

Cast Into The World

of Vinyl

BY DAVE KING

Cast vs. Calendered:
What is the truth behind these
adhesive-backed films?



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turers to help develop new and better technologies. In addition to writing for Digital Graphics Magazine, Dave is a frequent speaker at The Sign Business & Digital Graphics Show. He has also produced InkJet Printing, Laminating and Mounting, an educational video for the Video Classroom series. For more information call 1-800-691-8047.

I have never felt better about the adhesive-backed vinyl market than I do right now — that is, since the last SGIA show. When I look back over the years, each SGIA show has been dominated by a certain type of technology — and this year it was *solvent inkjet printing*.

The days of wondering whether you can print on a given material (or if it was cast or calendered) are over. Typically, the rules for adhesive-backed vinyl have been these: calendered is thick (typically 4 mil) and less expensive (10 to 50 cents per square foot), cast is thin (typically 2 mil) and more expensive (60 cents to more than \$1 per square foot, depending the manufacturer, warranty and local vendor).

TIMES ARE CHANGING

The world of cast vs. calendered first became blurred when Encad and Hewlett-Packard introduced their aqueous-based UV inks designed for the outdoor market. These new inks

required a coated media to allow the inks to set up and dry properly. These coated vinyls were expensive to manufacture, and as a result their price was high. Unfortunately, the high price tended to confuse users into thinking these films were cast. Even if the manufacturer *started* with a cast film, by the time they finished coating it for inkjet, some vinyls would no longer *perform* like a true cast vinyl.

Installers and sign shops that tried to use these coated films in cast applications involving compound curves (and rivets) sometimes found over time that installs

failed prematurely. The film would pull back and begin to peel off the vehicles.

About three years ago my shop took the plunge and purchased a NUR Fresco solvent-based printer. We soon learned that we could print onto just about *anything* provided we could feed it through the printer. But I also realize that spending more than \$350,000 on a solvent printer was beyond the means of a lot of smaller shops.

However, as I walked through October's SGIA show I noticed a lot of new solvent printers priced under \$50,000 — some as low as \$18,000. Solvent machines are now within reach of a lot more shops. I believe this means that very expensive coated vinyl media will soon become a faded memory.

This is good for everyone, because now if you ask for a calendered vinyl for your solvent printer, you can still expect to pay between 10 and 50 cents per square foot. But when you ask for *cast* film you will pay less than half of what you pay now for those specially coated inkjet films — and it will perform as a good cast vinyl should.

APPLICATIONS AND PERFORMANCE

Depending on who you ask, you can get many different answers as to application and performance characteristics of cast vs. calendered. Take what you know and modify it to a basic set of rules.

In general, cast is best suited for applications where you expect the vinyl to conform around compound curves, corrugated surfaces, rivets and the like. These are situations where you expect the film to conform and *stretch* and stay put over the stretched area.



The frosted image in the foreground was created with 3M Dusted Crystal calendered vinyl. In the background you can see a graphic created five years ago with 3M's 8522 with 3M's 8519 luster lam printed on the HP 3000 with HP's UV outdoor inks. The sign has a southern exposure and sees sun all day long. Not bad for a vinyl with a two-year warrantee.

Cast vs. Calendered



Reflective vinyl with permanent adhesives are often used on municipal signs. These babies last a long time.



Just look at this. The paint on the back of this truck failed before the cut calendered vinyl that covers it. Vinyl is final, baby.

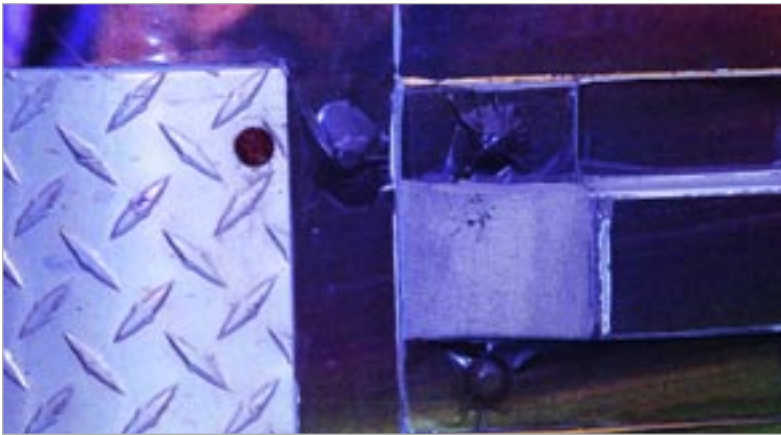
Calendered vinyl works best over flat surfaces. It is my recommendation that if you do not know what the surface is (let's say a 24' straight truck), then use the cast as the price difference will always outweigh the cost of redoing the truck. No warranty will cover your miscalculation on the vehicle's surface. Not all products follow the above rules for cast vs. calendered vinyl, but in most cases it is a good guideline to follow.

In my shop we have seen examples of vinyl *shrinkage* — some on signs and others on trucks. We've looked into this problem for the last few years and the best we can figure is that digitally printed solvent ink on calendered vinyl seems to be the most likely vinyl to shrink over time.

We have been printing onto cast and calendered vinyl with our solvent printers for more than three years. We have made prints that we hung on the shop wall to show as examples (the release liners left in place). Over time, however, we noticed that 24" x 60" calendered panels shrunk by 1/8" on all sides, and cast vinyl prints of the same dimension shrunk about 1/16" on all sides.

I've talked about this with many other printers and also with vinyl manufacturers, and I am led to believe that the shrinkage is due to the solvent ink. I believe the shrinkage is much worse when the vinyl is left on the release liner because the adhesive is not designed to stick to the release liner, so there's nothing to keep the vinyl in place.

In application situations you'll sometimes see shrinkage around rivets. When the vehicle leaves the installer, the film is stuck to everything, but after three weeks or so the vinyl has *tented* over the rivets. In other words the vinyl has lifted off the side of the



An extreme example of tented vinyl.

rivet causing a gap between the top of the rivet and the flat surface of the vehicle. Over time the vinyl will tear and fail, and again this is not covered by warranty. Even cast vinyl can fail this way. Tenting is generally caused by improper cleaning of the vehicle prior to installation (or oxidized rivets) or the vinyl may have been installed onto a wet/damp surface. Never install vinyl onto a wet vehicle.

ADHESIVE-BACKED WARRANTY

When we started working with solvent inks in my shop we learned that the vinyl manufacturers must be very careful as to what they say and how they guarantee their vinyl product. Most warranties cover fading issues, but there's also another issue to examine — removability.

Solvent ink is designed to eat into the vinyl and bond with it, creating a permanent colored image. That's what gives solvent vinyl prints such longevity on vehicles and other outdoor applications.

During the process of eating into the vinyl some of the solvents in the ink are left behind, and over time they evaporate from the film. During this evaporation process the solvents (depending on the film), can affect the adhesive side of the vinyl. In these cases the action from solvents in the ink will sometimes transform the vinyl's adhesive, turning a *removable* adhesive into a *permanent* one.

So, when you're looking at applications where the vinyl needs to be removed within a time frame (such as with many vehicle wraps), you need to make sure the vinyl you choose is *designed* for solvent ink applications, and that the manufacturer offers a warranty for removable applications when

printing on your solvent printer. For me, the most important part of the warranty is the part that deals with removability. I checked with the warranty people at two of the largest manufacturers of adhesive-backed vinyl and found that the most common warranty claim they see is for damage caused when removing vinyl (adhesive cleanup and paint lifting).

A FINAL WORD

The final word on cast vs. calendared is fun! These days, with all the new printers on the market, the vinyl manufacturers are ahead the game, offering vinyls that work with solvent inks, and coatings that are well tested and approved. We have taken standard cut vinyl (white, reflective, prism, diamond cut, and florescent) and just loaded and printed it on our printer, and it works! We have had to produce cut vinyl jobs with special colors that we could not purchase, so we printed the colors on the solvent printer, liquid laminated them with our Seal five-year lam, and then rolled the printed piece into the cutter and cut the images. It gave us a leg-up on our competition for jobs that we could do that they did not think they could!

Good luck, and I'll see you on the show floor.

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Cast vs. Calendered



This is a reverse-printed window graphic. It's mounted on the second surface using Catalina Plastics clear calendered film, backed with Avery's 4000 series cast cut vinyl. By day it's a graphic image and by night it's a backlit display when used with a halogen light source.



This shop truck is covered with Avery MPI 1005 EZ cast vinyl with ClearFocus window perf and Avery A7 Reflective High performance vinyl used in the white areas.

Cast vs. Calendered:

THE MANUFACTURING DIFFERENCE

The essential difference between cast and calendered films lies in the manufacturing process for creating vinyl film.

Cast film starts out as a liquid solution. The blended solution is polymeric in nature. Generally, polymeric films have a much longer performance life due to less migration of the plasticizers within the various stabilizers. The film's brightness or gloss level is determined by the surface characteristics of the casting sheet receiving the deposit of liquid solution in the casting process. Cast vinyl is usually only about 2 mils thick. Because of the film's thinness, it is very conformable to irregular surfaces, and is preferred for outdoor applications such as fleet markings where the film is applied over corrugations and rivets. Since the manufacturing process is much slower and more tedious than the calendering process, cast films are more expensive than their calendered counterparts. The manufacturers of cast film are expected to offer longer warranties, and they should have an insurance coverage account in the event of a failure.

Calendered films are created from a mixture of PVC. Rather than starting as a liquid solution, calendered PVC is blended into a soft, pliable thermoplastic resin. With the introduction of heat, the mass can be compressed into progressively thinner ribbons of material by being passed between a succession of hard steel rollers. These rollers are referred to as calender rolls. By passing the PVC mass through a series of these calendering rolls, the film can be reduced to virtually any desired mil thickness, although 4 mil is considered the standard thickness. If you need flexibility and conformability over rough or textured surfaces, cast films will likely be the best choice. Calendered films will do just as well over less demanding surfaces, and are likely to cost less to produce on your part. **DG**