



ADVANCED ADHESIVES REPORT

Your corrugating adhesives newsletter
from Harper/Love Adhesives Corporation

MAY 2004

Diagnosing directional fiber pull

By Chris Polster and Bill Nikkel

When a good fiber pull is achieved at one end of the finished board, but not the other, the problem is called directional fiber pull. This can occur on either the top or bottom liner side of the combined board, but is found more often on the bottom. Poor fiber orientation in the paper itself can cause the problem. So can poor adhesive transfer caused by a worn or dirty glue roll or incorrect adhesive formulation. Other causes are more complex:

Bottom liner

If the glue roll on the double backer is traveling at a higher speed than the web, adhesive will be applied more to the back edge of the flute rather than the tip. This concentration of starch at the back of the flute tip causes the finished board to have good fiber pull when the liner is separated from the trailing edge, but not when the liner is pulled from the leading edge.

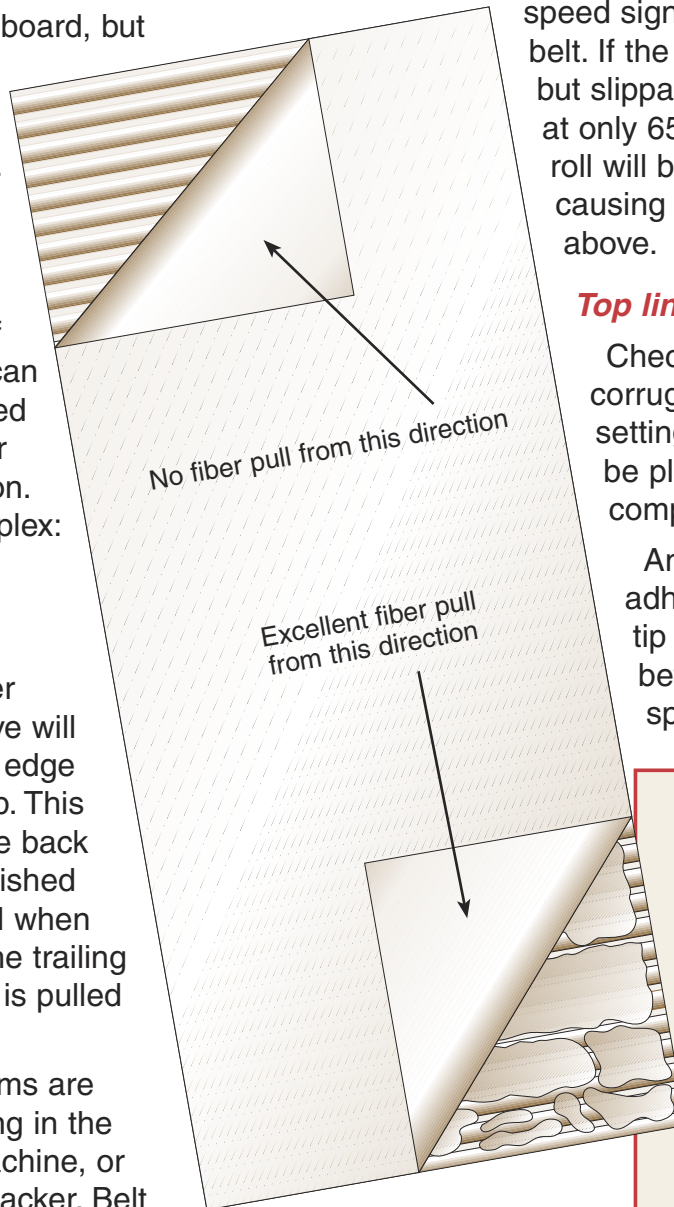
Glue roll overspeed problems are caused by an incorrect setting in the drive controls of the glue machine, or belt slippage at the double backer. Belt slippage is caused by a worn belt, bad bearings in the traction section, or abrasive liners.

On most corrugators, the glue machine gets its speed signal from the drive motor for the belt. If the belt is set to run at 700 lfm, but slippage causes the paper to travel at only 650 lfm, the double backer glue roll will be running faster than the web, causing the application problem outlined above.

Top liner

Check the gap at the glue roll-corrugating roll nip, as improper setting could cause more adhesive to be placed on one side of the flute tip compared to the other.

Another possible cause of more adhesive on one side of the flute tip could be the speed differential between the glue roll surface speed and the flute tip speed.



Common problems on the corrugator: the book

This handy 16-page pocket guide by Chris Polster and Bill Nikkel addresses directional fiber pull, and seven delamination issues, including flutters, cold spots, light-test blisters, no-starch blisters, and more. Ask your Harper/Love rep for your copy.



Tack vs. tachometer: how to measure corrugator belt speed differentials accurately

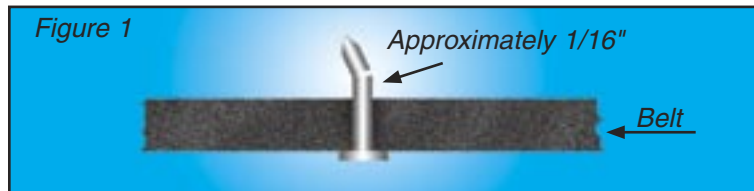
By Bill Nikkel

It is important to match belt speeds on your corrugator as closely as possible to minimize slippage. Slippage will cause variations in cutoff length with old style knives. Belt speed differentials also add unnecessary loading on the main double facer drive motor.

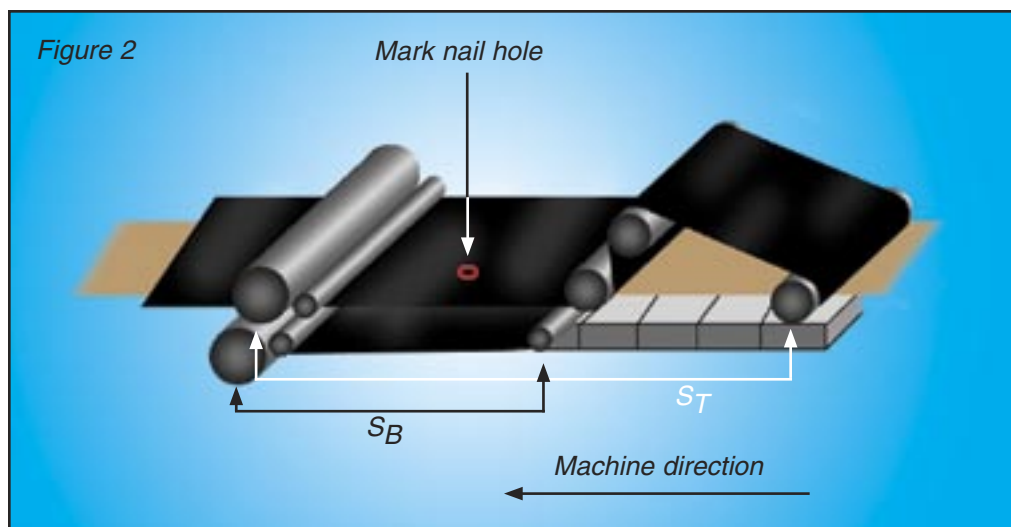
The following method is far more accurate than tachometer measurements.

How to do it

- Push a flat-head furniture nail (long thumbtack) through the belt from the inside and far enough toward the center of the machine to catch the width of the paper to be run.



- Cut the nail to leave approximately 1/16" protruding and make a crayon mark around the nail protrusion (Figures 1 and 2).
- Run the machine and, standing between the head pulleys and the triplex, mark the board coming out of the head pulleys when the crayon mark on the belt comes around.



How to read the results

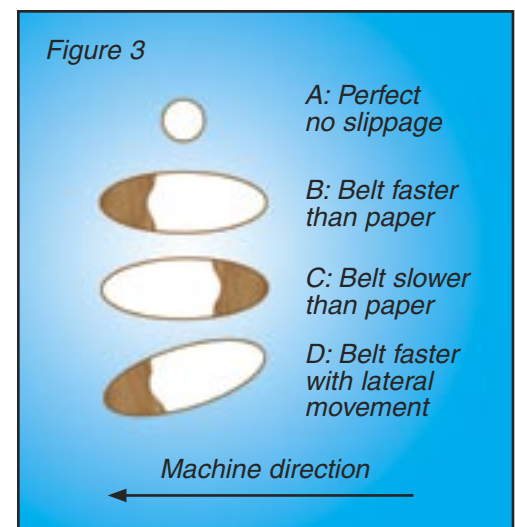
Gather the marked blanks from the stacker and look for the puncture mark made by the nail.

- If only a small hole the size of the nail is found (Figure 3A) belt speed and paper speed are equal.
- If there is a tear and the torn paper is bunched up inside the tear toward the leading edge of the blank (Figure 3B), the belt is moving faster than the paper. (These tears will rarely exceed 1.5".)
- If the torn paper inside the tear is bunched up toward the trailing edge of the blank (Figure 3C), the belt is moving slower than the paper.
- If the tear is angled (Figure 3D), the paper or the belt is weaving.

To calculate the speed differential percentage, divide the length of the tear by the length over which the nail was in contact with the paper (Figure 2: S_T for the top belt, S_B for the bottom belt).

Slippage indicated by these tears will likely vary with running speed, brake tension on the double face liner unwind stand, number of weight rollers in use on the top belt, frictional properties of different linerboards, etc.

Don't forget to remove the nail after the tests are completed.



Glue roll speed ratio: little things mean a lot

Small changes in glue roll speed ratio can have large effects on wipe distance, the size of the glue bead, and the resulting adhesive add-on.

By Bill Nikkel

On most glue machines and finger-type single facers, flute tips make contact and wipe the glue roll surface for some distance, rather than make line contact. To make sure the adhesive ends up centered on the flute tip, the flute tip should move a little faster than the glue roll surface to create this wiping motion.

The size of the bead formed at the leading edge of a flute depends on thickness of the glue film and the wipe distance.

In the diagram wipe distance $W = S - SR$.

S = Contact distance between flute tip and glue roll surface.

R = Glue roll speed ratio (glue roll surface speed/flute tip speed).

F = Glue film thickness.

Small changes in the speed ratio have large effects on the wipe distance W , and thus on the size of the bead and the resulting adhesive add-on.

For example, assuming a contact distance of 1":

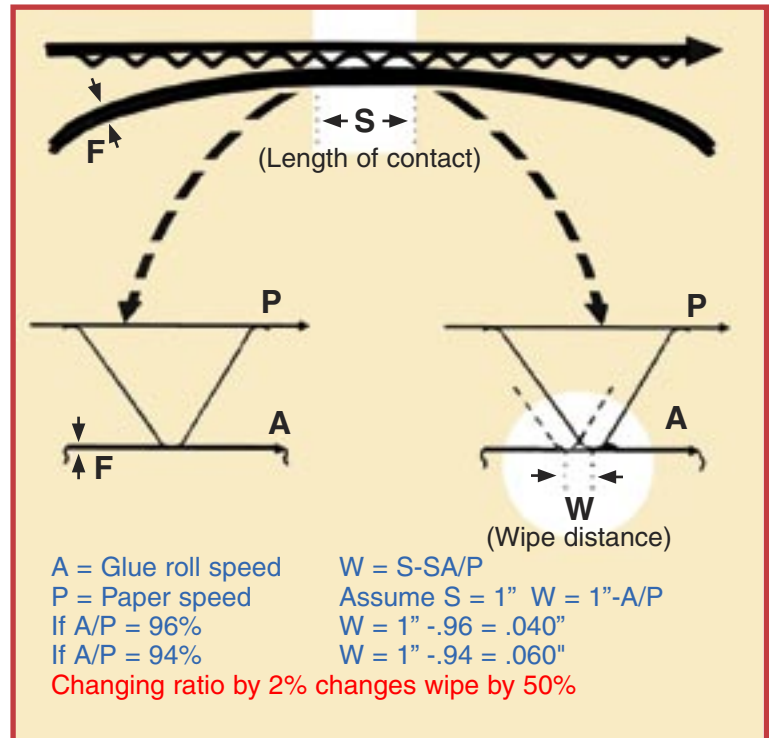
With a ratio of 96%, W would be $1" - (1 \times .96) = 0.040"$.

With a ratio lowered to 94%, W would increase to $1" - (1 \times 0.94) = 0.060"$.

A 2% change in the speed ratio creates a 50% increase in wipe distance, resulting in a significant increase in adhesive add-on.

There's more.

For the whole story on glue roll speed ratios, ask your Harper/Love representative for the Technical Information Bulletin, "How do glue roll speed ratios and the contact distance between flute tip and glue roll surface affect adhesive add-on for smooth and engraved glue rolls?"



The greater the contact distance and the lower the speed ratio, the greater will be the size of the bead and the more adhesive will end up on the flute tip.

See the movie:
"Variables that affect starch transfer"



Ask your Harper/Love representative for a private viewing of this informative program on starch transfer. The video discusses 5 key conditions that enable you consistently to apply the right adhesive, in the right place, in the right amount to obtain the greatest speed and quality from your corrugator.

*Directional fiber pull
Measuring belt speed differential
Glue roll speed ratios*

IN THIS ISSUE

e-mail: salestech@harperlove.com

www.harperlove.com

800-438-3066

*Leaders in the science of
making good adhesives better™*

Harper/Love Adhesives Corporation
11101 Westlake Drive
P.O. Box 410408
Charlotte, North Carolina 28241-0408

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REPORT

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LIQUIBOND BLUE™

Performance

Harper/Love's LiquiBond Blue is a unique fourth-generation adhesive performance product that combines natural and man-made ingredients. It is designed to be used on all board grades and paper combinations. LiquiBond Blue will improve bonding and reduce warp while increasing run speeds on all corrugators.

Reduces warp and waste!

enhancer

- Improves overall board quality for finishing
- Improves corrugator speeds
- Improves bond quality on all grades of paper
- Reduces warp and waste
- Reduces delamination and loose edges
- Increases carrier solids in the adhesive

