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ADVANCED ADHESIVES REPORT

Your corrugating newsletter from Harper/Love Adhesives Corporation

Setting up the double backer

Pressure on the web is a key factor for good bonding at high speeds

By Chris Polster

The double backer is usually the corrugator's Achilles heel when pushing for good bonding at very high speeds. Many facilities have single facers that will run reliably in excess of 1,000 linear feet per minute but experience several problems with the double back bond when trying to bring the entire machine up to these speeds.

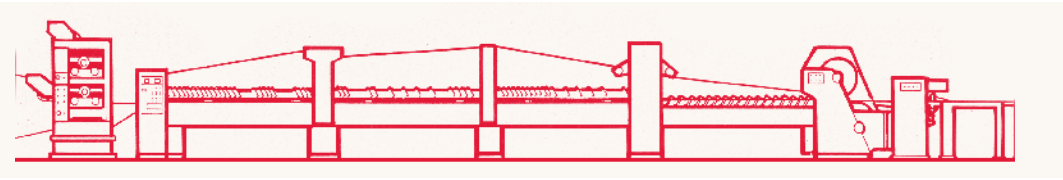
The main problem is that one edge of the combined board will usually have a very green or loose bond on the bottom liner at the higher speed. The problem will become more pronounced as the combined web is increased in weight and width. In some cases the bond will appear very green in the center of the web and will break loose on the slit nearest the center of the web as the web passes through the slitter/scorer. When running double wall combinations, whether the problem is on the edges or running toward the center of the web, we will see that the issue with bonding will have moved from the bottom liner to between the flutes.

More heat?

When troubleshooting these issues I will usually be met by the manager in charge of the plant or machine, who after explaining the problem will state that, "he needs more heat from his double backer." While this may sometimes be the problem when talking about a poor bond in the center of the web at the double backer, it is more often the exception than the rule and even more rarely the case when talking about a green or loose bond on one edge coming from the double backer.

Most of the speed-related bonding problems that occur at the double backer can be traced back to contact pressure through the process. In my early years on a corrugator, when we would have issues with bonding through the double back process we would call down to the double face operator and request more heat. He would then start dropping weight rollers, and the issue would improve. While he was indeed increasing heat transfer, the additional contact pressure was far more important to the resolution of bonding problems than the additional heat.

In later model machines we have found that we can turn hot plate pressures down significantly so that while in an automatic mode a double backer will run with more rollers or contact shoes down, and have far greater success running wide heavyweight combinations than if we simply tried to increase the amount of heat energy into the board.



On more conventional machines, those that do not have pressure controls at the hot plates, we have found that contact pressure is king; if we are able to maximize contact pressure, we are able to run these heavyweight combinations very fast and often at machine speeds.

Here's what happens

As the combined board is heated through the double back process the moisture present in the adhesive and paper expands significantly. This expansion is occurring in a small space, the flutes of the combined board. As the moisture expands, it is trying to lift the web off of the bottom liner (similar to filling a hot air balloon) while the hold-down system of the double backer is trying to keep them together and in good contact with the hot plates. The moisture is in a confined area and is allowed to expand only toward the edges of the combined board. Therefore the expanding moisture accelerates as it makes its way to the edges where it is released out of the flutes. As this expansion moves toward the edges of the combined board, the additional moisture present on the edges slows the gelling process of the adhesive; plus the acceleration of this moisture results in higher pressure within the flute as it makes its way to the edges. This is why the problem with poor contact pressure usually results in a loose or green edge through the double back process. The problem will usually be seen more on one side of the web than the other, depending on the way the corrugator is set in a facility.

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Setting up the double backer, continued

With the proper amount of contact pressure, the webs are held firmly together through the process and the moisture is naturally discharged out the flutes without disturbing the bond.

Earlier machines commonly employed several small rollers at the double backer to supply contact pressure. On some of these machines the bearings where of poor quality and the size of the roller itself meant it was turning at a very high rpm. This combination would often cause these systems to become an enormous drain on maintenance resources. Rollers would often simply be removed or blocked up off the board as they developed problems. This decreased the crew's ability to control contact pressure and often would lead to problems with bonding heavy weights at high speed. It is common to see a plant that has done away with 30 percent to 50 percent of their rollers simply because they were a maintenance nightmare.

Static hold-down systems, such as hot feet, shoes, or short presses, can provide excellent coverage across the surface of the plate. However, static hold-down systems create greater friction when contact pressure is increased. This can lead to belt slippage, increased belt wear on the inside of the belt, and excessive amperage draw on the drive motor.

On systems using larger rollers for maximum coverage over the hot plates and traction sections, we have seen very few problems with roller maintenance because of problems stemming from excessive friction when maximizing contact pressure. These are the machines where we have had the greatest success running at machine speed and maintaining an excellent double backer bond regardless of paper weight or width. Many facilities are going to a combination of static hold down systems along with the large rollers with good result.

Regardless of the system a plant chooses for its double backer, in the end, the ability to have maximum coverage and apply maximum pressure will best serve the facility when running the machine at high speeds.

15 years and counting!

Harper/Love recognizes long-term associates

Pictured from left to right are Left to Right: Bill Loppnow, Jim Carbone, Denise Barlow, Barry Mitchell, Phil Smith, Pam Flynn, Katherine Harper, Ron Harper, and John Meldrum of Love Starches in Sydney Australia.

At its annual sales meeting in Charlotte in June, Harper/Love recognized six associates who have been with the company for 15 years. Ron Harper, president, presented the awards.

The six associates receiving 15-year awards are Bill Loppnow, Jim Carbone, Denise Barlow, Barry Mitchell, Phil Smith, and Pam Flynn.

Altogether, the company has 14 associates with 15 years or more of service: In the Sales/Tech group, Bill Gerard, Lou Cuccia, Fred Rekola, and Roger Holzmeyer have more than 15 years. In Manufacturing, J.T. Frazier and Lamott Fennell have been with the company 26 years; Joel Davis and Al Loeffelbein have 17 years in service.

Said Bill Kahn, general manager, "In today's business environment, this level of longevity is remarkable. We're delighted so many good people have made their careers with us. Along with our continuing partnership with N.B. Love, their depth of experience helps us deliver consistent, knowledgeable service to our customers over the long term."

Harper/Love Adhesives Corporation was formed in 1978 as a joint venture of Harper Corporation of America and N.B. Love Industries, of Australia. The company serves the corrugating industry exclusively with products and services designed to produce measurable and sustainable improvements for its customers.

What can the single facer teach the double backer?

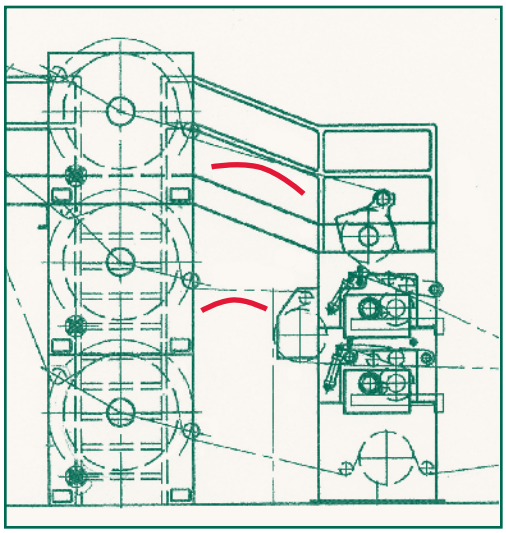
Reheating flute tips before the double-backer glue machine ensures enough heat energy to gel the starch

by Bill Nikkel

What happens at the single facer

After a flute tip picks up starch adhesive from the glue roll at the single facer, it takes less that 0.1 seconds for it to reach the combining nip (pressure roll or belt). That is not enough time for additional heat energy to be conducted from the hot corrugating roll through the paper thickness to reach the glue line. The liner web meets the starch-covered glue tip for only milliseconds in a pressure roll nip, or for about 0.7 seconds in a pressure belt nip.

Consequently, the only heat energy available to gel the adhesive in that short time is what is available in the portions of the medium and liner webs on and just below their surfaces directly in contact with the adhesive. As the combined web leaves the pressure nip, the starch will be fully gelled and the residual heat in this web will subsequently help to dewater the gelled adhesive while on the bridge.



It is easier and more efficient to supply extra heat to the SF web and liner before the glue machine, where both surfaces are uncovered and accessible.

On the double backer

When the single-face web reaches the double backer glue station, little heat energy is left in the flute tips and the liner web loses considerable heat energy in the long draw from the preheater to the entrance to the hot plate section. The necessary heat energy to gel the double-back glue lines now must be supplied by the hotplate surfaces through the insulating liner web, which takes time.

This time could be significantly reduced if we created conditions similar to those found at the single facer, which means reheating the flute tips and preserving more of the heat energy in the liner by shortening the draw to the hot plate section entrance.

It is much easier and more efficient to supply this heat to the flute tips of the single-face web before it reaches the glue roll, and to the liner prior to entering the hot plate section, while both these surfaces are uncovered and accessible.

The flute tips might be reheated by running them against the SF web preheater, but much of the heat picked up this way would be lost again in the long open draw to the glue machine. This may, however, make warp control more difficult. A curved heating plate mounted between this SF preheater and the glue machine would be more effective.

Additionally, more heat energy can be supplied efficiently to the flute tips after they have picked up adhesive from the glue roll, by means of a jet assist manifold.

To maintain a high liner temperature at the entry to the hot plates, additional preheating equipment might be mounted underneath the first hot plates.

In summary, what works at the single facer should work at the double backer, too. ■

Tip: Solve adhesive application problems caused by board slippage by synching glue roll drive to actual paper speed

Many independently driven glue stations are slaved directly to the main double-backer drive motor. This can affect adhesive application.

The problem is slippage. To increase running speeds, more ballast devices are being added over the hot plates. This increases friction and often causes board slippage. When slippage occurs, the board speed falls below belt speed but the glue roll speed does not change because the control signal from the main DF drive motor has stayed the same. When this happens, the glue-roll-to-paper-speed ratio changes, which affects the degree of wipe of the flute tips on the glue roll surface, which in turn affects adhesive pickup. Even small changes in this ratio have noticeable effects on adhesive application, which can affect bond strength consistency and may well contribute to warp problems.

The solution is simple: Let's take a lesson from direct-drive knives. Cut-off length is not affected by slippage with direct drive knives because these drives get their control signal synchronized with actual board speed. If we do the same with the glue roll drive, we will eliminate adhesive application changes caused by board slippage.

Leaders in the science of making good adhesives better™

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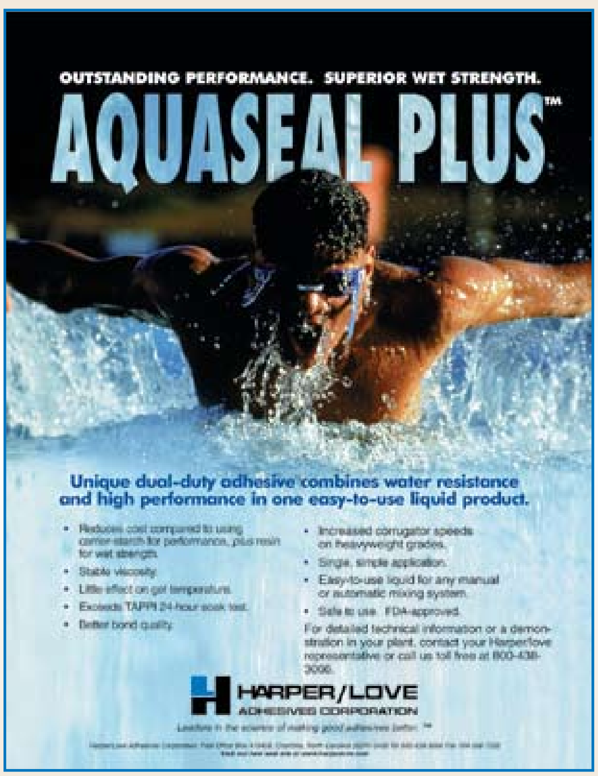

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For detailed technical information or a demonstration in your plant, contact your Harper/Love representative or call us toll free at 800-438-3066.