

Guide to Labels

A Guide To Label Elements and Materials



L&C

LABELING
& CODING

Introduction

Labels are important because they identify a product, build brand awareness, and provide information. A good label is one that suits the application, meaning that the materials - face stock, adhesives, coatings - are well suited for the environment in which the label is used.



Label materials need to last through the demands of the application, have an adhesive appropriate to bond to the surface it is applied to, and have a topcoat to ensure high quality printing of bar code, text, or images.

This eBook introduces the features of a good label and provides an overview of label manufacturing.



Choosing the Correct Label

Many factors influence the type of label needed for an application.

- How will the label be used? Once you define the label's purpose you have an understanding of the required label features.
- Consider the environment. Knowing where the label has to function determines important characteristics, such as the adhesive, face stock, and topcoat. Selecting the correct label components are key to a successful label.
- Where will the label be applied? The surface to which the label must adhere needs to be considered. Surfaces include glass, plastic, metal, etc. Surfaces can be smooth or rough, flat or curved.
- Regulatory requirements dictate label features. Examples of regulatory requirements include UL, CSA, RoHS, Mil-Spec, among others. Military, industry, or consumer requirements might also need to be met.
- For best results, match the printing technology to the application and environment. Decide whether to use pre-printed labels or print them yourself. Commonly used printing methods are Thermal Transfer, Direct Thermal, Dot Matrix, Laser, or Inkjet.

Parts of a Label

The pressure sensitive labels that you see on the products and cartons you use are actually made of several layers of specialized materials sandwiched together to create a label that looks good, identifies something, and lasts as long as it is needed. The components of a label are the Liner, Release Coat, Adhesive, Facestock, and Topcoat.

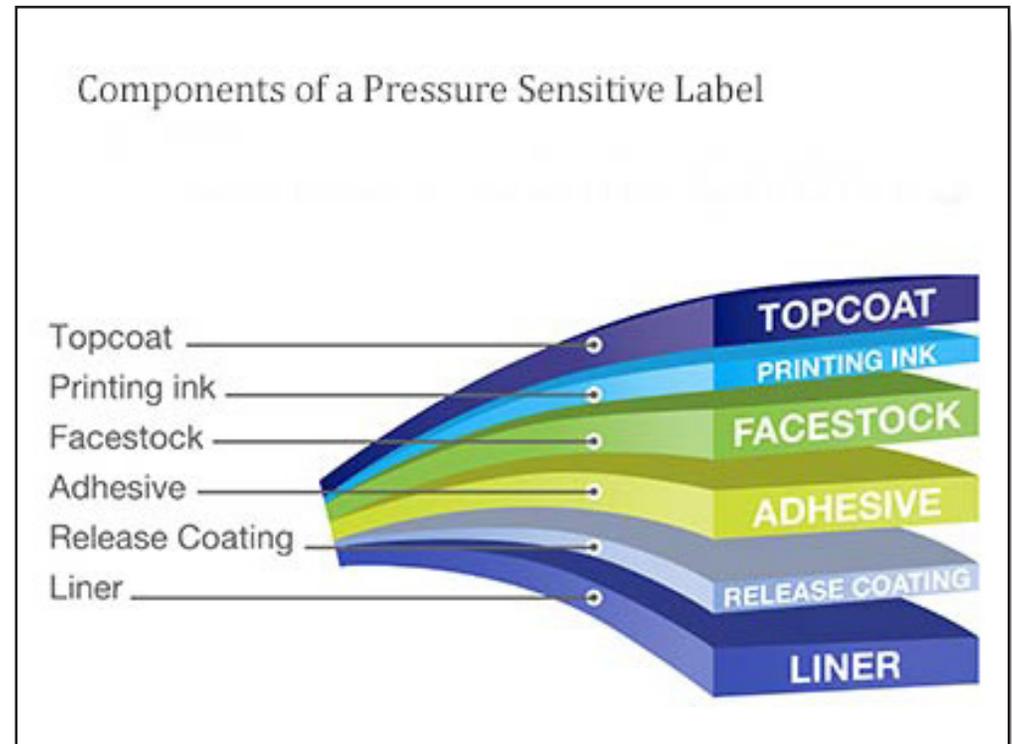
Liner

The liner is a critical component of any pressure sensitive label. The liner is the backing paper that carries the die-cut labels to the applicator and releases the adhesive-backed label onto the product. The liner supports the label through manufacturing and use, protects the adhesive until the label is applied, and provides appropriate label application, either by automatic or mechanical means.

Liners come in different types to meet specific performance criteria. Typical performance and quality characteristics include strength, smoothness, density, release level, and stability. Liners are made of paper or film.

Release Coating

The release coating is a coating applied to the top surface of the liner. The release coat is designed to resist the adhesive so that the facestock and adhesive peel away from the liner smoothly.



Adhesives

Pressure sensitive labels stick to a surface with light or moderate pressure from a label applicator. The amount of pressure needed, the permanence of the label, and the surface the label adheres to determines the adhesive needed.

Some factors to consider when selecting an adhesive include:

- **Permanence:** Will the label remain forever or will it be removed at some point? In some applications, the adhesive becomes permanent after a period of time.
- **Residue:** If a label is removed, what will be left on the surface?
- **Surface:** What type of surface will the label adhere to – paper, plastic, glass, metal?
- **Texture:** Is the surface rough or smooth?
- **Temperature:** What is the storage temperature of the label? What is the temperature when the labels are applied?
- **Environment:** Is the environment in which the label must function wet or dry, oily, dusty, etc.? Will the label be exposed to solvents?

Permanent adhesives create labels that cannot be removed without damaging the label or the surface to which the label is applied.

Removable adhesives create labels that can be removed cleanly from a surface. However, certain removable adhesives can be more permanent after a period of time or environmental exposure.

Repositionable adhesives allow short-term removability in cases where the label needs to be repositioned or reapplied.

Adhesives are made of rubber or acrylic

Rubber

Quick Stick / Initial Tack

Ultimate Adhesion

Adhesion to Low Surface Energy Substrates

Good Availability

Water Resistance

Direct Food Contact

Well Established

Economical

Acrylic

Broad Temperature Range

Open Time / Repositionable

Easy to Die Cut & Strip

Clear in Color

Long Shelf Life - Archival

UV Resistance

Chemical Resistance

Clarity – No Label Look

Good Mandrel Hold



Adhesives have varying properties that are suited to different applications. Important properties include:

- Tack - The immediate holding strength of the adhesive when it comes in contact with a surface. Low tack allows the label to be removed easily. High tack has stronger bonding to the container.
- Ultimate Adhesion - The maximum strength of bonding the label can achieve once fully adhered to a surface. The time it takes to achieve ultimate adhesion depends upon variables such as environmental conditions, the smoothness of the surface the label is applied to, and viscousness of the adhesive.
- Resistance to Solvents - Adhesives have varying resistance to solvents such as to water, alcohol, petrochemicals, etc., so the environment must be considered.
- U.V. Resistance - Labels exposed to U.V. light for long periods might change color or the adhesive can weaken and lose bonding power. U.V. laminates or other coatings added to labels can improve U.V. resistance.
- Adherence to Curved Surfaces - Adhesives with good Mandrel hold won't lift at the edges.
- Cold Flow - An adhesive's ability to bond to a container below normal temperatures is referred to as its cold flow. Some adhesives perform better when the label is applied to a surface in a cold environment.
- Application Temperature - Labels can lose adhesive properties if not applied at the correct temperature range. Adhesives lose their fluidity and can crystallize, losing effectiveness, so knowing the temperature range at which labels will be applied is important.

Facestock

This is the main material that is used for making self-adhesive labels. It is the top or "face" of the material from which labels are made. Facestock materials include:

- Paper - A natural product made from wood or pulp.
- Film - A synthetic or plastic type of material.
- Foil - A thin layer of aluminum or alloys.
- Tag - Stock that is typically 5-10 mils thick and generally supplied without any adhesive or liner.
- Tape - Facestock of paper or film with adhesive, but no liner.
- Static Cling - Vinyl facestock, no pressure sensitive adhesive, with a liner.
- Magnets - Paper or film on the top layer with a flexible magnet as the bottom layer.
- Holograms - Micro embossed metalized film.
- FDA Approved - Paper or film, direct or indirect food contact.

Topcoat

This is the coating or lamination applied over the facestock to provide physical protection from abrasion or to enhance some other property of the label. Topcoats can be used to improve adhesion or legibility of secondary imprints, typically used for date or lot coding.

- Varnish applied to a surface of a label gives it a protective gloss.
- Special UV sensitive varnishes or films can also be used, depending on the application.
- Laminates are a protective film fused to the labels that provide a high gloss finish and resistance to handling abrasions and chemicals.

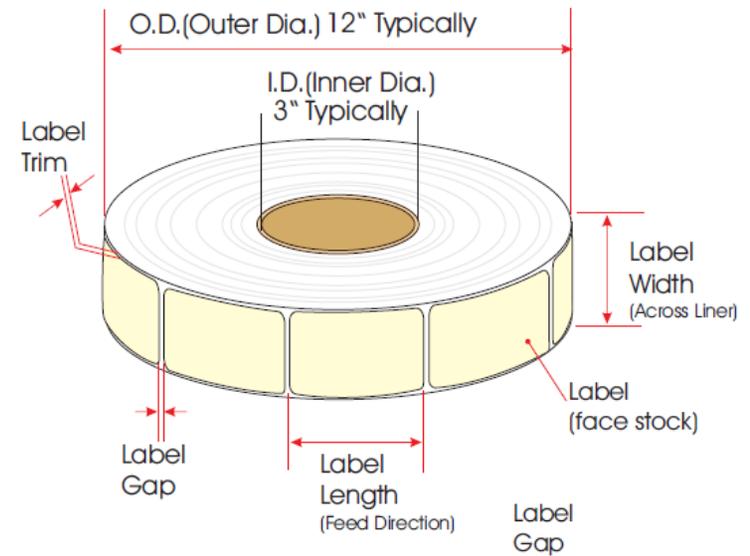
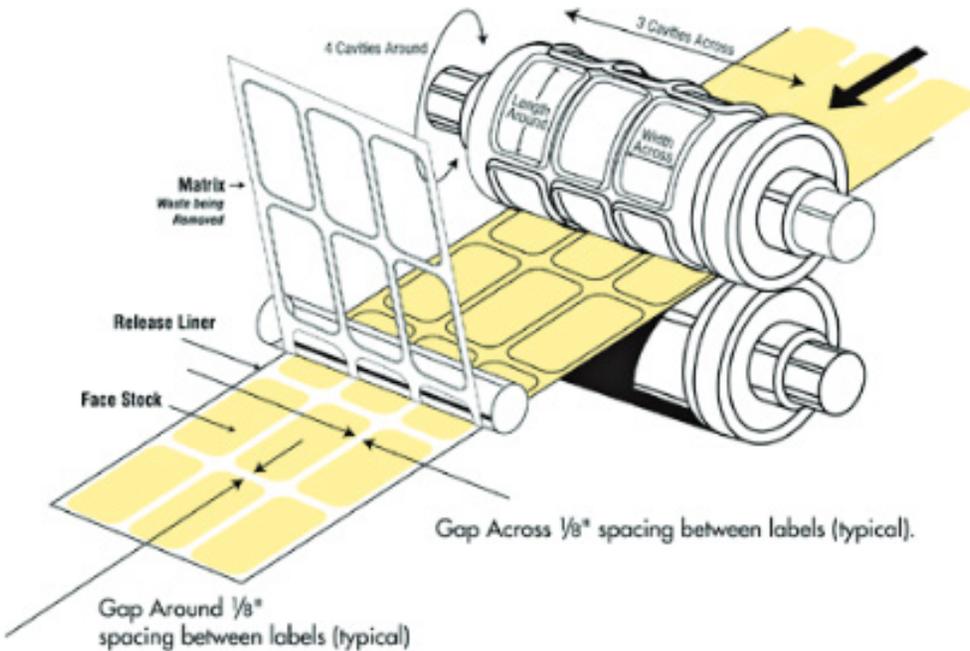
Label Design and Dimensions

Designing a label starts with the length and width of the label, which must match the requirements of the application. In addition, there must be an allowance for the gaps between labels. Typically this gap on a roll of labels is 0.125". The label repeat is the label height plus its gap. The label repeat is required even if the label is a round or oval shape. The length measurement is taken at its tallest point.

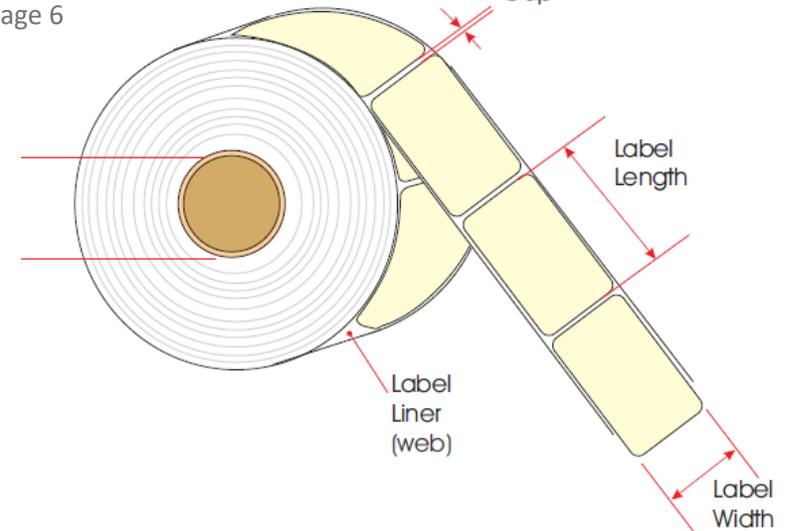
Usually, four to six labels are printed across the face of the web to improve throughput.

Labels in a roll format have an outer and inner diameter measurement. These measurements are important to know so that the size of the roll will fit onto the label applicator or within a label printer. A roll with too large of an outer diameter will not fit into the space provided. A roll with too small of an outer diameter will require more frequent roll changes.

Label suppliers diecut raw material and convert it into individual labels. Diecutting makes a cut around the label, cutting through the top layer while leaving the backing substrate untouched. Labels are shaped by different die cuts.



Page 6



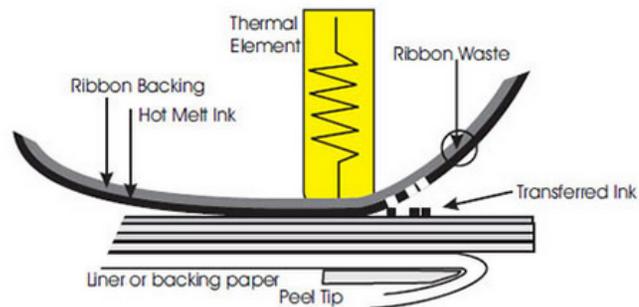
Direct Thermal and Thermal Transfer Printing

Direct thermal and thermal transfer are two thermal ways to print. Each uses a thermal printhead to apply heat to the materials being printed.

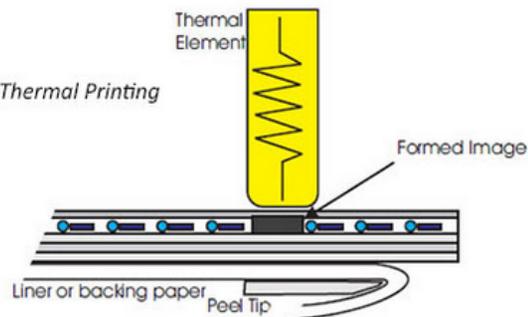
Thermal transfer printing uses a ribbon, which is heated during printing to transfer the mark onto the label material. The ink is absorbed so that the image becomes part of the media. This type of printing produces durable and long-lasting images on many types of label materials. Label materials and inks must be matched for quality and performance.

In direct thermal printing, chemically treated, heat-sensitive media is used, which blackens when it passes under the thermal printhead. Direct thermal printers have no ink, toner, or ribbon. Instead, the image is created directly onto the label materials. The media used for direct thermal printing is more sensitive to light, heat, and abrasion, reducing the life of the label.

Thermal Transfer Printing



Direct Thermal Printing



Direct Thermal

Used for short term applications, typically less than 6 months.

Image is activated with heat.

Generally less expensive than Thermal Transfer and Ribbon.

Common applications include shipping, warehouse, weigh scale, medical, shipping labels, patient and visitor identification, receipts, and ticket printing.

Thermal Transfer

Used for longer term applications.

Image is transferred from a ribbon.

Common applications include warehouse, medical.

Generally, more expensive than Direct Thermal when also considering ribbon cost.

Common applications are product identification, circuit board tracking, permanent identification, sample and file tracking, asset tagging, inventory identification, certification labels, laboratory specimens, cold storage and freezers, and outdoor applications.

Label Categories

Some labels are made to inform, some labels are made to attract attention, and some are made to allow tracking of an item. Each label has a distinct purpose. As a result, different types of labels have different features.

Prime Labels

Prime labels are the labels that appear on the front of a product. Typically they are colorful and eye-catching, with high quality images and text. Prime labels enhance brand awareness and attract consumer attention.

Flexographic and digital printing presses are used to produce high quality full-color labels on a wide variety of label materials ranging from one-color labels to ten+ colors.



Blank and Shell Labels

Blank and shell labels are typically produced with either thermal transfer or direct thermal materials. Such labels are eventually used within tabletop printers, mobile printers, and automatic printer applicators.

Thermal Transfer blank and shell labels can be kitted with matching ribbon. Kits ensure that performance requirements are met, makes re-ordering supplies easier, and reduces downtime due to consumable changeovers.

Labels with Variable Data

With digital printing capabilities, variable data can be incorporated into the label design and production processes. Serialized barcodes, consecutive numbers, and other variable data can be added to custom labels.

Some examples of labels with variable data include:

- Serialized barcodes
- Promotional labels with personalized images or text
- QR codes
- Use by/sell by dates
- IRC Coupons
- Sports tickets



Military Compliance Labels

The Department of Defense has specific requirements for labels on items shipped to them. The MIL-STD-129 standard ensures uniformity in marking military equipment and supplies that are transported through the DoD supply chain.

The Military Shipment Label (MSL) is sometimes also used as the Radio Frequency Identification (RFID) tag required for most shipments to the military. There are specific rules for the placement of RFID tags defined by Mil-Std-129R.

MIL-STD-130 includes UID labeling to track parts throughout the supply chain for efficient inventory control, quality control, and maintenance scheduling.



Labels That Perform in the Toughest Labeling Applications.

When you are labeling products subjected to high temperature, chemical exposure, prolonged exposure to environmental elements or have a challenging labeling application, you will want to be sure the label you choose is the right one, the very first time. An unreadable bar code label, a label that falls off or fails, can cost you money.

ID Technology manufactures industry-specific durable labels to ensure rapid delivery whether you need stock or custom labels for your application. Choose from a wide variety of UL recognized and CSA accepted labels & printing systems.

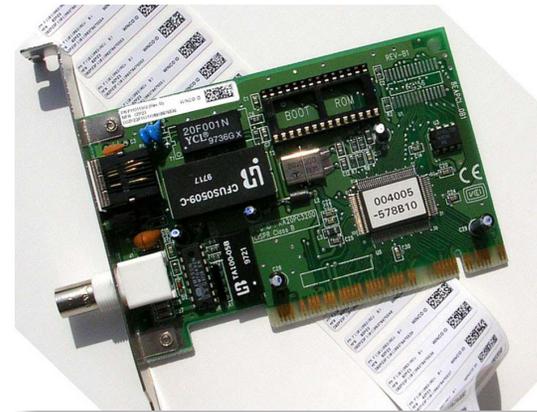
Our team has the expert knowledge to design and manufacture labels for the most challenging applications. We partner with world-class suppliers for access to the best testing labs and innovative materials. You get all that and more with every label from ID Technology.

Durable Thermal Transfer Labels

ID Technology manufactures durable labels that withstand the harsh production operations and challenging applications.

Uses include bar code labels, work in process bar code labels, UL/CSA electrical requirement plates, and rating / name plates on consumer products. Choose from a wide variety of UL recognized and CSA accepted printing systems for your identification needs.

- Polyimide (Kapton®) labels for high temperatures electronics manufacturing processing.
- Durable label materials to reduce the damaging effects of Electro Static Discharge (ESD).
- Labels to comply with the RoHS directive for lead-free manufacturing processes, EIA-standard marking and UL-listed and CSA-certified labels.
- Preprinted labels with warnings, graphics, logos, with room to print variable information on demand.
- Labels for cables, wire harnesses and assemblies.
- Bar code or alphanumeric identification of printed circuit boards for tracking production lots, warranty information, product authentication, and registration applications.
- Electronic assembly labels that withstand the high IR & vapor phase of solder re-flow without burning, curling, or damage to the printed output.



Label Converting

Manufacturing labels is frequently referred to as label converting, a process consisting of multiple steps. Sometimes label converting is completed on a single production line; other times converting is done in two parts, printing and finishing. This is a brief description of the stations typical in label converting.

Unwind

Here, the raw label stock is unwound from a large master roll and fed into the press. The unwind provides a starting tension for the web.

Web Guides

Label substrates are not completely uniform in thickness and weight, and this can cause web drift, the unwanted movement of the web from side to side as it moves through the press. Web guides steer the web through the press to control print registration side to side. The web guides also control dimensional tolerances for the label and the liner.

Printing

One of the most common methods for printing pressure sensitive labels is flexography. On a flexo press, a flexible plate, imprinted with a negative of the image to be printed, is wrapped around a cylinder. Ink is transferred to the face of the plate. The web is rolled over the plate, transferring the image to the face stock. A flexo press includes one station for each color used in the label.

Laminating

On labels that include a laminated top coat, the surface layer is adhered to the face stock after printing.

Die Cutting

A label cutting die is very similar to a flexo printing plate, but rather than a raised image, the die surface is imbedded with "cookie cutter" like knives, designed to cut the face stock into the desired shape of a label.



Matrix Removal

Here the matrix, (the face stock material between the labels) is peeled from the liner and collected on a waste rewind roller.

Web Splicing

Web splicing is a method of joining separate webs to create a continuous web for enhancing productivity.

Slitting

At this step, the roll stock is cut lengthwise into four or six separate rolls of labels, depending on the label design specifications. Precise web guiding in the slitting station ensures that the edges of the web are straight and parallel and that the label location on the web is consistent throughout the roll.

Inspection

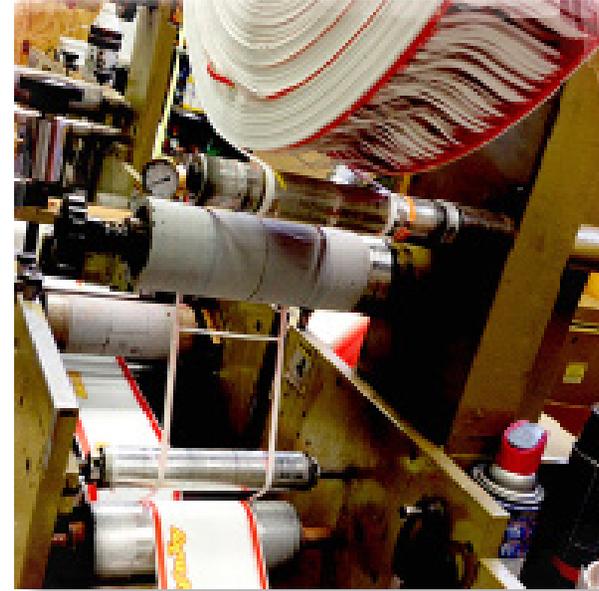
Images on the web are inspected and defects flagged. During a separate process, the roll is unwound and the defects cut out of the roll. The roll can then be spliced and rewound.

Rewind

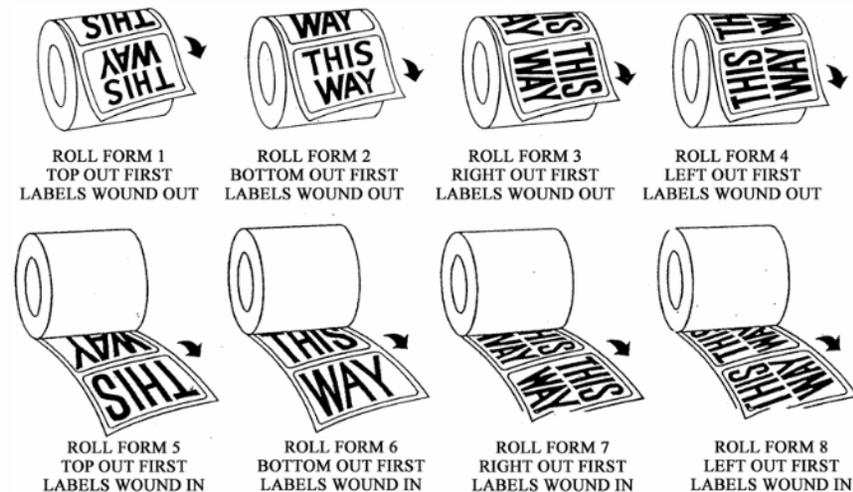
At the rewind station, larger rolls are wound onto cores into the format to meet customer specifications. The most important factor at the rewind station is tension. If the roll is wound too tight, the adhesive may bleed from underneath the labels. If the roll is too loose, it will be hard to handle and may telescope when carried horizontally.

Labels are finished in the manner suitable for a specific use, and the typical formats are rolls, sheets, or fanfold.

The orientation of the copy on a label is an important consideration when specifying for an automatic labeling system. The roll form and copy position chart shown in the figure provides a standardized way to describe the eight possible combinations. For automatic labeling applications, labels are typically wound out.



Roll Form Chart



Label Manufacturing Capabilities

Our six label converting plants in the US and Canada enable ID Technology to support all types of labeling requirements. Our label manufacturing capabilities include flexographic printing (including HD Flexo and full HD Flexo platemaking), HP Indigo digital, and hybrid flexo and digital options.

Flexographic Printing

Our flexo label presses can print up to 10 colors, as well as full color process printing on a wide range of substrate, both papers and synthetics, yielding superior quality graphics and ANSI A grade barcodes. Flexo converting is ideal for medium to large runs and it offers economies of scale benefits when comparing per label costs.

We offer the industry's highest quality printing plates to ensure that your labels are printed to your exact specification.

- HD Flexo delivers exceptional printing throughout the entire tonal range and higher imaging resolution for sharper images, smoother tints and a greater color gamut.
- Full HD Flexo offers all advantages of HD Flexo, along with enhanced quality in solids and whites, making this technology perfect for reproducing skin tones in labels used for beauty products.

Flexographic Features

Print on a wide range of substrate materials

Printing is not heat sensitive

Labels are durable

Fast production speed

Color matching is precise

High-speed and high-volume mean affordable long runs



Digital Options

Offering the flexibility and quality of digital printing, combined with high volume output, ID Technology's HP Indigo WS6800 digital press combines six color process with spot color printing. The HP Indigo system is the only digital press that can match the quality of gravure printing.

Digital printing is ideal for:

- Short to medium sized custom orders.
- Projects where art is going to change frequently.
- There are many different SKU's.
- Variable data is required.

Since digital printing does not require printing plates, project startup costs tend to be lower and lead times tend to be shorter.

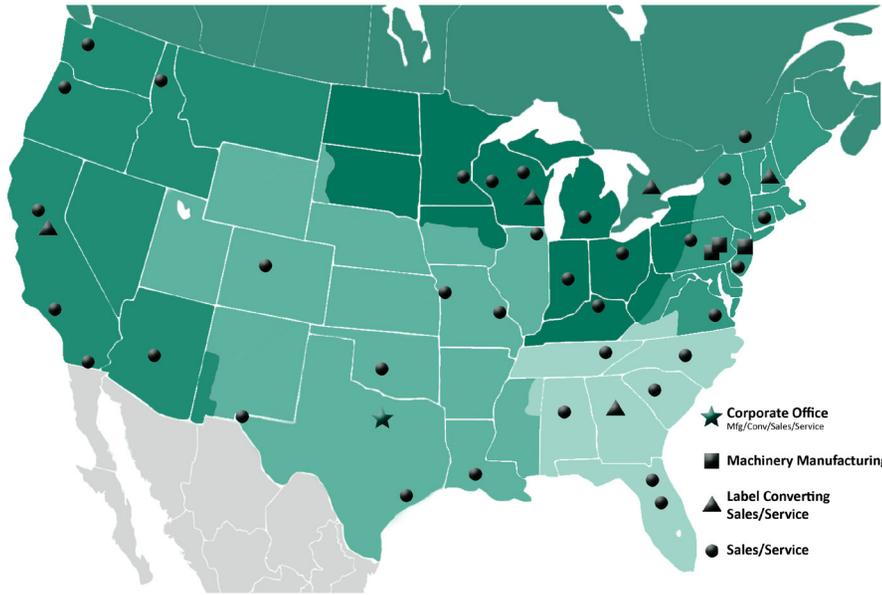


Hybrid Printing

Hybrid printing combines the advantages of digital presses with the advantages of flexo presses to create the best possible printing solution. Hybrid printing includes the ability to match specific Pantone colors and add variable data. It keeps a happy medium between the long run flexo economies of scale and the short run efficiencies of digital technology.

If you need to have variable data printed on your flexo labels – sequential numbering, linear or 2D barcodes, text, images or addresses – our wide array digital UV inkjet system is mounted on a 10 color flexographic press. This hybrid capability is the perfect solution for ticketing, promotions, license plate barcodes and many other data that it can be used on driven applications.





Shaded regions represent areas served by our Label Converting Facilities

Nationwide Service & Support

We pride ourselves in providing responsive nationwide customer service and support from any of our 17 regional sales, service and stocking facilities.

ID Technology technicians are PMMI Certified Trainers to ensure the highest standards of quality training are being met and unparalleled value is being given to the customer.

Our field service personnel are factory trained to service and support our full range of labeling, coding and marking equipment.

In addition to the field service team, ID Technology employs factory trained bench service technicians to accommodate timely depot service.

ID Technology boasts six label converting plants across the US and Canada that produce top quality labels and tags with local support.



*Complimentary Limited
Lifetime Equipment Warranty*

For customers using ID Technology labels with our labeling systems, we provide a lifetime limited equipment warranty free of charge. Just ask us for details!



5051 North Sylvania Avenue, Suite 405
 Fort Worth, TX 76137
 P: 888-438-3242