APPLICATION INFORMATION

FULACOLOR ADDITIVES FOR HIGH-SPEED INKJET PAPERS

A member of ALTANA

Contents

Introduction

Inkjet development

The development of high-speed inkjet printers is opening up new markets for inkjet printing as a result of the ability to produce short print runs of documents in full color and with variable information.

These features are especially suited to a number of markets previously dominated by traditional offset printing, including:

- Brochures
- Labelling
- Packaging
- Magazines
- Décor paper
- Trans-promotional

Substrate requirements

These developments pose a number of challenges to the paper supplier in that:

- uncoated papers do not deliver the image quality required
- silica-coated papers deliver excellent quality, but the cost is too high for most new markets
- calcium carbonate papers cost less, but the image quality is usually not acceptable

Note

To ensure the best appearance and full functionality, please open in Adobe Acrobat.

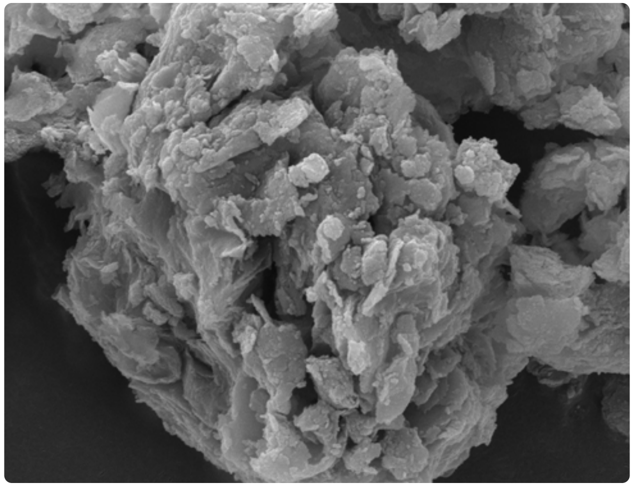
FULACOLOR pigments

FULACOLOR coating pigments have been designed to combine image quality needs with the cost effectiveness required in paper coatings. When correctly dispersed and formulated, these pigments can be:

- used alone or as a partial replacement for silica to provide a cost-effective alternative without a significant loss of image performance
- combined with calcium carbonates to produce a significantly improved image color density whilst maintaining the low-cost base

SEM image of FULACOLOR particle

Magnification (x 40000)

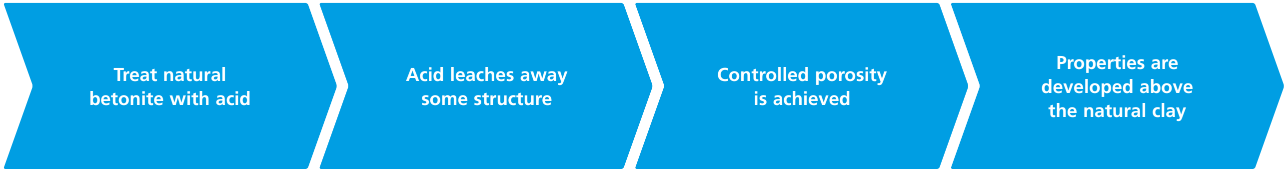


4 µm

G.01

FULACOLOR is produced from the natural mineral bentonite by controlled treatment with acid, otherwise known as an “acid-activated clay”:

Production process of FULACOLOR



G.02

Inkjet printing performance

Color intensity

The intensity of colored images and text is a primary consideration in inkjet technology markets. The high porosity, surface area, and liquid absorption capacity of **FULACOLOR** ensures that ink molecules are fixed close to the coating surface to produce a clear, bright, and vivid image. The high absorption strength ensures that the image is permanent and cannot be easily rubbed off. When correctly formulated, paper coatings with **FULACOLOR** pigments deliver images of enhanced intensity across the color spectrum. In addition, the images are superior to uncoated or standard calcium carbonate-coated papers when either dye or pigment-based inks are used (G. 03). The prints are also comparable with silica-coated papers.

Standard inkjet images for color evaluation

Uncoated paper

FULACOLOR coated paper

G. 03

Line bleed/sharpness/clarity

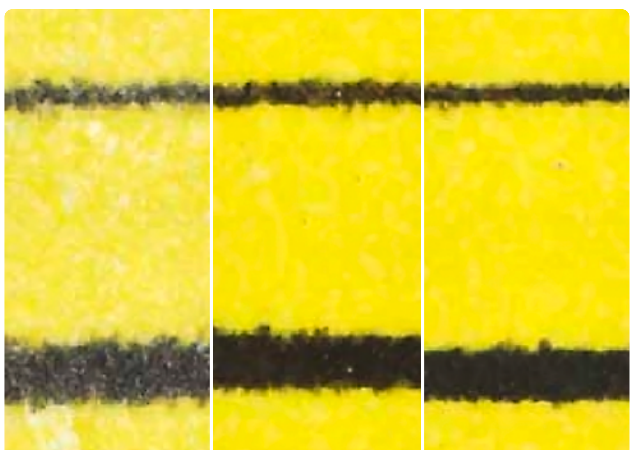
A further requirement of inkjet coatings is to provide sharp, clear, and uniform images and text resulting in prints with excellent definition, readability, and clarity. As shown in G. 04, coatings that contain **FULACOLOR-XW** produce a sharper image than uncoated papers. When also combined with a calcium carbonate, it is possible to achieve a line sharpness and image uniformity comparable to that delivered by high-cost silica pigments.

Drying time

As the printing speed increases, the ink drying rate becomes ever more critical. Rapid drying is essential to prevent problems of image smearing.

A combination of controlled particle size distribution and porosity control ensures that coatings with **FULACOLOR** pigments have the required pore structure to rapidly remove the ink solvent from the surface whilst holding the colored ink molecules at or near the surface and so that they remain bright and clear (G. 05).

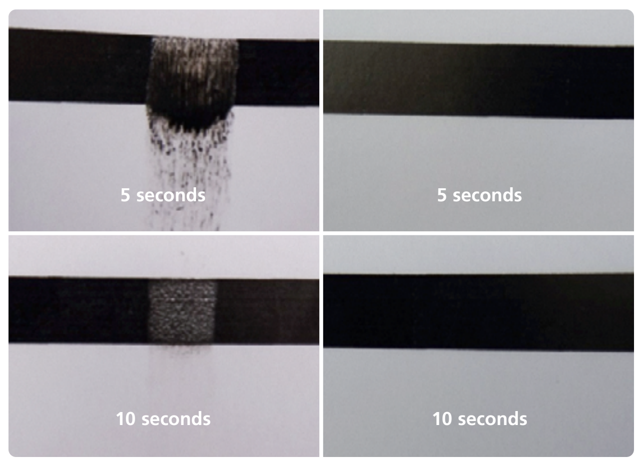
Sharpness evaluation images



Uncoated paper | FULACOLOR-XW coated paper | FULACOLOR-XW + $CaCO_3$ coated paper

G. 04

Improvement on ink drying time with FULACOLOR-XW



Uncoated paper | FULACOLOR-XW coated paper

G. 05

Formulating with FULACOLOR

To achieve the optimum performance of **FULACOLOR-XW,** complete dispersion is required. For best results, **FULACOLOR** should be dispersed in water at a pH of 7.5. The following procedure for incorporation is highly recommended:

- Weigh the quantity of water required for the desired solids content into the mixing vessel
- Add a caustic reagent to adjust the pH value in the range of pH 7–8 (usually sodium hydroxide is the preferred reagent)
- Add **FULACOLOR-XW** in several aliquots, allowing time for complete dispersion after each addition before the next
- As the solids increase, the viscosity will also increase, which may necessitate reducing the aliquot size
- Once **FULACOLOR-XW** has been added and fully dispersed, the other formulation components can be added
- The pH may require adjustment at the end for the relevant application

FULACOLOR dispersion

Note:
The amount of water is guided by the equipment available, the coating method, coat weight, etc. The size of the individual aliquots and the dispersion times depend on the equipment.

Other additives such as wetting and dispersing agents, defoamers, optical brighteners, and biocides can be added as required.

Cost effectiveness

Coating materials costs

The inkjet performance enhancements and handling improvements may be achieved without incurring the high material costs associated with silica coatings. Combinations of an appropriate ground calcium carbonate and **FULACOLOR** pigments can provide a particularly cost-effective solution. Typical basic formulations to achieve this performance are shown in Table T. 01.

Formulation	Dry Parts	
	A	B
FULACOLOR-XW	20	40
Ground calcium carbonate	80	60
Polyvinyl alcohol[1]	10	15
Cationic fixative[2]	10	10

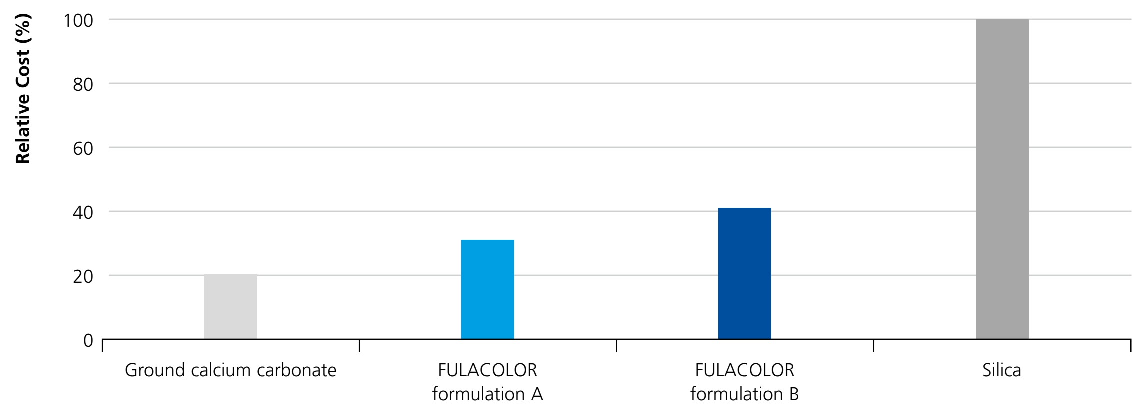
[1] Partially hydrolysed

[2] PolyDADMAC fixative required to fix anionic dye based inks

T. 01

Formulation A will offer highly cost-effective performance suitable for most duties, whilst formulation B will offer better performance for demanding applications at a slightly increased cost (G. 06).

Cost of inkjet formulations relative to silica



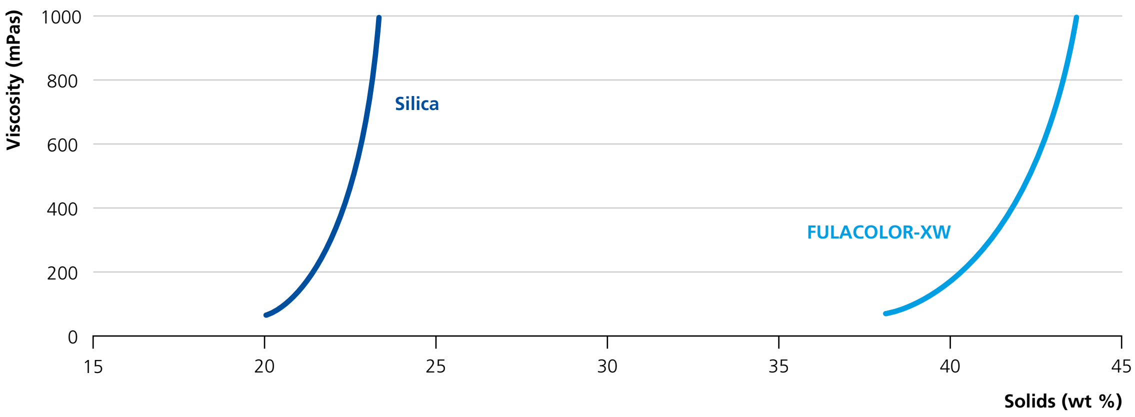
G. 06

Rheology of FULACOLOR dispersions

FULACOLOR pigments have been designed to facilitate the preparation of coating slurries to a high solids content relative to silica-based coating colors (G. 07).

This not only improves the quality of the coating but can increase the coating rate and significantly reduce the drying load of the coated paper, thus delivering major benefits with respect to coating production costs.

Viscosity as a function of slurry solids



G. 07

Benefits of FULACOLOR

The carefully controlled chemistry, particle size, and porosity of **FULACOLOR** pigments deliver many benefits to the user, including:

- Fast ink drying
- High print definition
- Highly cost-effective performance
- Excellent color density
- Minimal color/ line bleed
- Minimal strikethrough
- High coating slurry solids capacity
- Compatibility with all inkjet ink types

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