

Surface Treatment is a Challenge for Decorators

by Dianna Brodine

For the container decorator, surface treatment issues can derail an otherwise simple screen printing job. When ink adhesion fails, decorators must deal with the additional time and money required to perform offline processes.

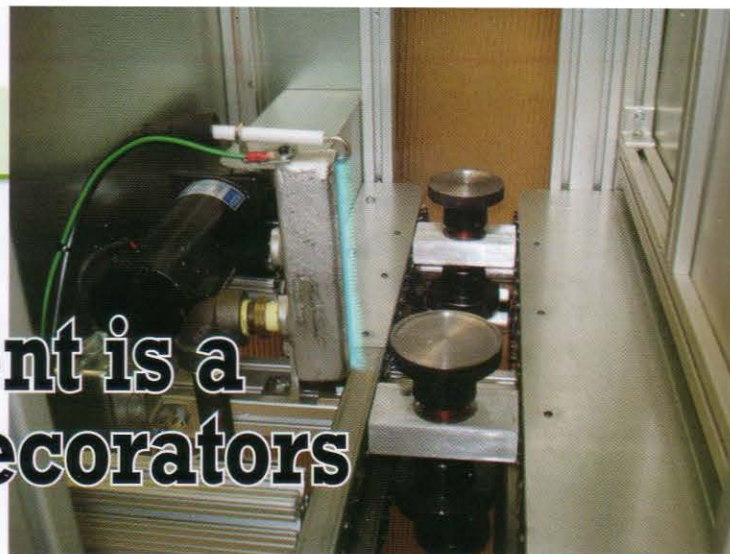
"As a bottle decorator, I have seen surface tension level problems increasing in the last several years," explained Michael Meuser, Pogue Label & Screen, Inc. "Blow molders mold and treat the bottles, which then are delivered to decorators like me. For shorter runs, we use semi-automatic screen printing machines, but these machines do not have online flame treating so if the bottles don't meet the ink standards, they must be flamed offline, which adds cost to the equation."

"There are several dynamics to the problem," said Jack Killoren, Ten Star Supply. "The molder will treat the containers on most occasions, but you often don't know if they've been plasma treated, lectro treated or gas treated." Killoren continued, "I've had issues with ink adhesion, so we'll recheck the dyne levels on the bottles and find that something that had been coming in consistently at the proper dyne levels suddenly are coming in not correctly. There doesn't seem to be any standards on the dyne levels coming out of the factory."

Changing Ink Chemistries Increase Dyne Level Requirements

Surface level dyne issues have increased for those decorators using UV ink chemistries. Solvent-based inks require dyne levels of 38-40, but manufacturers of UV inks suggest dyne levels of 44 or above. The molders still hold to the 38-40 dyne rule; thus, undertreated bottles are becoming a regular occurrence for those decorators using UV inks. "In defense of the molders," Meuser said, "it could be argued that it is not their problem that decorators are migrating to a new type of ink that requires higher dyne levels."

"When you look at a container industry as a whole," explained Greg Wood, Lectro Engineering Company, "75-80 percent of the containers either have a label applied in-mold or they're providing pressure-sensitive labels. The other 20-25 percent are decorated, and a great many of those are decorated using solvent-based inks. It's a small portion of the industry using



UV inks based on the overall amount of containers being produced."

Plastics Regrind Complicates Adhesion Issues

Killoren doesn't believe all of the ink adhesion issues are related to dyne level, however. "We have had instances where a bottle we've been printing for 10 years suddenly has an ink adhesion issue," he said. "We get new bottles, flame them here, re-run the decorating job and test them, but the ink still is coming off. At that point, it might be a bottle composition issue."

Wood agreed that rapid changes in plastic resins have played havoc with surface treatment effectiveness. "Just because a bottle says it is high-density polyethylene, that doesn't mean it's purely HDPE," he explained. "There are all sorts of additives – including color pigments, UV stabilizers, etc. – that can actually mask the surface treatment. Regrind is a big variable as well."

Henry Newman, Newman Printing Equipment, Inc., has seen an increase in problems due to imported plastic containers. "The main problem I see now is bottles from overseas that have no flame at all," he said. "In some cases, running them through a flame treater won't help, because the bottles won't hold a flame due to contamination in the plastic. Whether that's a mold release agent, colorant or regrind, I don't know."

"Bottles are becoming much more inconsistent. It almost requires a scientific study to figure it out," Killoren explained.

Ink, Additives Not the Only Factors

Wood pointed out that the age of the bottle is another complicating factor. "The typical life expectancy of a treated bottle is 90 days in the warehouse, although most treatment will last up to six months," he said. "But some of these bottles that find their way to a decorator might be a year old, and they've lost the surface activation. Once they ship the bottles, there's no way to know how long the bottles sit before they're shipped to the decorators."

Heat plays a role, too. Storage of plastic containers in a hot, humid warehouse will accelerate the rotation of high molecular groups within the resin. As the molecular groups rotate, the surface

treatment is no longer sitting on the top layer of the container, Wood said. "If storage is in a climate-controlled warehouse, then the migration is less prevalent," he explained. "But if someone buys a truckload of bottles and lets it sit in the sun for three months before wanting to decorate, there will be a problem."

Offline Flame Treatment is an Expensive Solution

"The bottom line," said Wood, "is that decorators using a UV-based ink need the dyne level of their bottles to test to 44-46 dynes. The mindset in the blow molding industry is to treat to 38-40 dynes. At some point, decorators will need to control their own destiny by purchasing untreated bottles and making capital investments to control dyne levels on site."

"Of my seven semi-automatic lines, we've transitioned five of those over to UV inks," Meuser explained. "Those semi-auto machines don't provide inline flame treatment, so now I have extra costs – labor costs, energy costs, machine costs – before it ever gets to decorating." Meuser does have two screen printing lines that remain set-up for solvent-based inks because certain jobs work better that way, but with the majority of his equipment set up for UV-based ink chemistries, treating bottles in house for each project could add significant costs.

Given the adhesion issues that are occurring with UV inks, why not switch back to the solvent-based inks? According to Meuser, his customers are asking for the UV inks. "They have a glossy look to them, which can be perceived as having a higher value over the look of matte-based inks," he explained. Also, there are operational advantages to UV inks. "We've seen better productivity rates, instant curing and the ability to put more lines in an area on the floor since we don't have to use huge dryers for UV inks," he said. "UV inks are a little more expensive, but we make up for it with the productivity. UV inks also have a higher shelf life if we have leftovers, and they don't produce VOC emissions."

Newman pointed out that while his company does sell stand-alone flame treaters, running every bottle back through to be treated is not an ideal solution. "It's a labor issue when the decorator has to perform three operations: flame, print and then UV cure or heat/air dry," he said. "Also, our flamers are normally sold to molders of bottles, cups, etc. as a primary pretreatment method. They're not meant to be a quick fix to increase dyne levels a little."

Lectro Treat does have a flaming solution that would allow decorators to 'dial in' the dyne measurement needed for each project when containers aren't testing to the correct level. The solution allows for treating bottles in bulk, but the additional labor and time factors still apply.

No Ready Solution Available

In the end, Killoren stated, the plastic decorator has to find a solution. "I'm a realist," he explained. "I'm just trying to fix it on my end. We'll re-flame bottles here or use different adhesive agents. For one bottle, we changed the ink we used, but I don't want to change my entire ink system for one job."

Newman agreed that the increased dyne levels required for good surface adhesion with UV inks have put decorators in between a rock and a hard place. "With UV inks, you really don't have a choice," he said. "You have to get the surface ready to print, and if that means re-flaming the bottle, then that's what has to happen."

"If an ink manufacturer could develop a UV ink that works at the 38-40 dyne level, they would have a huge leg up on their competition," Meuser pointed out. In the meantime, decorators committed to the benefits of UV inks will need to work with their customers up-front to explain the additional costs required to get the shiny result on the retail shelf. ■

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