

Ghosting, contact yellowing, appearance of glossy/matt spots in sheetfed printing

We see the term ghosting as the generic term for two different phenomena occurring in offset printing, i.e. contact yellowing and the appearance of glossy/matt spots.

Ghosting

Actually, the origin of both phenomena can be put down to the same mechanism. In oxidative drying, linseed oil and other vegetative oils or alkyd resins react with oxygen in the air. During this oxidative interlacing of the vegetable oils, small amounts of cleavage products – gaseous aldehydes and ketones – are generated which are also characteristic for the typical odour of drying sheetfed offset ink. While the inks dry in the pile, these cleavage products escape from the printing ink layer of the front side of the printed sheet and penetrate into the unprinted under side of the sheet lying above. This may cause reciprocal reactions with different effects.

Contact yellowing

If the cleavage products react with the paper coating in such a way that yellowing occurs on the back side of the sheet, we call this contact yellowing. There, the yellowed areas of the perfecting side are exactly face to face with the printed motif of the front side. One reason for yellowing is a reaction which leads to a decomposition of the optical brightening agent in the paper coating – as a consequence, the original colour of the paper will be revealed again. Another known reaction is the one between the components of the paper coating and the cleavage products which results in the formation of yellow compounds. In the past, the use of casein in the paper coat was a typical example for a risk of contact yellowing.

The treacherous thing about contact yellowing – which is already indicated by the term ghosting – is the fact that yellowing generally may happen in every sheetfed offset printing job and that it is not possible to predict whether the effect will actually occur or not. Consequently it is not possible to determine any absolutely safe procedures to avoid it, but nevertheless the following mentioned hints may be helpful:

- Contact yellowing is particularly strong, if the front page is printed with very heavy, sharp-edged printing motifs - wherever possible, this side should be printed in perfecting.
- It is only logical that high ink film thicknesses produce larger amounts of cleavage products – therefore it is helpful to avoid over-inking and the use of UCR or achromatic composition.

- Furthermore, a higher probability of contact yellowing must be reckoned with if the oxidative drying process progresses particularly fast – here it helps to work without IR drying and additional drying agents in the ink or dampening solution.
- Inline-dispersion coating is forming a "protective layer" in just a few minutes, which makes it more difficult for the gaseous cleavage products to migrate into the reverse side of the sheet lying above.
- Avoiding very long times in the pile as well as occasional aeration of the pile have proved to be favourable as well.

If contact yellowing has occurred despite all precautions, this effect cannot be reversed. Coating with oil-based varnishes can somewhat reduce the contrast due to the coloration of the print varnishes and thus make the contact yellowing effect less obvious.

Appearance of glossy/matt spots

The appearance of glossy/matt spots is also caused by the reaction between the cleavage products of oxidative drying and the components of the paper coating. In this case, however, the result is not a visible change of the colour of the paper, but invisible changes of the paper coating. Their effects are only seen in perfecting on the back side. At the "pre-treated" spots, the ink shows a changed ink setting, ink acceptance or drying behaviour. As a result there are regional differences with regard to the gloss. The print then often seems to be matter in the changed areas – yet occasionally increases in gloss are seen as well.

In addition there are reports about the occasional occurrence of glossy/matt spots in coatings with dispersion and UV varnishes. There have even been some cases where glossy/matt spots were observed with the application of glue for film laminating.

The risk factors and avoidance strategies with regard to the occurrence of glossy/matt spots are the same as the ones already described for contact yellowing.

Where glossy/matt spots have occurred in printing, it is often helpful to apply an additional coating with dispersion varnish. The gloss of the varnish layer levels the gloss differences of the ink layers lying below. Yet glossy/matt spots show the same behaviour as a real ghosting effect: their occurrence can neither be predicted, nor can any avoidance measures be determined with any success guarantee and nor can overprint varnishing in all cases make the glossy/matt spot effect disappear.