

# Large Format Graphics Systems

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## Application Bulletin

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### Lamination of UVgel prints

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#### 1 Introduction:

Lamination is the covering of a print in order to protect or enhance the print, or to make it easier to handle. Protection can be for mechanical damage (rub, impacts) or weatherability (UV, sun, rain) or resistance to cleaning. Lamination is done to make the print more robust (rub resistant) when squeegeeing during installation. Also a laminate on a print can create a different and special effect for the end application. For instance, textured laminates.

However, many customers use film lamination to make the print stiffer and easier to handle. This is useful when larger flexible media prints need to be handled by a single installer. The added stiffness can help.

Lamination can also add considerable value to your customer's end application and hence should be seen as a business opportunity.

In this paper, we will explore lamination in general and in conjunction with your Colorado.

#### 2 Follow the instructions supplied by vendors/suppliers

It may sound obvious, but it is true. Make sure you follow all the instructions and advice of vendors of both the laminates itself as well as the lamination equipment. In the end, they should be most knowledgeable on this part of the lamination process. Also, when troubleshooting, look there first for tips and tricks to follow. More often than not, they have already described the issues you encounter when laminating. A lot of generic issues can be solved with these guidelines already.

- Download/get a datasheet or technical bulletin with information on your specific laminate you bought from the supplier. Do not assume that this new laminate you are using will perform the same or require the same handling and application guidelines as the laminate you were already used to. Start with using these vendor instructions as first step.
- Make sure your laminating equipment is set with the right settings for your laminate and that it operates as intended and doesn't require maintenance. Check process parameters like temperatures, pressures, speeds but also the quality state of the rollers. Do not assume that one laminator will work in the same way or need the same settings and care as another.

### 3 Validate your laminated application

After following the above advice, we also advise you to validate (test, evaluate) your laminated application yourself first before going full-scale roll-out towards your customer. Especially new laminates or those applications that require environmental or mechanical robustness conditions are worthwhile to validate. You may try out different laminates (in combination with media), settings or techniques to come to the best result for your end application. Simulate your customers "field" situations as much as anyhow possible like environment (sun, rain, wind), positioning, installation, usage (or misuse), removal etc. This will enable you to make the best choice for your end application and the learning experience will provide confidence in case things still go "wrong". Lamination can feel more like an art than a science at times.

### 4 Tips & Tricks for laminating

#### Matching laminate

First of all: make sure you choose the laminate such that it matches the characteristics of the printed media as much as possible. One of the most common things that can go wrong is choosing a different type of laminate material than the self-adhesive vinyl for example resulting in different/uneven shrinking of laminate versus the print-media causing problems when the laminated print is installed in different (e.g., outdoor) conditions.

One of the main parameters for vinyl is calendared versus cast and polymeric versus monomeric. Match these parameters between laminate and print-media when possible.

As much as possible, when using media of vendor X, it is wise to choose also laminate from vendor X. Also, most manufacturers will be able to advise you which laminate to choose from their offering range based on the printed media you use from them.

Difficult substrates may require you to choose a different laminate.

#### PVC versus Polyester laminate

Most used low-cost laminates are made from polyester. However, choosing a PVC laminate (although it may be a bit more expensive), will generally result in a laminate that is more flexible which also means it will follow the contours and edges of the UVgel print better resulting in better adhesion.

#### Trimming/bleed

If your application allows it, we recommend leaving an unprinted bleed border around the printed image that you also laminate. Do not trim off this border. The rationale is that the adhesion of the laminate to the unprinted media (substrate) is generally very good and hence allows for a best strength seal at the edges of your finished application. It not only allows for a better full encapsulation against environmental influences but also reduces the chance that the laminate will peel off at the edges.

The trimming itself is best done using a waiting time between lamination and trimming. A waiting period of at least one hour is recommended. This also depends on the type of laminate

**Encapsulation and better handling**

If you need more encapsulation of the end application and/or need a better handling end result, you can consider applying a laminate on the back of the print too. Consider a thicker polyester laminate to use on the back giving the extra stiffness that often makes the print a bit easier to handle. This can be especially helpful when using thin and PVC laminates on the front of the print.

**Generic issues and their recommendations**

Issue	What (you see) is happening	What we recommend
Tunneling	Small tunnel(s) appear between the laminate and the print. What happens is that the adhesion between laminate and print is not strong enough. This issue can happen e.g., when rolling up laminated prints.	<p>Choose a laminate that is developed to withstand the forces involved in rolling up (or any other required flexibility of the end application) of the laminated print. These laminates have a higher adhesive strength.</p> <p>Let the laminated prints rest flat for a minimum of 1 to 2 hours to have the bond between laminate and print become stronger.</p> <p>Before laminating, make sure the print is clean: wipe it off (when needed) with a dry lint-free cloth ensuring maximum adhesion.</p>
Curl	Different curls in the end result of laminated print. This is caused by difference in properties of shrinkage (dimension stability) of the laminate versus the print.	Choose a laminate-print media combination that has similar properties with at least respect to shrinkage.
Silvering	Small air pockets at edges of ink-media in the print. The laminate has difficulty following the print surface (in general UV prints have more surface height structure) resulting in edges with a “silver” look to them.	<p>Try first increasing the temperature of the laminator a little. For example, 10°C.</p> <p>If that doesn't help, try a combination of (1) lowering the laminator's speed and/or (2) increasing the roller pressure.</p> <p>Or use a laminate with a thicker adhesive layer like a UV laminate typically has.</p> <p>Usually, a combination of the above does the trick. Try them in above order.</p>

Clouds	So called cloudy lamination where “cloud forming” can be seen in the laminated print.	Try increasing the temperature of the laminator a little. For example, 10°C.
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Follow the instructions of vendors of laminate and laminators.

**Note on temperature settings with laminators:** the temperatures required for the glue/adhesive on the laminate to become effective are not the same as the temperature setpoints/readings on the laminator device. In general, the temperature readouts on the laminator device are lower. This means a higher temperature to be set on the laminator than specified in the datasheet of the laminate itself may be required for the adhesive on the laminate to do its job properly. When in doubt, always do some tests (validate, test, evaluate) with your laminate under different temperature settings to determine what gives the best result.

### Lamination choices for UVgel

In general, UVgel customers use different types of laminates successfully given all above guidelines. Both film laminates (heat-assisted) as well as liquid laminates are suitable for lamination of UVgel prints.

However, stay away from laminates requiring activation temperatures above 80°C. These are mostly suited for offset printing and although cheap, generally do not work fine for UV or UVgel print lamination.

The range of laminates that need heat above say 50°C and below 80°C can be suitable but you will need to test and evaluate them for your specific needs. If you want to use these, make sure to evaluate finished laminated applications during a prolonged time (e.g., months) in the required environmental conditions (including thermal cycles) before switching over with confidence.

Also avoid cold (no assisted heat) lamination as it may cause more silvering effects.

We recommend using UV laminates in general as they tend to have better overall adhesion properties also for UVgel. Mainly this is because these laminates use a thicker layer of adhesive than many others. That thicker layer makes it easier for the laminate to follow the contours and edges of the UV or UVgel inks.

As for matt or gloss printing with UVgel prints; the adhesion of matt prints to laminates tends to be somewhat more difficult because of the nature of the matt surface of the ink (you can picture this as multiple hill tops and valleys giving less contact surface to the adhesive on the laminate). If you need a matte finish, we recommend using gloss prints and a matt laminate. Use of a matt laminate will have the advantage of better adhesion to the UVgel print and is also more productive as the gloss print modes print at higher corresponding print speeds (at similar print quality).

Bottom line remains that your results with different media and laminates may vary, and test and evaluation is always recommended to build required knowledge and hence confidence.

## 5 Generic laminate information

Laminate technologies include:

- **Film** laminates. In the base these are polymeric films
  - Polypropylene (PP): cheap, short term (<1 year) indoor applications

- Polyvinyl chloride (PVC): monomeric, average to higher price-range, short term to longer term (<5 year), both indoor and outdoor applications, medium gloss level and mechanical durability
- Polyethelene-tereftalaat (PET): more expensive, longer term (<5 year), outdoor applications, higher gloss levels and mechanical durability
- Polycarbonate (PC): average price, more durable than PVC
- Polyester: cheap and usually for hot thermal lamination intended.

These laminates can be applied with cold, warm or hot temperatures, usually under some pressure to the print. The warm/hot laminates have a glue layer that is activated by the heat, the cold laminates are usually thicker and lined with a release-liner.

- **Liquid** laminates: a liquid that is applied to the print (via sprayer, roller coater, or a manual paint-roller.

These can be divided into their base components:

- Water based
- Solvent based
- UV cured

Advantage of liquid lamination:

- Cheap
- Good moisture protection
- Good UV protection

- **Transfer** laminates: consisting of a thin film covered with resin (often an acrylate). Under heat and temperature, the laminate is transferred to the print after which the transfer backing can be removed. These laminates tend to be cheaper both in price as well as appearance.

Film laminates can be divided into temperature regions:

- **Cold/Heat-assisted:**

- **Cold:** No heating at all, ambient temperature. These are the most expensive laminates but are also the most reliable and durable generally speaking. Also, these can be supplied by vendors with special and textured finish surfaces. Most of them are made from PVC but polyester or polycarbonate variants also exist.
- **Heat assisted:** some moderate heat is applied (between 40°C and 90°C) in order to start the glue doing its job. A brand name here is "HeatSet" from DRYTAC which are made from vinyl which is flexible. The flexibility can be very beneficial for the lamination itself. For example, less chance of issues due to expansion and contraction under changing environmental conditions.

- **Thermal:**

- **High Melt.** Temperatures are here in the range of 100°C to 116°C. Mostly polyester films with a polyethylene adhesive. Popular in general for their low price.

- **Low Melt.** Temperatures are here in the range of 80°C to 100°C. Generally same as high melt laminates but the “second generation” meaning they can perform under lower heating temperatures.

The decision for low or high melt and between cold and thermal (or warm) in general should be based on heat compatibility with the media that you want laminate.

## 6 FAQ

Below some answers to questions we got from our customers.

### **Why/how should I choose a certain laminate?**

The choice of laminate is mainly influenced by application requirements like indoor or outdoor, application lifespan and budget and last-but-not-least the print media (e.g., cast versus calendared).

### **Which lamination method works best with UVgel technology?**

See section “Lamination choices for UVgel”.

### **Can I use my liquid laminator (coater) with UVgel prints?**

Liquid lamination is successful at numerous UVgel customers. But of course: make sure to do your own application testing with your particular laminator and laminate liquid first.

### **I am using the same media and laminate as with my HP prints, but it doesn't work with UVgel.**

#### **Why not, what should I do?**

As HP Latex is a different technology (not UV) it has different characteristics. Different print techniques can require different lamination techniques too. Most probably, you are using a thermal (hot) lamination technique which is not suited for UVgel. Make sure to read the section “Lamination choices for UVgel”.

### **The laminate doesn't stick to the UVgel ink. What can I do about that?**

See our tips and tricks section. There are multiple issues that lead to non-adhesion of the laminate to the UVgel print as well as recommendations you can use to eliminate these issues.

### **Are there guidelines for laminating gloss versus matt prints?**

See section “Lamination choices for UVgel”. In general laminates have better adhesion to gloss prints so you may consider printing in gloss (faster) and laminating with a matt laminate. The Colorado printer gives you (with one UVgel ink set) the flexibility to print either in matt or in gloss. Also, there are even more creative options with laminates than being glossy or matt, you may even choose textured laminates, or other special finishes. All choices to add value to the end application for your customer.