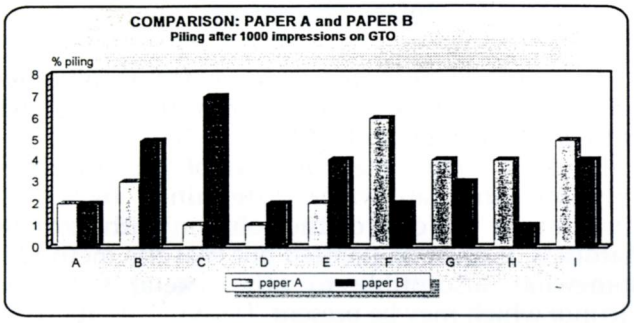
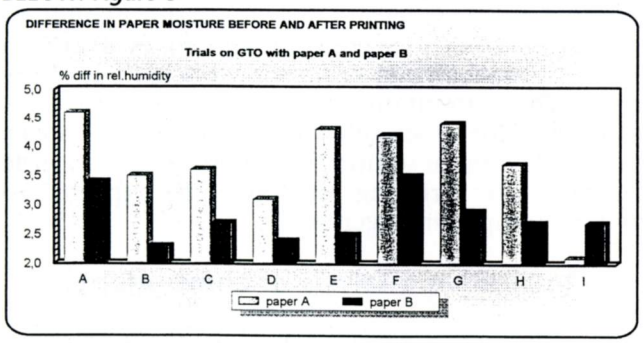


ABOVE: Figure 7

BELOW: Figure 8



changes in press settings and using the same ink and dampener feed. Prior to changing from one to another dampener, the fountain was emptied of all solution and the new solution was run-in on 200 sheets to ensure ink/solution balance. The blanket was washed down, using distilled water and cleanliness was checked densitometrically by arriving at a control zero reading.

The paper grades tested were:—

Paper A: uncoated wood-free offset; 18% PCC as filler; pH ~ 9.2.

Paper B: uncoated, wood-free offset; 12% natural chalk as filler; pH ~ 8.6.

Paper C: matt-coated, wood-free offset; calcium carbonate-based coating; pH ~ 8.6.

Paper D: matt-coated, wood-free offset; china clay-based coating; pH ~ 6.8.

Comparison between presses

The nine fountain solutions which were previously analysed were tested on the Gestetner and single-colour GTO and evaluation of the piling tendency was made using paper A only.

Figure 5 shows that piling is extremely dependent upon the type of fountain solution employed and that the GTO generally produces less piling than does the Gestetner, this depending upon differences in fountain systems, blanket hardness and degree of grinding, ink/fountain balance, *etc.* Interestingly, the solution E, containing alcohol, exhibits the greatest difference between presses. Solutions which contain alcohol are not generally recommended for Gestetner presses.

Comparison between chalk and china clay

Papers C and D were tested on the Gestetner using solutions E and G, which caused severe piling in the previous test. The main intention of these trials was to study the fundamental difference in surface chemistry between chalk and china clay and its bearing on rather aggressive fountain solutions.

Figure 6 displays a clear difference in piling between the two papers, resulting in virtually no piling at all for the clay-coated paper grade and severe piling for the calcium carbonate-coated grade. Furthermore, both an increase of fountain solution concentration (doubling of the recommended concentration) and increased edition (from 1,000 to 2,000 impressions) led to an increase of piling for paper C. These results typify the fundamental difference between the reactivity of chalk in an acidic environment and the inertness of china clay.

Comparison between papers A and B

The nine solutions were tested on the GTO on the two uncoated, calcium carbonate-filled paper grades A and B.

Figure 7 shows that a considerable difference in piling is obtained, depending on which solution was used. Moreover, the piling tendency cannot be related to the paper grade being tested; the differences in piling being enormous between the two grades for one and the same solution, *e.g.* sol. C, F and H.

To obtain an idea of the absorptive characteristics, *i.e.* aggressiveness of the different dampening solutions towards the paper substrates, measurements of the relative humidity of the paper prior to and after printing were carried out.

Figure 8 shows that moisture absorption of the solution into the paper is greatly dependent upon the solution being used, although paper A generally absorbs more solution than paper B. This is very likely due to the higher specific surface area of PCC as compared to natural chalk. No correlation could be found between moisture absorption and surface tension, pH or piling tendency.

Effect on print density

The ink/fountain balance is greatly dependent upon the composition of the fountain solution and can be affected by *e.g.* type and amount of tensides, excessive alcohol, *etc.*

Printability

General comments as to the print quality and ink/fountain balance whilst printing with each of the nine fountain solutions (dampeners) on paper A were given by the printer as per the following list.

fountain solution Nr.	general commentary on print quality and runnability by the printer
A	good print result; acceptable I/F-balance
B	little high dot-gain; acceptable I/F-balance
C	bad print result; emulsified (waterlogged) ink, bad I/F-balance
D	good even print result; tendency of toning (needs increased fountain feed)
E	uneven, mottled print; tendency of waterlogging; bad I/F-balance
F	good print result; good I/F-balance; however piling which after 500# effects print quality
G	uneven print-out; bad I/F-balance; blanket whitening after a short time
H	acceptable print result; bearly acceptable I/F-balance
I	totally unacceptable print quality; hickies, waterlogged ink, bo I/F-balance

As one can clearly see, a considerable difference in print quality results, depending on which fountain solution is implemented. On one and the same