Web Heatset Reverse-Side Non-Image Embossing

Sappi Printer Technical Service

877 SappiHelp (727 7443)

Problem

The printed web signatures exhibit reverse-side non-image puckering through the opposite side imagery appearing as an embossed pattern.

Description

This condition, sometimes referred to as non-image pucker or reverse-image embossing, primarily results from a combination of high-force top-to-bottom blanket release and non-uniform moisture loss/retention from image to non-image area

Reverse-side non-image embossing originates at the blanket release nip in the print unit with the heaviest solid ink coverage opposite reverse type or knock-out within an equally heavy coverage solid releasing from either top-to-bottom or bottom- to-top. The resulting high-force blanket release pulls the web non-uniformly from solid print on one side to opposing solid print with reverse type or knock-out on the opposite side. In the process of blanket release, there is maximum resistance from the opposing solid print, but minimal or less resistance through the non-image type or knock-out.

In conjunction with heavy ink coverage, the press' cylinder-stack and resulting blanket release characteristics may adversely affect the tendency towards reverse-non-image embossing. If the c-stack is aligned where the bottom blanket cylinder trails the top blanket cylinder, then the web should first release from the top blanket and slightly wrap the bottom blanket just prior to total release from the unit. The opposite release effect would be preferred if the top blanket cylinder trails the bottom blanket cylinder. If blanket release is too forceful with solid print both top and bottom, the web may inconsistently wrap on both blankets creating an s-wrap condition causing z-directional internal shear which could result in paper distortion in the form of non-image embossing or total delamination. Controlling a uniform and consistent blanket release with tension, ink tack, and ink/water balance will help alleviate print inconsistencies, paper distortion, and possible delamination.

Although a minor contributing factor, differential moisture loss/retention may have a tendency to lock-in reverse-non-image embossing. As the web passes through the dryer, the dryer heat first has to adequately evaporate moisture before effectively flashing-off ink solvents. Since the non-image areas of the paper may lose significantly more moisture as compared to the heavy coverage image areas, this moisture content differential could impede the paper's ability to uniformly re-acclimate and relax the puckered condition. Adequate re-moisturization is a key consideration in helping the dry web signatures uniformly re-acclimate.

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Causes

— Web tension between the infeed and chills is either too tight or too loose.

— Blanket height over bearer is inconsistent unit-to-unit and/or top-to-bottom.

— High-force blanket release from top-to-bottom or bottom-to-top.

- Heavy opposed solids with reverse-type or knock-outs.
- High tack inks.
- Smooth-surfaced, gloss coated paper.
- Smooth-surfaced blankets.

— High ink water pick-up resulting in excessive moisture retention in heavy image areas.

— Excessive dryer heat or slow press speeds causing high moisture loss in non-image areas.

— Inadequate re-moisturization after the dryer and chill rolls.

Options and Solutions

— Manage web tension between the infeed and chills to achieve the desired blanket release characteristic. Too much tension may result in web snap-back and circumferential misregister, whereas, too little tension may result in web-weave with lateral misregister.

— Gauge blanket over bearer height and adjust packing or blanket thickness to achieve unit-to-unit, top-to-bottom consistency. In particular, be sure that the last unit is sufficiently packed-up to prevent over-feed in preceding units.

— If the printing system requires blanket sleeves, ensure that unit-to-unit blanket compliancy averages cascade in a manner that provides optimal web control as per OEM recommendation. It is most often recommended to cascade from low to high compliancy.

— The incremental difference between the felt and wire side of the paper may effect blanket release. If possible, try turning the rolls in the roll stand to reverse the web top to bottom and compare results.

— Desired blanket release can also be controlled by variable top-to-bottom ink tack. Try running a lower tack ink set on the side of the web which should be first to release from the blanket nip.

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- Desired blanket release can also be controlled by variable top-to-bottom water control. Incrementally increase water to the plate on the side of the web which should be first to release from the blanket nip and/or decrease water to the plate on the trailing side of the web.
- Usually, heavy coverage black and cyan units are most problematic. If the press has open units, stagger the top and bottom solid ink coverage by printing the offending color in two different units of print so that the solids do not oppose each other at blanket release in the same unit of print. For instance, if the problem color is black then the top black would print in unit #1 and the bottom black would print in unit #2.
- Change to lower tack inks on both sides of the web.
- Change to a rougher-surfaced quick-release blanket to reduce the force of blanket release, especially when running smooth-surface gloss coated papers.
- Test ink for excessively high water pick-up; consult with ink supplier.
- Optimize dryer heat with ink coverage and press speed. It is an industry best-practice to run the least amount of heat possible to effectively flash-off ink solvents. This consideration will also improve retained ink gloss, minimize web shrinkage, minimize fluting, and decrease risk of blister.
- Adequately re-moisturize the web after the dryer and chill rolls. Re-moisturization will help the finished web signatures re-acclimate to a more uniform moisture content from image to non-image. As the moisture deplete non-image areas absorb more moisture than the heavy coverage image areas, the reverse non- image embossing has a better chance to at least partially relax over time. (Note: If the silicone applicator is the only method of re-moisterization, decrease silicone concentration with higher water to silicone ratio. Beware that excessive re-moisturization can cause paper surface “welting”.)