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Tek Tip

Latex Inkjet Profiling is the same as Baking a Cake

A Technical Tip on the Basics of Latex Inkjet Profiles for Plastics

Latex inkjet profiling is as easy as baking a cake. We've all baked a cake or two in our lives, even if it's just the out-of-the-box variety. Pour in the cake mix, add the assigned number of eggs, oil, and water, pour it in the 9"x13" pan and pop it in the oven. Easy. Have you ever tried to bake that same cake mix in a different pan and had it not turn out? Was the oven not hot enough? Did the dark metal pan not heat up as quickly as the clear glass pan?

Switching substrates is similar to switching your cake pan. Setting up a proper print profile for your Latex Inkjet printer with a specialty media can throw your process off. Did your print come out streaky and a bit wet, like an undercooked cake? It's likely that the temperature, time or speed settings weren't aligned with your media needs. Understanding the basics will help eliminate some of the 'trial and error' that may deter you from expanding your portfolio.

Selecting a Cake Pan: Understanding your media

Paper is porous, plastics are not. This may seem obvious, but it's important to keep this in mind when developing your print settings. Paper will absorb more of the water that the ink is carried in. Therefore, you can run material through the machine faster and it will absorb a bit of the color, so you will need to use a higher ink saturation level.

Not all plastics are created equal. A polyester film is a completely different 'cake pan' than a rigid vinyl film. The most important element your plastic should bring is dimensional stability, which indicates it will have minimal shrinkage when it sees heat. Some plastics have this stability naturally, some do not. Some are processed to be dimensionally stable, which often comes at a premium. Here's a quick chart that may help gauge which materials can stand up to the heat. (Fig. 1)

Figure 1

Property	Unit	PET	BOPP	RPVC	PC	PE
Elongation	%	120	110	50	140	400
Melt Point	°C	260	170	180	240	135
Tensile Strength	kgm/mm²	22	19	10	10	2
Runability	4 star rating	★★★★	★★★	★★★	★★★	★

So, what does this chart actually mean?

Polyester (PET) has the highest processing temperature, which means it's less likely to distort under the typical curing conditions of the latex inkjet press. Polyester is durable with an internal strength that will keep it from cracking under post processing conditions (tensile strength), but this means it isn't the best candidate for die-cutting. Polyester film is great for signage that may see movement, such as scrolling signage or tradeshow graphics.

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Polypropylene (BOPP) has a lower threshold for heat than polyester. However, its tensile strength is high, and should be a durable product as it's not as likely to stretch as polyethylene (PE). Unsupported PE should be run slower with a lower temperature setting to start. The thickness of the material will be a factor, as the higher the gauge, the more heat any material can sustain. Thin BOPP films are best run with a liner, as a pressure sensitive media. Typical applications may include signage and labels that require a little more flexibility.

Rigid Vinyl (RPVC) will run well with a naturally high surface energy so you will receive a strong ink-bond. However, the material cannot tolerate a lot of heat. It is best to run RPVC slower with a lower heat setting to avoid any wavy edges, which are caused from heat distortion and stretching. This material also has a low tensile strength, which means it will die cut easily. It's good to know that thicker gauge RPVC will also hold shape, such as curl, if left in roll-form for a prolonged period of time. For materials thicker than 10 mils thick, it's recommended that time is allotted for the material to sit 'reverse-wound' to help counteract this phenomenon. RPVC materials are often seen in signage such as door signs and posters, as white RPVC has advantages: a low light transmission level, requires minimal post processing to protect the ink, and can be cut to the desired shape.

Polycarbonate (PC) offers optical qualities that are often desired in Latex Inkjet printing. The high-end quality of the latex print, combined with polycarbonate offer a warm, photographic outcome. Polycarbonate has a temperature threshold that allows it to be run easily through the printer with little risk of stretching. Also, its low tensile strength allows this material to be easily die cut. It is often a good choice for backlit panels that will be placed in static frames, such as menu boards or backlit graphics.

Polyethylene (PE) is not a recommended substrate for Latex inkjet printing. The material does not have a great threshold for heat, and simply stretches too easily. Even if you find the proper profile settings to get the material to pull through the printer, it requires a coating for ink adhesion. Roll coaters are unable to consistently coat polyethylene without stretching or wrinkling in the material, which makes this material an unlikely material to be a successful option. Using a liner-supported version, in the form of a label stock, is a better option, as the liner supports the material from stretching and helps absorb the heat during both the coating and printing process.

Almost all plastics run better with a coating than without. The appropriate coating may vary from printer series to printer series, as the curing methods vary. Your film provider should be able to help you select the proper substrate for your print method.

The Recipe: The basics of profiling

We've established the requirements to bake a cake: mix the ingredients, pour in the selected pan, heat the oven, and set the timer. Now, let's break down what this means when setting up your print profile:

Ink Saturation: The ingredients. This is the most important part of the cake because it determines what it tastes like. When printing your piece, it determines what it looks like. How the file is set up determines what percentage of each CMYK color is in the ratio to create the specific color dictated, The RIP software has settings that dictate the total maximum ink laydown specified (the total amount of batter poured into the pan) and the printer settings determine the 'serving size' of each slice, or the amount placed on the media with each pass. Each element of this ratio is important because it will dictate how much time and heat you need to complete your job, as well as what the overall end result will be. Printing on a backlit media will require a higher ink saturation level than printing on a block-out film. As a result, backlit medias typically require adjustments to the temperatures and speed to avoid ink movement, rewetting or ink transfer.

Time: how long to bake your cake. Not only does time determine how quickly you can get your job completed, it will determine how much heat and curing your media sees. With many plastic films, high temperatures create distortion. For optimal outcome, you're better off running the material a little slower.

Temperature: How hot to bake your cake. Temperature + time = speed. If you need to run your material faster, you will need to raise the heat to ensure your media dries. The various latex inkjet technologies have various sources of heat. You will want to check to make sure you understand the sources of heat your printer has, and that you are adjusting them accordingly for maximum quality. Due to its faster speed, the HP Latex Inkjet 3000 Series uses two Near-Infrared (NIR) Lamps located on the print carriage to quickly promote the evaporation of water from the ink during the printing process, while other models have fans that back-fill heat in the platen area to dry the water from the ink prior to entering the curing zone. All of the HP latex inkjet technologies use convention heat to cure the latex polymer. Due to the distortion many plastic materials experience when too much heat is seen, starting with a lower temperature setting and increasing slowly until you find the "sweet spot" between time and temperature is the best practice.

Let it cool: post processing.

Everyone is anxious frost the cake and get it to the table, but if you apply the frosting before the cake has cooled off, you're going to end up with a mess. Similarly, everyone wants to get their print into post-processing and out the door to the customer. Most inkjet printer manufacturers advertise that inks are immediately dry. To the touch, the inks seem dry. However, just like a cake continues to bake a little bit once you take it out of the oven, the inks continue to dry. When printing on a porous substance, like paper, the excess water can be absorbed, and will be less likely to affect your image. But when you print on plastic, any excess moisture needs to be given the time to evaporate before laminating. Even if the material feels dry, we recommend allowing 24 hours, at a minimum, before applying any laminates or mounting. If moisture gets trapped between the material and any applied surface, you risk streaking, water marks, ink distortion or you could experience delamination from the inks re-wetting. Rushing to post processing can often mean you'll need to bake a whole new cake.

Time to Eat: The finished product.

Now that you know the basics of print profiling, and a few plastic-specific tips, you can feel more confident in broadening your offering. Your portfolio can now include backlit polyesters, textured polycarbonate and opaque rigid vinyl. From German Chocolate to Marble, you can have your cake, and eat it too.

Sources:
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