Decorating Surfaces -- To Treat Or Not To Treat
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Pre-treating

• Should I pre-treat or will this project be OK without it?
• What is pre-treating anyway?
• How do I do it and when do I know if I need to pre-treat?
• Why pre-treat at all?

Whether you’re a newcomer to decorating or you’re an old hand, the whole pre-treating issue is likely to surface every time your job changes. I’ve seen some innovative solutions evolve around the pre-treating question—some high-tech and some decidedly low-tech (picture someone using a portable butane blow-torch). Fact is, when you are looking for the best possible quality and durability, sometimes you’re going to have to pre-treat.

When decorating some substrates, such as polypropylene and polyethylene, the surface will need to be modified to ensure a good bond for the ink. These materials are extremely inert and were very likely chosen for that reason. They also have a very low surface tension and, now that they need to be decorated or marked, their inert nature provides a challenge.

Pre-treatments modify the bonds of the substrate surface and increase the surface energy, allowing the ink to bond to the substrate. In a nutshell, what happens when you pre-treat is add oxygen molecules to the surface. Adding oxygen opens ionic positions for chemical bonding to occur. It should be kept in mind, however, that a pretreated surface slowly loses its ionic character over time. Ionic charges present in the air around the surface “neutralize” the ionic charges that we spend so much effort to create.

Because these ionic charges dissipate quite quickly, I recommend incorporating pre-treatment devices on the actual printing equipment. Pre-treatment incorporation not only assures you of a good, highly durable ink bond, but it also eliminates double handling—saving time and manufacturing costs.

A very simple test to check for sufficient pretreatment is to trickle water over the substrate and watch what happens. The water will either flatten out onto the surface or form small beads that appear to be suspended over the top of the surface. If you envision the effect of rain falling on the hood of an old pick-up truck that hasn’t been waxed since it left the showroom floor compared to rain on a just-waxed car, you’ll know what I mean. What you want is the flattened out, old pick-up effect—a well-treated surface becomes “wet” when the water hits it and slowly (over about 10 seconds) begins to dry.

This is called the **Dyne level** - technically, the measurement of the angle of the side of the water droplet on a substrate surface. Both polypropylene and polyethylene usually have a Dyne level below 35 when they’re produced. For proper bonding, the Dyne level must be increased to 42 or above.

There are several surface treatments available and each has its pros and cons depending upon the manufacturing situation. The one you choose will depend on the characteristics of the substrate. Flaming uses the oxygen present in an open flame to energize the surface to a point acceptable for bonding.
This works well when decorating highly curved or shaped parts. Corona/plasma treatment uses electrical current to create an ozone layer at the substrate surface. This energizes the surface while increasing the Dyne level for good ink bonding and is the best method for pre-treating sheet-fed material. Chemical wipes are also used to pre-treat.

Chances are, if you decorate plastic parts, you will be called upon to make a pre-treatment decision - ink just won't bond well if the naturally low Dyne level isn't modified in some way. Because polypropylene and polyethylene parts quickly revert to their original state after pre-treating, it makes manufacturing sense to incorporate pre-treatment into the decorating process.

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