White Paper

Pressure Sensitive Labelers

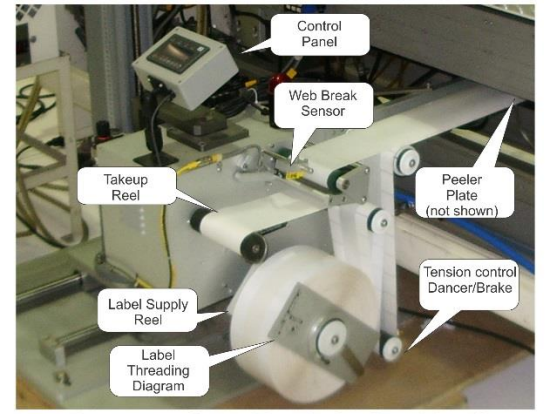
Pressure sensitive labels, sometimes called self-adhesive, auto-adhesive or just PS labels, come with the adhesive (glue) pre-applied. In order to prevent the labels from sticking to each other and to allow feeding, they are supplied on a coated paper or plastic backing sheet.

There are a number of advantages to PS labels:

- Applicating machinery is relatively simple compared to hot and cold glue labels.
- The labels can be made of virtually any material
- Labels can be die cut to any shape, embossed, provided with windows and other features to add function and pizazz to the product.
- Leaflet labels, combining multiple foldout pages in a single label can be used
- Speeds can range from a few cpm in a manual operation to 500 or more cpm on a high-speed line.
- There is no adhesive mess to clean up.
- There is no additional adhesive to buy.
- There is much less possibility of a label mixup as with cut labels.

There are some downsides too:

- Labels are more expensive
- Routine stoppages are required for roll replacement
- The backing web makes the labels effectively twice as thick reducing the number that can be carried on a roll. This increases the replenishment frequency.
- Splicing a new label roll to the runout roll is difficult to automate requiring stopping the labeler for splicing a new roll.
- The backing web material is waste that must be disposed of



Pressure Sensitive Labeling Head
(With extended peeler plate)

This picture shows a typical PS labeling head with the major components identified.

Label/web path

The label roll is mounted on the unwind axle. The standard unwind axle is 3” diameter and the label roll core should fit snugly without slipping. Some labelers will have a mechanical lock to prevent slipping. If the label roll can slip on the axle, web tension will be uncontrolled leading to out of position labels and breakage of the backing web. Standard roll size is 12” diameter but higher speed labelers may be designed for 16” or 20” OD rolls to allow more running time between changes.

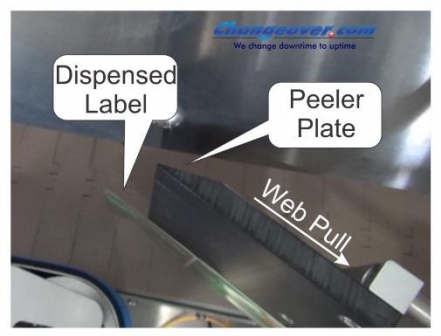
NOTE: If no locking mechanism is provided a screw can be added to the hub of the disk as shown here. This screw engages core (Make sure it does not engage the label roll) forcing it to turn with the disk.

A disk on the axle, supports and positions the roll. On a vertically mounted head, as shown, a second disk or cross piece helps hold the roll in position.

The unwind tension of the roll can be controlled by a simple mechanical brake on a dancer arm or a powered unwind with sensors to control the tension.

As the label web unwinds from the roll, it is guided to the peeler plate by several idler rolls. These often have collars on them to help position the web during threading. Do not use these collars to try to force the web into position during running. The position of the web is determined by the position of the label roll. If the web is not running straight, one of the idler rolls, the take-up axle or the peeler plate is probably not perpendicular.

After passing over the idler rolls, the web makes a 180 degree turn around the peeler plate. There is considerable stress on the backing web as it is pulled over the peeler plate. It is critical that the plate be smooth and free from any nicks or sharp edges to prevent web breakage



As the backing web bends, the label has a tendency to continue straight as it releases from the web . Some thinner materials or more aggressive adhesives may not want to release smoothly. One or more jets of compressed air (not shown here) directed at the label can aid release.

Additional rollers guide the now labelless backing web to the nip roller. The nip roller is driven by a servo motor and pulls the web from label roll and over the peeler plate. The roller is usually an elastomer. A spring loaded idler roller forces the web against the nip and prevents slipping.

The web is then taken up on a rewind roller. This roller is often designed to run continuously, with a slip clutch to prevent excessive tension.

Controls

Label dispensing is controlled by a PLC with several sensors and timers.

The labeling sequence begins when a sensor detects the product to be labeled. This initiates a product delay timer. The purpose of the product delay timer is to allow fine electronic adjustment of label position. This eliminates the need for physical adjustment

of the sensor. After timing out, the nip roller servo is activated, pulling the web and dispensing the label.

Another sensor, normally located near the peeler plate, detects the gap between the labels. This is commonly a photoeye above the web with a lightsource below. Sensitivity is adjusted so that it cannot detect the light through label and web but can detect it through the web alone at the gap. Transparent or translucent labels or a transparent backing web can be difficult to sense with a photoeye. Capacitance sensors or registration marks on the label or web can resolve this.

This signal triggers the label stop timer. This timer allows dispensing to continue after sensing until the label is properly dispensed and then stops the nip roller servomotor. Ideally the web should stop with the leading edge of the next label even with the peeler plate.

If dispensing stops too soon, the label will not be completely dispensed. Often, because it has already adhered to the product, this results in the web being pulled out of position. If dispensing stops too late, the label edge will overhang the peeler plate and will be out of position on the next product.

Some older machines do not have a timer and rely on physical positioning of the sensor.

Application

Dispensing the label is often the easiest part. There are a number of different types of applicators to get the dispensed label applied to the product. The type of applicator used, will be determined by label, product and product handling and required speed.

The simplest way to apply the label is to dispense it against the product as it passes. One of the critical issues with this method is the relative speed of the product and the dispensed label. If the product is moving faster than the label is dispensed, it will pull the label off the web, pulling the web out of position and possibly breaking it. If slower, the labeler will try to push the label onto the product causing it to wrinkle.

A secondary roller, brush, squeegee or other device is required to assure that the label is well adhered to the product. These can often be mounted directly on the peeler plate as shown here.

When using direct dispensing like this, synchronizing conveyor and labeler dispense speeds electronically is highly recommended. Depending on mechanics, and especially operators, to keep them synchronized manually is seldom reliable.

Blow-on applicators have the advantage of disconnecting dispensing and application.

The blow-on applicator is a small box, typically 4-6” cube, mounted at the peeler plate. The top of the box has a small pancake fan such as used for cooling electronics. The bottom of the box has a plastic grid. A number of small compressed air jets are inserted in the grid approximating the label shape and size.

As the label is dispensed, it is pulled, adhesive side out, against the grid by the airflow from the fan. When the product is in position, a sensor opens a solenoid valve causing the compressed air jets to blow the label onto it. Immediately after application, the next label is dispensed and staged on the grid.

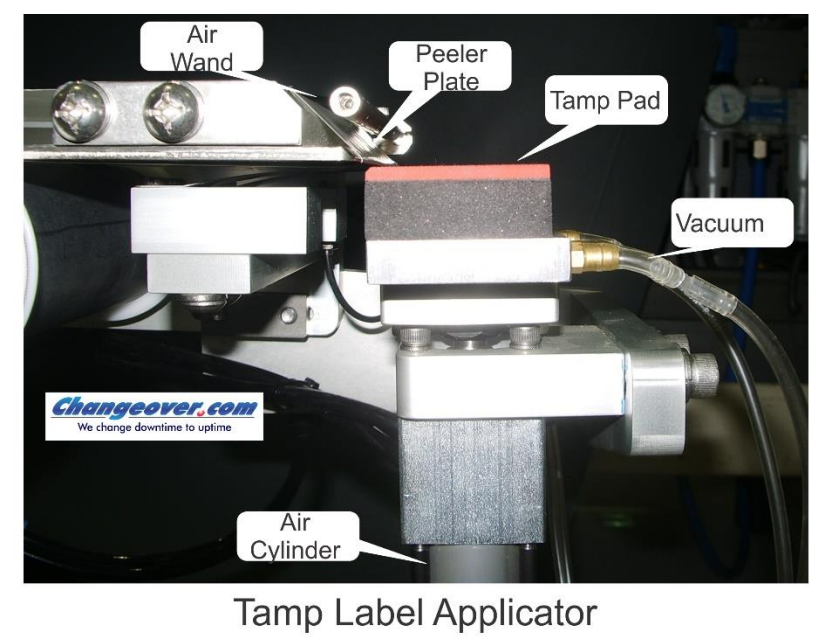
This system will work in any orientation, at speeds to 3-400ppm, and is generally accurate to within +/- 1/32” or so. Product can be moving or stopped at time of application. The gap between grid and product must be kept as small as possible, generally no more than 1/8”, for maximum reliability and accuracy.

A secondary brush or roller may be used to assure that the label is tightly adhered to the product.

Tamp applicators also delink dispensing and application.

The tamp applicator consists of a pad, often flat rubber but sometimes shaped or articulated to conform to the product. The pad is mounted on an air cylinder and positioned above the peeler plate.

As the label is dispensed, a small jet of air from the air wand blows it against the pad. Vacuum holes in the pad hold the label in position. When the product is in position for labeling compressed air is applied to the air cylinder, extending it to make contact with the product and applying the label.



Tamp Label Applicator

Tamp applicators generally require the product to be stopped during application but may be used with the product in motion in some applications. They are especially useful when the label needs to be applied into a recess on the product.

Articulated labelers can be used to apply labels around corners of cases, to apply a seal label to a carton, a partial label to a round pail or drum.

One style of corner labeler uses a tamp style applicator but the pad is divided into a fixed and a moving section. The label is dispensed onto the pad and the pad is moved against the edge of the case. The spring loaded half of the pad applies half the label to the side of the case. The fixed half continues forward wiping the label down on the end of the case.

Pressure sensitive labelers are the workhorses of the packaging industry. They can apply labels in any orientation and any position to static or moving packages for any application. Their simplicity makes them economical to buy, operate and maintain. If you need to label, pressure sensitive will normally be your first choice.