Latex Knowledge Center

Cookbook - HP Latex Fleet Graphics

March 2018

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1 Overview

This document is intended for:

- Customers that wish to produce **high-volume fleet graphics** with an efficient workflow and with low production costs by screen printing a clear coat rather than using film lamination.

- Customers that wish to produce **trimming workflow** enhancement.

It presents in detail the HP Latex solution in partnership with 3M™ and Fotoba™ as an option to replace pages produced with hard solvent or screen printing with an environmentally-friendly digital printing solution. This solution provides higher image quality and superior color gamut than alternative digital printing technologies, with the added benefit of a 3M™ MCS™ warranty for up to 5 years.

The document also provides an overview of the more common types of vehicle graphics, covering the application requirements and the most suitable combinations of base material and protective laminate.

2 Introduction to vehicle graphics

The term **"Vehicle graphics"** refers to digitally printed graphics that are applied to **any kind of vehicle** for the purposes of either **decoration** or (more commonly) **advertising**.

The end-user's requirements (durability, price, and warranty), as well as the equipment that the print service provider has available, will determine how the application will be manufactured according to:

- The choice of **base material** and **over-laminate**.
- The **over-lamination application technique**.

Figure 1 shows a generic example of a vehicle graphic;

1. First, there is a **base layer of a self-adhesive vinyl.**
2. Then a **layer of ink** on top of it.
3. And the **protection***.

Note: Protection is an option since, for very short-term applications such as promotional stickers where the durability requirements are low and cost is a constraint, there may be no protective layer needed.

Figure 1 Generic vehicle graphic example

Choosing the right self-adhesive vinyl

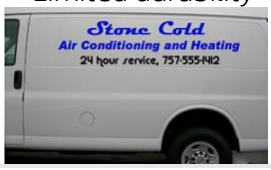
Self-adhesive vinyls can be classified in various ways according to their internal structure, the type of adhesive, *etc*. Considering the internal structure, these are the main types of self-adhesive vinyls:

1. **Calendered vinyls:** Calendered vinyls are inexpensive, but have poor conformability and hence are limited to application on flat surfaces. There are two types:
    a. **Monomeric:** being the most economical
    b. **Polymeric:** offering greater durability
2. **Cast vinyls:** Cast vinyls are thin, durable and highly conformable, which allows them to adapt well to the curves of the vehicle.

For **complex curved surfaces**, the right choice would be a **cast self-adhesive vinyl**.

Example

Car wrapping is usually an application that requires **high durability** and **high conformability** to adapt to vehicle surfaces, which is why the best choice is a **cast vinyl**. Car-wraps tend to be replaced infrequently, hence durability is a requirement and the ability to offer a warranty an advantage, so the customer is less concerned about the cost.

	Monomeric	Polymeric
Cast	N/A	• Complicated contours • High dimensional stability • High durability • Low price restrictions 
Calendered	• Economical solution • Applied over flat surfaces • Limited durability 	• Mid cost Solution • Applied over flat surfaces • Mid durability 

Cost

Conformability

Durability

Figure 2 "Help me choose" table for self-adhesive vinyls showing the most suitable vinyl for each type of application depending on durability, conformability and cost

For **public transportation**, such as buses or trains, artwork is very seasonal and **surfaces are flat**. Because they are **replaced frequently**, **price** is more of a constraint and **durability** requirements are **lower**. Since trains and buses have flat sides, conformability is not required and therefore the best material would be a **calendared polymeric vinyl**.

In the case of applications on flat surfaces that require less durability, a **calendared monomeric vinyl** will provide a **more economical solution**.

Choosing the over-laminate

Printed surfaces should be protected according to the customer requirements. For **cars, vans** and **trucks**, a **5-year warranty** is required in most cases, but for public transportation it often doesn't require a warranty due to the frequent changes of graphics.

The warranty is given by the material manufacturer and covers all the finished graphic

- Material
- Ink
- Protection

As a result, the material manufacturer will specify how the graphic should be produced and installed.

Over-laminate can be a film or a liquid clear coat. **Clear coats** can be applied to a roll with a roll-to-roll laminator, or to sheets after cutting it using a screen print process

Applications	Application requirement		Workflow
	Durability	Warranty	
Car/ vans	> 2 years	Yes	Roll-to-roll lamination
Public transport	Seasonal	Depends	Non-laminated /Roll-to-roll
Fleets	> 5 years	Yes	Roll-to-roll or screen

Material	Over-laminate type
Cast vinyl	Film
Polymeric	Film - No lamination
Cast	Clear

Figure 3 Application requirements, material and over-laminate summary depending on the vehicle type

3 Fleet graphics

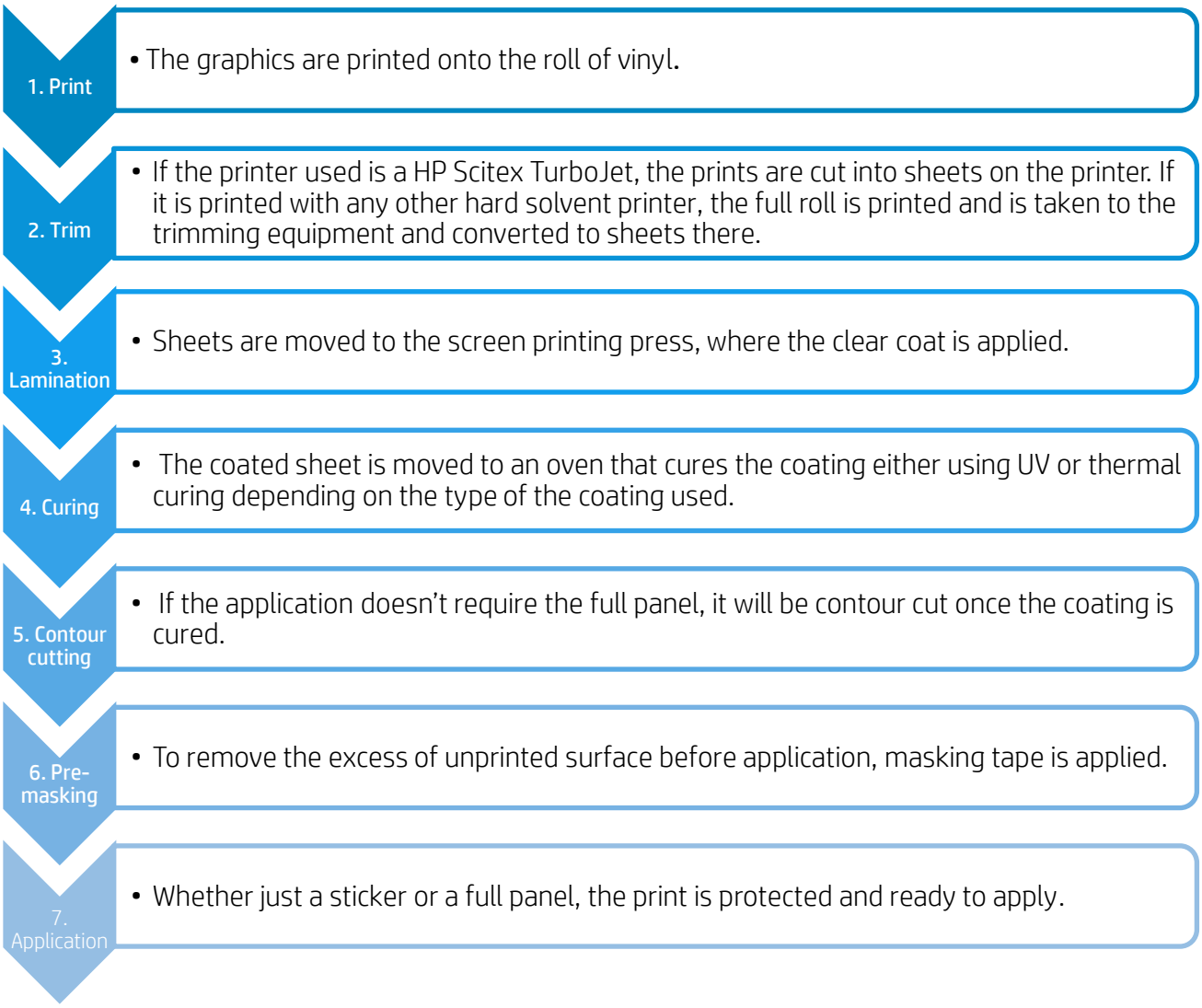
Fleet graphics refers to the branding of commercial fleets used in vehicles from different types of companies such as a courier, post or haulage, etc. Fleet graphics applications are produced primarily by **print service providers** that have evolved from traditional screen printing companies. Volumes are high and customers usually work directly with the brands.

Fleets are typically **not re-branded** all at once – there may be a long-term relationship between the print service provider and the fleet owner, with the vehicles being branded as they are replaced over a period of years.

Fleet graphics used to be a screen printing application that **evolved to hard solvent** in some cases. It was one of the key applications for the old HP Scitex TurboJet hard solvent printers.

Figure 4 Printed truck with rigid sides

How rigid-sided trucks are branded today



Key requirements for this application:

- **Color:** Company logos over solid area fills are the most common art in this application. Therefore, brand colors coverage, color consistency and repeatability are required.
- **High production efficiency:** volumes per order are very high and time to deliver short. In many cases the production is fully automated from the image upload until the panel is installed in the truck.
- **Low production cost:** because the volumes are very high, in most cases the cost of having to use film lamination is not acceptable for the manufacturers, who pursue a more cost-efficient solution such as a clear coating.
- **At least 5 years of warranty:** it depends customer to customer, in some cases warranty is not required. Since the volume is related to the brand image renovation of fleet owners, which is a high investment, the renovation cycle is slow, therefore, high durability and responsibility is required.

4 The HP, 3M™ and Fotoba™ solution for fleet graphics

The HP solution, in partnership with **3M™** and **Fotoba™** , is designed to match customer requirements across the entire workflow and it is covered by the 3M™ MCS™ **warranty for up to 5 years**.

Print

The solution is HP Latex ink printed onto 3M cast or polymeric film, the most common material used is 3M™ Scotchcal™ Graphic Film series IJ 180.

The **recommended printer** is an **HP Latex 3600** in order **to maximize the productivity;** since you can load rolls weighing up to 200 kg, which allows twice the hours of continuous printing compared to the HP Latex 3200 model for the standard weight of a 3M™ Scotchcal™ Graphic Film series IJ 180 roll.

Please check the table below with the recommended print modes available at the HP Media solutions locator.

Material	Print mode	Speed
3M™ Scotchcal™ Graphic Film series IJ 180	6p 6c 100%	77 m^2/h
	8p 6c 120%	65 m^2/h

At the end of the unattended printing process, there will be two printed rolls ready to be moved to the trimming station.

Match color requirements

Color is the most important requirement for fleet graphics – the print technology used must have a sufficiently-wide gamut to match corporate logo colors, consistency to produce truck-wide panels and repeatability of color over time:

- **Gamut:** being able to match corporate colors is key for applications. In this case, Latex gamut has a log coverage of 73% (delta E_{2000} tolerance)[1], higher than UV coverage.
- **Color consistency across panels:** HP's 3rd-generation Latex printers use 3rd-generation HP thermal inkjet printheads that require lower temperatures to fire the drops which provides a

[1] Printed on a Self-Adhesive vinyl – 3M™ Scotchcal™ Graphic Film series IJ40 on a HP Latex 3000 series printer at 6p 6c 100%.

color consistency of under 2 delta E_{2000} from left to right of the print and along the roll. For colors where the human eye's sensitivity is higher, such as shades of orange and grey where 1delta E_{2000} is required, the HP Latex 3000 series feature a *tiling mode*, which enables color differences of less than 1 delta E_{2000}.

- **Repeatability over time:** as explained, print service providers get different vehicles to brand using the same brand images over periods of years and they must be able to produce the same colors. HP 3rd-generation Latex printers are contone printers, so they are able to repeat colors within a 2 delta E_{2000} color difference by using the closed-loop color calibration on regular basis.

Trimming

As mentioned above, HP has partnered with Fotoba™ , the developer of a feeder compatible with the split spindles of the HP Latex 3500 and HP Latex 3600 printers. This enables parallel trimming and printing actions, enhancing productivity.

Depending on the cutter specifications, a single Fotoba™ HS series cutter can keep pace with up to three HP Latex 3000 series printers. One single operator can handle the four pieces of equipment. At the end of the trimming process, the printed sheets will be ready to be coated.

Figure 5 Fotoba™ feeder compatible with the HP Latex 3500/3600 split spindles

Lamination and solution warranty

The lamination that protects the printed surface was developed in partnership with 3M™.

The product developed by 3M™ for HP Latex is called Screen Print UV Gloss Clear 9760LX, is UV-cured and delivers a 3M™ MCS™ warranty of **up to 5 years** for the finished graphics.

As per the characteristics of the 9760LX clear coat, it is a very glossy and thin coating. Compared to glossy paper, it creates a surface that is twice as glossy. The thickness recommended is between 6 and 12 microns. The clear coat is designed to be applied by screen printing and UV cured.

Following the process mentioned above, the customer will pick the trimmed sheet and put it under the screen printing device, it will apply the product, lift the screen and move it to the laminator.

Please see the section below to address the major parameters that should be controlled during the lamination process in order to ensure correct application and avoid issues such as cracking or stickiness.

For more information about the **3M™ MCS™ warranty,** please visit http:// www.3m.com

Figure 6 3M™ Screen Print UV Gloss Clear 9760LX description

Product application considerations

To get full specification of the application requirements as well as considerations on regards of the warranty, please refer to the 3M™ Product Bulletin 9760LX on 3M's website.

Let's us briefly skim over certain appliance considerations. As described above, there are 5 main steps on the **lamination process**:

1. Apply the coat over the printed and trimmed panel.
2. Cure the coated material on a UV oven.
3. Contour cut if necessary.
4. Apply masking tape when necessary in case of non-panels production.
5. Apply the protected art on the truck.

There are 3 parameters that need to be strongly considered as per 3M consideration:

1. **Web thread density:** 140-150 threads/inch and 31-34 microns thread. Incorrect web thread density will lead to:
   - Incorrect distribution of the clear over the surface, therefore issues on gloss uniformity.
   - Cracking due excess of product

2. **Curing power and time:** Curing power lamps have to address **600 nw/cm²** and curing speed has to match; and exposure: **200 w/inch**. If both parameters are incorrectly settled, it will lead to a lack of curing. Incorrect curing will be manifested as yellowish issues and stickiness over the surface.
3. **Masking tape** must be under 3M masking tape bulletins.

Please follow the recommendations in the 3M bulletin prior to applying the product.

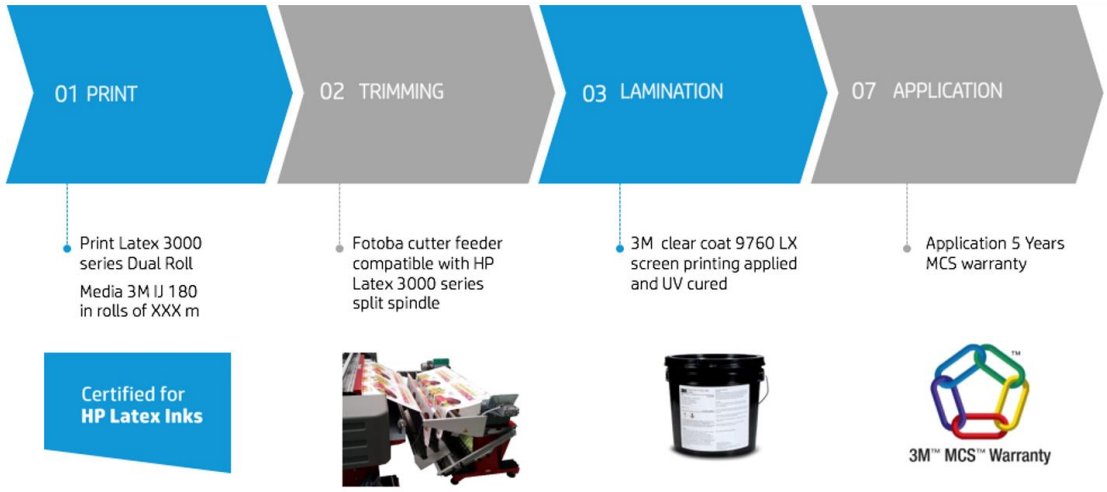


Figure 7 End-to-end HP, 3M™ and Fotoba™ solution to produce truck panels