

# Choosing the Right Ink: How to Make Sure Your Printing Stays Printed

**You may be sending work out the door that will come back to haunt you.**

Screen printing is one of the most popular and versatile printing methods ever invented. Posters to pocketknives, T-shirts to the massive decals that go on the sides of locomotives, the list of things that can, and have been screen printed, is enormous. With such a vast range of materials to be printed, it is scarcely surprising that a large number of different types of inks have been developed. With so many inks to choose from, the odds of choosing the wrong one can be pretty high.

Consider this worst-case "sign"-ario...

The job took longer than you expected, but right now the shipper is in the back of the shop packing up those 200 coroplast signs. You sigh and sit back in your chair thinking of how close you cut that deadline. But then you look up. The shipper is standing in the door holding a sign. From here you can see a big white scratch across the very first letter. You're up out of that chair in a flash, and with growing alarm you scrape your fingernail across sign after sign. The ink on every one of them comes off with the slightest touch. You, my friend, have a problem.

The truth is, it's a problem you might have prevented quite easily by knowing your materials, correctly matching inks to substrates, and pre-testing.

## Know Your Inks

Inks can be divided into **three** main groups according to how they dry:

1. Evaporation
2. Thermosetting
3. UV (ultraviolet light) exposure

Ink is made up of two basic components: pigments and a carrier. The carrier is usually either water or a solvent. Inks that dry by evaporation can be either water or solvent-based. The principal solvents are almost all VOCs or volatile organic compounds, which means they evaporate rather well. Water dries more slowly than the solvents, but doesn't put VOC emissions into the atmosphere.

Environmental concerns have led to a lot of interest in water-based inks and some very rapid developments in that area. Unfortunately, although water-based inks can now be used even on some plastics, they are still only available for a limited number of substrates. Most sign shops use air-dry inks exclusively, and most air-dry inks are still solvent-based. Multipurpose, vinyl, and enamel inks all use different solvents as carriers, which mean that each type of ink will be a little bit different to work with. For example, multipurpose and vinyl both dry faster than enamel, but both will remain vulnerable to solvents after they dry. Enamel will not.

While not often used in sign printing, thermosetting inks are common in other industries. **Thermosetting inks cure rather than dry and will remain liquid until exposed to heat. Plastisol is undoubtedly the best-known thermosetting ink because of its widespread use in printing T-shirts and textiles.** Epoxy inks are associated with the thermosetting group because a number of them can be heat-cured to increase durability. Epoxy inks cure through a chemical reaction between the base and a catalyst, which has to be added separately. Normally the catalyst is added just before you start

printing because the ink cures within a few hours. They are commonly used for printing on glass, metal, ceramics and some types of plastic.

UV inks are definitely becoming more popular every day, but they need to be exposed to a powerful UV light source in order to cure. With their extremely high solids content and rapid curing ability UV inks are usually found in high-volume printing operations. As with the plastisols there is no danger of these inks drying in a screen. However, UV drying equipment requires a considerable investment, and beginning sign printers would be well advised to stick with the usual air-dry inks. Because they contain no VOCs, and consequently produce no environmentally harmful emissions, UV inks are often regarded as the wave of the future.

### **Match the ink to the substrate**

Most adhesion problems arise when an inexperienced printer encounters an unfamiliar substrate. The most important single step you can take is to correctly identify the material you intend to print on. Be specific. Don't just tell your ink supplier you'll be printing on "plastic." Polypropylene and polystyrene are both plastics, but as different from one another as night and day when it comes to screen printing on them.

This does not just apply to plastics; the same thing goes for every type of material. You are not printing on metal but on aluminum or brass. If the metal has a coating, remember you're not really printing "on" the metal, you're printing on that coating. The coating is what you need to identify.

Sometimes, though, you may unwittingly stray into unfamiliar territory. The substrate may closely resemble something you've printed before, but is it really the same material? Even if you've printed the same type of material a hundred times before, a slight change in the manufacturing process can make the familiar unfamiliar. Something as subtle and invisible as a new silicone coating can make a material impossible to print in the normal way.

Don't depend on your substrate supplier to alert you to every change in the manufacturing process or even be aware of it. Suppliers are not usually in the business of screen-printing themselves, and often the first time they become aware of a printing problem is when you tell them about one. The responsibility for knowing the material you're printing on and what it takes to put ink on it and keep it there is all yours. A basic rule to keep in mind is that any change in the substrate changes everything.

Another thing to consider: If you print on a number of different types of substrate, you can easily find yourself with a considerable investment in inventory. Not only do you have the different types of ink but their corresponding array of thinners, additives and wash-ups. Since a quart of ink is the smallest quantity you can buy, you may end up with nearly full cans of oddball colors dating back to a small area on a few signs you printed years ago. Over time this can amount to a considerable storage, and eventually, a disposal problem.

It's worth taking some time to organize your storage area because with a variety of different inks on hand, the risk of grabbing the wrong type increases. Using the wrong ink accidentally is just as bad as using the wrong one through ignorance. You should never mix different types of ink together and be very cautious even about blending similar types of ink if they come from different manufacturers.

### **Testing, testing**

Fortunately, most suppliers will be able to give you some advice about which ink you need to use. While such recommendations are certainly welcome, they don't relieve you of the responsibility to do your own test prints. If you neglect this step, and run into problems, no ink manufacturer or substrate supplier will take the blame for them. Ink manufacturers print warnings in their catalogs and in every

piece of literature they produce. It is your job to run test prints to see if the ink you're using will work on that specific substrate. The very fact that manufacturers need to post such disclaimers should alert you to the fact that problems are far from rare. When printers get together, horror stories of "ink failures" regularly make the rounds, but how can you call it "ink failure" when the ink has behaved exactly as it was designed to do?

Manufacturers do just about everything else to insure you get great results when you use their products. In fact, many of them will test your substrate using a number of their inks to see which one works best. You should be able to arrange with your supplier to send samples off to the lab for testing. It may take anywhere from a few days to a week or more for the results to come back, but they will definitely tell you which ink to use. Unfortunately, you may be in the position of keeping an anxious customer at bay while you wait for the test results. But it's far better to make a customer wait for the job than to have him unpack a bunch of signs and watch the ink flake off.

Manufacturer's labs can save you lots of money. The biggest saving obviously comes from avoiding the costs of a botched print job. But lab testing can also spare you the more modest expense of buying different types of ink to do your own tests. Still, once you've got that recommended ink, pour it into a screen and pull your own tests. A lot of factors can affect ink adhesion, and running your own tests can alert you to any problems long before you get into the middle of a production run.

After you've printed your samples, set them aside to dry for twenty-four hours. Then belabor your prints with fingernails, pencil points, and whatever else is handy. Do everything you can to try to scrape the ink off the substrate. Lay a strip of tape on the ink and smooth it down until you've got an almost perfect seal. Then rip it off. If the ink still stays on, you've got a winner.

Your choice of ink will affect a host of other factors as well: the mesh count in your screens, the stencil material used, and how you dry your prints. Each type of ink has its corresponding battery of solvents, additives and wash-ups, and in some cases, special screen printing techniques designed to put that ink onto a substrate and keep it there. This is why printing on a number of different materials can get expensive. As we said earlier, a screen printing ink has been developed for almost every type of material that can be printed. Fortunately, sign printers only have to worry about a few of them.