Smart Media for Ink Jet Poster Printing

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Abstract

From the end users point of view, printing on an inkjet media in most cases isn't the final stage in the production process. Depending on the application the prints must e.g. be laminated and afterwards mounted on foam boards. Each step in the production of the final product generates extra costs and can result in problems requiring a reprint of the original, thereby generating more extra costs. A new approach in reducing risks and costs is presented in this paper.

Introduction

The first generation of ink jet photograde media for water based inks was mainly based on polymeric type receiving layers coated on resin coated paper. A typical photograde ink jet paper is shown in figure 1.

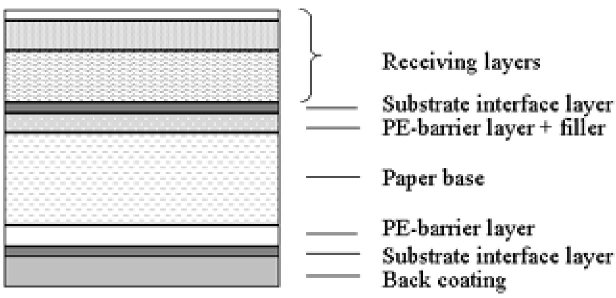

Figure 1 . Typical photograde ink jet media

The receiving layers evolved from mainly gelatin based coatings in a first generation to polyvinyl alcohol based coatings. Both types of coatings had their advantages and disadvantages. Gelatin being well known from the traditional silver halide based photographic coatings is a gelifiable polymer and therefor easy to coat. Next to that gelatin is known for its protective properties that shield the dyes against ozone and light fading. On the other hand this polymer has a slow drying characteristic which doesn't allow a lamination step shortly after printing.

The polyvinyl alcohol based coatings have faster drying characteristics, but the coating process requires more attention and technical skills. Also the protective properties of polyvinyl alcohol are not as good as those of gelatin, although still acceptable.

Due to the evolution of ink jet printers printing speeds new problems showed for the polymer based receiving layers. The absorption rate of the inks into the polymeric layer is too slow and as a result the ink volume applied in a first pass isn't absorbed into the layer yet before the next load of ink is sprayed on top of it. In that case physical parameters like surface tension of the inks produce image artifacts like coalescence.

For both types the mix of polymers and additives defines the final print quality that can be achieved. The stability, price and image quality, still make polymer based photograde media attractive for a large number of users.

Microporous Media

A new type of receiving layers, the so-called microporous layers based on inorganic fillers e.g. aluminum or silicium containing components don't suffer from this slow drying. These materials are also called instant dry media because of their fast drying properties. Typically absorption of droplets is 100x to 1000x faster than the polymeric layers. Figure 2 shows the difference in drying times between a matte macroporous type, 2 microporous type and a polymeric type-receiving layer.

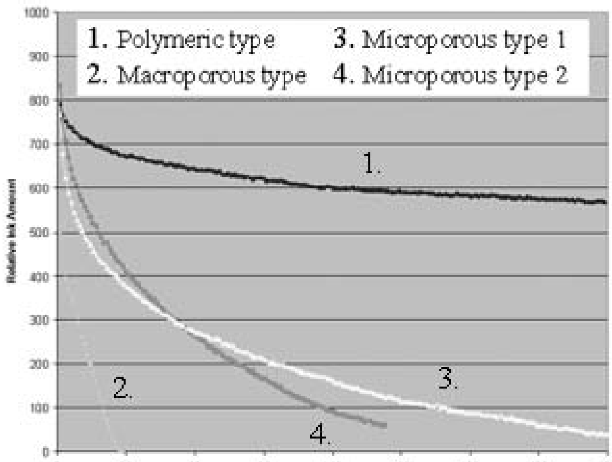

Figure 2. Drying properties of different media types

These fast drying properties make microporous media ideal for instant lamination after printing.

A well known disadvantage of microporous media is their poor stability, mainly due to ozone disintegration of the dyes. This can be overcome by using pigmented inks but then the images are vulnerable to scratches. To overcome this problem and to protect the prints for dirt they also have to be laminated.

Smart Media

Based on the previous statements it can be said that microporous media still need improvements to make them even more attractive to customers.

As a first step on NIP 18 a paper[1] was presented that showed the differences in location of the colorants in the layer between 3 different microporous media. Figure 3 shows this difference.

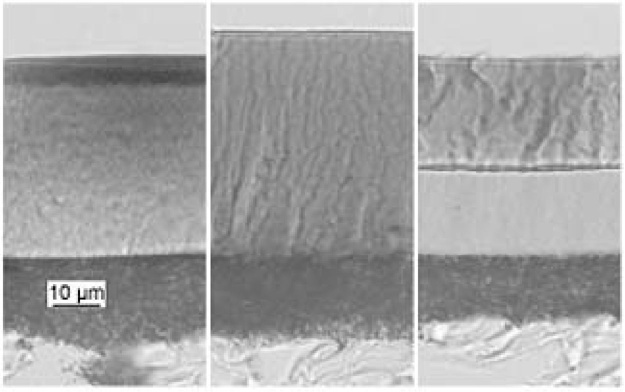

Figure 3. Location of the colorants in 3 microporous media

Keeping the largest concentration of the dyes into the top coating drastically improves the gamut of the printed images. The result is an ink media combination with a colour gamut that matches closely the gamut of prints on polymer based media.

As mentioned before this doesn't avoid microporous media from fading due to the ozone presence in the surrounding air, so shielding the dyes from this ozone is still required. The most logical step of laminating has some danger and requires a highly skilled operator. Air enclosures, folds, delamination and even destruction of the print are possible causes that require a customer to reprint and laminate the job. Most failures are introduced at the point where laminate and printed paper come together. In such case the end user has to reprint the original but also looses the laminate, which increases the loss.

To overcome these possible causes for a bad production a new concept has been investigated. The basic approach is to build the sealing properties into the receiving layers. After printing the finishing step can be reduced to just feeding the printed paper into a hot laminator to seal the surface and shield the dyes. Several concepts can be applied, but the most successful tested so far was to build in a heat activated polymer.

The risk of damaging the printed papers is reduced dramatically since no air enclosures, delamination or folds in the laminate can occur. The finished product shows all positive aspects of a laminated photograde media, like waterfastness and shielding against ozone. There also wouldn't be a need for a skilled lamination operator, which saves costs.

Conclusion

A new material concept and a method have been presented that give the end user the advantage of having to use only 1 single material that results in waterfast and light- & ozone stable prints. Compared to the normal laminating process, the chances of production failures are reduced dramatically, which results in higher productivity and higher profit.

Aknowledgements

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References

1. M. Graindourze et al., Proc. NIP 18 pg. 515 (2002)

Biography

Leo Oelbrandt is the technical manager heading the application department for inkjet media and poster printing systems of Agfa's Graphics Division in Mortsel Belgium. He studied chemistry and graduated as an industrial engineer in electronics and computer engineering at the IHAM College in Antwerp. He joined Agfa in 1984 and built up experience in R&D projects for medical and graphical applications. As a project manager on R&D ink jet projects and since 1999 in the more market oriented application department he has more then 10 years of experience and several patents in different areas of the inkjet printing technology.