

LASER PRINTING PROBLEM SOLVER

- Controlling Moisture
- Die Cutting & Sheeting
- Adhesive Contamination
- Laser Compatible Materials
- General Tips
- Other Common Problems

Laser Label printing problems are primarily a function of:

- A. Controlling the moisture level in the material,
- B. Die cutting and sheeting,
- C. Controlling adhesive contamination,
- D. Using laser compatible materials.

Controlling the moisture level in the material

Label stock is composed of two different substrates, the facestock and the liner. Liners (the part without the adhesive) are coated with silicone and less porous. Paper facestocks are usually uncoated and more porous. Both materials react to the ambient humidity level in the environment. When the materials are exposed to high humidity, the materials absorb moisture and expand. When the materials are exposed to low humidity, moisture is dissipated from the materials and they shrink. However, the facestock typically absorbs or dissipates moisture at a faster rate than the liner. Because the adhesive bonds the two substrates, the sheet will curl toward the liner if there is high humidity and the sheet will curl toward the facestock if there is low humidity. Materials will always curl across the leading edge because of the fiber action within the paper (see illustration 1 and 2). Fibers in the paper are oriented parallel to the web direction. As the fibers absorb moisture they swell more than they lengthen, resulting in the expansion and curl across the leading edge.

Facestock and liner materials must be resistant to rapid changes in the environment in order to remain stable (flat). Papermakers will add calcium carbonate (salt) in the papermaking process and maintain a moisture level of about 5% within the paper. These processes allow paper to perform in laser printer equipment. As liners are silicone coated, they are remoisturized on the opposite side, stabilizing their lay flat characteristics.

At this point materials are exposed to the environment in which they are stored or processed. When papers and liners are laminated together, there is some moisture exposure from the adhesive, most notably in the facestock. When label converters print the label, the materials are exposed to more moisture in the printing plant. Furthermore, the facestock is exposed to moisture in the ink. The more ink which is printed on the label, the more moisture that is absorbed into the facestock. When the labels are shrink wrapped and packaged in cartons, the moisture level at the time of production is trapped in the label stock. The faster the labels are removed from the cartons and put into a laser printer, the less time the labels have to acclimate to the users environment.

Die cutting and sheeting

Matching the production leading edge with the printer leading edge will result in better printer performance. If the label is fed into the printer with the 8.5" as the leading edge, then the label should be manufactured with the leading edge being 8.5" (sheet at 11 or 14"). Traditionally, most slow-speed desktop printers have required the 8.5" dimension be the leading edge. Conversely, most high-speed floor model laser printers have used the 11" dimension as the leading edge. More recently, desktop laser printer manufacturers have changed the leading edge requirements in some printers in order to increase the page per minute output.

Traditionally, people think of grain direction for stiffness. There is less concern about stiffness as there is roll memory. As labels are sheeted off the press, they maintain various degrees of roll core memory based upon how close the core of roll the labels were when they were sheeted. Some curl control can be maintained at the press, but there is still memory in the sheet. Roll memory curl will create feeding problems from the paper tray.

Extensive die cutting and/or slitting can reduce the stability of the sheet. This can result in feed jams, jams inside the printer, pre-dispensing of labels inside the printer, and excessive curl after printing.

Controlling adhesive contamination

Most adhesives will ooze when exposed to pressure and/or heat. When label stock is manufactured in rolls, the roll tension can result in very small amounts of the adhesive being squeezed out the sides of the stock, while still in a roll. If this adhesive is not removed from the edge during label production, adhesive on the edge of the label will a slight build up inside the laser printer. Over time, there will be an adhesive ridge on each side of the feed path. This can cause documents to jam inside the printer or picking which may cause labels to pre-dispense. The edge sheeted in production (typically the leading edge of the document) is not as critical a concern as is the sides of the sheet parallel to the web (grain direction). Slits on the liner may leave a small area which adhesive may seep out onto the advance rollers in the printer. There are a very few patented adhesives, designed for laser printers, which will not ooze from the sides. However, they are not guaranteed in duplex printing applications.

Using laser compatible materials

There are a number of laser-qualified materials for laser label products. While some non-qualified paper materials may work most of the time, they are not manufactured to work all of the time. They may have a lower purchase price, but will certainly end up costing more in lost employee productivity and potential equipment damage. Non-qualified synthetic materials may immediately damage the printer by melting inside. If heat resistant inks are not used, the ink may soften from the heat and transfer onto the fuser roller causing permanent damage to the roller.

General Tips:

- Laser printers generate heat. Make sure you position the printer so as to prevent obstructing ventilation.
- Quality printing starts with quality materials. If you are using substandard substrates, you will probably get substandard print quality.
- Over time, printers will accumulate excess toner, dust, lint, etc. Clean your printer per the manufacturer's recommendations.

- Reusing previously used label/tag stock or reinserting the stock to print on the other side may cause a problem. Toner images previously printed will be melted off from the heat inside the printer and stick to the fuser roller or other rollers inside the printer.

Other Common Problems

The following are common problems associated with laser label and tag printing.

- Labels/tags will not feed.
- The labels/tags are jamming in the feed tray.
- Multiple labels/tags are feeding at one time.
- Labels/tags are curled when they come out of the printer.
- The data on the labels/tags is misaligned.
- The labels are sticking in the printer.
- The image is not sticking to the face.
- Printing on the liner is poor.
- Labels are pre-dispensing in the printer.
- Printed images are ghosting on subsequent pages.
- The labels are jamming inside the printer.

Problem: Labels will not feed.

- Potential cause: Cross curl in the material is preventing the pick up rollers from advancing the sheet. Cross curl is generally a result of poor moisture control.
Solution: If the stock has not been given time to acclimate to the using environment, open the packaging and let the stock sit in the using environment. 24-hour acclimation is recommended. A qualified laser stock should flatten with acclimation. If the curl does not subside, check with your supplier to confirm qualified laser stock has been used.
- Potential cause: Roll memory curl in the material results in the leading edge being too low for the advance mechanism to advance the stock. During label production, the material near the core was not de-curved.
Solution: Storing the boxes upside down may help flatten the material.
- Potential cause: The stock is too slick. Either the facestock and/or the liner are too slippery preventing the pick up rollers from getting enough traction on the stock to advance it into the printer. Laser printers are designed to print and process stock with an average roughness surface comparable to normal copy paper. Coated surfaces may create feeding and imaging problems.
Solution: If the printer allows, try to invert the paper (i.e. rather than face up, put it in face down). The other side of the stock may provide a more conducive surface for feeding. This is only an option if the printer can be directed to print the other side. If this can be identified as the problem, consider switching to different label stocks. Many traditional liner manufacturers provide "slick" liners. More recently, liners have been modified to provide a rougher surface for better feeding in laser printers.

Problem: The labels are jamming in the feed tray

- Potential cause: The stock may be too thick and/or too stiff. Most printers have recommendations on stock thickness.
Solution: Check the printer manual for recommended stock thickness. Frequently, the maximum recommended thickness is .007 inch (7 pt).

- Potential cause: The substrate advance mechanism within the printer (i.e. advance rollers) has advanced one side of the leading edge faster than the other side. There may be debris (dust, lint, adhesive, etc.) on the advance roller causing uneven feeding into the printer.
Solution: Clean the advance rollers.

Problem: Multiple labels are feeding at one time

- Potential cause: Low humidity has created static buildup causing the sheets to cling together.
Solution: Let them acclimate in a satisfactory humidity level. Fan the labels apart. Check the humidity level in the using environment. Relative humidity should be in a range from a minimum of 35% to a maximum of 75%, with an ideal target of 55% relative humidity.
- Potential cause: The feed tray is overloaded.
Solution: Do not fill tray beyond recommended level. The recommended sheet count will not apply to tags and labels, which are significantly thicker than standard paper. A good rule of thumb is 1 sheet of tag or label stock is the same thickness as 2 sheets of standard laser paper.

Problem: Labels are curling as they leave the printer

- Potential cause: Exposure to the heat in the laser printer causes the moisture to evaporate from the sheet. As a result the sheet shrinks, more so on one side than the other, causing the curl. Even laser qualified label stock will curl slightly however, the maximum curl for label stock should not normally exceed .375". Non-qualified laser stock may curl considerably more.
Solution: Confirm that you are using laser-qualified materials. Make sure you have acclimated the stock to the environment.
- Potential cause: Extensive die cutting and/or slitting and perfining can weaken the dimension stability of the stock, even if it is laser-qualified stock.
Solution: Test similar stock without the die cuts or slits to determine if the die cutting is the problem. If so, a change in stock may improve performance...certain material manufacturers provide stock more conducive to such die cutting, slitting and perfining.

Problem: Information on labels is misaligned

- Potential cause: The substrate advance mechanism within the printer (i.e. advance rollers) has advanced one side of the leading edge faster than the other side. There may be debris (dust, lint, adhesive, etc.) on the advance roller causing uneven feeding into the printer.
Solution: Clean the advance rollers.
- Potential cause: The facestock and/or liner on the label stock are not rough enough to provide traction for the advance rollers.
Solution: If the printer allows, try to invert the paper (i.e. rather than face up, put it in face down). The other side of the stock may provide a more conducive surface for feeding. This is only an option if the printer can be directed to print the other side. If this can be identified as the problem, consider switching to different label stocks. Many traditional liner manufacturers provide "slick" liners. More recently, liners have been modified to provide a rougher surface for better feeding in laser printers.

Problem: Labels are sticking in the printer

- Potential cause: Label adhesive oozing from the side edges of the label stock have built up as ridges, inside the printer, on each side of the feed path. This may be on one, many or all of the

feed rollers or fixed surfaces.

Solution: Check the feed rollers and other areas of the feed path. If this is the problem, extensive cleaning must be done. Typically this builds up slowly over time and is not necessarily obvious until the printer heats up and softens the adhesive, typically in the afternoon. You must change label stock to use non-ooze adhesives, strip away the edge of the facestock so the adhesive is not against the edge of the liner, or use strip coated adhesive product.

Problem: The image is not sticking to the face

- Potential cause: The label or tag stock may be too smooth to properly receive the toner. Laser printers require a certain level of smoothness/roughness in order to achieve toner adhesion. If the stock is too smooth, the toner may not stick, or easily chip/rub off.

Solution: Laser qualified products should provide an approved surface. Some coated stocks are now available for laser printer. Typically, but not always, they have a toner grip varnish that provides for adequate toner adhesion.

- Potential cause: The label or tag has a UV varnish or ink on the surface. Toner will not adhere to UV covered surfaces.

Solution: Printed fields must be moved or the UV varnish/ink must be minimized or converted to a water-based process.

Problem: Printing on the liner is poor.

- Potential cause: Liner is not designed to accept toner. Traditional liners are too smooth to satisfactorily print with laser printers. Toner will not adhere adequately resulting in smeared or partially printed images.

Solution: Label stock must be ordered with laser printer liner. Newer liners are now available which print considerably better than traditional liners.

Problem: Labels are pre-dispensing in the printer

- Potential cause: Die cutting or die cutting combined with the type of feed path. Either the die cutting is too close to the edge of the document or too intricate. In both cases the edge of the shape is lifting and catching on an internal roller. This is likely to happen in a desktop printer having a curved "S" shaped feed path. As the stock is guided around the curve, the label edge lifts up and is caught by an internal roller.

Solution: Try feeding the stock via a straight feed path. Most printers will allow this, though it generally requires single sheet feeding. At the very least, it may identify the problem.

- Potential cause: Adhesive ooze at the die cut edge is sufficient to stick to an internal roller. This is more likely to occur after the printer has heated up (later in the day for a typical office environment). The internal components are hot enough to potentially soften exposed adhesive causing it to become tacky and stick to internal rollers.

Solution: Try turning the printer off to enable it to cool down. You may also have to inspect the rollers to see if any adhesive has accumulated on them. If so, clean them. Once the printer has cooled off, turn it on again and try printing again. If this appears to temporarily solve the problem, then the ultimate solution is to change adhesives or die cutting to prevent the oozing.

Problem: Preprinted images are ghosting on subsequent pages

- Potential cause: Heat resistant inks were not used to preprint the material. Typically, when printers are initially turned on and used, the internal heat is low enough not to cause a problem. As the printer heats up, the internal heat softens regular inks, and the preprinted image is

burned onto the fuser roller. As a result, each subsequent document receives a transferred image of the preprinted graphics via the fuser roller. Not only are the documents damaged, but also the fuser roller may be permanently damaged.

Solution: Preprint stock with heat resistant inks.

- Potential cause: The ink has not dried sufficiently. Even heat resistant inks need approximately 3 days to dry before usage. If the labels were printed within three days of use, there may be a problem.

Solution: If possible, let the stock sit for a day or so to let the ink dry completely. Retry printing.

Problem: The labels are jamming inside the printer

- Potential cause: The labels are being unevenly advanced into the printer. The substrate advance mechanism within the printer (i.e. advance rollers) has advanced one side of the leading edge faster than the other side. There may be debris (dust, lint, adhesive, etc.) on the advance roller causing uneven feeding into the printer. If there is loose debris (i.e. lint or dust) there may not be enough contact on the label stock...the roller may slip or spin rather than grip the stock. If there is adhesive debris on a roller, then there is too much grip on the stock impeding advancement of the entire sheet or causing one side to advance ahead of the other resulting in slight sheet rotation, enough to cause the jam.

Solution: Clean the rollers.

- Possible cause: Uneven thickness of stock, uneven smoothness of stock. Smoothness variation may be as a result of selectively varnishing part of the label surface. Also, some printers have advance rollers across the top and bottom of the stock. Materials with significantly different levels of smoothness from front-to-back may contribute to poor feeding.
Solution: Evaluate the smoothness front-to-back. If it is significantly different, this may be contributing to the problem. If significantly different, test stock with a facestock and liner having more similar levels of smoothness.

Determine if the face of the document has been spot coated with varnish. This could also contribute to the problem. If so, consider having the stock printed without the varnish.