GETTING THE BEST FROM DIGITAL TEXTILE PRINTING

Digital inkjet printing is a well-established and growing print technology that has had a transformative effect on the textile industry, but there is still a way to go, believes Sylvia Hane

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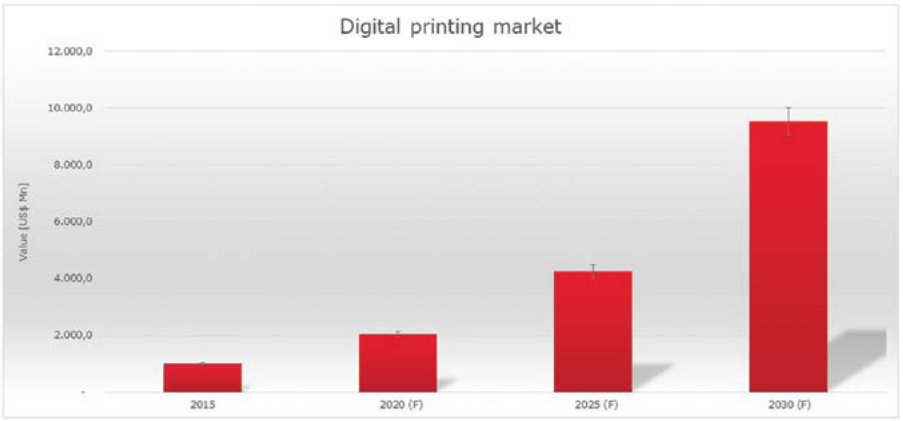

Forecasted growth of the digital inkjet market up to 2030

The growing relevance of inkjet printing has put forward increasing quality requirements. At the same time, the demands of eco-friendly textiles and sustainable production processes have been booming within the textile industry.

Several years ago, TANATEX Chemicals – an international organisation that sells, develops and produces chemicals for the textile industry – created the TANAJET range for inkjet preparation, and is still continuously adding new products to fulfil new market trends and consumer demands. This article aims to discuss the general inkjet processing differences and explains the TANAJET product range for this application.

PROCESS DIFFERENCES

Digital inkjet printing has had a transformative effect on the textile industry. The ability to deliver higher levels of flexibility and efficiency has revolutionised manufacturing processes. So far, a tremendous growth of production volume with inkjet printing has been seen. A growth of around 500% in production volume with inkjet printing is forecasted for 2030.

As digital inkjet printing and its advantages have been established in the market, the focus has been shifted to the optimisation of cost, quality and ecology – factors that have gained more and more importance in the market.

In order to match the brilliance, colour intensity and fastness level of conventional fabric printing, digital inkjet printing requires a lot of energy, water and chemicals. Similarly, to conventional printing processes, the complexity of inkjet printing is huge. The different fibres and articles, ink classes and quality requirements all have varying needs in terms of processing and machinery equipment. This results in differences regarding energy, water and chemical consumption as well as the necessary processing time.

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INK CHEMISTRY

In order to provide a rough idea about process differences on a high level, a differentiation between several kinds of applied ink chemistry will be discussed.

When applying reactive inks to cotton, viscose fibres, silk or wool, an additional application step to apply migration inhibitors, urea, other salts and various further chemicals in alkaline pH medium is needed to prepare the textile for the ink fixation. This step is necessary to stop ink migration and reduction as well as bleeding.

After inkjet printing and drying, a steaming step with saturated steam is mandatory, followed by post scouring. This requires a lot of chemicals and is energy-, time- and water-consuming.

A similar process route is necessary for applying acid inks on polyamide, wool or silk and its blends. Different chemicals are applied and a pH setting to acid conditions is

Ink class	Fibre	
Pigment	All fibres	+ Flexible to be applied on various fibres + No post scouring needed +/- Preparation of fabric needed, depending on article and end use - Limited rub and wash fastness level
Sublimation	Polyester	+ Design transfer via contact heat + No preparation of fabric needed + No post scouring needed - Only suitable for polyester
Disperse	Polyester	+ Brilliant and deep shades + Fixation with dry heat +/- Preparation of fabric needed, depending on article and end use +/- Post scouring is depending on article
Reactive/ Acid	Cotton/Viscose Wool/Silk Polyamide, polyamide/elastan	+ Brilliant and deep shades + High fastness level - Preparation of fabric needed - Dye fixation with saturated steam - Efficient post-scouring is required

Pros and cons regarding application of different ink classes

Type	Products	Fibre type			
		Cotton/ Viscose	Polyamide	Polyester	Wool/Silk
Thickeners & migration inhibitors	TANAJET M 4019	•	•	•	•
	TANAJET Prep RL	•			
	TANAJET A 4100		•		•
	TANAJET Prep MHP	•	•	•	•
	TANAJET EP 4034	•	•	•	
	TANAJET EP 4038	•	•	•	
Shade depth enhancer	TANAJET Wet R	•			•
	TANAJET Wet A		•		•
	TANAJET Wet PT		•	•	
Anti-reducing agent	TANAJET Oxi R	•			•
Urea replacement	TANAJET Fix UR	•			•
	TANAJET Fix UA		•		•
De-foamer & deaerator	TANAJET Air NF	•	•	•	•

Overview of the TANAJET range, which offers flexibility with economical formulas to achieve quality standards.

needed to prepare the textile for the ink fixation.

When using disperse inks for polyester, the preparation step as well as post scouring is not necessary in all cases, depending on the ink system, end-use and fastness requirements of the printed textiles. Fixation is possible with dry heat instead of steaming. For sublimation printing, the process route is again different. Having printed the design on transfer paper with specific treatment, the design is transferred to polyester fabrics by contact heat with calendar. No further process steps are needed.

Pigment inkjet printing has received a lot of attention over recent years. It has several advantages compared to inkjet printing with reactive, acid and disperse inks. Firstly, pigment inks can be flexibly applied on various fibres. Secondly, the ink fixation is done with hot air – specific fixation conditions depending on individual ink formulation. This means no post scouring is needed. However, an after treatment might be necessary for higher wash and rub fastness requirements. Deeper shades and higher fastness levels can be achieved due to the newly developed inks and preparation products.

INKJET PREPARATION PRODUCTS

In order to achieve the best results for textile printing in terms of brilliance, colour depth and contour sharpness, TANATEX is targeting quality-oriented manufacturers with its TANAJET range. All products have been tested in the digital printing lab at TANATEX's headquarters in Ede, the Netherlands. The lab also develops recipes for customer fabrics that serve as the basis for preparation at the customer's actual printing equipment.

"TANATEX is targeting quality-oriented manufacturers with its TANAJET range"

The TANAJET range consists of a core range of products that are necessary to achieve a good inkjet print result. The supplementary range contains products which can enhance the end result even further. All products can be combined as required.

TANATEX takes on its environmental responsibility for products, production and processes. To achieve ecological standards, most products in the TANAJET range are Oeke-Tex, ZDHC, Bluesign and GOTS (Global Organic Cotton Standard) certified.

THE TANAJET RANGE

The TANAJET core range includes all thickeners and migration inhibitors. Various products have been developed to provide the best printing results depending on the substrate and the ink chemistry used. The two key products in the core range are TANAJET M 4019 (M stands for 'multiple') and TANAJET Prep RL (R stands for 'reactive' and L for 'low viscosity'). The highly concentrated thickening agent TANAJET M 4019 is recommended for inkjet printing with reactive and acid inks. The low application quantity produces extremely favourable formulation costs. TANAJET Prep RL is a low viscous, easy handling preparation product for reactive inks.

Beside these well-established products, we have seen the trend towards inkjet pigment printing, and we focused on the development of preparation products for this application field. TANAJET EP 4034 is the answer for cost efficiency-orientated customers. With a low usage amount this migration inhibitor results in good print results regarding shade depth and brilliancy.

In order to comply with sustainability requirements such as GOTS and offer an eco-friendly product that achieves the highest fastness requirements in pigment inkjet printing, TANAJET EP 4038 has recently been developed. EP stands for 'Experimental Product'. Although the product still has trial status, it is available without restriction.

100% COLOUR; 0% UREA

TANATEX offers further products to improve print results. A strong focus has been given to the replacement of urea to reduce nitrogen effluent. Therefore, two products have been developed: TANAJET Fix UR (R stands for 'reactive') for use with reactive inks, and TANAJET Fix UA (A stands for 'acid') to be applied with acid inks. Both products are 100% nitrogen-free and complete or partial replacement of urea is possible, depending on the article and the process conditions. ■

"Various products have been developed to provide the best printing results depending on substrate and ink chemistry"

TANAJET is a trademark of TANATEX IP B.V.

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