

Application of Overlaminated Avery cast films on irregular substrates

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This technical bulletin describes the steps involved in creating a successful total vehicle covering. The information described **only** applies to the following combinations of materials:

- **Avery MPI 1005 Supercast series with DOL 1400 series overlaminate**
- **Avery MPI 1900 series with DOL 1400 series overlaminate**

Application of these overlaminated Avery MPI Cast films to irregular surfaces has to be done in the best possible manner in order to ensure that the product will perform as intended and designed. Successful application results in an adequate bond between adhesive and substrate. Please read the instructions for surface preparation of the substrate prior to application.

The entire process of applying digitally printed and overlaminated materials to irregular surfaces involves a number of basic steps. Any material conversion needs to be done in the best possible way.

The information provided in this document can also be found on our website, www.academy.averygraphics.com. This website also contains instructional How-to videos and additional theory modules.

1. Picture preparation/Printing

In order to obtain good-quality printing results, use dedicated media profiles within your RIP software. Profiles are optimised settings that help to create constant and reproducible output of your machine-ink-media-RIP combination. Media profiles for many combinations can be downloaded from the Avery website: www.europe.averygraphics.com.

Use of profiles will only be effective if all settings for files, software and printer are correct. In the prepress stage it is advised to use options such as Grey Colour Replacement (GCR), Solid Colour Reduction (SCR) or Under Colour Removal (UCR). This will reduce the amount of ink deposited on the material, resulting in less influence of the solvent on the material properties.

After printing, digitally printed images on Avery MPI cast films should be thoroughly dried before application. This means that the materials should be allowed to dry for at least 24 hours, but depending on the ink amount and ink type, the required drying time could even be up to 72 hours. It is important that the material is not tightly wound on a core.

2. Image lamination

The second step in the process is to laminate any of the DOL 1400 series overlaminate on top of the base film. There are a few issues to focus on during the lamination:



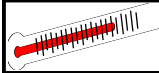
Lamination temperature and tension

As the DOL 1400 series overlaminate is a pressure-sensitive material, there is no need for a high temperature during lamination. The rollers could be set at 25°C, which can reduce the possible presence of 'silvering'. Tension on the unwinding overlaminate should be as low as possible to reduce the amount of tension in the laminated material.

Please note that increased roller temperatures in combination with higher winding tension could lead to unwanted elongation of the overlaminate. Because overlaminates such as Avery DOL 1460 or Avery DOL 1480 are designed to be ultra-conformable, winding tension should therefore be carefully monitored and kept at an appropriate (low) level.

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Please see the following table with general settings that could be used when laminating:

	 Pressure (psi)	 Speed (m/min)	 Roller temperature (°C)
Avery DOL 1460 Gloss Avery DOL 1480 Matt	50-70	0 - 2.5	20

Note: Materials need to be fully dried before an overlaminates is applied. In general, a drying time of 24 hours will be sufficient. If a lot of ink is deposited, materials may need up to 72 hours in order to be sufficiently dry. When drying, material should **not** be wound tightly on a core as the solvents are then unable to evaporate. The materials should be left to dry loosely, wound on a core or stacked in racks as sheets. Properly dried images are always needed in order to benefit from each product's specific features.

3. Surface preparation

The surface has to be cleaned by:

- washing with a mild detergent solution, after which the surface should be rinsed and dried with a lint-free cloth.
- Avery Surface Cleaner.

Many commercially available cleaning/degreasing products exist: the applicator should establish the suitability of a product prior to actual use. In addition, the following factors should be considered prior to any application:

Car wax and polish residues must be **completely** removed.

Paint surfaces must be completely dry, hardened and free of scratches. On most baked paints films can be applied immediately after cooling down. Air-dried and car repair paints require at least two weeks to dry out before films should be applied. Solvent residues in painted substrates may adversely affect film adhesion and may cause excessive shrinkage or blistering.

Painted substrates for self-adhesive films should be prepared according to the paint manufacturer's instruction. Here, too, it is important to avoid solvent retention. Paint system components which are not compatible or do not adhere properly to each other may cause paint to be lifted when films have to be removed after use.

Special attention should be given to critical areas such as edges, corners, welding seams, rivets, corrugations and the like. These areas must be thoroughly cleaned and dried before application.

It is always recommended that the last step of cleaning is done using the Avery Surface Cleaner. This will remove any residual negative influences of the substrate. It is advised to give extra attention to critical areas.

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4. Application methods

Overlaminated Avery MPI Cast films have a high degree of conformability compared to other overlaminated cast vinyl systems. Overlaminated Avery MPI Cast films show excellent results even on 3D-shaped surfaces. Of course, the use of an industrial hot-air tool is needed to improve the ease of application.

After application it is absolutely necessary to re-heat those parts exposed to stretch, strain or other deformations to obtain their final shape. Re-heating will eliminate the applied tensions in the film.

Always respect the minimum application temperatures as specified in the technical datasheets.

Avery MPI Cast films are designed for dry application to prepared surfaces. It is not recommended to use the "wet method" for overlaminated graphics described in this technical bulletin.

4.1 Dry Application Method

One of the benefits of applying an overlaminated graphic is the fact that there is no absolute need for an application tape to add 'body' to the graphic. The overlaminated graphic allows for a higher degree of positioning and protects it against stretching while repositioning. Hereafter this newly formed laminate will be referred to as film.

If no application tape is used, care has to be taken that the material is not scratched during application. This means that the squeegee has to be in good condition!

The following images describe an application **with** application tape.

Application surfaces

The following section describes a number of surfaces with short explanations and instructions.

Concave surfaces

This hollow or bowl-shaped form implies that the material will be laid into a rounded or curved-in surface. Position the film over the total surface area as explained in our Technical Bulletin 1.4. Remove (a part of) the liner and apply the film on the surface with the help of your thumb or a squeegee. Remove the application tape (if appropriate) and start working the film into the hollow shape. If convenient, some heat can be applied to soften the film, thus making the inlay process easier.

The applied temperature should be in the range between 45° and 55°C. The use of hand gloves (slightly wet) will make this process easier. Gently follow the form of the substrate until all the material has been positioned.

Apply heat over the total area, especially over the concave part in order to allow the film to take the shape of the substrate. The stretched parts of the film should be re-heated in a temperature range between 80° and 90°C. It is important that both the film and the substrate are heated to these temperatures. The best results are achieved by re-heating gradually instead of a short blast of heat. Let the film and the substrate cool down to room temperature prior to any cutting of edges or overlays, etc.

Convex surfaces

This curved or rounded form implies that the material will be stretched around a curved-out surface. Position the film over the surface area as explained in Technical Bulletin 1.4. Remove (a part of) the liner and apply the film on the surface with the help of a squeegee. Move around the convex area and apply gentle strikes until the film cannot stretch any further in order to avoid air being trapped.

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4.1 Dry Application Method (*continued*)

Remove the application tape (if appropriate) and start shaping the film with a felt squeegee or use hand gloves making gentle movements around the area. Remove air entrapment by punching small holes in the film and if convenient, use some hot air to make the film more conformable. During the conforming process the applied temperature should be in the range between 45° and 55°C.

After you have completed the application, apply more hot air to the film in the temperature range between 80° and 90°C over the convex area and apply pressure again in critical areas using a squeegee covered with felt or hand gloves. Again, it is important that both the film and the substrate are heated to these temperatures. The best results are achieved by re-heating gradually instead of a short blast of heat.

Let the film and the substrate cool down to room temperature prior to any cutting of edges or overlays, etc.

Compound surfaces

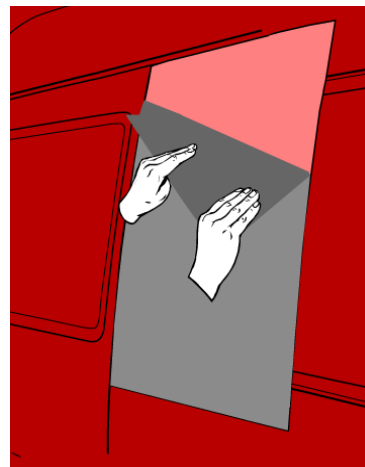
This is generally a complex form of concave and convex surfaces, which can be found one after another or even side by side. These shapes are frequently found in modern models of cars or vans. The method of application follows the description of the two individual shapes provided in the previous two sections.

Corrugated surfaces

Position the film to the application surface with a masking tape that can serve as a hinge (see Technical Bulletin 1.4). Ensure that the hinge is in a flat section of the surface. Only remove a small area of liner to prevent pre-sticking. Application to this type of surface has to be done systematically; section by section is the best approach. Deviation from this application sequence may result in pleats, which are sometimes difficult or even impossible to be eliminated.

Start the application at the hinge (continue section by section) and apply the film from the centre to the sides of the film or printed graphic. This method will limit the occurrence of pleats.

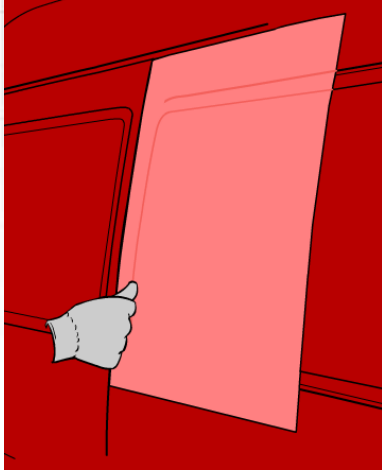
While keeping the adhesive free from the substrate, apply the film with a plastic squeegee. Do **NOT** stretch the film, but follow the irregular shaped surface. Use the full width of the squeegee and press the film firmly down over the entire surface area. Vertical sections should be applied with vertical squeegee strokes. Make sure the film is applied correctly in the edges, corners, seams, etc. Remove the application tape (if appropriate) after 3 to 5 minutes and re-squeegee the edges or corners.



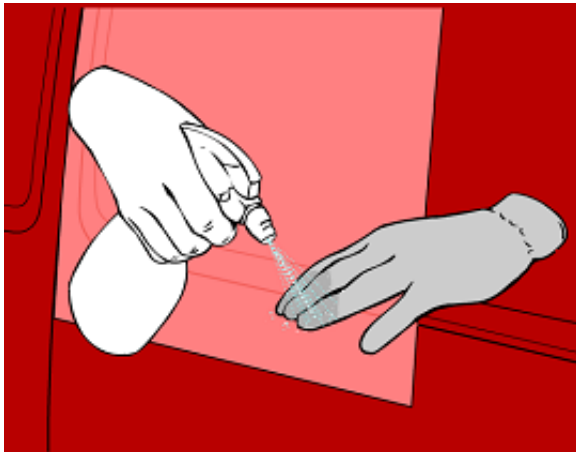
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4.1 Dry Application Method *(continued)*

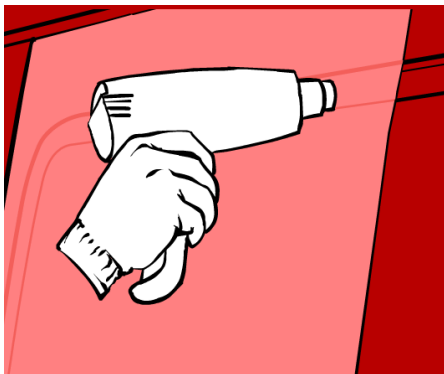
When edges and corners are re-squeegeed, make sure the material is fixed on the edges of the corrugation (see below), and work your way around the entire corrugation, just fixing the edges!!



Now, the application of the material in the corrugation can start. In order to be able to do so without forming pleats or creases, it is advised to wet the glove, using a water/soap mixture.



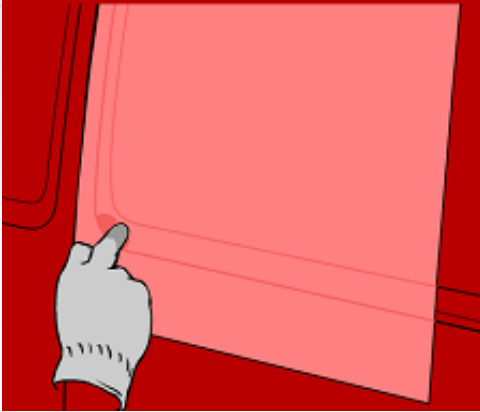
The next step is to heat the material gently, using a hot-air gun, to about 45°-55°C. It is advised to do small areas at a time.



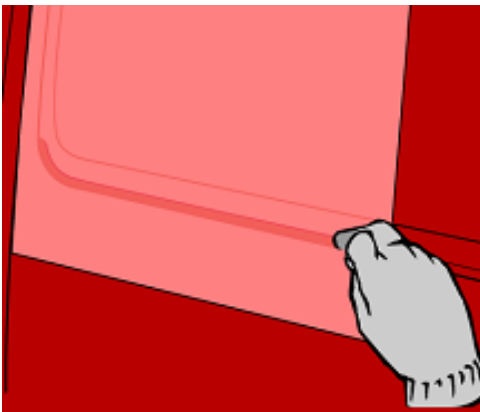
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4.1 Dry Application Method (*continued*)

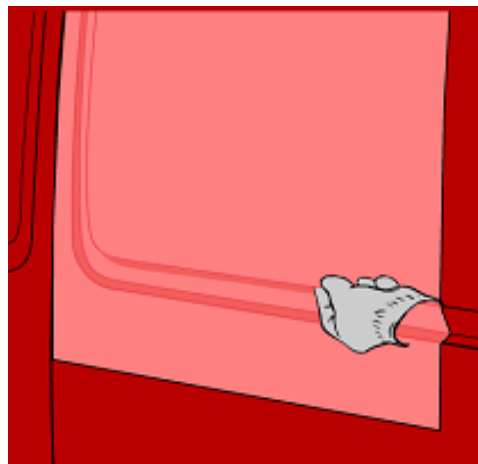
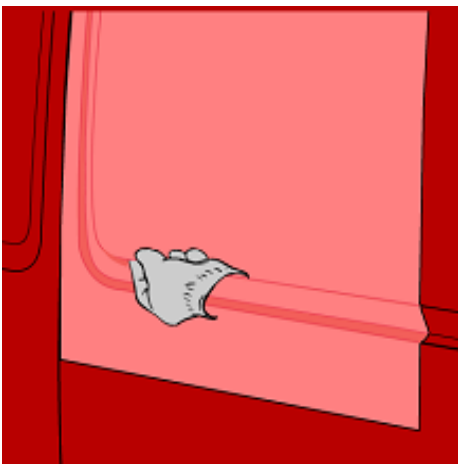
Now, start stretching the material in the corrugation, **starting in the deepest part** of the corrugation first. Make sure that the material is heated to remain in the 40°-50°C temperature range.



Continue your way around the corrugation, only focussing on the deepest part of the corrugation.



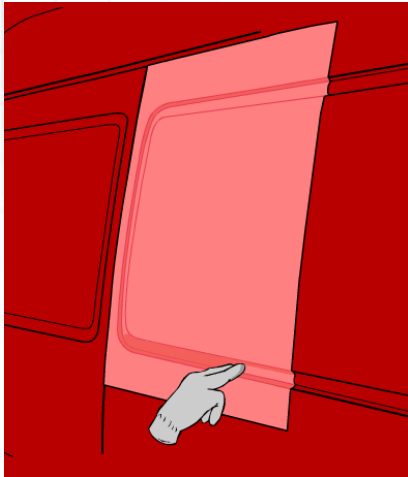
When all the deepest parts of the corrugation have been applied, the inside of the corrugation can be done. Again, make sure the material is heated to the required 45°-55°C, and work your way through the corrugation.



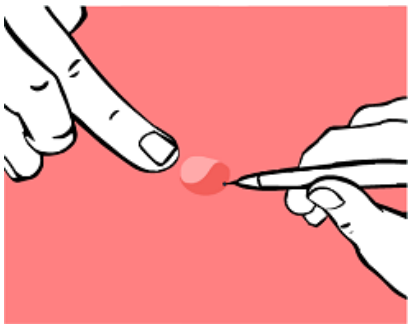
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4.1 Dry Application Method (*continued*)

With all the edges now properly applied, apply the material in the centre of the corrugation. Make sure that no air is trapped by always leaving an opening for the air to escape



Check the application for remaining bubbles. If you see any small air bubbles, remove them by making a small puncture, heat it a little and push out the air



Then the final stage of the application starts. Using the hot air gun, the material should be heated to a temperature of approx. 80°-90°C, especially in those areas where the material is stretched. Make sure that the heating is done gently, and the temperature is gradually increased. It is important that both the film and the substrate are heated to these temperatures. The best result is achieved by re-heating gradually, instead of a short blast of heat.



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4.1 Dry Application Method (continued)

Riveted surfaces

Position the film to the application surface with a masking tape that can serve as a hinge (see Technical Bulletin 1.4). Ensure that the hinge is in a flat section of the surface. Only remove a small area of liner to prevent pre-sticking.

Start the application at the hinge and work towards the edges of the film or graphic. When a rivet is reached, push the film towards the rivet head with the squeegee and apply the film leaving an air “bubble” around the rivet. Maintain sufficient tension in the film to prevent pleats around the rivets. Once the film part or graphic has been applied (with the application tape still in place), use a needle to punch 4 or 5 holes around the rivet and proceed to apply the film with a plastic squeegee. After this stage has been completed, remove the application tape.

Gently push the air out of the entrapment by hand, using gloves or with a soft squeegee. Apply heat to the film around each individual rivet with a portable hot-air tool until the film softens. It is advisable to use a temperature range of 45°-55°C. Push the film further into shape around the rivet with your thumb (using gloves) or a felt covered squeegee.

Eventually the film can be moulded around the rivet head by means of a brush, using circular movements. Be aware to apply the pressure of the brush on the film only at room temperature and avoid scratching the surface.

Complete the application by applying hot air to the film using a temperature range of 80°-90° C. It is important that you heat both the film and the substrate to these temperatures. The best result is achieved by re-heating gradually, instead of a short blast of heat. Check and re-squeegee the edges of the rivets of the applied film or graphic, where required.

5. Recommended use for cast vinyl series

Product name	Description	Features	Air Release	Slideable	Repositionable	2D Surfaces		3D Surfaces		
						Un-laminated	Laminated with DOL 1000 series	Un-laminated	Laminated with DOL 1030 DOL 1130	Laminated with DOL 1460 DOL 1480
MPI 1900 MPI 1900 Easy Apply MPI 1906 AP	Conformable Promotional Cast vinyl	Grey Coating for High opacity	no	no	yes	+	+	+	+	+
MPI 1005 Supercast	Ultra Conformable Cast vinyl	Grey Coating for High opacity Highly Durable Long Term Removable	no	no	no	+	+	+	+	+
MPI 1040	Conformable Clear Cast vinyl	Excellent clarity Virtually no shrinkage	no	no	no	+	+	+	+	+
MPI 1004 Easy Apply	Conformable Cast vinyl with Air Release	Grey Coating for High opacity Highly Durable Long Term Removable Air Release	yes	no	yes	+	+	+	+	+
MPI 1005 Supercast Easy Apply RS	Ultra Conformable Cast vinyl with Air Release	Grey Coating for High opacity Highly Durable Long Term Removable Air Release, Repositionable & Slideable	yes	yes	yes	+	+	+	○	+

○ = when applied on concave surfaces make incision (after reheating) to relieve tension