HARPERLOVE

ADVANCED ADHESIVES REPORT

YOUR CORRUGATING NEWSLETTER FROM HARPERLOVE

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Managing Splicers

Excerpted from an article written by HarperLove's John Kohl and Jim Carbone

First, we should define what constitutes a perfect splice. The simple act of transitioning from one roll to another without the web breaking is not a perfect splice. A perfect splice is achieved when you transition from one roll to another at the splicer's designed speed without performance issues to downstream processes (and ideally with no paper left on the core). Consistent tension and alignment must be maintained through the complete splicing sequence until the machine returns to its pre-splice speed.

Synchronized Splicing

Some Wet End Controllers offer the benefit of synchronized splicing. These systems have the ability place liner and medium splices within 3 feet of each other. This reduces waste as only one sheet is discarded due to the roll change. However, synchronized splicing offers no benefit if crews must discard extra sheets at every paper change due to warp or other quality issues.

Your plant's operating procedures should detail the correct way to initiate a synchronized splice using the wet-end controller. Manual paper changes should be a last resort because of the increased waste generated by operators trying to "best guess" when one splice will line up with the others. Using the Wet End Controller for synchronized splices can reduce your waste. Be sure that these systems are mechanically and electrically sound and are being operated in automatic mode. Remember that wrap arms should "home" prior to a paper change.

Periodically, the synchronized splice should be verified by measuring the distance between the first and last splice on the sheets containing the splices that are pulled out at the stacker. If the distance is greater than 3 feet, adjustment in the controller is necessary.

It is estimated that automatic splicers should operate at a success rate of 98% or above to minimize the costs associated with waste and downtime. The time lost because of poor splicing can be calculated by multiplying the splicer efficiency by the number of splices in a year times the average number of minutes lost per missed splice. For example: 54,000 splices

annually at 91% efficiency with 2 minutes lost per missed splice equates to 54,000 x 0.09 x 2 = 9,729 minutes, or 20 shifts of lost production in one year.

Plants incur unnecessary waste costs when they leave excess paper on the cores. With current paper prices, 15 feet of 110" 42 lb. liner will cost the plant over $2 per splice. Consider this when evaluating the cost of leaving paper on the core as it is easy to leave that amount or more.

During audits, we often find that more than 60% of the splicers are operated in manual mode. Splicing in manual mode will generally increase waste to 0.45% vs. 0.10% - 0.12% in automatic mode when using synchronized splicing.

Tracking Splicing Performance

The first step towards reducing production loss because of splicer inefficiency is to determine why splices are being missed. Accurate reporting is essential for achieving efficiency goals and for troubleshooting if goals are not being met. Newer and updated splicers can record splicing efficiency, but if no one is reviewing those reports, problems can get out of control. Tracking can also be accomplished through a manual tracking process using a splicer log similar to the one below. This report should be reviewed by the corrugating supervisor and maintenance. Adequate maintenance is essential for proper splicer function and will have a significant impact on board quality and production.

Splicer Log

Splicer #: 3	Operator: John Doe	Date: 1 June, 20xx	Shift: Swing		
	Time	Speed	Order#	Success "X"	Missed "O"	Reason Code
1	19:25	534	234566	X		
2	19:38	545	234566	O		A
3	19:42	578	234577	X		
4	19:51	567	234577	X		

Instructions: When each splice is attempted, the Operator is to mark the appropriate number with an "X" (Success) or "O" (Missed). For missed splices, the Operator is to fill in the information requested in the table. Choose a reason from below and fill in the appropriate letter.

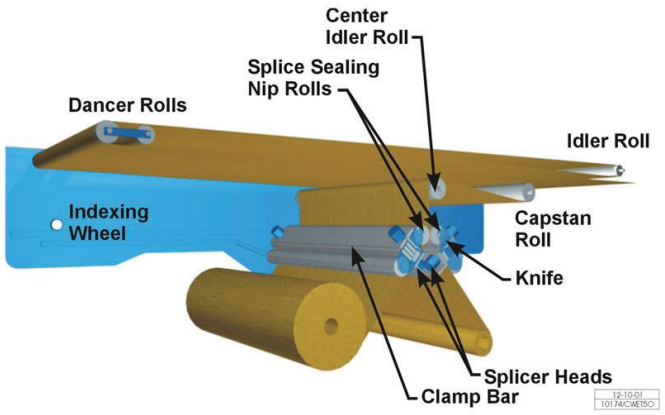
A	Damaged roll of paper	G	Clamp damage in center or edges
B	Head went in too far	H	Tape melts off on preheater
C	Dancer roll too far from home	I	Core Damage
D	Tape does not stick	J	Splice made, but broke before preheater
E	Operator error	K	Core spinning on chucks
F	Optics dirty or out of Adjustment		

Housekeeping

Build-up of debris on the preparation roller is common and can lead to significant problems making splices. This build-up is usually splicing tape that has not been trimmed completely during splice prep or the sticker that mills apply to the end of the rolls. If not cleaned periodically, friction will eventually cook this material onto the roller and it will become very difficult to remove.

Festoon

A festoon is a controlled reserve of paper that is created between stationary idle rollers and the dancer roll. The dancer roll is really a set of rollers that move back and forth the length of



the splicer creating a surplus of paper to draw on during the splice sequence. During the splice, the dancer roll moves toward the primary idle roll, allowing the corrugator to pull from this reserve of paper. This allows time for the new roll being spliced to slowly start unwinding and increase in speed so less force is exerted on the splice joint. After the splice is made, the dancer roll automatically moves back into the home

position creating a new festoon for the next splice. The amount of paper festooned in a splicer is a key factor influencing the speed at which a splice can be reliably made. Larger festoons can be created by increasing the number of dancer roll assemblies so the paper threads back and forth more to create a larger reserve of paper.

By examining the paper's edge as it travels through the splicer, it is relatively easy to see if anything is out of parallel. During operation, all edges must line up through the splicer. Offset edges indicate that the splicer or the roll stand need to be checked for parallel.

Gap Control

Since the thickness of a splice is the sum of both paper calipers, some type of gap control is needed at the singlefacer to allow it to pass through. Most singlefacers have accumulators incorporated into the loading systems of the rolls, which act like shock absorbers when the increased caliper of the web comes through the roll nips. Some singlefacers open the glue roll to metering roll gap during a splice so additional adhesive will be applied to ensure the splice will be bonded well.

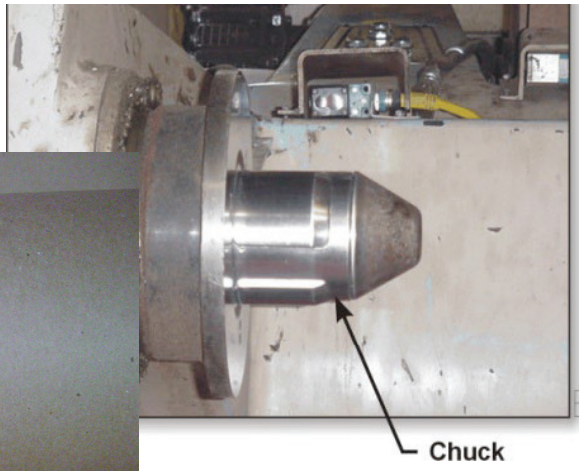
Butt Rolls

Unusable butt rolls contribute to unnecessary plant waste. Rolls that are 15"or smaller in diameter are generally considered butt rolls. Each butt roll represents approximately $125 in waste material. If each shift produces one butt roll per day, the annual plant waste from butt rolls alone would be approximately $100,000 .

Many plants have successfully implemented "half-roll" programs. In concept, if a corrugator run will leave less than 5,000 Lineal Feet of material on a roll, then another roll should be spliced in to keep the Partially Consumed Roll (PCR) greater than 5,000 Lineal Feet.

Core Issues

If an operator shafts a roll of paper and tightens the chucks so the core goes over the lip of the chuck, it will wrinkle the edges of the roll. This can cause the paper to tear, resulting in a missed splice and increased waste.



Using the Whole Roll

The expectation should be that paper is run completely off the core for all rolls. Improvements such as the installation of Wet End Controllers and automatic splicers with the Tail-Grab feature can help achieve this. Be sure that these systems are mechanically and electrically sound and are always being operated correctly. Operating procedures should detail correct settings for core diameters to allow the paper to be run to the cores and trigger the end of roll splice. Regular cleaning of the tail grab photo eye will assure functioning of the tail grab feature in the event of a tear out. Management should regularly inspect cores in the waste carts to verify that there is no paper left on them.

It is possible to achieve a 98% - 99% splicer success rate. Regular splicer audits will allow you to monitor your splicer performance and identify necessary improvements to your equipment and processes.

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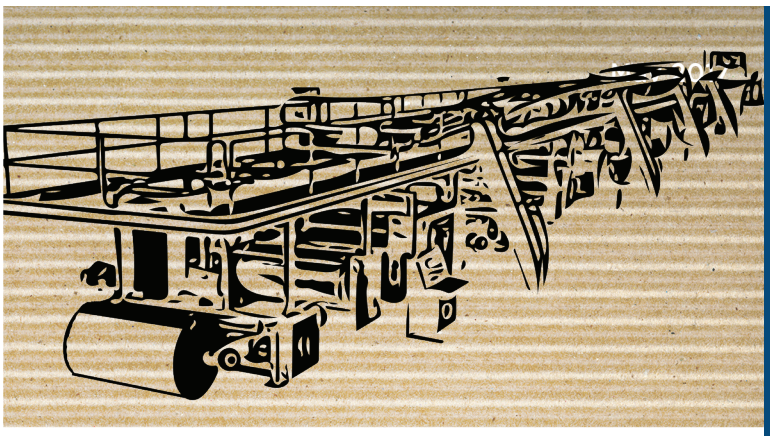

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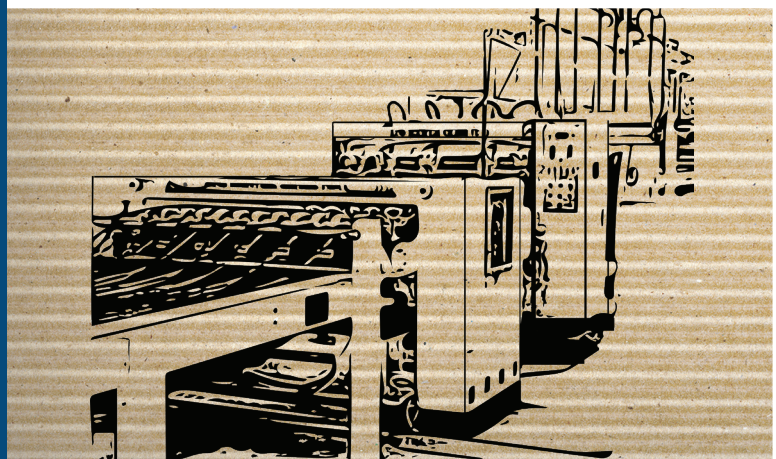

Service across your entire plant:

- Machine & Process Audits
- Technical Support
- Training
- Improvements in:
  - Speed
  - Waste
  - Consumption