blankets of the offset press, which is difficult to remove. In extreme cases, this can lead to excessive plate wear and eventually image blinding.

To gain a deeper understanding of the chemical interaction between fine paper and fountain solution during the offset process, the following comprehensive study was carried out. Hopefully, this work will prove helpful in the development of fountain solutions which are more favourably tailored to modern paper.

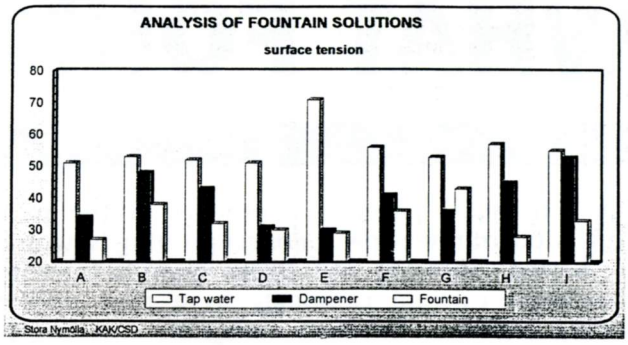
Blanket contamination: still remains one of the main sources of irritation and discontent for the printer. The cause of blanket contamination can be any of the following:—

- ❑ Dust, cuttings or dried ink particles which result in hickeys or dusting.
- ❑ Insufficient surface strength of the stock, which causes picking.
- ❑ Excessive use of anti-setoff powder, causing an even deposit on mainly the first blanket in non-image areas during the second run. Often referred to as linting or non-image piling.
- ❑ Inadequately worn-in or harshly brush-cleaned molleton covers can cause fabric fibres to loosen and fasten to the plate and subsequently onto the blanket.
- ❑ Chemical reaction between the paper filler or coating pigment and the fountain solution, which can cause an even build-up of the resulting precipitate to occur in the non-image areas of one or several blankets.

The latter-named phenomenon is often diagnosed by the printer as a linting problem and this is partly correct; it can, however, often be incorrectly interpreted as a dusting problem, having the same cause as hickeys — *i.e.* loosely attached fibres and filler/coating pigment adhering to the blanket. Typical for the deposit of a precipitate is that it is extremely difficult to remove from the blanket surface, whether using polar or non-polar solvents. This 'linting' represents quite a new problem area and finding the cause can prove to be extremely complicated even for the most experienced printer with experience in printing chemistry.

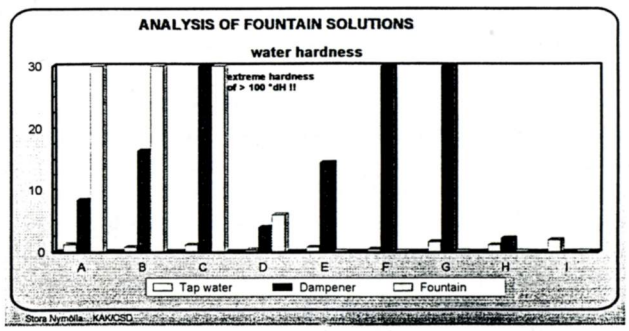
To be able to predict which chemical reactions can be expected, here is a list of a number of chemical and physical properties of chalk:—

- ❑ relatively insoluble in earth-alkaline salts;
- ❑ solubility increases with declining pH value;
- ❑ reacts with most inorganic acids and a host of organic acids to form calcium salts of these;
- ❑ reacts with acidic salts, *e.g.* aluminium sulphate, to form calcium salts;
- ❑ rather strong alkaline buffer capacity to pH of 8.5;
- ❑ particle form mostly irregular spherical;
- ❑ slightly more abrasive than china clay (except PPP — precipitated calcium carbonate).



ABOVE: Figure 3

BELOW: Figure 4



Analysis of fountain solutions

Eight undiluted fountain solutions, their respective dampening solution or dampener (fountain solution diluted to dampening strength) from the first printing unit and corresponding tap water were collected from different printers. A fountain solution, referred to as 'control' or sol. D, was formulated by the author, bench-marking the non-reactiveness towards calcium carbonate.

The analyses carried out on all samples included:—

- ❑ pH value
- ❑ conductivity
- ❑ surface tension (static)
- ❑ hardness (°dH)

Furthermore, simple qualitative analyses (spot-tests) were carried out to determine the type of acid used and whether gum arabic was present. The determination of acid type was restricted to phosphoric, citric and acetic acid.

In the following diagrams, the fountain solutions are shown, with no reference made to their brand names, excepting D, which is the author's control solution.

Figure 1 illustrates the significant difference in pH of the various fountain and dampening solutions, as compared to their corresponding tap water, all of which being more or less acidic. The difference in pH value between fountain solutions and tap water gives an idea of how well the buffering capacity of the solution is. In not one case can this be regarded as well-controlled, or one could anticipate that the buffer system of the solutions has been upset in some manner during printing.