SELECTING HIGH GRAPHIC SUBSTRATES FOR DIRECT PRINT

BOARD CONVERTERS CAN PRODUCE SUCCESSFUL AND REPEATABLE RESULTS BY CONTROLLING SEVERAL KEY FACTORS.

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As plants step into the realm of demanding flexographic printing on combined board, they quickly learn that the formula of success contains many more ingredients than simply the proper machine. They soon realize how important the crew, ink, plates, metering system and anilox are to the success of the job. The selection of the proper substrate is equally, if not more important, to the success of the finished product.

WHEN PRINTING MULTI-COLOR PROCESS IMAGES, REPEATABLE COLOR GAMUT IS ABSOLUTELY NECESSARY FOR SUCCESS

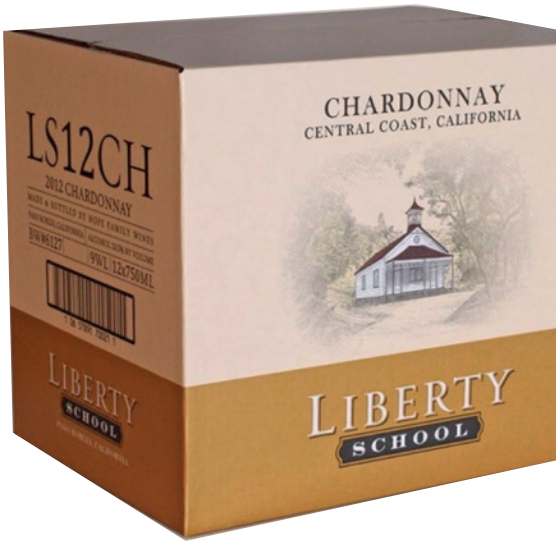
When considering substrates for high graphic direct print, we typically focus on the important factors of brightness, smoothness, and holdout. We must understand and learn to control or use each of these aspects to produce expected, successful, and repeatable results.

Brightness along with color hue has to support the graphic image. A narrow definition of the brightness and hue is necessary for repeatable color accuracy throughout the order and on subsequent orders. Ink manufacturers and pre-press

houses depend on the information provided in the press characterization test print to reproduce the exact color gamut of the customer's images. When printing multi-color process images, repeatable color gamut is absolutely necessary for success. Even slight changes in brightness or hue can dramatically affect the acceptability of the customer's color.

Smoothness is the guide to coverage. Only sufficiently smooth liners will allow the printer to achieve the sufficient coverage with the thin ink films necessary for high quality, high graphics printing. Thinner ink films promote faster drying, easier trap (printing one color on top of another) and present lower dot gain which results in sharper images.

The two most popular methods for determining smoothness are Sheffield and Em VeCo. The Sheffield method measures the amount of air that escapes under the ring of an inverted cup placed on the liner surface. The Em VeCo method determines smoothness by moving a stylus across the liner surface. While many companies use one or the other, we have found that a combination of both methods provide the most useful information.



In addition to smoothness, coverage is also influenced by the liner's free surface energy (or surface tension) and surface pH. These two factors will affect the flow and drying characteristics of the ink and may be affected by a variety of manufacturing and environmental variables. Therefore, to ensure the desired outcome, printers must test various liners under controlled circumstances with his/her own set of variables (ink, plate, anilox and metering system) to determine acceptable printability.

Holdout, the ability of the substrate to control absorption and carry the ink film near the surface, allows the ink to produce the glossy "still wet" look that many customers desire. The three major aspects of the substrate that contribute to holdout are smoothness, porosity, and pH.

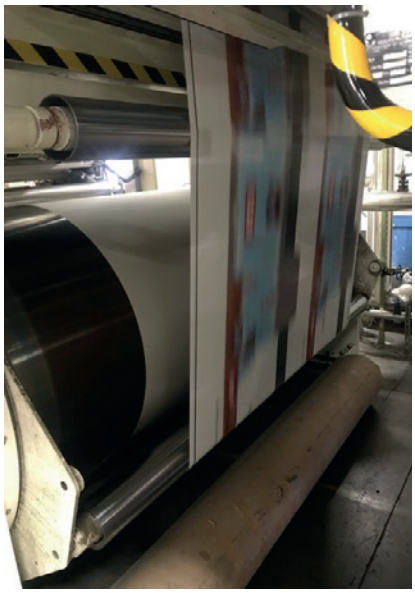
While pH has been and will continue to be discussed in innumerable venues, less attention is paid to porosity. Porosity is a measure of the air space between fibers. Unlike smoothness, porosity not only affects the surface, but extends through the liner and has a greater affect on the absorption of carriers and pigments. A substrate could have a relatively smooth surface yet the porosity may allow rapid absorption affecting the drying, gloss and other aspects of the finished product.

Often this important attribute is overlooked during selection. This is in part due to the fact that it is difficult for a box plant to measure. The surface Cobb test 60 seconds, though usually used in corrugator applications, measures water absorption and may provide useful information when applied to the surface of combined board.

Today's economic realities force us to consider other factors as well. Ease of corrugating with reduced washboarding, availability in lighter grades with good ECT, general fiber reduction, etc., all of which contribute to the printability of the board.

Corporations with business models built on forestry economics are not overly concerned with developing a strong and sound lightweight liner or board that is conducive to high quality graphics and low weight strength. There are many corrugators around the world corrugating combinations such as 26#, 18#, and 23# in C- and B-flute and very successfully printing multiple colors on them. However, this requires finely engineered liners and well-tuned and maintained corrugating equipment.

WITH THE ADVENT OF DIGITAL INKJET PRINTING, FREE SURFACE ENERGY OF THE SUBSTRATE IS COMING INTO FOCUS AGAIN



POST-CONSUMER RECYCLED WHITE TOP LINERS, USED IN FLEXO PRE-PRINT AND DIRECT PRINT, CAN OFFER ADDITIONAL MARKETING OPPORTUNITIES

Learning to properly and economically corrugate strong, lightweight materials may be a key to increased profit and reduced waste in many operations. No doubt, there is a huge market of finely printed, heavily over-constructed boxes, where margins are hidden in the wasted fiber.

Another area of interest is recycled. We are now finding recycled white top liners in grades below 30# that have high brightness (GE 78 +), fine smoothness (Sheffield 120 or lower), and even a light coating with high holdout.

There is also the relatively new group of low-brightness, clay-coated liners. These liners are based on more traditional "mottled" grades with brightness in the low 70s GE. A light clay coating provides improved gloss and holdout over standard "mottles." While the low brightness might be less desirable where a lot of paper is shown, it does not distract at all when the graphics feature large solids (particularly of darker colors). These are shaping up to present a very fine economic solution in high coverage applications.

With the advent of digital inkjet printing, free surface energy of the substrate is coming into focus again. For digital inkjet printing, surface energy is crucial, as it controls the spread of the droplet on the paper. Liners optimized for digital inkjet printing may require special flexo inks to be printed in the analog process. The latest development is clay-coated liners, where the coating is optimized for inkjet receptivity and water-based flexo ink acceptance.

There still remains little standardization in the surface qualities of liners. Printers are best served to investigate the world market and perform their own tests when exploring new high graphic substrates.

As you formulate your criteria for your testing keep these points in mind. Invite a number of suppliers to participate in your testing. Open the test to a range of substrates. The typical test may include three or four grades of high brightness clay-coated white top, two grades of low brightness clay-coated white top, and maybe four grades of un-coated white top.

Develop a controlled procedure that is a balance of "fingerprinting" and life job testing.

When you make your choices stick with them. As your operators, designers and ink suppliers work with the substrates and become familiar with their characteristics, efficiency will increase, quality will improve and waste will be reduced. ■

BROHL WELLPAPPE EXCELS AT PRINTING SIX- AND SEVEN COLOR GRAPHICS ON LIGHTER CONSTRUCTION BOARD.

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