

As for application of the pretreatment, it depends on the volume of parts you plan to coat. If you can manage manual spray, it is a good low cost option. If you have a high volume of parts and a moving, conveyorized line, you will need to install an automated pretreatment process (capital intensive). Please let me know how many parts you need to coat per hour or per working shift.

2. Regarding cleanliness of the powder coating finish, this is a very important but difficult issue to manage. It is essential to have a clean environment to spray the powder. This entails an environmentally controlled enclosure around your application system (or your coater's). The incoming air should be filtered and there should be a net positive pressure in the

application area to keep too much air from the outside environment from entering the spray room. It is tricky to achieve this balance and requires air movement management.

You need to identify the root cause of the defects you are observing in the finish. Is the coating clean to begin with? You need a high-quality powder supplier who can prove they make clean powder every time. You also need to be able to spray incoming powder off-line in a lab area with a small, clean lab oven. This allows you to determine if the contaminants come from your environment or from the powder itself. If you think it is your environment, you can spray a small part or lab test panel and place it into a tin can and cure it in the oven. If it is clean, then the environment may be the cause of the defects. You need to ensure that the metal cleaning process is clean, and contaminants are not present on the surface of the parts before they are powder coated.

Your comment about electrostatics influencing the deposit of contaminants is accurate. The electrostatic field will attract airborne contaminants to the surface of your parts. This why the application area must be as clean as possible.

3. The clearcoat may be too soft and not abrasion-resistant enough to avoid scratching during handling. On the other hand, the handling process may be too aggressive for the clearcoat. Employees should wear cotton gloves while handling parts and packaging materials should be soft—avoid rough kraft paper and cardboard. Polyurethane powders are much more scratch resistant than polyesters, however they are more expensive.

4. Packing materials can reduce gloss as they can leach out plasticizers (if they're plastic or foam, of course). The same can happen with tapes and adhesives. Paper may be abrading the surface and you would be able to quickly ascertain this if it is only on the surfaces that are in contact with the paper.

Gloss reduction can also occur with some powders due to "blooming," which is inherent to some lower cost powders. In addition, under-cured powders commonly "bloom" or exude low molecular weight materials to the surface causing a hazy loss of gloss.

I hope this helps. Please let me know if you have any further questions. Someday I would like to visit Bosnia—it looks like a beautiful country.

Best regards,

— Joe Powder

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Editor's Note: Letters to and responses from Joe Powder have been edited for space and style.