

Pad Printing: 3 Common Problems to a Centuries-old Process & 3 Simple Solutions

One of the things we love about pad printing is that it's both simple and high-tech; with applications ranging from a simple logo transfer onto the surface of a child's toy to large, multi-panel components for the medical industry.

Despite its simplicity, straight-forward process, many innovative applications and end-uses, pad printing can present a few snags to the technician. In fact, pad printing is a delicate process with numerous variables that can lead to an unsatisfactory image transfer if done incorrectly.

Some Basics: Understanding the Pad Printing Process

Before we can start troubleshooting, it's necessary to understand the process itself. Pad printing is the process of taking a 2D image that is etched onto a cliché and transferring it with a silicone pad to a 3D object. Ink is spread over the cliché and then wiped away, leaving the ink only in the etched image. A silicone pad strikes the cliché, transferring the desired image onto it. The inked pad then moves and places the image onto an object.

Proper fixturing determines much of the quality of the image. Precision fixturing is used to orient and firmly hold an object in a way that the object best receives the image transfer. It also ensures consistency in the location of the image transfer.

Ferriot's pad printing process allows us to add branding, user instructions, warning labels and any other artistic elements to the outer plastic or metal components of a product or subassembly. Common applications are business machines, gas pumps, drive-through lines and medical equipment – although pad printing can be used on practically anything else that comes into contact with a user or consumer.

First Thing's First: A Little Housekeeping

Performing preventive maintenance on your equipment is going to be the most important part of achieving and maintaining good transfer. Having clean blades, cups, pads and clichés - along with ink mixed to the vendor/manufacturer's recommendations - is vital to a successful print job. Even when we incorporate these practices, problems can still arise. When these three common problems emerge, the following simple troubleshooting tips will help put the process back on track.

3 Common Pad Printing Problems

The most commonly encountered pad printing problems tend to focus on three issues:

1. An incomplete print or a print featuring excessive voids
2. Distorted and blurred prints
3. A pad carrying excess ink or dirt outside of the desired image

Problem 1: Incomplete print or excessive voids

Solution: Remedy Solvent Issues

If any job runs long enough, you will eventually begin to see voids within the print or incomplete prints. This is due to the evaporation of the solvent or “thinner” from the ink, which in turn makes the ink thick and resistant to a clean transfer. Eighty-five percent of the time, mixing in more solvent is sufficient to fix the issue. At times, even when thinner is added, the poor print still persists or rapidly reemerges. Here are a few recommended solutions to this issue:

- Control your pad printing environment. Excessive heat and humidity drastically increase the rate at which solvents evaporate from ink. An isolated and climate-controlled area for pad printing is likely to extend the usability of most inks.
- Move from an open inkwell system to a closed inkwell system. As the name implies, the closed inkwell closes ink off within a cup. Any time that ink can be better protected from the environment, quality and consistency are more likely to be achieved.
- Evaluate the mix of the ink itself. Certain solvents evaporate more quickly than others. Moving to a “slower” evaporating solvent will extend ink life as will adding a strong retarder to a normal ink mix. At Ferriot, we carry a wide range of products from “fast” to “slow” thinners and retarders. Just as ink with not enough thinner can have a negative effect on image transfer, so can ink with too much thinner. Blurred and blotchy looking prints are common when ink is too thin to maintain crisp and clean lines when transferred.

Problem 2: Distorted and blurred prints

Solution: Rethink your Pad Replacement Procedure

When ink is mixed correctly, but the transfer is still flawed, the silicone pad or the cliché are most likely the cause. Any bending, bowing, or abnormal curvature to an image that has been transferred can be attributed to the pad. When a pad strikes the cliché or the surface of a part too hard, the smashing of the pad will distort the print during transfer. The pad should only strike hard enough for complete ink pick up and complete ink transfer. Too much pressure runs the risk for distortion and too little pressure will lead to an incomplete print. The same problem can occur when the shape of the pad does not fit the contours of the part. Make sure manufacturers and suppliers are involved when new pads are made for programs and ensure that clean, undamaged pads are used in production.

Problem 3: Excess ink or dirt outside of the image**Solution: Replace and Maintain Clichés**

Just as detrimental as incorrectly handled ink and pads is a damaged cliché. Any scratch or nick deep enough for ink to seep into will be transferred over to an image if the pad strikes that particular area of the cliché. For good measure, develop a routine to maintain the surface of clichés and to prevent rust.

Taking our Own Advice: A Real-World Example of How Ferriot Keeps the Project Going without a Hiccup

Every job is critical, but portions of the process that involve images or text are among the most visible elements of manufacturing quality for any project. Paying attention to all of these common solutions to ensure a smooth and effective pad printing process will help avoid wasted time and project delays. Asking questions of your contract manufacturer about its pad printing quality procedures is a critical part of the vetting process. Be sure to confirm that they offer a printing process that is seamlessly integrated into the entire production process and schedule.

As an example, when we took these same steps to avoid the common snags mentioned above, we were able to help one particular customer break through a pad printing quality bottleneck for one of its components.

A medical equipment manufacturer needed critical text to be printed in four colors onto its control panels for medical diagnostic equipment. As is common in the medical equipment industry, the equipment panels were white in color and their surfaces were textured. The light colored substrates of medical equipment allow for clear, distinguishable text such as instructions for safety warning labels and operating instructions to be more visible to the operator. Pad printing is preferred in the medical industry over using labels. Medical parts undergo frequent wipe downs and cleaning/disinfecting treatments, so pad printing the critical text onto the surfaces eliminates the chance for bacteria to thrive around and behind adhesive labels.

Because of the panels' textured surfaces, however, we ran into issue No. 1 above – excessive voids in the printed image. Ferriot's process engineers applied two solutions:

- **Adjust ink viscosity:** We increased the viscosity of ink so it flowed better.
- **Pad parameters:** We worked with our silicone pad material to create a custom pad that was harder, which is a bit counterintuitive. Most would think that to fill voids, a softer pad would work better, but our experience is the opposite – a harder pad that is less resistant to changing shape actually works better at driving ink into a textured surface than a softer pad. After experimenting with various pad pressures and hardness, we arrived at the optimum pad characteristics. One other parameter we experimented with was the pad dwell time, the length of time the pad stays on the surface, to achieve a clean transfer. For this component, we arrived at an ideal dwell time of between .5 to 1 second.

This type of process engineering time on our end eliminated the voiding we saw in our pad printing. We met our customer's specs, the products were approved and despite the short delay in our production while we worked to troubleshoot the image, we were still able to deliver the finished parts to the client within the promised delivery time.

How We Keep our Customers Satisfied

We pride ourselves on the fact that our customers avoid the hassle of dealing with multiple suppliers of parts and pieces. This is achieved because we can take a molded part and apply a full finish, seamlessly taking an unfinished molded part to decorated part. Most other pad printing providers can't say the same.

With factory workers averaging more than 20 years of experience each, our talent pool covers a full range of core competencies:

- Finished painting
- EMI/RFI shielding applications
- Cosmetic coating
- Ultrasonic welding
- Hot stamping
- Heat staking
- Pad printing
- Assembly

Learn more, at www.ferriot.com, or [contact us](#) for a free assessment to uncover ideas for removing cost from your manufacturing process.