

Recently many of you may have encountered a problem with a printer who calls you describing an on-press situation of mottle with our paper. When you see the sample it appears to be “grainy” and you realize it is not the typical print mottle you have seen in the past. You then discover the printer is printing 5 or 6 colors, process and spot colors. What you are actually seeing and the printer are experiencing is a mechanism known as “back trap mottle” (BTM).

Back trap mottle is caused by small-scale nonuniformities in the absorptivity of the paper. The nonuniformities lead to differential ink film split as paper passes through the press, which causes variation in the color of the print. The lack of color uniformity is noticed visually as a mottle.

To understand the BTM mechanism a little background of ink/paper interaction is needed. Inks are made up of pigments, resins, and solvents (vehicles) and other additives. The sole purpose of the solvents is to help this mixture of materials to flow from the ink train to the paper. Once that’s accomplished, the solvents need to get out of the way to let the resins cure and bind the pigments to the paper surface. One way this happens is for the ink vehicle to be absorbed into the paper surface. “Ink setting” is the term used to describe this process, and it begins immediately as the ink comes in contact with the paper surface—even as it is passing through the later units of a press.

As the press is made-ready, a portion of the original ink film on the paper is redeposited or “backtrapped” on the downstream blankets. Backtrapping is normal and necessary in multicolor offset printing and indicates that the absorptivity of ink/paper system is fast enough to get good ink transfer and ink trap, but not too fast as to cause picking or piling problems.

Backtrap mottle occurs when the absorption of the ink vehicle is not uniform. Instead of a uniform ink film back split, the downstream blankets split the ink unevenly to the point where it’s severe enough to cause noticeable color variation.

While paper plays an important role in BTM, it is also important to understand what effect the dynamics of the press system might contribute to the problem. To determine this, a design of experiments (DOE) was undertaken on a 6-color Heidelberg Speedmaster. Key press variables were evaluated to determine how they impacted BTM. The variables studied included:

- ✓ Blankets – cast vs. buffed
- ✓ Ink – High vs. low VOC inks
- ✓ Speed – 4,000 iph vs 10,000 iph.

1. Using a buffed blanket resulted in higher back trap mottle. When the cast blanket was used back trap mottle decreased.

2. The use of a Low VOC ink contributed or resulted in higher back trap mottle in comparison to the high VOC ink.

3. As speed decreased, back trap mottle increased. Many times a printer will slow the press down believing they are helping a situation. The results were contrary to old thinking. The crew should speed the press up if possible.

4. Changing color sequence also helps. In printing a job a particular color appears to be back trapping swap that color with a color from a later unit. The further down the offending color prints the less likely for back trap to occur.

5. Back cylinder pressure, if too great, can increase BTM.

6. 5 and 6 color press systems are more prone to BTM than 4 color because of the additional opportunities for ink film splits.

7. Cyan ink or light PMS inks if placed at the beginning of the color sequence can be more prone to causing BTM. Moving these colors to the later print units will reduce BTM.

In summary, using a cast blanket, higher press speed, lower back cylinder pressure also with a high VOC ink can reduce the effects of back trap mottle.

By offering the above information, a printer may be able to reduce back trap to an acceptable level. You will find many printers do know what back trap is but will not call it by name. They may refer to the problem as “mottle” or a “grainy appearance.”

