PRESS VARIABLES

Matthew Boulton College

THE LIMITED ACCURACY OF THE PRINTING PROCESS

Colour reproduction in the graphic communications industry is a complex process of division and reassembly. It starts with a continuous tone original. Four sets of screened separations are made, plated and printed onto paper using cyan, magenta, yellow and black inks. Then the reproduction is compared with the original for accuracy in colour and other details.

By looking at the following problems it is almost a miracle that the goal of matching the reproduction with the original is ever achieved. The density range between the whitest paper and the darkest ink printed on that paper will rarely be over 1.80 when measured with a reflection densitometer. However, the difference in density of an original between the brightest highlight and the darkest shadow will frequently exceed that density range. Consequently, no matter which press, paper or inks that are used, it is not possible to reproduce, the density range or shades of colour of the original on the press sheet.

Four colour reproduction starts with a continuous tone original, but the separations are screened, this conversion is necessary because the press can only print a uniform layer of ink, i.e. either it prints solid ink or leaves the white of the paper. The shades of the copy are broken down into various size dots, proportional to the tones in the original. It is difficult to match the converted halftone print with the continuous tone original. The dots are made tiny, with the hope that when printed the entire area is seen as an integrated continuous tone image rather than individual dots.

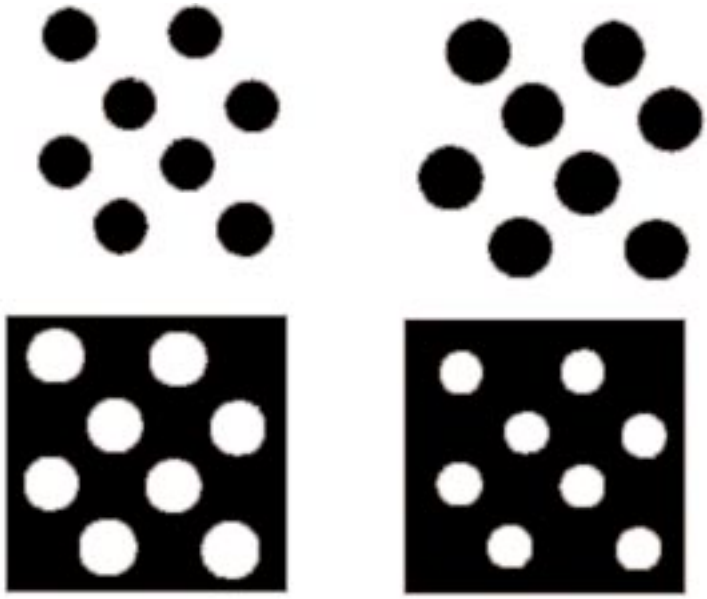
The process inks have deficiencies or contamination. This means they do not reflect or absorb colours in the correct proportion. When the ideal cyan ink is measured with a densitometer using red, green and blue filters, the ink should record the highest density reading with the red filter and zero density reading with the green and blue filters. Similarly the ideal magenta ink should record its highest density with the green filter and the yellow ink its highest density with the blue filter and zero readings with the other two filters. In practice, however, when the actual process inks are measured they produce different results showing unwanted densities in the other filters.

It is not possible to subtract unwanted colour from the individual inks when they are printed alone. The unwanted colour can be subtracted when more than one ink is printed to produce secondary and tertiary colours. For example when magenta and yellow are printed together to produce a red, a lesser amount of yellow contamination is subtracted from the magenta. This is a basic example of what colour correction is and why it is needed.

Four colour process reproduction is a compromise, because thousands of colours seen in originals have to be reproduced using only four inks. These four inks are printed on white paper in such a way that every spot of the reproduction reflects the same amount of red, green and blue light as the original. This is made even more difficult by the printing problems of dot gain, ink trapping and paper quality.

Colour Profiles For The Printing Press
Once a colour profile has been created for the monitor, scanner and proofing device, it can also be downloaded into the printing press. This will control the ink and damping.

Dot Gain
This may be defined as the condition which causes a thickening of the halftone dot on the printed sheet. Dot gain can be caused by a number of different factors, both on the press and during platemaking.



Generally the dot gain in the press room could be caused by the following:

- Excessive ink
- Inadequate water supply
- Excessive pressure
- Loose blanket
- Incorrect roller settings

Dot gain and slur is less of a problem with compressible blankets as they can compress without lateral distortion at the printing nip.

Ink Water Balance
An excessive ink film tends to fill in halftones, as will an over reduced and emulsified ink. A correct ink water balance is necessary to avoid this problem. Alcohol dampening systems produce a better defined halftone dot.

Platemaking
Loss of contact whilst exposing a negative working plate will cause light to creep and hence dot gain, as will over exposure of a negative working plate. Photo scum in the background of the plate may cause dot gain as will a poorly desensitised plate. In comparison poor vaccum contact and over exposure of a positive plate will result in a dot loss. Sensitising of the background areas can aslo be caused on the press by casein or similar compounds being transferred to the plate surface from the paper.

QUESTIONS ON PRESS VARIABLES

(1) What is the density range between the whitest paper and the darkest ink?

(2) Frequently the density range of the original _____ the range of the printed sheet.

(3) Why are continuous tone originals (photographs) screened?

(4) Printing inks are pure colours, TRUE/FALSE.

(5) Colour profiles can be created for the monitor, scanner and proofing device, what other areas of the printing process can profiles be used to control quality?

(6) Define the term dot gain?

(7) Give an example of how dot gain can be caused on the press?

(8) Give an example of how dot gain can be caused during platemaking?