Development of FUJIFILM Quality Thermal Photo Paper: A New Thermal Photo Printing Material

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Abstract

We developed a new thermal receiving paper having improved image quality and handling. Compared with conventional thermal printing papers, the new paper has achieved better image quality (5% increase in whiteness; 20% increase in gloss). The new paper resulted in reducing the antistatic property of the surface resistance to approximately 1/1000 compared with previous papers. This property will help prevent the freshly printed thermal photo prints from clinging and achieve a significantly easier handling. The application of our coating technology based on the aqueous dispersion system hardly uses organic solvents. Therefore, during its production, a significant amount of environmental pollution shall be reduced.

Introduction

Among various photo printing methods, D2T2 (Dye Diffusion Thermal Transfer System), with its convenience and the capability of producing high quality images, have been used in many purposes such as home-use printers, ID card makers, and printers for recreational purposes. To transfer the dye efficiently with the heat of the printer heads, insulation of the printing papers is an important property in the D2T2 system. We have developed a receiving paper production technology that based on our simultaneous aqueous multi-layered coating technology. The technological combination with the photo base material technology also enabled us to offer high-quality printed images that have smooth color reproduction, higher maximum density, enhanced whiteness, and high degree of gloss. The printing paper also can be handled with ease. This paper reports the detail of our new receiving paper.

Photo1 D2T2 Thermal Photo System "Princiao"

Photo2 The Receiving Paper and the Ink Ribbon

Development of the New Receiving Paper

Composition of the Layers of the New Receiving Paper

Conventional receiving papers comprise an insulation layer by attaching coating papers to void films, and receiving layer is coated above it. The newly developed receiving paper consists of an intermediate layer, insulating layer, receiving layer above a support material laminated with polyethylene on the both sides. Fig.1 shows the cross-section of the new receiving paper.

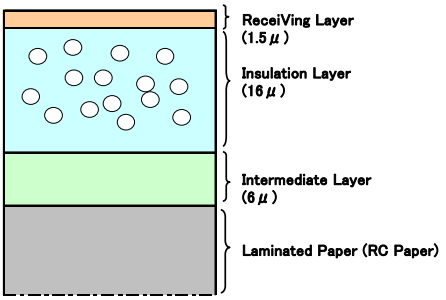

Fig.1 Cross section of the new paper

Receiving layer

The receiving layer creates images by receiving the dyes diffused from the ink ribbon. High receptiveness of the dyes is required, and the receiving polymer must be able to be supplied by aqueous dispersion material so that the receiving layer can be formed by aqueous coating.

Fig.2 shows a vinyl chloride-based material is favorable to achieve high maximum density.

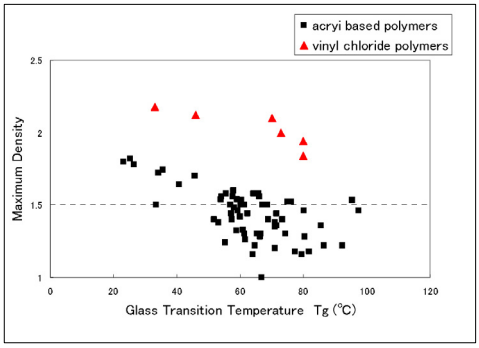

Fig.2 Influence of components and Tg of the receiving polymers

Insulation Layer

To achieve a high level of insulation, using air as insulation material is preferable since it has a low thermal conductivity. The air inside the void film assumed a similar role in conventional papers. In the new paper, we made the hollow-body polymer particles containing air in them.

The insulation layer, consists mainly of hollow-body polymer particles and a binder, prevents the heat from diffusing and prompts the transfer of the dyes from the ink ribbon to the receiving paper.

Photo3 Hollow-body particles

Intermediate Layer

In the D2T2 system, the printing is done by heating sandwiched between the thermal head and platen roller. Elasticity is therefore required for the printing paper. The new paper acquired this property by introducing an intermediate layer having SBR as its main component, since SBR has a low glass transition temperature and is an elastic material.

Support

Dual-sided resin coating paper (or RC paper) used in the silver salt photo color paper is adopted as support material for the new receiving paper.

Performance of the New Receiving Paper

The new receiving paper has resulted in a favorable yellow-less whiteness with high brightness and high gloss. (Table 1)

Table1	Previous Paper	New paper
Whiteness(ISO)	87%	92%
Gloss (45°reflection ratio)	73%	92%

On the back of the support material, a conductivity layer is coated for anti-static purposes. A dramatic drop of electrification is therefore achieved by the decrease of the surface electrical resistance rate to about 1/1000 compared with traditional printing paper. Conventional printing papers have a large amount of electrification. Therefore, after the photos were being taken out from the collector, jogging of the photos was a troublesome job because of the bad slip. The new paper has solved this issue.

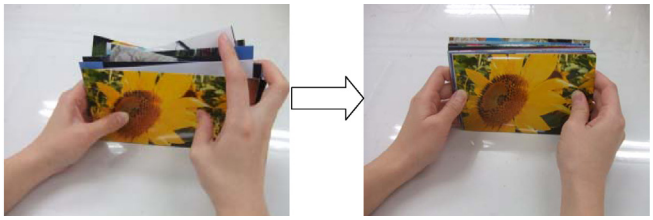

Photo4 Effect of improvement of electric conductivity on working efficiency

Conclusion

We have developed a new D2T2 printing paper having improved whiteness and gloss. In addition the electrical conductivity is decreased, and that achieves a significantly easier handling. By forming all the coating component layers on the base material with organic solvent-free aqueous coating liquid, we also dramatically reduced the emission of environmental pollution during the production the printing paper.

Author Biography

Shigeaki Ohtani received his MS in applied chemistry from Kyoto University in 1985. Since then he has worked on the research and development of photographic materials at Fujifilm Co..

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