



REAL WORLD VINYL

By Rob Ivers

The Dynamic Duo

The effects of temperature and pressure on vinyl-graphic installations

Rob Ivers owns Rob Ivers Inc. (Raymore, MO), a vehicle-graphics company. He's installed vinyl since 1978 and taught vinyl-graphics installation since 1993.

Temperature and pressure significantly impact vinyl-graphic performance during and after installation. Most graphic vinyls are described as pressure-sensitive vinyl. Yes, the films have a pressure-sensitive-adhesive component, but I find this term lacking. Temperature plays such an important role in vinyl and adhesive performance. I believe a better name might be temperature (or thermal)-pressure-sensitive vinyl (or adhesive). Like Batman and Robin, temperature and pressure become an inseparable duo that influences every vinyl-graphics installation.

Proficient vinyl-graphics professionals must thoroughly understand the dynamics of temperature and pressure. All vinyl we use comprises three parts: liner, adhesive and vinyl. The liner is important; we couldn't use vinyl without it. However, the liner must be removed for the adhesive to make contact with the surface. This leaves the vinyl and adhesive. Although they function together as

one unit, each includes distinct properties. Both are affected significantly by temperature and pressure, but in distinctly different ways.

The basics

Vinyl manufacturers and industry professionals agree 70° F is the optimum, graphic-installation temperature. First, consider the vinyl. As the temperature decreases, the vinyl becomes more rigid, even brittle, and prone to tearing and breaking. In warmer environs, the vinyl becomes softer and more pliable, which may lead to undesirable stretching.

An adhesive becomes less aggressive as the temperature decreases. As temperatures increase, the opposite occurs. Generally, an installer should use less squeegee pressure in warmer conditions and more pressure as the temperature decreases.

Mastering squeegee pressure is vital. Pay very close attention to how vinyl reacts to squeegee pressure. Equate your squeegee pres-

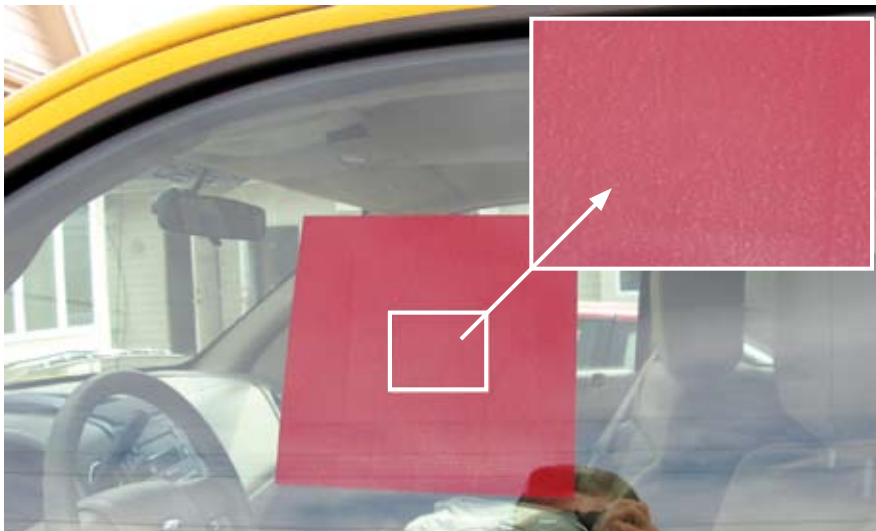
sure to a dial that can be adjusted to any pressure. An excellent installer uses precise pressure (which often changes moment to moment) based on vinyl type, temperature, surface and vinyl shape, among other factors.

Don't install vinyl at surface temperatures below 60° F. I know some manufacturers specify minimum surface temperatures of 40° to 50° F, but that's a minimum that's *not* recommended and *certainly* not optimal. Installing vinyl on surfaces below 60° can promote such problems as vinyl tearing, poor adhesion and lifting.

To better understand the temperature-and-pressure relationship – and the importance of following common-sense recommendations – consider a stick of margarine. I could store one in the freezer, the refrigerator, on the counter at room temperature or on a warm range top. If I took one from the freezer and tried to cut it, I'd have to push very hard with the knife and may send a rock-hard piece flying across the room. If I tried to spread it on a slice of bread, it would destroy the bread. If I took it from the refrigerator, I'd cut it with considerably less pressure, but it still wouldn't spread well on the bread.

The stick left on the counter at room temperature from the counter would take even less pressure to cut off and would spread on a slice of bread quite easily. The one by the hot range would take virtually no pressure to cut, but wouldn't stay on the knife long enough to spread onto the bread.

Where do you keep your margarine? Most of us would keep it on the counter for awhile if we planned to butter much bread. Don't let customers talk you into installing vinyl on near-freezing surfaces, or,



Immediately after a bubble-free installation on a 79.5° F surface, hundreds of bubbles seem to appear on vinyl's adhesive side. This is the way all vinyl looks immediately following installation, but the bubbles are only visible on glass or plastic. After the adhesive wets out, the vinyl will look completely smooth on both sides.

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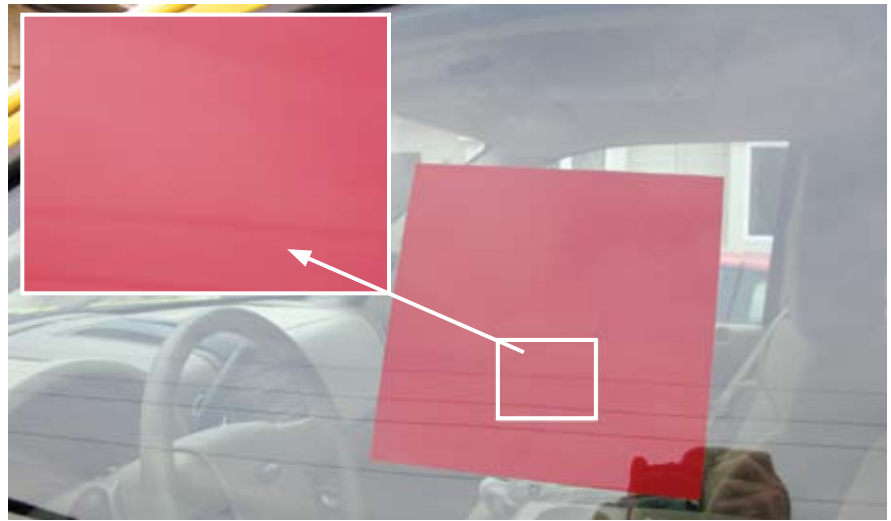
At 70° F, vinyl wet-out requires approximately 24 hours. This photo was taken 10 minutes after the prior photo. To demonstrate the effects of temperature and pressure on vinyl, I heated it to 200° F, let it cool down to about 100° F and squeegeed the vinyl again with a felt squeegee and firm pressure. The area arrow indicates a close-up of completely smooth, vinyl adhesive.

those over 100° F. Just ask them where they keep their margarine.

I've postponed or walked away from many jobs based on poor ambient conditions. I consider such situations last resorts when all other options have failed. I try to be creative in finding better alternatives for my customers.

Extreme installations

I once handled an installation for an electric-utility client who erected a nearly 300-ft.-tall wind turbine. The client ordered the company logo rendered in vinyl on both sides of the propeller's housing mounted on



the very top. They chose the windiest spot in Nebraska. However, I'm not sure why the job required a winter installation.

Money wasn't a concern – the customer just needed prompt completion. That type of budget starts my creative juices. To perform the job, I purchased a large roll of heavy-duty, reinforced, clear plastic and a large, propane heater, and rented a 100-lb. propane tank and a small trailer.

I sat in my pickup truck for hours, parked in a cornfield, on a very cold (10° F) and snowy day. The customer required me to be ready when the housing arrived. Given the high cost of the huge crane and workers necessary to lift the propeller housing off the truck and attach it 300 ft. in the air, I received a one-hour window to install the graphics.

When they arrived, I unloaded as they set the housing on the ground. I quickly positioned my scaffolding

and covered the entire area with the clear plastic and attached it with squeeze clamps to my scaffold to block the wind. I fired up the huge propane heater inside my makeshift "greenhouse." In less than 15 minutes, the housing's surface temperature reached 80° F.

I quickly installed the large graphics on both sides. After removing the premask, I squeegeed the entire graphic again; I paid extra attention to the edges. Finally, I post-heated all the edges to approximately 200° F. I finished the entire process in 48 minutes and earned a satisfied customer. Nine years later, the graphics still stand.

All wet

Vinyl's adhesive keeps working, after installation. It undergoes a process called wetting out. The adhesive, which maintains a toothpaste-like consistency, continues to flow for up to 24 hours at room temperature. Ultimate bond strength may require 72 hours. Higher temperatures require less time, lower ones more.

Always install at the proper temperature (60° to 80° F) if possible, and allow the adhesive to wet out properly. If you must install vehicle graphics below 50° F, leave the vehicle inside (set the thermostat to 70°), at least overnight, but preferably for 24 hours.

If circumstances won't allow normal adhesive wet-out, squeegee everything with firm pressure and heat the entire graphic, or at least the edges, to roughly 200° F. The adhesive will flow much more quickly than at room temperature. Let it cool to about 100° F and squeegee the graphics again. Hopefully, the vinyl will stay adhered. If it won't, there's nothing more you can do; more heat than that will probably burn or destroy the vinyl.

Made in the shade

I once decorated several red vans outside on a 70° F day. To make removing the old vinyl easier, I faced their rear doors into the sun. However, when I began installing the vinyl, it was soft, sticky and bubbling. As I poked one of the

bubbles, the van's heat forced me to quickly pull my hand away.

Curious, I applied my surface-temperature thermometer to gauge the temperature; it read 139° F! I turned all of the vans to place the rear doors in the shade. In a few minutes, they cooled to 70° F. When working on warm-weather, vehicle-graphic installations, take the extra time to park in shade.

When decorating buildings or windows, find out which direction they face, and schedule your work for the shady part of the day.

Do your best to make sure surface conditions stay in vinyl's "sweet spot." It may even take some pressure off you, the installer. ■

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