
FLEXO TROUBLESHOOTING GUIDE:

**12 COMMON
PRINTING DEFECTS
&
HOW TO FIX THEM**

LUMINITE®

12 Common Flexographic Printing Defects & How to Fix Them

Your print comes off the press, but it just doesn't look right. You might not even recognize the reproduced image on the substrate. You immediately go into troubleshooting mode.

What went wrong?

As you well know, you must execute **many sensitive processes correctly and in sequence** to achieve printing perfection. Failure to assess and adjust after spotting flexographic printing errors can mean:

- Lost time
- Wasted material
- Client dissatisfaction
- **Lost revenue**

Analyzing Your Flexographic Printing Defects

Analyze your substandard printing results closely. Does the text bleed together? Do solid blocks of color appear to have the slightly bumpy texture of an orange peel with variations in color density? Is the ink lighter in some areas than others?

You may have one of the following 12 common flexo print problems:

- Dot gain
- Gear marks
- Halo
- Feathering
- Doughnuts
- Skip out
- Misregister
- Mottled image
- Filling in
- Bridging
- Pinholing
- Dirty print

You may have a problem simply caused by pressure. It may be an ink transfer problem caused by incorrect viscosity, surface tension, or other issues. Or the drying temperature or UV levels don't best suit your choices of ink and substrate. You also may have a press mechanical issue.

Or you may be experiencing various ***combinations of those problems and more.***

Use the following printing defects checklist (on page 5):

How to Use The Printing Defects Checklist

Use the following interactive grid to match defects with their causes.

1. The defects listed on the left of the grid each correspond to a cause or causes along the top.
2. Causes often correspond to multiple defects, and you may actually have multiple problems happening at once. Use your best judgment to make a diagnosis. If you're unsure or don't want to misdiagnose, [we can help identify the issue](#).

Ultimately, this **interactive grid** should help you narrow down the potential causes and effects, make adjustments, and achieve quality prints every time. Click the printing defect on the grid to automatically be taken to a more in-depth explanation and a list of potential fixes.

CAUSES

- Pressure
- Press Mechanics
- Anilox
- Cell Volume
- Ink Transfer
- Ink Viscosity
- Ink pH Level
- Contamination
- Plate Swelling
- Drying Speed

PRINTING DEFECTS

	Pressure	Press Mechanics	Anilox	Cell Volume	Ink Transfer	Ink Viscosity	Ink pH Level	Contamination	Plate Swelling	Drying Speed
Dot Gain	○	○	○	○	○	○			○	
Gear Marks	○	○								
Halo	○		○	○	○	○			○	
Feathering	○									
Doughnuts	○		○	○	○				○	
Skipout	○	○	○	○	○	○				
Misregister	○	○							○	
Mottled Image					○	○				○
Filling In	○		○	○	○	○		○	○	
Bridging	○	○	○	○				○	○	
Pinholing		○				○	○	○		○
Dirty Print		○	○	○		○	○			○

1. Dot Gain

Photo Courtesy Lead Lasers

Symptoms: [Increasing dot size](#) from the engraved image to the physical print. It's predictable, but sometimes difficult to manage without proper foresight and planning.

Why?

- Printing pressure is too high
- Printing plate is too thick or swollen
- Incorrect ink viscosity, volume, and/or anilox setting
- Press damage and/or wear
- Mounting tape has the wrong thickness or trapped air
- The impression or the printing plate cylinder is dirty
- Dots "dipping" into the anilox

Fixes:

- Lower the printing pressure (use a kiss print)
- Use thinner plates
- Replace the plates if residual solvent is present or if they are swollen
- Maintain correct ink viscosity
- Use an anilox roller with a lower volume or higher cell count
- Repair or replace damaged or worn press parts (such as gears, mandrels, and cylinders)
- Change the mounting tape
- Ensure that no air is trapped and remount the plate
- Clean the impression and printing plate cylinders
- Use a metering method

2. Gear Marks

Photo Courtesy Lead Lasers

Symptoms: A series of [misprinted parallel lines](#) spanning the substrate. The lines will be matching and will appear at regular intervals.

Why?

- Incorrect/damaged gear
- Base is undersized
- Too much pressure between the anilox roll and printing form
- Too much ink pressure in the doctor blade chamber
- Image positioning on the printing form is lacking balance
- Concentricity (total indicated runout, or T.I.R.) of rotating parts (printing form, anilox) are out of tolerance
- Vibrations of the printing press due to mechanical or electrical issues
- The printing form or plate/tape package are too thin

Fixes

- Check gear condition and size
- Check base diameter
- Check tape and plate thickness
- Adjust printing pressures to normal levels, and monitor ink transfer on printing form and anilox
- Control the ink flow to/from the ink chamber and ensure anilox cell volume is correct
- Alter the layout of the design and/or plates
- Adjust the concentricity of the printing form and the anilox roll
- Adjust printing form package to best accommodate the press and its speed setting
- Modify printing speed to reduce vibration or harmonic effects at certain speeds
- Troubleshoot printing press for other miscellaneous defects or malfunctions



3. Halo

Photo Courtesy Lead Lasers

Symptoms: [Ink extends beyond the edges](#) of printed areas on the substrate

Why?

- Printing pressure is too high
- Pressure is not regular and constant between the printing form and substrate
- Too much ink is being applied
- The printing form or the mounting tape is too hard
- Print cylinder and substrate are at different speeds

Fixes

- Check the pressure uniformity across the web and adjust it accordingly
- Use softer printing forms
- Check the hardness of the mounting tape
- Use an anilox roller with a lower cell volume or a higher cell count
- Correct the form carrier (sleeve/cylinder) concentricity if it is out of tolerance
- Check web to cylinder speeds



4. Feathering

Photo Courtesy Lead Lasers

Symptoms: [Uneven edges](#) around printed areas.

Why?

- Ink buildup around dots increasing printing surface area
- Incorrect printing pressure
- Too much ink or dried ink on the plate
- Inadequate ink transfer and/or viscosity
- Static electricity
- Incorrect drying speed
- Inadequate solvent mix
- Debris and dust on the substrate
- Surface tension is not allowing ink to release to substrate

Fixes

- Adjust pressure between anilox roll and printing plate cylinder
- Balance printing speed and ink drying speed (slow down the drying process by adding a retarding agent and making sure ink trays are covered)
- Maintain the correct viscosity and avoid large increases in viscosity (use the ink container lids to avoid excessive solvent evaporation)
- Balance the solvent mix
- Adjust the ink viscosity to a lower tack
- Clean the printing plate, anilox roller, and web, if necessary
- Use an antistatic device
- Check surface tension chain



Photo Courtesy Lead Lasers

5. Doughnuts

Symptoms: Screen dots on the print appear slurred and distorted.

Why?

- Too much printing pressure
- Printing forms and/or mounting tape are too hard
- Ink viscosity is too low
- Ink with too much draw
- Print cylinder and web are not at the same speed

Fixes

- Adjust the printing pressure
- Employ softer printing forms and/or a softer mounting tape
- Adjust the ink draw with the correct solvent
- Adjust the ink viscosity
- Check print-to-web speeds

6. Skip Out

Photo Courtesy Lead Lasers

Symptoms: The ink on the substrate in some places is [very light or missing entirely](#). This is a textbook example of poor ink transfer.

Why?

- Inconsistent contact pressure between the anilox roll, printing form, and/or substrate
- Low impression pressure
- Parts of the printing form surface are not inked
- Printing form cylinder bounces
- Printing form has low areas, low quality, and/or make-ready
- Pretreatment of the form surface was not done correctly
- Printing unit elements are not parallel
- Printing unit locks up
- Dirty anilox
- Damaged gear

Fixes

- Adjust the pressure settings involving the press, printing form, and anilox roller
- Adjust the printing unit to be laterally parallel
- Address variations in form thickness
- Prepare the form correctly
- Check shafts, bolts, bearings, gears for dirt and/or signs of wear
- Check the concentricity of form cylinders and gears
- Wash the printing forms with solvent
- Replace the printing forms, if necessary
- Adjust the nuts of the printing group lock mechanism
- Check anilox for dried ink



7. Misregister

Photo Courtesy Lead Lasers

Symptoms: This common flexo printing issue results from colors not being positioned correctly so the print [image becomes blurred or even distorted](#).

Why?

- Printing plates not mounted in the correct register
- The compensation roller for the print register is not centered
- The press is generally misaligned
- The idle rollers drag or rotate irregularly
- Using the incorrect drive-roller setting
- Drive gear is damaged
- Web temperature too high
- Incorrect web tension

Fixes

- Check the form mounting and its equipment and remount the forms in register and realign the press, if necessary
- Check form thickness, potential distortion, and relief height
- Make sure the pressure setting and parallel of the web guide are uniform across the web length
- Replace or lubricate the idle roller bearings
- Replace the drive gear
- Center the compensating roller of the side register and longitudinal register and then manually adjust print register
- Adjust web tension control to best suit the substrate
- Reduce dryer temperature
- Check mounting tape thickness

8. Mottled Image

Photo Courtesy Lead Lasers

Symptoms: Most common in printing solid colors, this error causes the printed image to appear [slightly bumpy with minor-to-moderate shade or hue variations](#) like that of an orange peel.

Why?

- Poor ink transfer or not wetting out fully on the printing form and/or substrate
- Low ink viscosity or concentration
- The impression cylinder is dirty and/or scratched
- Residual chemicals from the plate-making process remain on the surface
- Printing form has an uneven or unclean surface

Fixes

- Increase pressure between the printing form and substrate
- Modify ink (and its solvent balance) to the correct viscosity or opacity and change the ink, if necessary
- Use softer or more compatible plate or cushion tape
- Properly pretreat the substrate
- Clean the impression cylinder
- Wash the printing form to remove residual chemicals or remake the printing form, if necessary
- Increase the ink film thickness

9. Filling In

Photo Courtesy Lead Lasers

Symptoms: Excess ink accumulations [fill in spaces](#) that weren't intended to be printed, especially on prints with small type or halftone screened areas.

Why?

- Too much ink is transferred
- Uncontrolled pH level or viscosity
- Ink has an incorrect solvent balance
- Letters, graphics, and/or screen are designed incorrectly
- Poorly prepared printing plate
- Rollers are set incorrectly
- Debris or particles of pigments on the substrate or plate
- Leftover ink from the previous printing unit

Fixes

- Use an anilox roller with a lower cell volume or higher cell count
- Increase the pressure of the inking roller, the doctor blade, or the closure of the doctor blade chamber
- Adjust the solvent mixture
- Check the drying speed of the solvents in the different colors and ensure they're balanced between printing decks
- Ensure the viscosity (check that the anilox roller has the correct cell count l/cm (lpi) and volume)
- Maintain the viscosity and pH level at constant
- Always cover the ink containers
- Use a printing plate with a higher shore hardness
- Check the plate relief and the printing surface (check that the edges of the printing images are not round)
- Use dispersed ink with small particles
- Clean the plate, pump, hoses, and ducts
- Ensure the design is even suitable for flexo printing



10. Bridging

Photo Courtesy Lead Lasers

Symptoms: Separate dots in the print screen [connect with each other](#) irregularly.

Why?

- Volume of the anilox roller too high or cell count is too low
- Ink viscosity too high and not suitable for printing screen jobs
- Printing form screen too fine
- Dirt or paper dust in the printing form
- Too much pressure
- Dots are bent

Fixes

- Use an anilox roller with a lower volume or higher cell count
- Adjust the printing pressure
- Adjust the relationship of the screen between the printing form and anilox roller
- Adjust the ink viscosity
- Change the type of ink
- Wash the printing form
- Ensure the paper quality
- Check support shoulder of dots

11. Pinholing

Photo Courtesy Lead Lasers

Symptoms: The ink doesn't completely cover the print surface, leaving [small holes](#) in the image.

Why?

- Poor ink transfer
- The ink dries on the anilox roller and fails to transfer onto printing form
- The ink doesn't build a uniform film on the substrate
- The anilox roller has lost volume due to dirty cells or is experiencing wear
- Dirty impression cylinder
- Strong surface variation (irregular, pitted, or polluted) on the substrate rejects ink transfer

Fixes

- Adjust the ink viscosity
- Increase the ink film thickness
- Increase the printing speed
- Use a solvent with a slower evaporation and adjust the power of the dryers
- Increase printing form to substrate impression
- Check the condition of the anilox roller and replace, if necessary
- Clean the impression cylinder
- Check the metering system
- Use a softer printing form or a soft mounting tape
- Check the validity of the surface treatment of the substrate



12. Dirty Print

Photo Courtesy Lead Lasers

Symptoms: Speckles on the ink give the print [a dirty appearance](#).

Why?

- Dirty plate
- Dried ink
- 'Volume of the anilox roll too high
- Incorrect ink viscosity
- Ink has excess pigment
- Ink film too thick
- Contaminated ink
- Pressure setting between the printing form and anilox roll is inadequate
- Incorrect hardness
- Incorrect type of plate/tape package

Fixes

- Clean plate
- Select a better anilox screen count and cell volume
- Adjust ink viscosity and enhance consistency
- Do a "kiss" impression
- Use a softer cushion mounting tape
- Use a balanced extender to adjust the ink strength
- Reduce the ink viscosity
- Adjust the printing speed
- Adjust doctor blade pressure
- Wash the printing forms and anilox rolls

Elastomer Sleeves: The Overarching Solution

Elastomer sleeves **prevent many issues** that cause your printing defects. The right blend, of elastomer, which include both natural and synthetic polymers, produce high quality and long-running jobs.

In an industry where being off by **thousandths of an inch is total failure**, you'll quickly appreciate elastomer for eliminating plate issues such as:

- Lift
- Registration
- Ink incompatibility
- TIR
- Straightness

You need the enhanced characteristics elastomer blends achieve. These include:

- Resistance to wear, heat, and chemicals
- Specific surface tensions and hardnesses
- Longer runs
- Improved transfer
- Faster startups

Elastomer brings the most out of your flexographic printing sleeves and plates. That'll equal highest quality imaging possible, unmatched longevity, and excellent ink transfer.

Conclusion

*Flexographic printing quality relies on a variety of variables working together seamlessly. If one of those factors is off (even by the tiniest fraction of an inch), your reproduced image could be unrecognizable. Failure to diagnose issues efficiently and resume quality printing promptly will equal **lost time and money**.*

Use this guide and checklist as a quick and repeatable reference point to correct the error and get back on track.

About Us

Luminite Products Corp. introduced laser engraving elastomer printing plates and cylinders to the United States in the 1970s. Decades ago, it was a great alternative to plate-mounted cylinders, which were inconvenient to change and less durable.

Today we're the global standard for **the most successful printers**. Luminite specializes in flexographic printing products and is the most recognized manufacturer of continuous laser-engraved printing cylinders in North America. We've also patented a revolutionary air sleeve called Load-N-Lok.

You're aiming to boost your printing efficiency and productivity. Air-assist mounting sleeves will allow near continuous operation and unmatched quality.

That's **money in the bank**. See how [we can help](#).

[Photos Courtesy Lead Lasers](#)