Technical Information

MOTTLING

Mottling is a very complex issue. The following measures should help to overcome any problems which may arise.

Print with mottling

Print without mottling

Definition of the term

mottled – adj. blotchy, speckled.
The term mottling refers to printing irregularities in the intensity of colour and printed images, which appear speckled. It appears most often in printing machines with at least 4 printing units and can be seen in both single-colour areas and especially in overprints. Mottling most often appears when printing the colour cyan. This is because cyan is printed with a relatively low film thickness and the colour is usually printed on the first print units. If the ink is absorbed irregularly by the cartonboard, this leads to mottling.

The phenomenon of mottling can be divided into two groups:

- Back-trap-mottling
- Hydrophobic-mottling (mottling caused by fountain solution)

Back-trap-mottling

- During offset printing, there is surface contact from one printing unit to another between the sheet and the rubber blanket. During printing, the colour film on the rubber blanket splits and about half of the colour on the blanket is transferred onto the cartonboard.
  On the following units, a small part of the ink film already transferred onto the cartonboard splits again due to contact with the rubber blankets of the subsequent colours. If the ink film was not able to set off homogenously onto the cartonboard because of irregular off-setting, the subsequent rubber blankets will lead to irregular back trap on the ink film. The result will be different thicknesses of the remaining ink film on the sheet and the image will appear speckled.
- Therefore, mottling is mostly noticed with colours printed on the first units at the beginning of the printing sequence. Please note that back-trap-mottling can never appear in the last print units. In order to check whether back-trap-mottling has occurred, the following units should be removed and checked, to see whether the image appears speckled. If this is the case, the error of back-trap-mottling has been identified.

Hydrophobic-mottling (mottling caused by fountain solution)

- Residue of the fountain solution used in offset printing can disturb the ink set-off of the cartonboard and cause an error which looks similar to the speckled appearance of back-trap-mottling. This fountain solution residue comes from the non-printing areas of the printing plate and the spaces between the dots.
  Therefore, this kind of mottling is usually most common in the last printing units and never appears in the first unit.
- To establish where this speckled print comes from, the same test as for back-trap-mottling should be performed. The units following the mottled colour should be removed. If the speckled print remains, then it is due to hydrophobic-mottling, since the fountain solution residue did not allow a regular colour absorption.
- If in doubt, alternatively, hydrophobic mottling can be recognised by shutting down the previous units, since then the mottling colour does not print out speckled.

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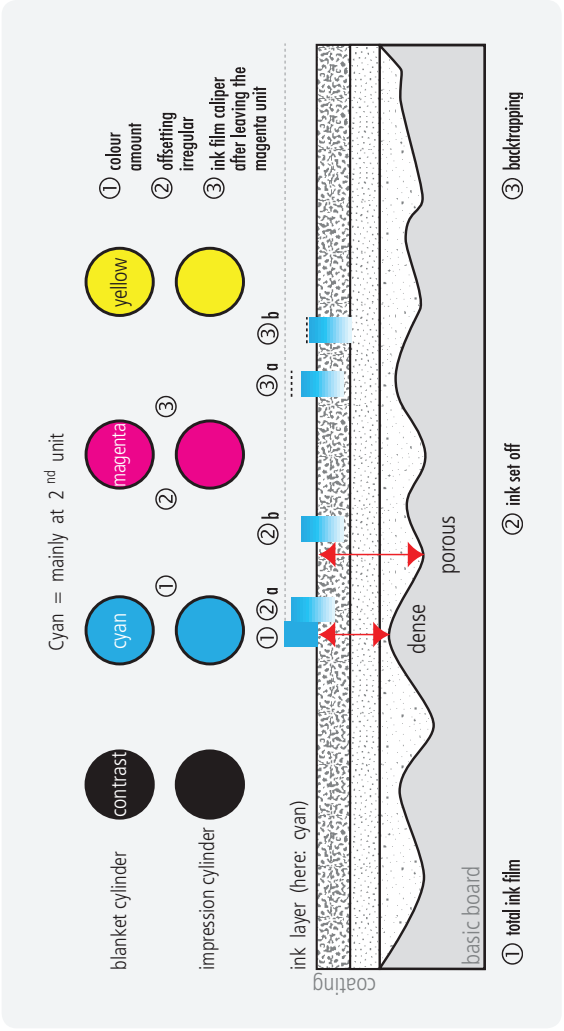
BACK-TRAP-MOTTLING

**This mottling effect often occurs due to a combination of several unfavourable factors.
One factor is rarely responsible for causing the mottling effect.**



Problem	Solution
Ink Back-trap-mottling occurs most often in colours in the first printing units. Quick off-setting inks and badly matched colours make mottling worse. In addition, the colour sequence plays an important role in the appearance of mottling.	▪ Adapt the colour sequence to the mottling, that is, move critical colours as far to the end of the sequence as possible ▪ Ensure that ink speeds coincide Ask advice from the ink manufacturer ▪ Basic rule: dots before solid areas when planning units ▪ Replace quick off-setting inks with anti-mottling inks Add transparent white to reduce the ink set-off
Rubber blankets Old and porous rubber blankets cause back-trap-mottling.	▪ Change the existing blankets ▪ Replace with another type of blanket ▪ Change the rubber blanket underlay
Cartonboard A strongly structured formation (sheet formation) of the carton-board can lead to irregular off-setting and back trap of the ink due to microscopic bumps and indentations. Here, where the coating is thinner and more compact, the ink is offset differently at the top of the bumps than in places (indentations) where there is a higher quantity and less compact colour. Unwanted migration (wandering) of the binder to the coating, caused by drying problems in the cartonboard machine, can also lead to irregular off-setting and cause back-trap-mottling.	▪ See SOLUTIONS for ink ▪ Use replacement material (possibly from another cartonboard machine) ▪ Ask the technical service of the cartonboard manufacturer

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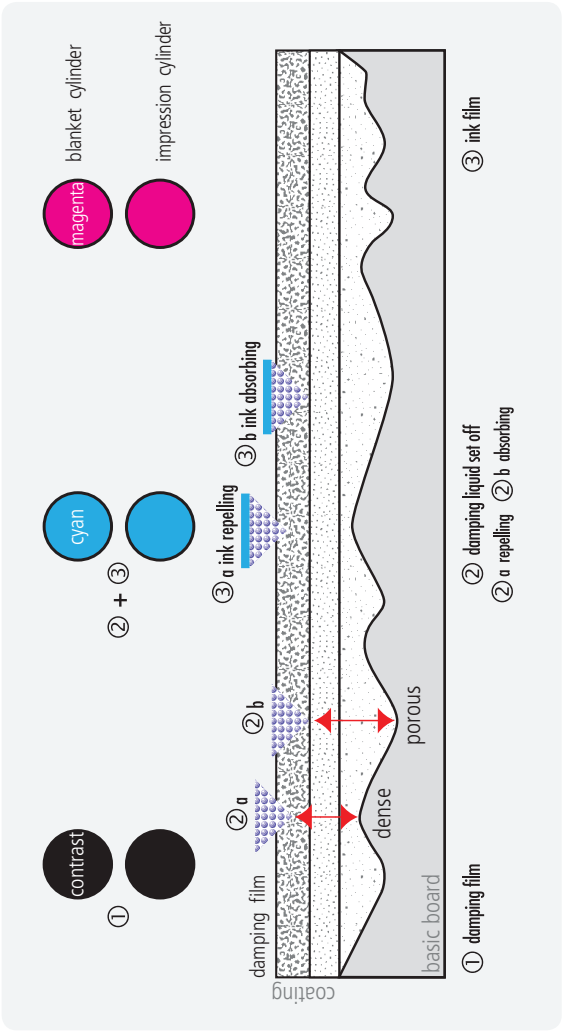
HYDROPHOBIC-MOTTLING



Problem	Solution
Printing machine Machines with five cylinder systems (R-800) are more prone to hydrophobic-mottling.	▪ Change to another type of machine
Ink/Fountain solution Blue colours with high area coverage can cause mottling because the human eye is more sensitive to variations in these colours. Hydrophobic-mottling appears when ink cannot adhere to the cartonboard surface because of the fountain solution residue from previous units. Incorrectly adjusted fountain solution favours the appearance of hydrophobic-mottling.	▪ Adapt the colour sequence to the hydrophobic-mottling, that is, move critical printing plates with a high amount of fountain solution and low ink coverage as far to the end of the printing units as possible ▪ Reduce the fountain solution to the scumming limit
Rubber blankets Old and porous rubber blankets cause hydrophobic mottling.	▪ Change the existing blankets ▪ Replace with another type of blanket
Cartonboard Unwanted migration (wandering) of the binder to the coating, caused by drying problems in the cartonboard machine, can lead to irregular absorption of the fountain solution and cause hydrophobic-mottling. If the coated cartonboard surface is compacted a lot in some places by friction (rubbing during rolling off/on), visible as a highly-glossed area on the unprinted cartonboard, this can lead to insufficient absorption of the fountain solution in these places.	▪ See solutions for „ink" ▪ Use replacement material (possibly from another cartonboard machine) ▪ Change the type (eg. another coating) ▪ Ask the technical service of the cartonboard manufacturer