

PRE-TREATMENT FOR DIGITAL PRINTING: APPLICATION METHOD IS THE KEY SUCCESS FACTOR!

Preliminary questions:

- ✓ Which pre-treatments are suitable for digital textile printing in the various application technologies?
- ✓ Which application methods offer: while saving auxiliary chemicals, water, and drying energy whose finishing results are comparable to foulards?
- ✓ What kind of methods of application does digital textile printing have?

Chemical manufacturers only marginally consider these questions. Instead, the chemical manufacturers understandably only highlight their unique inkjet pretreatment range, which allows for applying tailor-made pre-treatment for different articles and application processes.

The pre-treatment recipes published in brochures and websites describe foulard applications, alternative systems such as Rotor Spray, Foam, or other systems are mentioned without going into detail.

The global demand for digital textile printing is high. Still, chemical manufacturers must recognize the ongoing disruption between the various application techniques and rely on them in good time.

This paper will deal with **rotary spray technology**

Introduction

With the advent of inkjet printing, the concept of printing has changed significantly. The spraying process is gaining importance. The strongest drivers for the development are the savings in resources, time, and money, as well as the increased in flexibility

The pre-treatment of digital textiles represents a significant challenge.

*A summary of a joint research project by ITCF Denkendorf, DITF-MR, and TITV Greiz^{***}:*

"However, the interplay of printing inks, textile material, type of fabric and chemical pretreatment of goods is complex. Even the smallest change affects the printed image. Print resolution and edge sharpness, color depth, color fastness, and the printing behavior are the properties that must be mastered to achieve reproducible good print results."

Compared to the foulard, which applies with high pick-up, rotor spraying is a gentle, non-contact finishing, which is of the utmost importance for knitwear. These reasons require a move away from traditional application systems towards new, efficient, and highly accurate non-contact application methods for pretreatment for inkjet printing.



Rotor-disc spinning



Rotor-disc carrier

The spray process for inkjet preparations is an application technology. The rotor spray technique applies textile auxiliaries with finishing results comparable to those of foulard application. It is exciting because of its precise, non-contact dosing and additional important properties that no other technology can match. Additionally, it applies with high productivity, without wasting water and chemicals, and reducing energy consumption, especially drying energy.

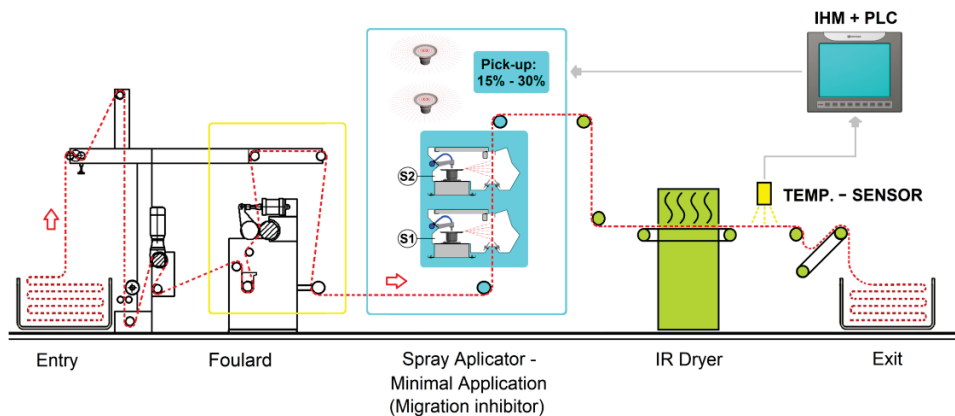
Pre-treatment for digital textile printing with spray technology

Spraying units are the central components of a coating system.

The essential feature of this system is the non-contact application - wet on wet or wet on dry - of the chemicals on moving textile materials using rotating spray devices. The pre-treatment (coating) with migrations inhibitors is one of the most critical steps in functionalizing surfaces for digital printing to produce high-quality properties.

Spray applications in the low angular velocity range are a significant advantage of aerosol application because the number of droplets and their kinetic energy are minimal. As a result, they cannot penetrate through the fabric but are deposited on the surface of the textile goods. Therefore, textile materials can be finished in such a way that their sides have different finishing results (double-face effects).

Spray equipment installed at the entrance of stenter (frame) one-sided application with two spray units.



With the spray process – with inkjet preparation – the application is one-sided, it can be regulated and controlled. The spray equipment could be installed Stand Alone or at the entrance of a stenter (frame).

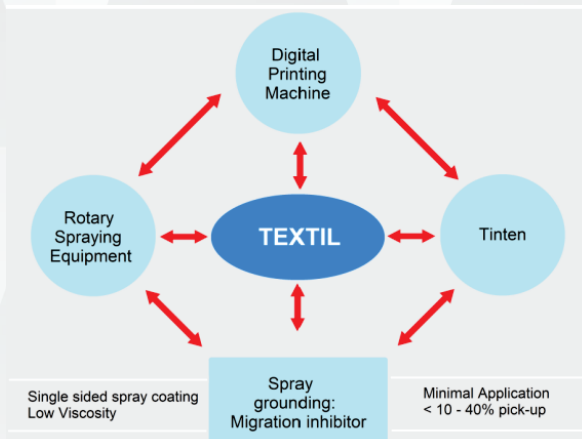
Proper pre-treatment is always the pre-requisite for good printing

Some printing plants still have quality problems in the pre-treatment of the goods, which can only be seen after printing or fixing. Without professional pre-treatment - no flawless digital printing! The guidelines for correct pre-treatment according to fiber and ink combinations are in the article by S. Geitel*.

Interrelationship of the components

Suppose developers of pre-treatment chemicals and users do not understand the interactions between the molecular substances of the migration inhibitor and the spray parameters (angular speed of the spray rotor, angular spraying, aerosol size, and impact speed).

Then, developing a fine chemical would not be possible because the interaction between the ingredients under the influence of centrifugal force, the size of the aerosols, and impact speed change the sum of their individual properties.



Dyeing and finishing chemist must interpret and understand the frequently mentioned diversity of migration inhibitors for pre-treatment.

The following contribution by Sylvia Hane clears this theme brilliantly:**

*"A preparation product that achieves excellent results in terms of color depth and brilliance in reactive printing does not necessarily have to show comparable good results on polyester. Products that show outstanding results on heavy substrates may not be suitable for light articles. Another important criterion for a product from the core range is the application process. **Not all products are suitable for the same process (e.g., foulard). Different viscosities and rheological properties are needed.**"*

Fashion printing

*If the fashion print is produced digitally, **fast response times represent a significant advantage in all fashion-oriented industries.***

Previous testing of samples is essential for bringing new products to market, ensuring the properties that formulators and end users expect. Pretreated samples ready for digital printing with spray technology is very handy. The samples of the quality printing fabric are evaluated, allowing to make quick decisions related to product launches.

To know how

The difference between wanting to achieve something and the process of getting there is called competency. Up until now, good print quality has been based on the experience of developers of inks and pretreatment chemicals and users.

The know-how of spray technology for non-contact applications is based on suitable migration inhibitors, auxiliary chemicals, application methods, and their interaction. However, the exact relationship between these parameters is developed by each company and is, therefore, a trade secret.

To achieve desired results of printing is necessary to ensure the fabric is correctly prepared for digital printing. So, when considering pre-treating material for digital printing, it's essential to work with a partner who can help you make the right choices and understand the constraints that affect textile printing.

Summary

The spray method is effective when the pre-treatment liquor has been correctly determined according to the fiber and ink combination, with the appropriate rheological properties and setting of the spray parameters.

Competitors with the spray technology are emerging who rely on it in good time and do not need to consider established traditional application methods. However, if you have the necessary textilechemical expertise and the appropriate spraying systems, you can set yourself apart from the competition here. Unique opportunity to develop a disruptive business model!

Technical literature

- (1) Stephan Geitel: Druckvorbehandlung für den Textildruck“ – Wissen – Inkjet Praxis*
- (2) Sylvia Hane: „Modulares Hilfsmittel-System für die Inkjet-Präparation“
Textilplus Ausgabe 09/10-2017*
- (3) ITCF Denkendorf, DITF-MR und TITV Greiz - „Beste Druckergebnisse im digital Textildruck“*

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