



Solutions for digital textile printing challenges

The following presentation gives an overview of the digital textile printing market.

We will present a technical review of available digital printing technologies on the market and how to link these individual ideas to superior solutions.

Expanded partnerships, close co-operations and sharing of ideas between all partners are essential for the success in digital textile printing.



Digital textile production – worldwide

The first decade has gone, since digital textile printing was adopted to the textile world. With rapid strides this new technology has left the stage of infancy and is nowadays well established in many textile markets worldwide.

Even if digital textile printing is the fastest growing technology in textile printing, it still accounts for less than 1% of the global market for printed textiles. This share is likely to expand clearly beyond within the upcoming decade.

The digital textile print production is estimated to grow from 80 million m² to date to 180 million m² in 2010.

Trends in textile printing

- Significant cost and pricing pressure
- Shorter runs per design particularly in Europe
- Shorter lead times
 - ◆ fast adaption of fashion trends
- Increasing design individualization
 - ◆ more designs
 - ◆ shorter fashion cycles
 - ◆ more colors
 - ◆ new visual effects
- Increasing ecological requirements

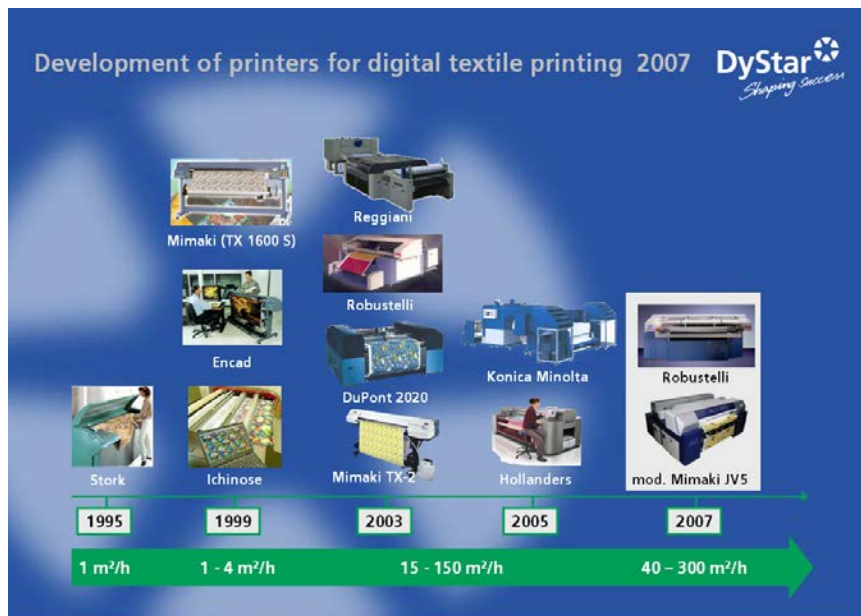
Trends in textile printing

The ongoing globalization keeps the European textile industry increasingly under pressure.

Textile manufacturers suffer from rising raw material costs as well as declining product margins. In addition highest levels of ecological standards must be guaranteed.

The tendency to more customized products and the individualization of design results into ever smaller run lengths.

Based on the highly challenging market demands, conventional printers are under extreme price pressure from Asian companies for standard products. This underlines the need of complementary technologies like digital textile printing.

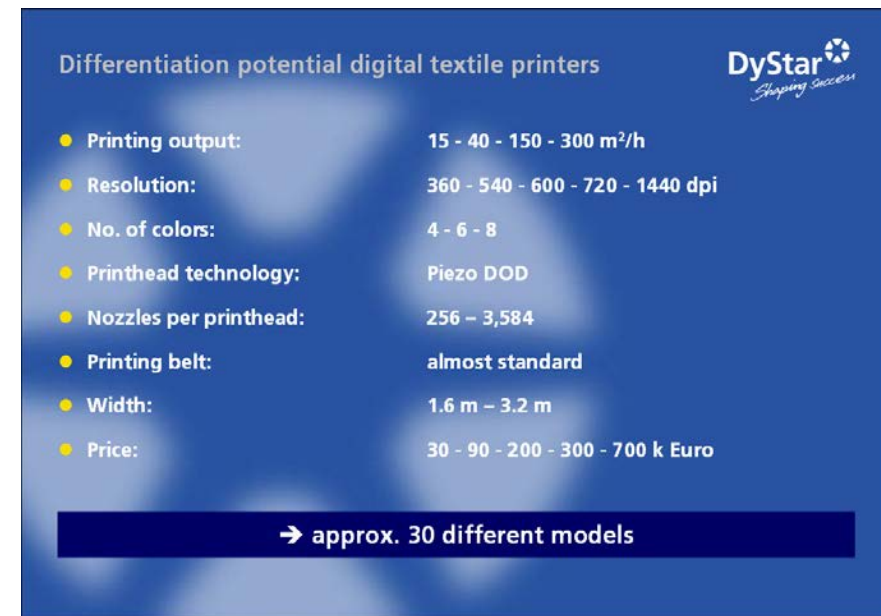


Technology Status - Printers

Since 1995, the performance of digital textile printing machines has improved continuously. In contrast to the printers of the first decade, the newest developments achieve suitable bulk production speeds.

Right from the start many pioneers developed the digital textile printing technology more or less independently.

Their great efforts led to many individual technological solutions, some of them disappeared already from the market, and others proved to be successful.

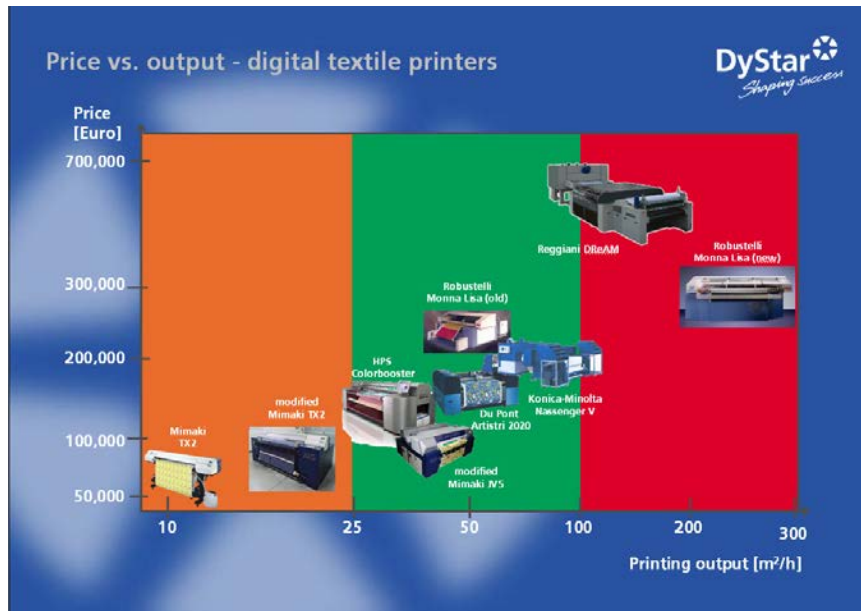


Technology Status - Printers

Today various digital textile printers with more than 30 different models are available on the market.

With a printing output of up to 300 m²/h and an achievable resolution of 1440 dpi most of the available digital printers are using 8 color setups.

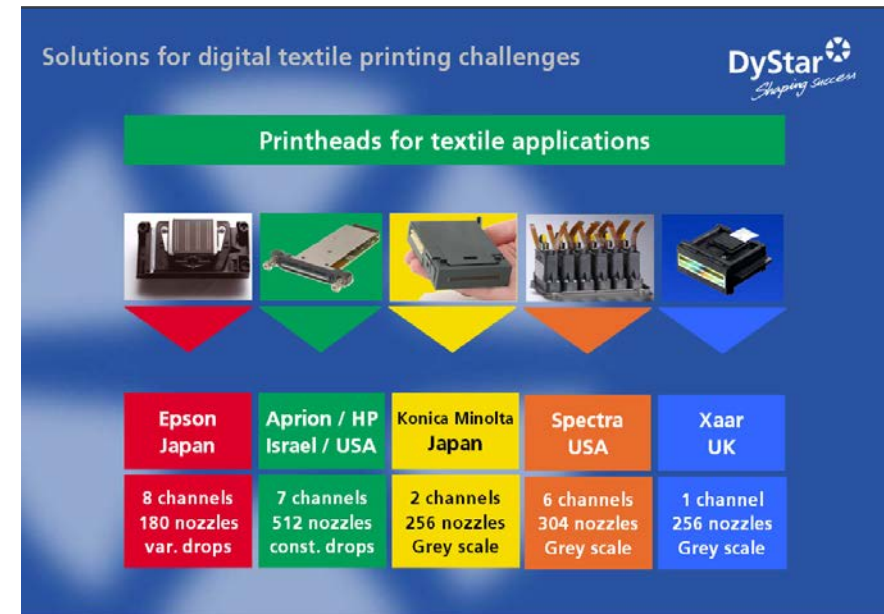
The broad variety of textile fabrics, e.g. fabric weight, elastic/non-elastic, woven or knit goods require a simplified and reliable transport of the fabric. Printing belts (rubber belts) are almost standard today.



Technology Status - Printers

The broad offer of digital textile printers, software and inks on the market makes the selection of the best digital printing system based on the specific needs of the investing print house exceedingly difficult.

The costs of the digital printing system in respect to the achievable performance have to be balanced accordingly.



Technology Status – Print heads

A wide range of print heads for digital printing applications is available on the market today.

Unfortunately most of them have been developed for industrial applications outside the textile industry (graphics industry, paper printing). As a result in digital textile printing, downtimes for maintenance are quite high and the reliability of the printing process was not state of the art.

Most prototypes are multi-channel print heads with variable drop size suitable for printing color-gradients (grey scale).

In future it would be desirable to have more robust print-heads designed for textile applications.

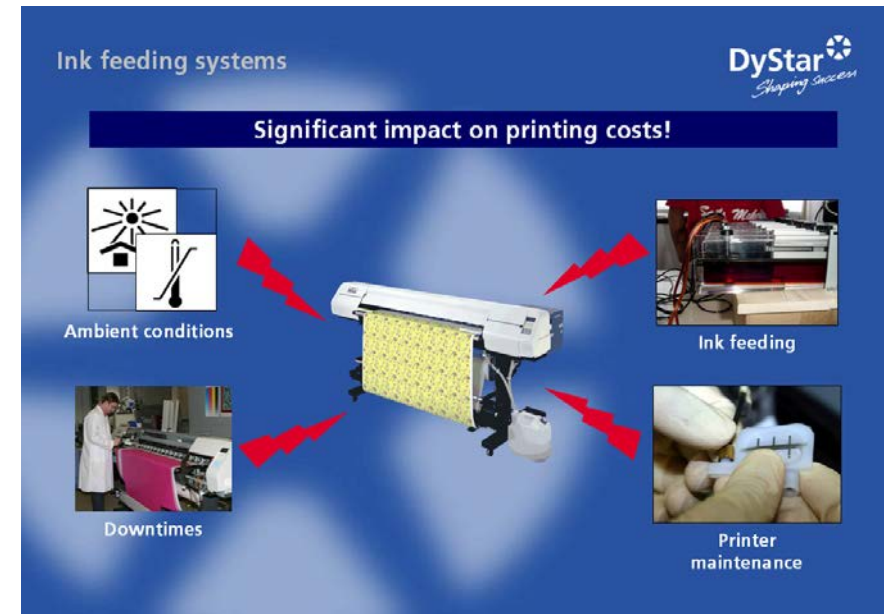


Technology Status – Ink feeding systems

Appropriate ink feeding systems secure a constant ink flow and the performance of the printing process.

Closed bulk feed systems (cartridges) are of interest due to their lower sensitivity to environmental influences.

Bulk feeds with extended ink reservoirs enable longer production runs with less interruptions for the re-filling of ink and involved maintenance.



Technology Status – Ink feeding systems

Closed bulk feed systems with ink in cartridges are supporting the reliability of the digital printing system:

- Less sensitivity to environmental influences
- Stabilized performance for the entire digital printing system
- Less interruptions for printer maintenance
- Cost savings in spare parts and cleaning auxiliaries
- Ability for real productions even secure overnight
- Constant ink-pressure ensures very high stability of the ink flow
- Minimized production of seconds

Ink feeding systems

DyStar
Shaping Success

External ink feeding system
with 2 liter cartridges



The alternative for reliable digital textile printing

The multiple benefits for the print houses with reliable bulk feed systems have been adopted by DyStar with their innovative 2 liter bulk feed system.

In addition to the already explained benefits, these are doubled due to the double ink content compared to standard 1 liter cartridges.

Article segments in digital textile printing

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| Article segment | Substrate | Inks | Trend |
|---|-------------------------------|------------------------------------|-------|
| Apparel / fashion | Cotton Viscose Silk | Reactive | → |
| Swimwear Ties Scarves | Nylon / Lycra Silk Wool | Acid | → |
| POS / adverts Flags / banners Apparel / fashion | Polyester | Dispersion -Direct -Transfer | ↑ |
| Home textiles Decorative articles | CO/PES CO Others | Pigment | → |
| T-Shirts | CO/PES CO | Pigment | ↑ |

Technology Status – inkjet Inks


A wide range of digitally printed articles are available on the market.

Current market trends influence the demand of the used substrate and their corresponding inks.

Today's most successful application areas for digital printing are flags and banners with disperse inks, swimwear with acid inks, viscose fashion wear with reactive inks and T-Shirt printing with pigment inks.

Inks for digital textile printing

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- Reactive (Jettex R)
- Acid (Jettex A)
- Dispersion
 - Direct printing (Jettex D)
- sublimation-stable dyes
 - Transfer printing (dye-sub)
- sublimation dyes
- Pigments

Technology Status – Inkjet Ink

The available inks for textile application on the market comprise the following four dye classes:

Reactive ink

Reactive inks for digital printing on cellulosic, silk and wool

Acid ink

Acid inks for digital printing on silk, polyamide and wool

Disperse ink

Disperse inks for direct- and transfer- printing on polyester fabrics

Pigment ink

Pigment inks with binder system for digital printing on various substrates like cotton or polyester fabrics

Pre- and aftertreatment

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| Pretreatment | Fixation | Aftertreatment |
|---|---|---|
|  |  |  |

Technology Status – Pre- and aftertreatment

Beside the digital printing process itself an appropriate pre- and aftertreatment of the fabric is essential.

Customized equipments for fabric pretreatment, washing-off and aftertreatment steps are available and can easily be adapted to fit to the output of the digital textile printers.



Technology Status – Pre- and aftertreatment

Overview of the currently available pre- and aftertreatment units for digital textile printing



Technology Status – Software

Software packages for digital textile printing focus on different aspects e.g. some are specialized in reducing the digital print quality down to the lower standard of conventional printing, others try to achieve photorealistic results for unique prints.



Conclusion

Digital textile printing is a technological challenge for conventional textile printing in Europe and creates new perspectives even for niche-markets with small outputs.

Digital textile printing is not aiming to compete conventional printing, but to complement each other.

Expanded partnerships, close co-operations and sharing of ideas between all partners are essential for the success in digital textile printing.

During the past decade it became obvious, partnerships and co-operations have better opportunities to be successful in the business.

Only a perfect coordination of all components makes digital printing successful.