



**CHOOSING THE RIGHT
PRESSURE-SENSITIVE LABELER**

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INTRODUCTION

Pressure-Sensitive labeling, also known as self-adhesive labeling, is an efficient and cost-effective means of identifying and decorating products or packages. In every major industry, pressure-sensitive labels are applied to most types of containers at speeds matching many product or packaging lines.

The label consists of a face stock

material, coated on one side with an active adhesive. The face stock material can be paper, plastic, foil, polyester, vinyl, or laminate and can be of varied thickness and weight.

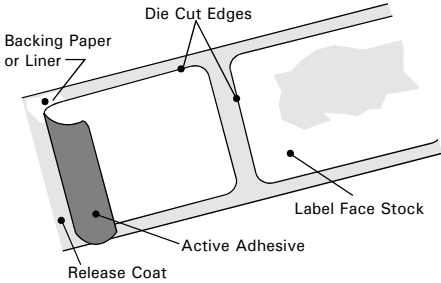
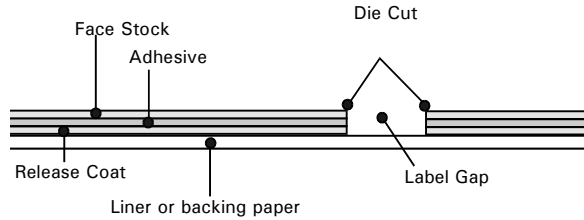
The label is carried on a silicone-coated backing paper or film to allow easy release on demand. The backing paper is of translucent composition so that the label can be identified by photocell scanning for automatic application. The substrate weight, adhesive and the adhesive

thickness are formulated for many application requirements. The label adhesive can have characteristics such as permanent, removable, cold temperature-resistant, or water-soluble.

Pressure-Sensitive labels are supplied in sheet, roll or fanfold

forms. Roll form, with a predetermined specification for automatic application, is favored for easy and efficient handling. Among the printing processes used to produce roll-form labels are flexography, thermal transfer, ion deposition, gravure, rotary silkscreen, rotary letterpress or a combination.

In North America alone, there are thousands of label printing companies including many that specialize in producing labels for use on automatic pressure-sensitive labeling equipment.

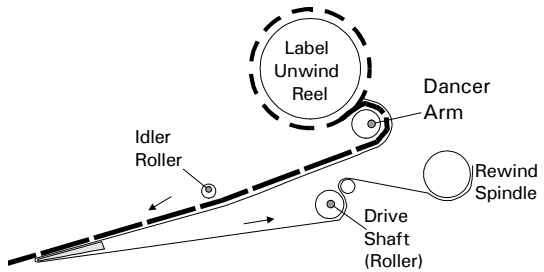


The availability of pressure-sensitive labels has enabled machinery designers to produce labeling equipment, which is fast, efficient, simple to operate, and service, and accurate in label placement. The machines are economical to purchase, require no extensive change parts, and are cost effective in production.

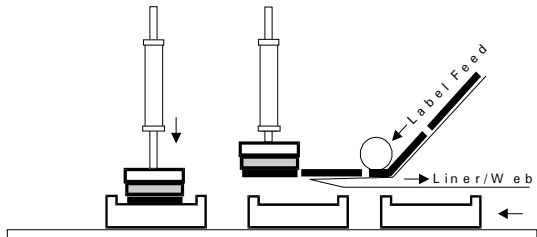
COMMON METHODS OF P-S LABEL APPLICATION

There are three basic methods of automatic pressure-sensitive label application: direct transfer (roll-on or wipe-on); tamp (tamp-on); and air-jet (air-applied, air-blow, blow-on)

Direct transfer - (also called roll-on or wipe-on) the label is dispensed directly onto the package or product and rolled or wiped on as the product passes the labeler. The label must be dispensed in the same direction that the product is moving and at approximately the same rate of speed. Direct transfer application is primarily used on flat, non-irregular surfaces for prime, secondary and wrap-around labeling.

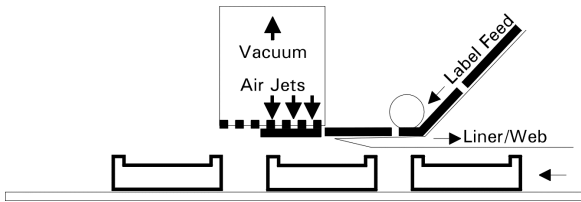


Tamp application - (tamp-on) The label is dispensed from the web backing and then held in position, on a tamp pad, by vacuum. The tamp pad is connected to an actuator which, when signaled by the operator or product detector, is extended to the product for label attachment. Tamp applicators are used for applying labels into deep recesses or where accessibility to the product is restricted. The label is driven to the product by the air cylinder and applied to the product by direct pressure.





Air-jet application - (air applied, air-blow, blow-on) The label is dispensed completely from the backing web and held in position by vacuum, across the perforated front of an air box. The label is applied to the product by a direct blast of air. The label is driven aerodynamically to the product when the operator or a product detector gives the signal. Air-jet applicators are used for prime, secondary, specialty, and bar code labeling on regular, irregular, curved or recessed surfaces.

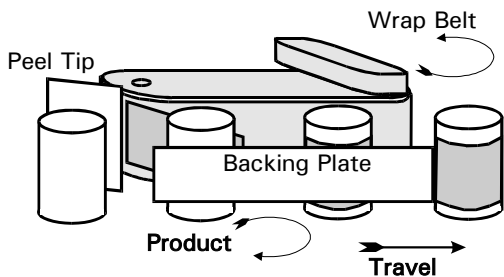


Hybrid applicator - This is a combination of the three basic labeling processes described earlier.

Tamp-blow - This system uses both the tamp and air-jet processes for applying small, thin film labels. The tamp-blow applicator is ideal for labeling into restricted and less accessible places without physical contact with the product. The label is dispensed onto a tamp pad and when the cylinder extends to apply the label, a blast of air through the tamp pad propels the label to the product.

Tac-wrap - Applies the leading edge of the label to the product using air-jet, direct transfer or tamp process. Label application is then completed in a wrap station. Tac-wrap applicators are used for side panel, spot label, or for wrap-around labeling.

Vacuum-wrap - A variation of the tac-wrap process. The label is detached from the backing and held in position on a vacuum grid. The leading edge of the label contacts the product at the entrance to the wrap station. The label is then wrapped around the product as it moves through the wrap station. Vacuum-wrap applicators are easy to set up and are used for spot, side panel, and wrap-around labeling. The air-jet process is generally used for side panel labeling.



SPECIAL SYSTEMS

Label-application systems designed for unique or special applications include dual-web supply, multi-label, dynamic vacuum-wrap, and spreader applicators.

Dual-web supply applicators - Incorporate one application station supplied by labels from two independent web-drive supply systems. This process is used for zero downtime labeling, multi-label application or high-speed sequential labeling.

Zero downtime labeling - One web-drive system is active, supplying labels to the applicator station while the other web-drive system is on standby. Switchover from one web-drive supply system to the other is automatic for web break, missing label and end of label supply or by option of the operator for copy change. Dual-web supply applicators are used for high-volume labeling applications where the cost of downtime for label supply replenishing or copy change is significant.

Typical applications include in-line press labeling of continuous business forms and specialty coupon labeling where the number of labels per roll is reduced because of the multi-layer construction.

Multi-label applicators - Apply labels to ranks of products. One web-drive system supplies labels onto a vacuum belt transport where the labels are indexed on centers and positioned for application.

Dynamic vacuum-wrap - A variation of the multi-label applicator, dispenses two labels onto a moving vacuum belt, for application to products transported through a wrap station. This enables front and back label application in one pass from one labeler.

Spreader labeler - Developed for the simultaneous application of multiple labels. Dispenses labels from the backing liner onto two or more application stations where they are held by vacuum. The application stations then spread or position themselves on product centers for labeling ranks of products. Labels are then applied using one of the three basic methods of label application.

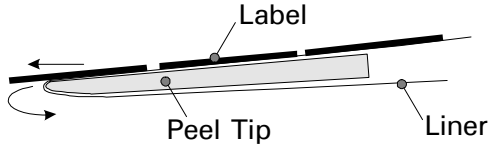
Die-cut pressure-sensitive labels can be automatically applied to most product surfaces including, paper, board, glass, plastic or metals. Labels can be applied in any position; sides, ends, neck, angular, into recesses, and partly or fully wrapped around the product.



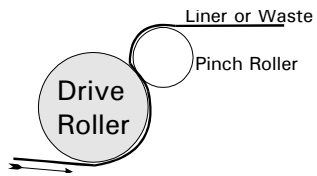
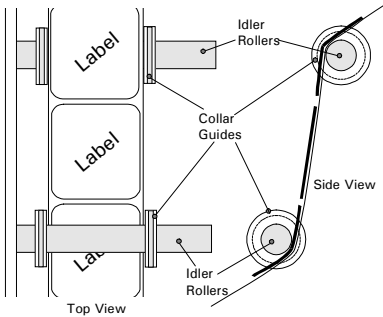
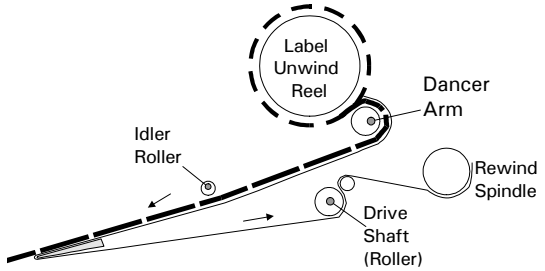


BASICS OF PRESSURE-SENSITIVE LABEL APPLICATORS

The basic operation of label applicator is best described as pulling the liner, with the labels on it, through the system. The labels are peeled off the liner at the *peel tip*, also known as peel plate. The labels detach from the liner as a result of the pulling action of the liner around the radius of the peel tip.

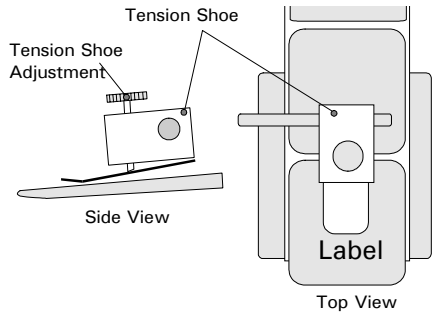


A roll of labels is placed on the *unwind reel* and threaded through the machine according to the *threading diagram* posted on the machine or in the operating manual. Typically, the labels go on the unwind reel and thread around what is called a *dancer arm* or dancer roller. This is a self-breaking mechanism that slows the unwind reel as demand for the label is decreased. The dancer arm prevents the unwind reel from free spinning and unwrapping all the labels from the core. As the labels are required, the dancer arm allows for the free flow of labels from the unwind reel and through the system. *Idler rollers and guide collars*

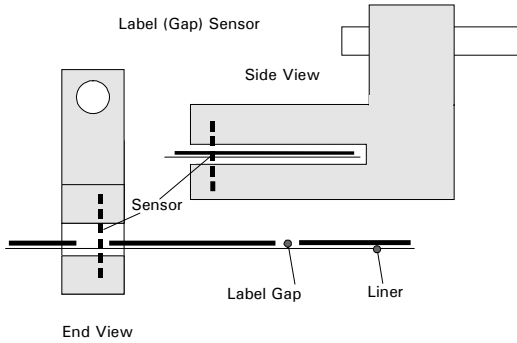


assist in guiding the labels and web. The web is pulled through the system by the *drive roller* and the *pinch roller*. Located towards the end of the threading path, the drive roller/pinch roller feed the rewind *take up reel* (or spindle).

The *Tension Shoe*, located above the peel plate, applies a slight pressure to the label, keeping it flat to the peel tip. This pressure ensures proper travel through the gap sensor and aids in the peeling action of the label from the liner. Too much tension can create drag in the system and mar the label, while too little tension can cause miss reads of the gap sensor or prevent proper peeling of the label.



The label stop is set up by first setting the *label sensor* (or gap sensor). This sensor sees the difference between the label on the liner versus the liner alone. It senses the density and indicates to the controls that the gap between the labels has passed.



This signal causes the internal clock to count and then stop the advance of the label. The delay between sensing the gap and stopping the label is operator controlled and establishes label placement on the peel tip between dispensing cycles. This placement is called the *label stop* position. Some products

require that the label be flagged for application while others need the label to remain almost completely on the peel plate until needed.

PRODUCT HANDLING

There are a variety of ways to present the product to the label applicator or applicator system for labeling. From semi-automatic (manually loading the product in a fixture at the peel tip) to inline automatic systems, hand feeding from another system, or from a packaging table to automatic transfer from one conveyor line to another. The ways are as varied as the imagination. Guide rails can be



used to direct the product through the system and ensure alignment at the peel tip for proper placement of the label.

In secondary labeling applications, the labeler is often used with existing product-handling equipment. Labelers mounted on portable stands can be readily moved from one production line to another.

As pressure-sensitive labeling increased in prime labeling applications, so did the need for product-handling devices. Semi-automatic product handling devices can range from the simple hand-loaded jig fixtures to more complex handling systems.

Automatic product-handling devices include control and orientation devices. These can be conveyors with pushers or pucks, product or part feeders, gating or metering devices, roller chains or top hold-down mechanisms, elliptical aligners, and single or dual feed screws, to name but a few.

Of the many types of conveyors, flattop chain and belt conveyors are the most frequently used for transporting products during pressure-sensitive label application.

Powered top hold-down belt assemblies are used to maintain orientation while exposing all sides of the product for labeling.

Options for pressure-sensitive labeling equipment include secondary label impressors, label imprinters, verifiers, counters, larger roll capacity and operator alarms.

A *secondary label impression* completes label application to irregular shaped products. For example, impressing a label to a second or third side panel of a square container after the initial application to the front panel.

Label imprinting is a standard option with most applicators for printing date codes, lot/batch numbers, product codes and product descriptions using ink coders, hot-stamp foil printers and various computer-driven printers for variable information including bar codes. Label imprinting or embossing is possible on almost any label face stock such as paper, foil, and plastic.

The strict requirements relating the product traceability, especially in the drug and pharmaceutical industry, has resulted in an increase in the use of label *verification* equipment. Examples include missing-label (on

web or product) detection, missing-imprint detection, bar code reading, and visual computer/camera recognition. Optional equipment can be used to scan for a label on every package or scan and read every bar code to verify the readability/quality of the code.

Labelers equipped with *counters*, digital readouts or computer-based camera systems, are used to display labels consumed and/or total products processed. Printers are also available for hard-copy records.

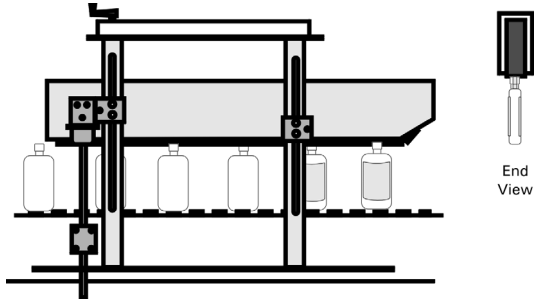
For high speed, high-volume applications, *operator alarms* (visual, audio or both) alert the operator of low label supply, web break, missing labels and missing imprint. Alarms are also used to notify the operator when the readability/quality of a bar code drops below specified standards. Optional functions can include that the conveyor shut down upon reaching a predetermined number of bad bar code scans or missing labels.



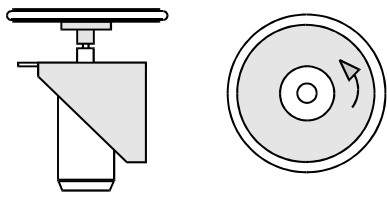


ILLUSTRATED EXAMPLES OF PRODUCT HANDLING

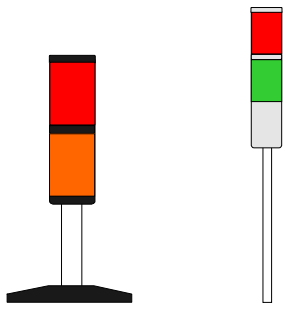
Top hold down conveyor - A height adjustable belt that is mechanically synchronized with the product conveyor is used to stabilize and control products during the labeling process. Best used on light weight, tall or unbalanced products and where accuracy is critical. Top hold down conveyors are often used in conjunction with feed screws or an elliptical aligner.



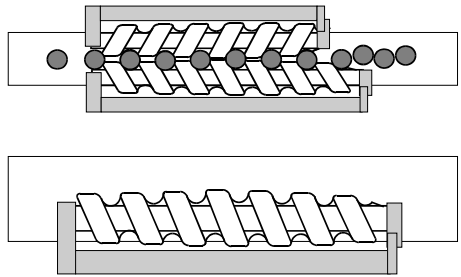
Metering Wheel - Used to create a pitch (the distance between the leading edge of one product to the leading edge of the next) as a product enters the labeling system. A minimum distance is required to label many products. The metering wheel travels at a slower rate than the conveyor. This action allows the product to be "gated" past the wheel.



Flashing Beacons - Informs the operator of the status of a variety of label applicator functions including low label, web break or other error conditions.

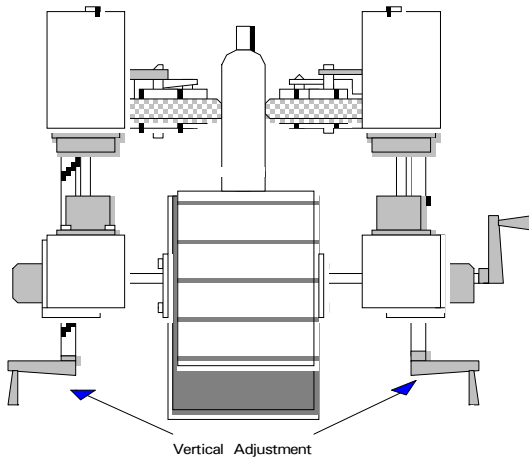


Feed Screws - Used for high speed labeling when absolute accuracy is desired and precise metering is needed. Single or Dual set ups can be used to provide exact spacing between products. A top hold down belt is generally used to trap the product before exiting the feed screws. Product samples are required to produce feed screws as each set is manufactured to match a specific product.



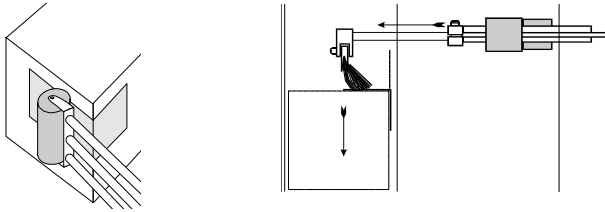
Because many feed screws require backpressure, it is common to provide additional control to ensure the feed screw is always jam fed with products.

Elliptical Aligner - Used for oval or odd shaped products, the elliptical aligner will center and align the product on the conveyor top. It is essential that a product be perpendicular to the conveyer and parallel to the labeler's peel edge, to ensure accurate labeling. The product travels between the aligner belts and is positioned before being trapped by a top hold down conveyor. The elliptical aligner is useful when a variety of product sizes are being labeled on the same system.

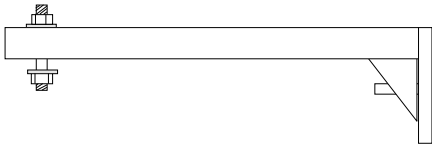




Secondary Application - When a label is applied around the corner of a product, a secondary action must be used to apply the label around the edge. Rollers and brushes attached to an actuator are used to complete the label application. As the product travels down the conveyor, a signal is given to extend the actuator and complete the wipe down.

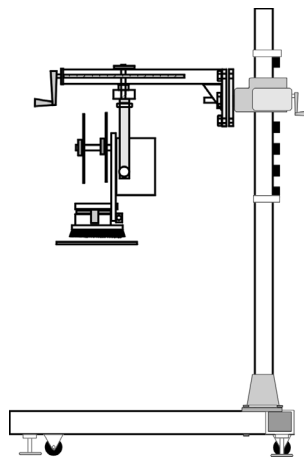


Yardarm - A yardarm, mounted to the raising mechanism of a T-base stand allows the applicator to be suspended over a product line or placed in an area where using a standard T-base stand does not allow the desired reach.



Arms are available in different lengths and are generally ordered to match the specific application.

Traversing Yardarm - Also mounted to the raising mechanism of a T-base stand, the traversing yardarm allows for fine tuning the position of the applicator over a product line. The applicator is attached to the yardarm by a lead screw in the body of a u-arm mounting bracket. A manual crank is rotated to adjust the placement of the applicator. Arms are available in different lengths and are generally ordered to match the specific application.





Advances in pressure-sensitive labeling include the use of microprocessor-controlled electronics, zero downtime labeling systems, multi-label application systems, and video recognition.

Manufacturers using microprocessors or digital controlled circuits can offer improved labeling accuracy and more features as standard. These control systems allow an economical approach to smart systems that are self-monitoring to increase efficiency and reduce downtime.

Surprisingly, most pressure-sensitive labelers using these technologies, with all their power, are easy to understand and are very user friendly.

Speed and accuracy has improved with the advent of stepper motors, servomotors, and shaft encoders. Used in conjunction, shaft encoders and stepper motors have considerably improved label placement accuracy, speed and production output. Operator and system controls continue to see advances with the integration of PLC's, status boxes, and computer interaction. Using simple LCD menus or push button control panels, label formats can be stored for easy selection at the labeling station. Consumers can produce their own label designs with bar codes and graphics and/or variable information fields through simple point and click software programs.

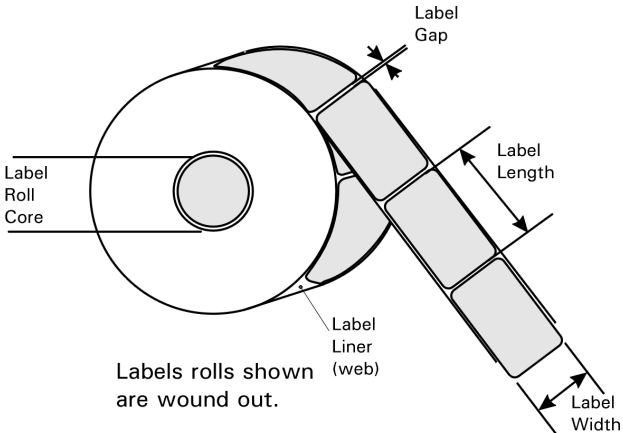
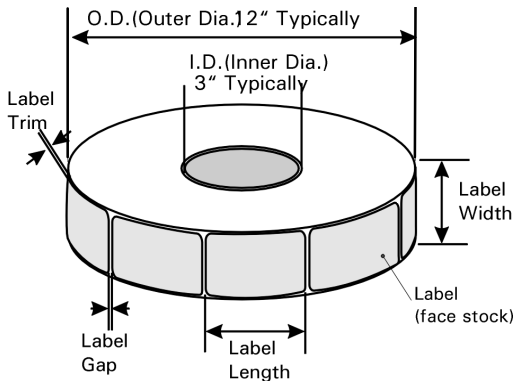
EQUIPMENT SELECTION

The selection of pressure-sensitive labeling equipment will depend on the capability of the machine matching the application requirements. It is necessary to determine the size, shape and material of the product and label; the label location, labeling speed, and type of label to be applied; the number and volume of products; and whether single or multi-purpose labeling is needed.

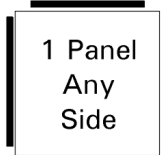
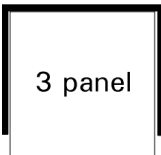
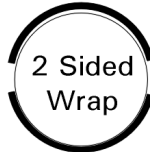
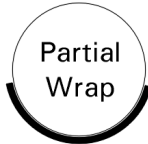
In selecting the equipment supplier, installation procedures, operator training, technical support and after-sales service -- on a regional, national and international basis -- are important considerations.



PARTS OF THE LABEL ROLL DEFINED



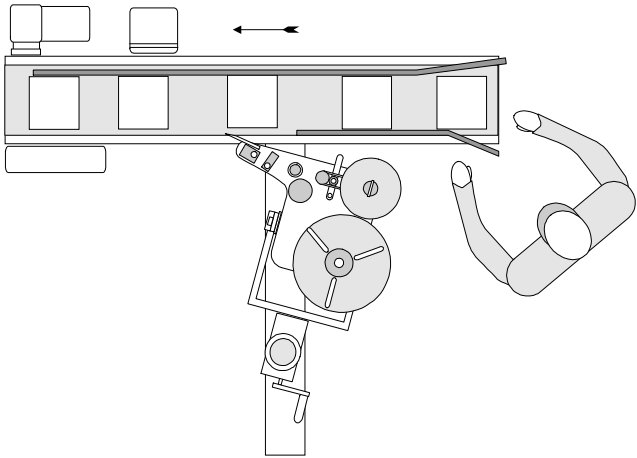
TYPES OF SURFACES AND LABEL PLACEMENT



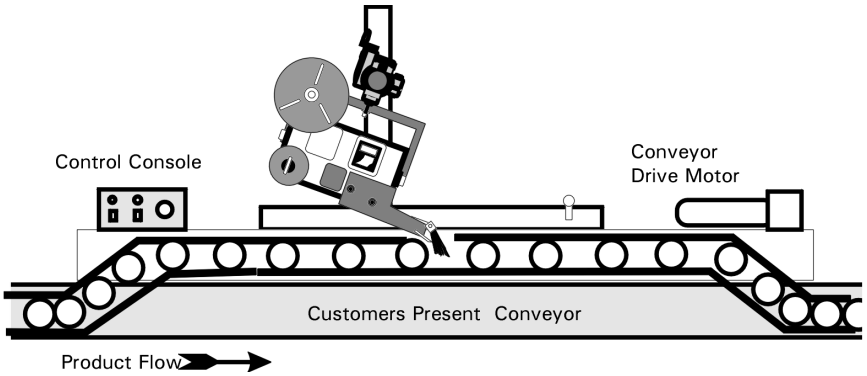


ILLUSTRATED EXAMPLES OF LABELING SYSTEMS

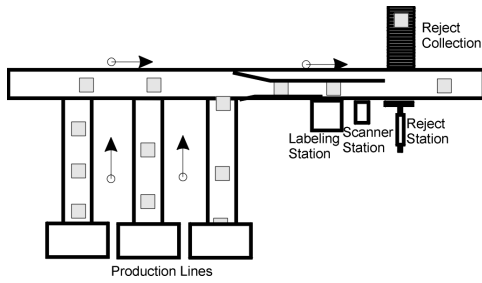
Simple hand fed systems



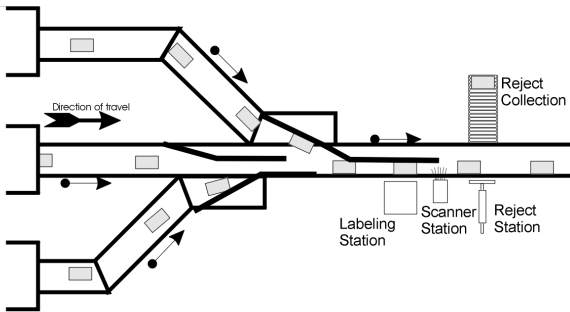
Side transfer from another conveyor system



Multiple lines feeding onto a main conveyor system

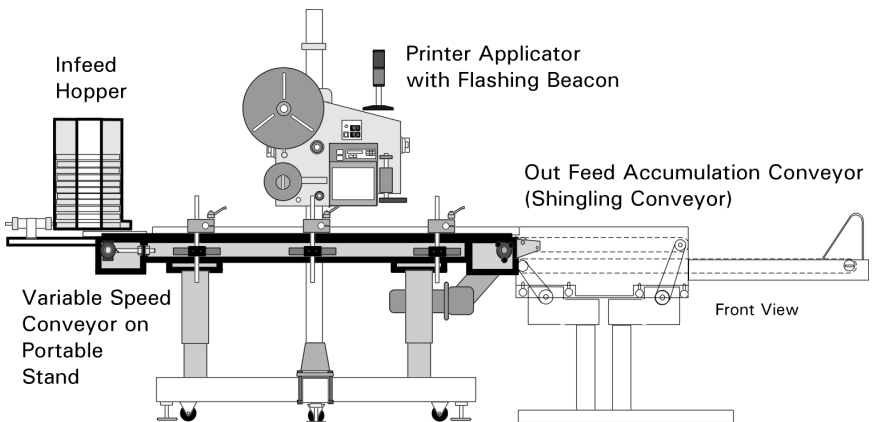


Several lines merging onto one conveyor



High-speed systems with integrated product-handling systems

(shown is a print and apply system feeding a shingling conveyor unit)



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ABOUT THE AUTHORS:

Robert Zuilhof has been President and CEO of ID Technology since 1993. He has over twenty years of experience in the label, labeling machinery and product marking industry.

Jim Moss has been in the Labeling, Coding and Marking industry for twenty-five years working in various capacities such as Sales, Technical Trainer, Product Development and Sales & Marketing Management. Jim is currently the Regional Manager for the ID Technology Southwest Regional Office.

Bruce Richards has been in the packaging industry for over ten years and is currently the Technical Sales Coordinator for ID Technology. His background includes Electronics Instructor and Curriculum Development, Product and Sales Trainer and Technical Services Coordinator. He has written and illustrated numerous operator and technical manuals.

ID Technology has nationwide sales, service and stocking facilities providing a full range of labeling, coding and marking systems, equipment and supplies. For further information or assistance call 1-888-438-3242 ext. 46.