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TECHNICAL TIP #32

Digital Printing Installation

- Squeegee Strokes
- Wrinkles
- Heat Setting
- Tension
- Trim
- Overlaps
- Finish Work

General Notes:

When installing Arlon's DPF 6000XRP it is important to realize and use the internal strength of the laminated graphic to the installers benefit, that is when one takes advantage of both the strength and the distortion recovery capacity of the product then application confidence, speed and bubble reduction improve proportionally. While the instant adhesion (tack) of DPF 6000XRP is high enough to keep film in place over deeply stretched applications it need not be an obstacle to installers when one considers the balance between tack level (about 2 lb./in) and film strength (>15lb/in). DPF 6000XRP in combination with the overlaminate Series 3220 film will provide over 15 lb./in of Tensile Strength before breaking. For even a moderate sized graphic of a couple of feet on edge this means over 100 lb. of tensile strength across the application line! One would have to pull extremely hard indeed to break the product while repositioning. It is true that plastic of any kind tears at edges far easier than along the face so when repositioning it is important to snap or lift uniformly rather than pulling from one or another edge. It is also true that installation during warm weather increases tack and softens film while cold temperatures lower both tack and film stretch. Care must be taken to avoid extremes of temperature whenever possible.

Heat recovery is a unique feature of the DPF 6000XRP/Series 3220 laminate

The film laminate may stretched over 300% beyond its original shape yet can be returned to flatness and perfect print condition. This is simply a matter of passing heat across the face (either flame torch or heat gun) until the film softens and eventually shrinks back into it original shape. This can be done repeatedly.

Different Strokes

The most effective strategy for using any type of squeegee is to stroke from the center of the section one is working on to the nearest edge. The normal problems one encounters with large applications such as vehicle wraps such as wrinkles, bubbles and gathering of excess film into a pucker are all minimized when the stroke distance is equal from side to side and stroke distortion is evened out.

Contrary to the normal method of handling a squeegee (dragging the tool with the edge trailing the stroke for flat applications) the squeegee is often turned around and used with the edge leading the stroke. This method will help shape the film more effectively as the plane of the film is moving from flat to curved.

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Different Strokes (Continued)

Unlike some products that are designed primarily for quick installation due to low surface contact DPF 6000XRP is designed for high instant and long-term adhesion thus assuring the application remains intact. This characteristic requires using high squeegee pressure at the point of application to remove all air as the film makes contact with the vehicle. Trapped bubbles are a function of low contact pressure rather than paint or adhesive outgassing. The angle at which the film is held just prior to being squeegeed should be as near to the body panel as possible without touching. Wrinkles and bubbles are commonly caused by positioning the film too far off the vehicle and forcing the squeegee to reshape the film as it being attached.

Wrinkles

Since applications of a flat rectangular sheet of film to a shaped vehicle will require the film to be distorted constantly the ability to recognize where wrinkles are forming and tactics to remove them are very important.

Wrinkles will develop in stages starting as an area of looseness then shaping in soft wedges of film and finally hardening into a folded wrinkle. It is important to notice where the looseness starts to form and work to keep it from developing by changing squeegee stroke to impart more or less stretch to the sheet and spreading the looseness across a larger area. The best way to approach all wrinkle prone areas is to begin the squeegee stroke in the center of the fan of wrinkles and work to the edges. When working out areas where wrinkles are a constant problem it is best to use harder squeegees with a very slick (slippery) edge. A hard Teflon squeegee will often avoid wrinkle development on its own as it can shape film very effectively with out the use of additional heat. There will be times that the distortion required is too great or isolated to such a small area that the wrinkle cannot be overcome simply and heat from a gun or torch will be needed in the case of hard wrinkles forming at the leading edge of an application the way to release the tension on the film is to hold the unattached film away from the vehicle with minimal force and sweep a heat source quickly over the wrinkled area until the wrinkles flatten out. A torch would be swept back and forth about a hand width away from the film while a heat gun will be slightly closer and take about twice as much time. Either heat source may be used depending on the conditions of the installation and availability of electricity. As torches are the preferred heat source for installer's familiar with riveted truck applications they are likely to be the weapon of choice for wraps as well.

Once enough heat has been used to smooth out the wrinkles in a graphic it is wise to let the film return to room temperature before proceeding with the squeegee: film which is too warm will be gummy and tend to stick to the squeegee. In areas of very tight corners it is not unusual to install as little as an inch of film at a time between heat and squeegee cycles.

Heat Setting

When cast vinyl film is distorted during installation and is not set into its new shape with high temperature it is very likely to pop out of whatever channel etc. it is adhered to. On the other hand calendered films will not retain this remolding and is constantly pulling away from stretched areas as though it were a rubber band. Heat setting is a simple process and should be done as soon after the primary installation is done as possible. The idea is to raise the temperature of the film to above 300°F (150°C), which will partially remelt the film and soften the adhesive coating so it flows completely to the surface of the paint. As the graphic cools continue to apply pressure with squeegee until it reaches room temperature. The film is now reshaped and will exert very little pulling stress on the graphic.

Tension

When installing vehicle wraps it makes a great difference in terms of speed, bubble and wrinkle reduction and the finished look of the job when two installers work as a team. The hands holding the vinyl in preparation for the squeegee stroke or the application of heat make all the difference. When holding the vinyl the best method is to apply uniform and light tension at a low angle. When heating to remove wrinkles or approach a corner the tension should be very low until the wrinkles dissipate then gradually increase to make the required shape. When repositioning the graphic the action should be to snap the product off the vehicle rather than pull it away gently. Gentle pulling to reposition the graphic creates stretched areas as well as increases the likelihood that the printed film will separate from the overlaminate.

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Trim

Areas such as door handles, gas caps and headlights and body joins and wheel wells all need to be tucked and trimmed to present a uniform appearance to the job.

Following certain rules for trimming will ensure a good finished look and provide the least opportunity for edge lifting and cracking or tearing of the graphic. The most overarching rule of thumb is that “cleanliness is hardest to achieve, dirt easiest to collect and failure most likely to start at edges of things” – graphics on vehicles in particular.

If some dirt or contamination is missed during vehicle prep on a large body panel it is not likely to precipitate a massive failure as the surrounding areas of high adhesion will help keep the dirty area intact. When the same thing happens in a channel, door edge or under a wheel well that area will lift. Cleaning of most areas consist of nothing more than a good pressure wash followed by a wipe of IPA/Water in equal amounts. Where road tar or soot are present more aggressive cleaners may be used as long as the last cleaning is the IPA/Water mix.

In areas where it is possible remove the obstacle do so: wheel flares, dealer and model names, lamp assemblies and mirrors can be taken off or loosened allowing the film to be tucked behind these areas so that when the assembly is refitted the finished job looks extremely clean and sharp. Beyond the initial smooth appearance the edges of the vinyl will never be exposed to chafing, petroleum spillage or other rough usage which is routinely the lot of wheel wells, front ends of vehicles and window seal strips.

When vinyl is to be tucked into the space between the body panels or side molding it is to be cut in all cases. After cutting, tuck the remaining film as securely around the panels as possible. If the work is on the vertical body joins between doors etc. make the dividing cut such that more film is available to the leading edge of the cut. This ensures that wind, ice, road grime etc. is not forced into the glue line and force premature failure.

Installing Overlaps

When creating an overlap that will be easy to apply and result in perfect image registration is important to create plenty of shared border between sheets when setting print borders. As much as six inches on a side is not overdoing it considering that a “handling edge” is needed which will be damaged by constant contact with finger oil as well as scalloped from constant pulling force. When overlapped printing is created then registration is simplified and edge trimming made very clean by the use of a strip or two of masking tape on the line of trim then light application of the top layer. A sharp knife is then used to cut through the top layer of graphic and to the layer of masking tape. The film waste is removed, the film over the masking tape folded back, masking tape removed and the overlapped film reinstalled using high squeegee pressure along the line of the lower edge to remove all air.

Finish Work

Finishing a vehicle wrap so it looks like both graphic design and the application fit the vehicle as though it was OEM work is the mark of truly professional installers. These last touches are usually the first thing a customer notices and give the best final impression of quality of work of the installer.

- Areas of door handles are often printed again and installed after the initial print has been cut away.
- Window film is tucked under the lower rubber sill of the glass seal strip so the edge of the vinyl will not catch when the window is lowered.
- Visible edges are trimmed straight and even.

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Finish Work (Continued)

- In cases of common usage such as driver side doors, a quarter inch strip of vinyl, matching the original paint, join the graphic to the paint giving an extra degree of assurance that the constant chafing of entry and exit of the car will not tear the film away from wrapped edges.
- All sections of deep stretch are once again heated and reseated to be sure of the best contact and longest durability.
- The surface of the vehicle is waxed and buffed to ensure a lustrous and uniform gloss.

Digital Products Removal

All Arlon DPF Films may be removed from OEM paints without damage to paint or clear when keeping in mind the following factors:

1. The installation must be made using only thoroughly dried prints.

   When installation are made with prints containing retained solvents from printing ink these solvents can cause a variety of application problems such as bubbling and high levels of shrinkage. In addition the solvent will be trapped beneath the film/overlaminate for quite a while. During this time those solvent will act on the paint and clear coat to damage their integrity. The damage will usually come in the form of softening the paint but in extreme cases reduce interlayer bond between paints and surfaces or paints and clear coats.

   In consequence and especially if the film is removed before the paint has had a chance to dry and recover (reharden when graphics are stripped away, deformation (such as chatter lines particularly when film is removed cold) and delamination can occur. The installer must be sure that prints are completely dry before lamination so latent solvents do not become permanently trapped in the matrix of the graphic.

2. The paint itself must be completely cured. Paints which are only surface dried or tack free cure are not appropriate application surfaces and will result in both installation and removal problems. While the customer or installer may notice bubbling after installation the most severe risk is resultant delamination of paint from substrate when repositioning or removing graphics.

   When paint coatings are completely dry (dehydrated at the paint/substrate interface) they achieve the associated crosslinking that will create both a cohesive paint film with all the hardness and durability characteristics of the finished product as well as the substrate bond that will secure the paint to the vehicle or sign substrate.

3. The party responsible for removal must always be sure the film and adhesive are at least warm to the touch before attempting removal. Warm film (95°F – 150°F/35°C – 70°C) will become pliable and the adhesion will drop by as much as 60% as compared to cold product thereby reducing the risk of either paint deformation or delamination.

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