ADVANCED ADHESIVES REPORT

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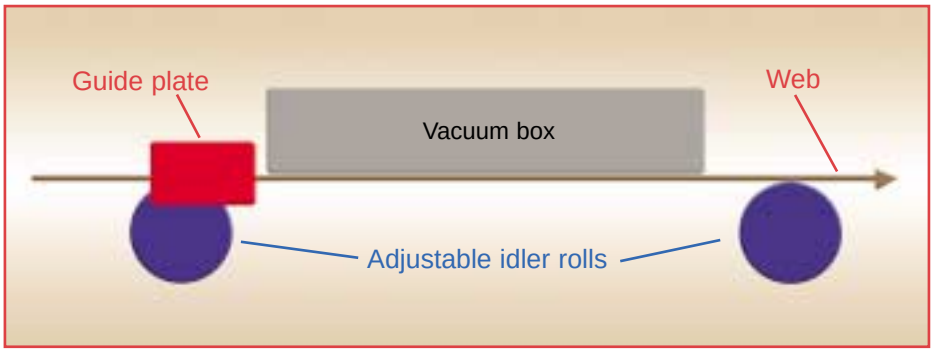
Troubleshooting vacuum bridge guides

Poorly adjusted guides are the cause of several quality and runability problems

by Chris Polster



Vacuum bridge guides are understandably popular in the industry. Adjusted properly, they do a fine job of centering the single face web as it enters the double backer and provide a great deal of flexibility in controlling web tension.

These systems, however, are often overlooked as the source of several quality and runability problems that can occur if the vacuum guides are out of adjustment. When they are identified as the source, it is important to adjust them properly to solve the problem without creating others.

Let's look at some problems that can be traced to the vacuum bridge guides.

End-to-end warp

An out-of-adjustment vacuum guide assembly will cause the web to pull to one side of the machine as it passes through the device. The quick fix is to add or decrease vacuum to center the web. This is not a good idea. Adding vacuum increases tension on the web, which can create up-warp. Decreasing vacuum reduces tension on the web, which can create down-warp.

Twist warp

When an off-center web rides against a guide, there is more friction on that side, which creates uneven tension in the web. This can cause twist-warp. If the condition persists, the web can actually cut slots in the guide plates. As the web rides in the slots, even more friction is created and the problem gets progressively worse.

Excessive or uneven belt wear

When crews use higher vacuum to compensate for out-of-adjustment guides, there can still be uneven tension in the web—even if the web looks tight and uniform as it passes out of the bridge guides, over the preheater, and into the glue machine. This uneven tension can cause excessive or uneven wear on the corrugator belt. Look at the web between the glue machine and the hot plate entrance. If the web is tight on one side and loose on the other, there is a problem. As the corrugator belt begins to wear unevenly, it also becomes a source of twist warp, compounding the problem of poorly adjusted guides.

Width change troubles

Out-of-adjustment vacuum guides also create problems during width changes. When the double backer operator reduces or turns off the vacuum the web immediately moves to one side and contacts the guide plate. When the operator opens the side guides for the next paper width, the paper continues to walk off center, requiring corrective action.

How to adjust vacuum bridge guides

There are two idler rolls in the vacuum guide assembly—one upstream and one downstream. One or both of these rolls can be adjusted to raise or lower one end. Adjusting the downstream roll has the greatest effect.

It doesn't work very well to try to reset the vacuum guides with a machinist's level or check the idler rolls for parallel with a metal tape. It's better to do it this way:

- Have a technician ready to adjust the downstream roll with the machine running at a good steady speed.
- Have the double backer operator reduce web tension until the web begins to walk to one side.
- The technician on the bridge then adjusts the idle roll until the web returns to center.
- Have the double backer operator reduce web tension again, and readjust the roll.
- Repeat these steps until the web tracks straight when the tension setting at the guides is turned all the way down, with the machine running at about 500 lfpm.

The quickest check to see if your guides are set properly is to look at the side guides. If the web has cut slots in them, you have a problem.

A good time to check and reset a vacuum bridge guide system is after changing a corrugator belt. After the bridge guide system is properly adjusted, it is important to replace all worn side guide plates.

Machine alignment: have you checked yours lately?

by Rex Woodville-Price

A corrugator that is not in alignment invites operational difficulties and will not fulfill its potential for producing quality board. Machine alignment is not a set-it-and-forget-it exercise; machines can and do go out of alignment. So it is important to monitor alignment and make corrections as needed.

Here are some symptoms that can signal a misalignment problem on a machine. (These symptoms can also be caused by other factors such as paper problems or excessively worn machine components.):

- Paper or web with one loose edge and one tight edge
- A paper or web temperature difference from side to side of more than 10^{0} F or 15^{0} F
- A double backer belt that won't track properly
- Significantly more wear on one side of a bridge guide
- Twist warp
- Frequent tear-outs; the web or paper will have uneven tension and will tear out

When we say a machine is aligned, we mean that all the components are aligned *relative to each other* so the machine will function as designed.

- They must be level
- They must be parallel
- They must be centered

Level

All machines should be level. Since many things on it depend on gravity to work properly, an out-of-level condition can impair the proper functioning of the machine. For example, the starch in the glue pans relies on gravity to present an even surface for the glue roll, and steam traps depend on gravity for their proper functioning.

We use a bubble-type spirit level to check for level. Most machines have some sort of jacking bolts on their base to allow leveling adjustments. The bottom end of these bolts will have a piece of plate steel under them to keep them from digging into the concrete as the machine vibrates.

When leveling a machine remember you are leveling to a plane and not just to a line. It must be level from side to side and from front to back (paper direction).

Parallel

For a machine to be parallel means that the axis of each roll is parallel to the axes of the other rolls, as well as being level.

With modern equipment, parallel is often checked using theodolites or lasers. Since it is usually impractical if not impossible to sight a laser down the center of the machine an arbitrary reference line called a datum line is established. This is merely a reference line drawn on the floor parallel to the center line of the machine. All machine axes must be perpendicular to this datum line.

Centered

All individual machine components should be centered. A machine component is centered when its center lies on the center line of the machine. This is traditionally achieved using a tightly strung wire set above the machine. A plumb bob is then dropped from it to transpose its exact location to the machine or to the floor. The center line can also be measured from the datum line described in the preceding paragraph.

Manufacturers will often mark the centers of machines in some manner. Sometimes the roll has a light groove or scribe line on its center. Sometimes the frame is marked with prick marks to indicate the center. If the frame is marked fore and aft it can also help to parallel it since if both marks are on the center line the machine will be very nearly parallel.

A word of caution: the dimensional middle point from the outsides of the frames is rarely the center of the working surface of a machine, e.g., a preheater roll or a glue roll. Machines are generally asymmetrical to accommodate drive mechanisms and their requirements. As far as the paper web is concerned it is the center of the working surface that matters.

Other considerations

Trammeling is a useful way to check for misalignment between two components. The method consists of measuring the diagonal distances between the two opposite corners and comparing the dimension obtained. These dimensions will usually be equal only if the machine is both centered and parallel.

Be aware it is possible to get equal diagonals if you have components that are both off center and out of parallel. Trammeling should therefore only be used to double check your other methods.

Once a machine has been aligned, its lagging bolts are tightened and locked (using a lock nut or similar device). It is usually grouted in place or has mortar (typically high pressure hydraulic cement) put around and under it to help keep it there.

How to minimize peel waste in the box plant

by John Kohl

Peel waste can add 0.25 percent to 0.40 percent to a box plant's controllable waste figure. This may seem like a small number, but when you look at the overall cost of this waste, it becomes significant. In an average plant, a conservative cost of one percent waste is a loss of $12,000 per month. At a rate of 0.25 to 0.40 percent, this is a loss of $3,000 to $4,800 per month. On a yearly basis, this is an additional cost of $36,000 to $57,600 for paper. Keep in mind that this is a conservative estimate. Some large plants with two corrugators and high volume, could be adding an additional $100,000 annually to their controllable waste by not limiting their peel waste.

To minimize the cost to the plant, operators need to be trained in the best method to open rolls without removing too many layers of paper. The methods used to open new mill rolls of medium and liner at the corrugator haven't changed much over the years. Some operators still use the razor utility knife or large paper knives, to split the outer wrap layers of paper off the roll. This cutting into the roll from the outside will damage more layers of paper than necessary to open it. Most new rolls of paper can be opened by removing only one or two wraps of paper. The knife will usually cut too deeply into the roll and almost always score the next layer or two under the cut. This scoring effect also adds to the waste when the roll is on the corrugator. The score may cause a stress concentration that will develop a tear, when the roll is initially spliced and there is a lot of stress on the paper.

There is also a safety factor to consider with the razor knives or paper knives. A large number of finger and hand cuts can be attributed to the use of razor knives. Many plants have implemented the mandatory use of a kevlar glove on the hand not holding the knife.

The use of the newer plastic roll splitter or roll stock cutter is a more economical and safer means to open mill rolls. They can be inserted under one or two layers of paper and very easily run across the face of the roll. If there is excessive shipping or handling damage, it is wise to take as few wraps as possible off the roll to remove the damaged paper. The deeper damaged areas can be cut away with a knife to keep as much of the roll intact, minimizing wasted paper.

Cost of one wrap from a full roll

Roll width	33# Kraft liner	42# Kraft liner	57# HRC liner	26# Medium
60	$0.612	$0.676	$0.722	$0.398
72	$0.735	$0.811	$0.867	$0.478
84	$0.857	$0.946	$1.011	$0.557
96	$0.980	$1.081	$1.156	$0.637
108	$1.102	$1.217	$1.300	$0.716

One wrap of paper from a roll may not seem like much, but at current paper prices, it can add up to a large amount of lost dollars quickly. To an operator, one or two more layers is not a big deal until they can see the true dollar value of each wrap. The following table is based on the current paper prices and full roll diameters. If your controllable waste is high, it may be time to have a refresher course on the proper (most economical) way to open a roll of paper.

The Harper/Love roll slitter provides a safe, economical way to open mill rolls.

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How to use a measuring tape to check rolls for parallel

A quick and accurate way to check if two rolls are parallel to each other is to use a tape. If two rolls are parallel then the distance between them must be exactly the same at both ends and the middle.

Wrap the tape around both rolls near the journal. Make sure the roll surface is as clean as practical. Pull the tape back and forth several times so that it lies flat on both surfaces and is perpendicular to the axis of the rolls. You will feel when this happens because due to the increased contact area the amount of friction will also increase (you can feel the tape "bite"). If the rolls are very far out of parallel, this will of course be more difficult. This will also be the smallest dimension you can obtain at that point. Repeat the procedure on the other side and compare the two dimensions.

This method of checking parallel has more merit than might at first be evident. You will be able to detect even small variations in distance because you are actually measuring the distance twice. You must also remember that if you read a difference of say 1/16th inch you really only have a difference of half that much; 1/32th inch.

Tips:

- Use a flat metal tape such as a surveyor's tape. Fiberglass tapes will stretch and give a false reading. Don't use an ordinary carpenter's tape; they have a convex profile and will not lie flat against the roll.
- Try to measure as far apart as possible. This will give the largest reading and allow you to detect the smallest difference.
- Keep idler rolls from turning so you can better feel the "bite" when the tape is square.
- Don't try to read the end of the tape. Instead, start at the one or two inch mark and use that line. This will be easier and more accurate since you are reading two distinct lines.