Considerations for Printing Web Cover

Sappi Printer Technical Service

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Problem

Coated web cover grades may have greater tendency to delaminate in the units or blister in the dryer as compared to corresponding text grades. Web cover paper is particularly vulnerable to delamination and blister at the printer's roll splice and during start-up.

Description

The industry acknowledges definite challenges with web cover as compared to web text, because the operating window of web cover is usually narrower for blister and/or delamination. The tendency for blister exists because the higher fiber content has more potential to absorb and carry moisture which can trap under sealed image areas and vaporize under high heat in the dryer. Web cover weights are also more susceptible to fiber rupture or delamination in the printing units due to inherently lower bond strength as compared to text weights.

Paper strength in the Z-direction, indicating internal fiber-bond strength is measured perpendicular to the paper surface and called Z-directional Tensile Strength (ZDT). Scott Bond is another testing method to measure the Z-direction bond strength of paper. These directional strength tests best simulate the stresses simultaneously applied to both sides of the web during blanket-to-blanket impression release. As a specific grade increases in basis weight and thickness, it typically decreases in ZDT strength. High-force blanket release can increase the probability of surface rupture or delamination with subsequent dryer blister in certain web cover print applications.

Causes

— **Paper Acclimation** – Cold paper, unacclimated and exposed to a warm pressroom, will condense the surrounding air and pick-up the resulting moisture which increases the risk of blister. Outer winds of the unwrapped roll or long web leads staged in the splicer are especially vulnerable. Cold paper can be a contributing factor in high ink tack build which increases vulnerability to surface pick and delamination.

— **Moisture** – Due to higher fiber content, cover weights contain more moisture per lineal foot than text weights even though coated web cover is manufactured with less moisture on a percentage-by-weight basis. Fiber-intensive cover weights also have more potential to adversely absorb and retain moisture especially on the more exposed outer winds of the roll.

— **Form Layout and Ink Coverage** – Heavy ink and varnish coverage on opposing sides of the web will seal the sheet from both sides and trap moisture. This moisture can vaporize under high temperatures and expand, which will cause blistering.

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- **Dryer Oven Length** – Short dryers, with minimal dwell time, may demand higher web temps to flash ink solvents which can increase the rate of water vaporization and result in blister. Longer dryers, with increased dwell time, allow for lower temps, reducing the rate of vaporization and lowering internal sheet pressure which reduces chance of blister.
- **Press Speed** – Slower press speeds increase dwell time in the dryer. This increased exposure may adversely raise web temps if oven temps are not reduced.
- **Ink** – Ink strength, solvent content, wax/silicone content, and high temperature flash oils can also affect blister. High ink tack build can increase the risk of delamination.
- **Blanket Release** – High-force blanket release can increase the risk of delamination or fiber rupture in the units especially at the vulnerable cut lead-edge of a new roll splice. Fiber rupture, sometimes non-visible, can subsequently result in blister through the dryer.
- **Roll Splice Overlap** – Excessive blanket-to-blanket squeeze at an overlapping roll splice can increase the risk of fiber rupture or delamination in the units.
- **Pressroom Variables** – Other factors such as press configuration, ink/water balance, pressroom environment, roll acclimation, and storage conditions can influence results.

Options and Solutions

STORAGE AND HANDLING CONSIDERATIONS

- Properly conditioned paper runs with a broader operating window on press. Paper should be fully acclimated to pressroom temperature while still packaged in original roll wrap. Industry recommendation is 24–48 hours depending upon temperature differential and volume of paper. Ideal storage and web pressroom temperature is 68–78° F. (20–25° C.). Avoid opening rolls in areas of high humidity.
- Avoid rough roll handling and heavy clamp pressures that may damage outer roll windings or crush cores.
- Avoid unwrapping rolls prematurely as outer roll winds may adversely absorb moisture causing blister after the roll splice. Consider slabbing off a small portion of the outer roll winds just before staging a new roll for splice.

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PRESS CONSIDERATIONS

— Web pre-heaters at the infeed are often utilized to stabilize moisture and condition the paper to optimum temperature.

— The combined potential for outer-wind clamp damage, outer-wind moisture pick-up, and excessive blanket-to-blanket squeeze at the roll splice may necessitate lifting the units off impression until the splice clears the dryer. This would eliminate the risk of delamination at the roll splice and a potentially damaging blanket cylinder wrap-up.

— Reduce the risk of blister due to high and prolonged heat exposure with either lower dryer temperatures or faster press speeds. Optimum press speed is dependent upon ink coverage, oven length, and the temperature necessary to effectively flash the solvents from the ink.

— Screen-back solid varnishes to help open the surface and allow for moisture release in the dryer. Another consideration might be under-color removal or converting back-to-back solids to 90% screens.

— Any consideration to decrease blanket-to-blanket squeeze would help minimize the potential for delamination or fiber rupture and subsequent blister. If press configuration allows, remove .001" to .002" from blanket packing and add same to plate.

— Decreasing blanket squeeze at the splice can be accomplished by using 80# text “leaders” between the tail edge of the expiring roll and the lead edge of the new roll. Caution should be taken as leaders need to be cut to exact web width and staged as square as possible to avoid wrinkles at the splice.

— Consider flopping rolls to determine best opportunity for delamination resistance.

— Change to a rougher-surfaced, quick-release blanket.

— The vulnerable lead edge of the new roll splice should be lubricated with alight film of ink tack reducer or grease to facilitate low-force blanket release. The easiest and most effective application is coating the splicer vacuum bar or vacuum roll with a light film of tack-reducer solvent or ink spray just before staging the splice. The edge corners of the new splice should then be clipped off at a 45 degree angle to avoid the potential for a roll-up or fold-over.

— Consider an ink color sequence that would minimize ink tack build through subsequent units of print so that each successive unit wet-traps fresh ink over the primary image areas. When possible, run light coverage PMS colors first down, and avoid running open “wet units” in the middle of the color rotation.

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— During start-up, spray ink tack reducer on the blankets just prior to engaging units on impression.

— Start-ups, roll splices, and mill splices should be operator-observed through each unit down the press line to visually detect any potential delamination or wrap-up.

INK CONSIDERATIONS

— Shorter dryers and/or heavy ink coverage may require low-solvent ink formulations. Dark colors may be more prone to blister because they absorb and retain more heat. Consult with ink supplier regarding a low-solvent ink formulation that may flash and dry at lower heat.

— Reduce ink tack on one side of the web to compliment the natural blanket wrap and release characteristics of the cylinder stack. This stabilizes blanket release and prevents the web from S-wrapping and snapping back and forth between top and bottom blankets.

FOUNTAIN SOLUTION CONSIDERATIONS

— Minimize water transfer to the web through the print units by using effective wetting agents and reducing plate moisture as much as possible.

— Fountain solution additives, such as glycol in the alcohol substitute, can increase lubrication and reduce high-force blanket release.