The Secret to Better Corrugated Board with Less Starch

Consumers in the corrugated industry are demanding a decrease in starch consumption and not just for the cost savings. It is the thinner, weaker paper (with weights as low as 80 grams) that are used for gluing board. This type of paper requires the application of less starch, using as little starch as possible.

Add the fact that both water and heat are enemies of paper. Applying too much water has a negative effect on the smooth application of starch requiring additional drying, with all negative consequences for the quality of the paper. Another trend seen in the industry today is the fast-growing market for E-flutes and Micro-flutes. The flutes per linear meter for E-flute board are 295 (90 in inches), requiring a consistent application of a low dose of starch onto the board!

Both TAPPI and FEFCO publish informative production information with regards to industry trends and developments.

Flute designation	Flutes per linear foot	Flute thickness (in)	Flutes per linear meter	Flute thickness (mm)
A-flute	33 +/- 3	3/16	108 +/- 10	4.8
B-flute	47 +/- 3	1/8	154 +/- 10	3.2
C-flute	39 +/- 3	5/32	128 +/- 10	4.0
E-flute	90 +/-4	1/16	295 +/- 13	1.6
F-flute	125 +/-	1/32	420 +/- 13	0.8

The application of the level of starch is influenced by two factors:

1. The gap between glue and doctor roll. (especially shortly after printing)
2. The screen/profile on the glue roll.

The gap between the glue and doctor roll applies for approximately 60% of the glue application and can only be controlled by using the tightest tolerance in the manufacturing process of both the glue and the doctor roll. This is mainly determined by the materials that are used to manufacture the glue set and its durability and reliability on the long term. The best results are reported when using a stainless steel glue roll in combination with a ceramic doctor roll. Of course, both have to be according to OEM specifications, even after one or two times reconditioning. In this case, special attention has to be given to the diameter build up of both rolls, preferably with durable materials such as steel or stainless steel. The second parameter determining almost 40% of the volume of starch/glue transferred onto the corrugated board, is the screen of the glue set.

Theory behind finer screen counts

Gluing of board can be compared to the printing of board. In theory, a finer line count or finer pattern results in a more detailed print result. The exact same happens with the application of glue: a more even layer of glue is applied onto the board.

However, it is also necessary to mention that the finer the line count, in most cases, means shorter lifetime of the glue rolls is. In the recent past, very good results were achieved with screen counts of 50 l/cm (130 lpi). Beautiful even layers of glue were applied onto the board, but once the glue roll came into contact with the corrugator roll, damage occurred very easily to the fine walls of the cells, creating issues like score lines.

Together with leading companies in the corrugated industry, glue set manufacturers discovered a compromise that is currently often used while producing board, in the situation of single-facers as well as double-backers. Standard engravings of 10 l/cm (25 lpi) with a volume of 120 cm3/m2 (78 bcm) with a 45° angle and 15 l/cm (40 lpi) with a volume of 60 cm3/m2 (39 bcm) with a 45° angle both deliver very consistent and satisfying results in the application of glue.

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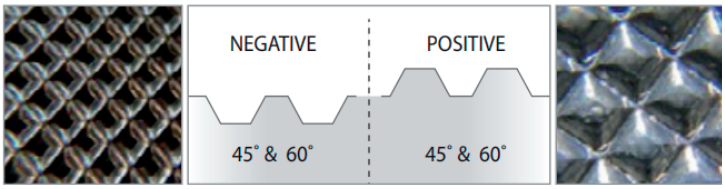
Why GLUE SETS with Accora

New Screen / Engraving Innovations: Positive Reverse Screen (PRS)

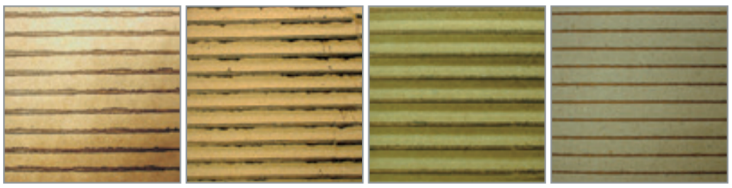
In the past, the average speed of corrugator machines was 250 meters/minute. Today, corrugator machines have faster speeds up to 400 meters/minute. This is one of the causes for taking another critical look into the capabilities of the engraving pattern of the glue roll. This lead to the development of the Positive Reverse Screen (PRS). In comparison with the closed cell structure of a conventional line pattern, the positive line pattern has an open cell structure. The designation reverse line pattern refers to the quasi inversion (positive) of a conventional line pattern; what previously constituted the base of a cup is now an upright nodal point in this line pattern. The webs become a network of channels.

Increasing machine speed is generally associated with additional glue application in the gap, due to the build-up of hydraulic pressure in the gap and the problem of aquaplaning. Another phenomenon often occurring here is that more glue is applied in the center than in the edge area. The positive line pattern can considerably reduce or equalize the build-up of hydraulic pressure. The result is a more consistent application quantity, irrespective of the speed range.

A screen that is used for the new high speed corrugators, both single-facer and double-backer, is 10 l/cm (25 lpi) with a volume of 70 cm3/m2 (45 bcm) with a 45° angle. This type of engraving eliminates the existence of aquaplaning between doctor roll and glue roll and it results in an even laydown of starch on the paper.



The glue application can be examined more closely using "iodine" images:
The two images on the right show the uniform deposition of glue using the positive reverse line pattern. There are no contact and bonding problems even in the corners. The two images on the left show the glue application using a conventional line pattern



Conventional line pattern *Positive reverse line pattern*

CONCLUSION

Optimal starch consumption and reduced volumes are only possible with a reduced gap and the absolute tightest tolerances on the doctor roll and glue roll. Furthermore, the application of glue is determined by the screen count, as well as the screen pattern. It may be worth asking us for the latest developments in this particular field of surface engravings in order to realize significant cost savings thanks to improved board quality, reduction in paper waste, less starch consumption and less energy consumption (for drying).

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For more information on Apex Accora Glue and Meter Sets please contact your local Apex representative or visit www.apexinternational.com