

## Pressure Sensitive Labeling Solutions Whitepaper

By

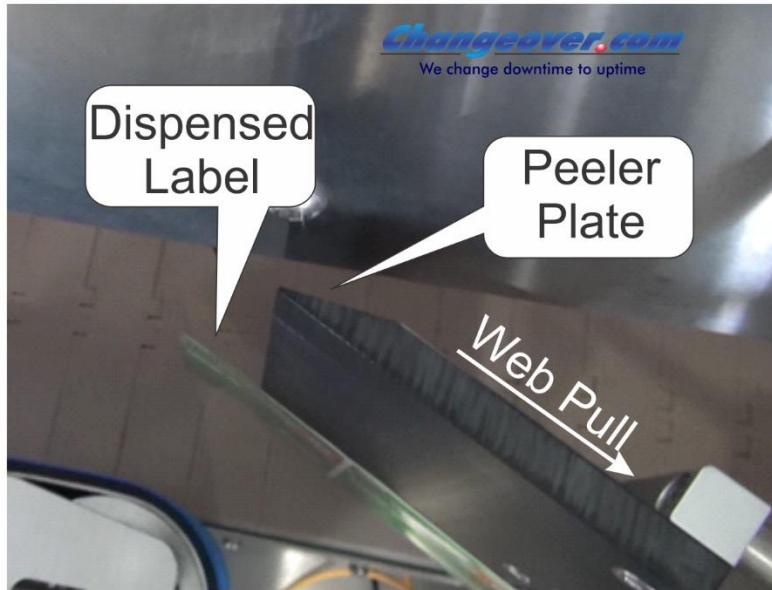
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It is hard to think of a product without at least one label. Labels have many purposes and come in many materials including paper, plastic and foil. They may be die cut in complex shapes or may be butt cut squares or rectangles. They may be sheet, roll or web fed. They may be applied with hot or cold glue or with pre-applied pressure sensitive adhesive.

The variety is seemingly endless. This paper will focus on automated pressure sensitive (PS) labeling.

Pressure sensitive labels are supplied on a backing web. The web is coated with a releasing finish and the labels are coated with an adhesive. They are typically supplied on rolls though fan-folded labels are also used occasionally. Typically, even if square or rectangular, they are diecut on the web with a 1/16" gap left between labels.

The basic principle of pressure operation is easy to understand. The web is pulled across a peeler plate which bends it about 180 degrees. As the web is pulled backwards, the label continues forward, releasing from the web and either going directly onto the product or staging onto an intermediate applicator which applies the label to the product.



That's the basic idea, the execution is more complex. Here are a few of the more common problems with pressure sensitive labeling and how to solve them.

## **Adhesive, adhesive, adhesive**

Adhesive and package must be carefully matched for good performance in application and on the shelf. To a lesser extent, adhesive must also be properly matched to the label itself and the backing web.

There are over 200 different pressure sensitive adhesives. Some work well at warmer temperatures such as a hot filled bottle, others on frozen products. Some are designed to be peeled off by the end user, some must not be removable without visible damage. Some work well on glass but not on plastic, others vice versa. There is no universal adhesive.

The most obvious symptom of improperly matched adhesive is that the label falls off the package. Another symptom of improper adhesive is that the label fails to apply properly in the first place. What may appear to be a machine problem may actually be an adhesive problem. In one instance a CPG packager began experiencing problems with a thin plastic label wrinkling as it was applied to a rectangular bottle. This was attributed

to the machine and a number of hours were spent trying to adjust the wrinkles out. Deeper investigation determined that the bottle supplier had changed their process from flame to plasma treatment. The adhesive that worked fine on the flame treated bottles no longer worked as it should. Once the problem was identified, a change in adhesive solved it.

## **Damaged webs**

Pressure sensitive labels are supplied on a backing web of either coated paper or plastic film. This web is used to pull the label across the peeler plate and dispense the label. This causes quite a bit of tension on the web. An undamaged paper web will have enough strength to withstand this pulling. Even a minor nick in the web acts like a tear notch and the web can easily break. When the web breaks, it typically takes several minutes to rethread.

These nicks can occur at the converter during die cutting or on the labeling machine. Web damage commonly occurs in 2 ways:

At the converter, the labels are printed on a continuous roll stock and web. The label is diecut and the excess material removed. When diecutting the converter must cut cleanly through the labels without cutting into the web. If the die does cut into the web it will create a weak spot that will be prone to breakage.

To check the diecut remove a label from the web and look at the web where the diecut is made. It is common to have a slight indentation from the die but there should be no actual cut on the web. To check for a cut, place the web on a sheet of white copy paper and scribble a felt tip pen over the diecut impressions. If there is no cutting, ink will not bleed through the web onto the paper.

Nicks can also occur in the labeler itself. Guide collars on the perpendicular rollers are sometimes adjusted too close to the web and will cause edge damage. If the peeler plate is nicked, it can cause breakage.

One way to eliminate web breakage is to switch to a plastic film backing web. An objection to this is that it is more expensive than paper backing. This extra cost,

especially with larger or higher speed labeling, is often justified by reduced line downtime.

## **Label position**

When labels are not properly positioned on the package, this is often attributed to labeling head. Time may be lost making adjustments which only aggravate the problem. Proper labeling depends on the package being properly positioned as well as the labeler properly dispensing the label.

Even an almost imperceptible axial misalignment of a rectangular bottle can result in label position. Twisted one way, the face label will be off to the left and the back label off to the right. Twist the bottle the other way and now the face label is off to the right and the back label to the left.

Considerable time may be wasted adjusting the labeling head to get the label positioned correctly when the problem is in the bottle handling, not the labeling machine.

## **Label storage**

Label rolls that are stored improperly will be problematic when running. If paper labels are stored in an excessively dry or humid environment, they will dry out or absorb moisture. Either can affect the way the way the label handles. Excessive humidity can make it limp and not want to peel. Excessive dryness can make it stiff or cause it to curl.

High temperatures can cause the adhesive to soften. The normal pressure from the winding can cause it to squeeze out from between label and web. This leaves insufficient adhesive on the label where it is needed and adhesive on the web between and along the labels where it should never be.

Some plants, such as pharmaceuticals, do roll-to-roll inspection of all incoming label rolls. Labels are unwound from one roll, run through inspection, then rewound onto a new core. If the inspection operators do not understand the importance of tension control, they may rewind the labels more tightly than they should. This will squeeze the adhesive out from the label.

## **Tension control**

If the label, as it is being dispensed, doesn't stop in exactly the right position every time, it will not be positioned correctly on the product. Most labelers manufacturers recommend that the web stop with the edge of the peeler plate centered in the gap between labels. If it stops with the trailing edge of the dispensed label still on the web, the label as it tacks onto the product will pull the web out of position. When the next label is dispensed, the web will snap tight and can break.

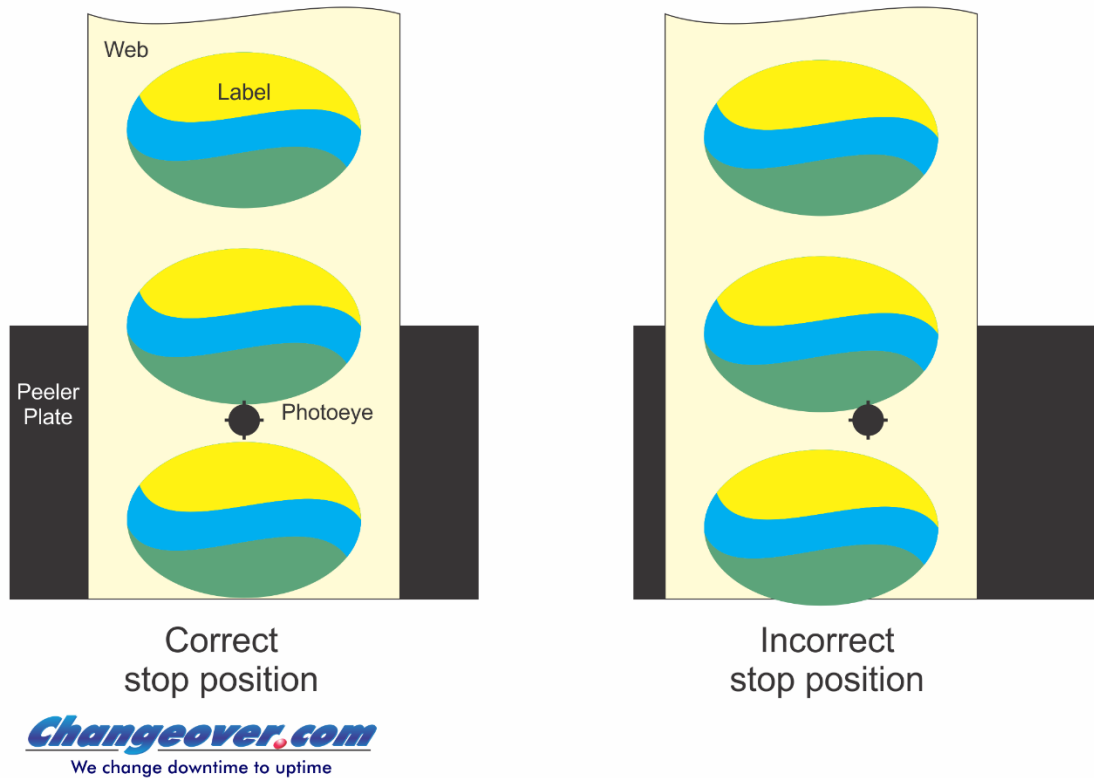
Tension control will differ from machine to machine so be sure to follow the machine builder's recommendations on adjustment. More critical than perfect adjustment is that the tension be consistent. It is only when tension is consistent that adjustments can be made to correct any offset.

## **Label stop detection**

Most modern labelers use a photoeye sensing through the label and web to stop label dispensing. For transparent labels a capacitance sensor will often be used but the following applies to both types.

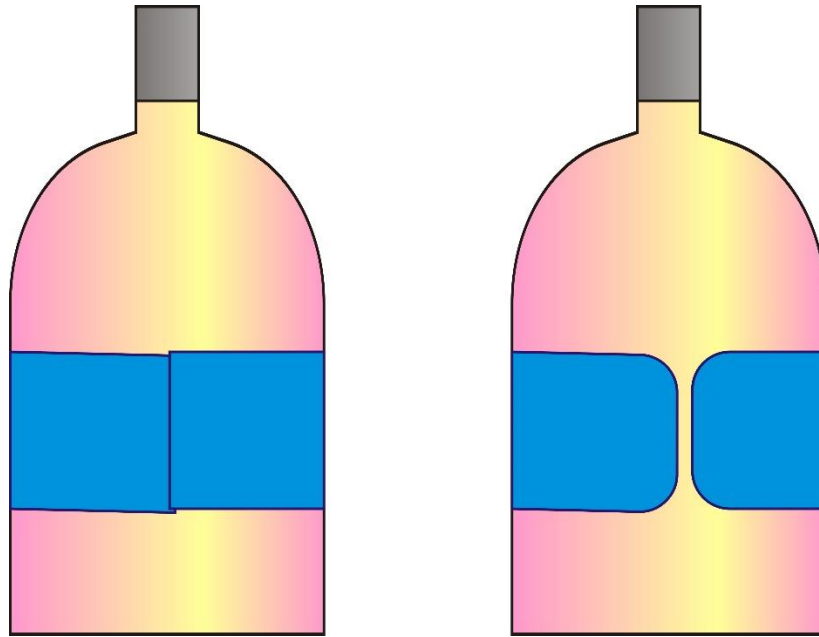
The sensor is looking for the difference in opacity between the web by itself and the web with label. The sensor is normally triggered by the gap between labels or, more specifically, the leading edge of the next label after the gap. The web needs to stop with the peeler plate edge centered in the gap. On some machines the stop position is adjusted by physically moving the photoeye. This is fine but can be touchy to make fine adjustments. Other machines have a fixed photoeye and a time delay set digitally. The photoeye senses the label before it gets to the peeler plate. Dispensing keeps going until the time delay stops it.

Detection of round or rounded labels can be sometimes be problematic. As shown below, if the label and web get off center, the photoeye will stop later than it should. This will leave the label overhanging the peeler plate. Careful attention to web guiding can usually correct this. If not, it may be necessary to add a registration block to the web. This will always provide a consistent stop position but adds cost to the label.



## Label skew

When labels are wrapped around a product, skew or misalignment of the label ends can occur. One solution is in the label design. If the ends meet, even minor skew will be apparent. If the label can be made slightly less than 360 degrees, the same amount of skew will probably not be apparent to most people. Rounding the corners can help hide it even more. Both labels below have the same skew. One is visible, the other not.



That's a cheat, though. The better approach is not to have any skew.

Skew occurs because the label, as it is dispensed, is not perfectly square with the bottle. An issue that is more common than it should be is that the bottle is not perfectly vertical. When it is not, the label goes on at an angle and skews. Trunion rollers or top and bottom clamping, as in a rotary labeler, can force the bottle into verticality.

If the bottle is relatively tall and thin, it may be wobbly as the label is applied, causing misalignment.

More commonly, the problem is misalignment of the labeler head, peeler plate, conveyor and bottle. Careful attention to detail in setup will take care of this.

## **Label position**

Time can be lost verifying whether a label is in the proper position or not. Here's a simple tip to instantly verify position. This was made by a maintenance supervisor who got tired of discussion about whether the label was correct or not. He machined a hole and a window in a PVC rod. Drop the bottle in, rotate it until the label aligns with the window and it is obvious whether or not the label position is correct. Variations on this idea can be used with almost any type of bottle or package.



## **Smile!**

Your label is your product's face. It is what your customer sees, it is how they identify you. It must be properly and securely applied. When it is, your product is smiling at your customer and they smile back, all the way to the cash register.