

# The concept of matt coated paper

As the term itself indicates, matt coated papers are papers with a matt surface, in other words, a low degree of gloss. To achieve a matt appearance, coarse pigments are used in the coating layer, preferably multi-edged particles that help disperse light diffusely in all directions. Surfaces that reflect less direct light, appear more matt. This is why calendering is not used in the production of matt paper (with the possible exception of a matt or soft calender), which has the additional effect of a usually higher paper thickness and stiffness than can be achieved with glossy papers.

The problem is that there is no exact definition of the concept "matt" and this makes it impossible to draw fine lines. Around the world, all sorts of coated papers are being produced with a specification of "matt", regardless of rather large differences in gloss and smoothness. Some of these papers are distinctly matt, with a Tappi 75° gloss value<sup>1)</sup> of around 10%, while others are slightly glossy, with gloss values of up to 50%. It only goes to show that "matt" does not always mean "matt" in the proper sense of the word, but is used to include "demi-matt" as well.

Demi-matt paper, also known as "satin" or "silk", is a compromise between high-gloss paper and truly matt paper. It is a paper with a silky surface, which favours readability. It is less coarse than matt papers, which makes it perform somewhat better in terms of ink rub resistance, and it lends itself fairly well to surface finishing.

To produce a classic matt quality paper with good printability characteristics, the surface of the paper should combine a high macro-smoothness and evenness with a low micro-smoothness in order to obtain the diffuse reflection which is essential to the overall matt appearance of the paper. The advantage of the higher specific volume should be maintained.

The properties mentioned above will basically result in a lower degree of rub resistance – the high macro-smoothness and low micro-smoothness causing increased static and dynamic friction resistance because of the larger contact surface, coupled with a stronger coherence of micro-irregularities.

<sup>1)</sup> Gloss Tappi is a method for measuring the specular gloss of paper at 75° (15° from the surface of the paper) according to the method Tappi T 480. This method is widely used as a partial measure of the surface quality and shiny appearance of coated paper.

High micro-roughness of a paper leads to a higher surface porosity, which in turn results in faster ink absorption. If the ink strikes into the paper too quickly, the diluting agents may take some of the resin with them. This can leave the pigments on the surface of the ink film with very little resin to protect and hold them. In other words, the decreased presence of binders will make the ink film less rub resistant.

This adds up to two possible causes for reduced ink rub resistance.

## Adjustments

To improve the degree of ink rub resistance, a number of measures can be taken, all, however, to some extent influencing the essential characteristics of matt paper and all producing certain negative side-effects.

The production of a matt coated paper with a high degree of surface smoothness and outstanding printability and processing properties proves all in all to be a big challenge for the paper producer.

One possibility, for instance, is adjusting the pigments. One of the most obvious ways to produce a matt coated paper with the desired degrees of macro-smoothness and micro-roughness, is to use a coating layer with a high percentage of rather coarse calcium carbonate. On the other hand, reduction of the calcium carbonate share in order to produce better rub resistance performance, significantly compromises the overall matt appearance of the paper.

Partially replacing the calcium carbonate with aluminium silicate adds to the gloss and increases the danger of gloss stripes at the slightest friction or touch. An additional problem is that, due to the high whiteness of calcium carbonate, it is very difficult to obtain a certain light-fast whiteness.

It should, incidentally, be understood that there is no one-on-one connection between the chalk content of the paper and the rub resistance of various types of papers.

It is also possible to make adjustments to the binders in the coating layer. The synthetic or thermoplastic binders in the paper surface basically produce the smallest amount of lasting surface deformation if the volume of binders, is say,