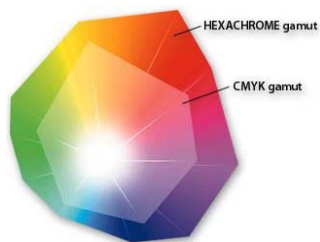


Digital Printing for Textiles



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 TC 706 Color Science
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 September 25, 2008

Printing on Textiles vs. Paper

- Textiles absorb and reflect light differently than paper due to a 3-D structure
- Due to many different fibers, each reacts differently to type of ink
- Printing on textiles takes more time
- Calibration of the printer for textiles is difficult
- Highly porous textured surface & various levels of absorption of the ink
- Strict end-use requirements to meet color-fastness, abrasion and typical wear and tear
- Apparel end use requirements for assembly

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Digitally printed Types of Fabric

- Cotton 48%
- Cotton/ polyester blends 19%
- Polyester 15%
- Viscose 13%
- Polyamide, polyacrylic, wool and silk account for a small percentage

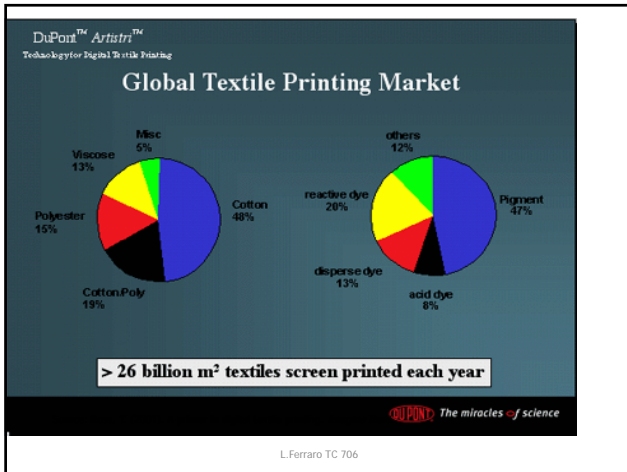


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Screen Printing vs. Process Color

- Screen printing- spot color process, which means colorants are pre-mixed
- Process color- done with ink-jet printers where the colors are mixed on the fabric
- Inkjet technology began to emerge for fabric printing around 1995
- Inkjet printing has significantly reduced the time and cost of the production of sampling

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- ### Inkjet Printing
- Three basic components: print head, ink, medium
 - Continuous Ink Jet (CIJ) and Drop-on-Demand Ink Jet (DOD)
 - CIJ- Ink is applied by squirting the ink through nozzles at a constant speed with a constant pressure applied
 - DOD- Ink droplets are ejected only when needed to form the image
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Water Based Inks			
Ink Chemistry	Fibers	Post Processing	Markets Supported
Acid Dyes	Silk, Nylon, Wool	Steam/Wash, can be drycleaned	Fashion textiles, indoor soft signage (not flameretardant)
Disperse Dyes (Sublimation)	Polyester (flameretardant or non-flameretardant)	Heat fixation	Fashion textile, indoor & outdoor soft signage, home textile (wash fast and durable, not very UV resistant)
Reactive Dyes	Natural fibers: Cotton, silk, rayon, wool	Steam/Wash, can be drycleaned	Fashion textiles, indoor soft signage (not flameretardant)
Direct Dyes	All Fibers	Steam/Wash, can be drycleaned	Fashion textiles
Direct Dyes	Cotton, Polyester	None	Flameretardant soft signage
Direct Dyes	Cotton, Polyester, Nylon, Rayon, Silk	None	Not Flameretardant soft signage
Pigments without binder	All Fibers	Dry Heat	Indoor and outdoor soft signage, home textile
Pigments with binder	Cotton and possibly polyester	Dry Heat	Indoor and outdoor soft signage, home textile

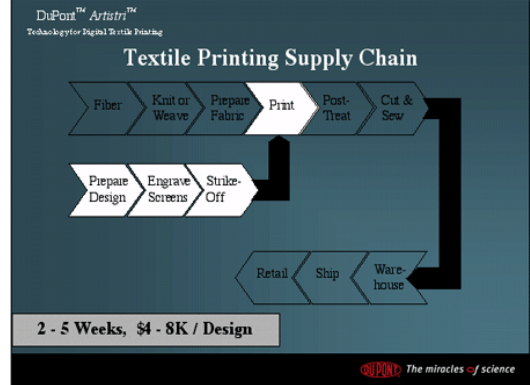
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- ### Color Profiles
- A color profile tells the printer which color to lay down on the fabric and in what quantity
 - For instance, acid inks used on silk will need a different profile from reactive inks used on cotton.
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Advantages of Direct Inkjet Printing

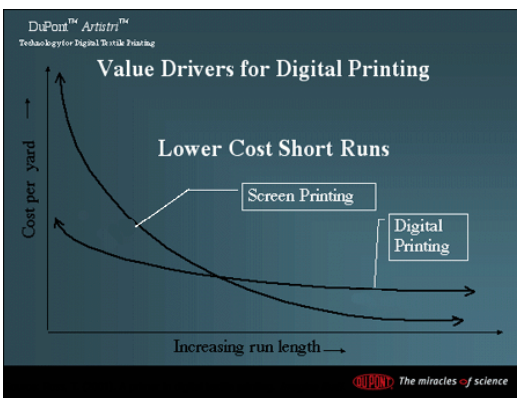
- Full preparation of screens is not necessary
- Register between the screen and color control isn't a problem
- Gives the designer direct control over the appearance of the colors
- Last minute decisions can be made before printing
- No waste of time and money spent on screens that were made for only for sampling and often are discarded

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Source: Ross, T. (2001). A primer in digital textile printing. *Imagine that.*

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Digital Printing from a Designers Perspective

- Technology and creativity
- Resistance to technology
- Flexibility and opportunities, more freedom

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Challenges

- Transferring a digital design to the fabric to the fabric it is printed on
 - The observers vision
 - Digital image capture
 - Computer monitor display (RGB)
 - Digital color printer (CMYK), calibration
 - Illumination, D65 or D50

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Color Management Systems

- Main purpose is to provide a control system so that measured color data of a design may be reliably and accurately transformed into output data for display on a monitor or as input to a printer, so that the appearance of these outputs reliably represents the design to the observer.
- Helps assist in the transfer of color data from image capture through to the final printing system (cross-system transfer)

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DuPont™ Artistri® Digital Textile Printing

http://www2.dupont.com/Artistri/en_US/index.html

- DuPont™ Artistri® inks are available in both pigment and dye-based formulations that combine DuPont proprietary pigment dispersion, polymer and ink formulation technology.
- Artistri® inks offer superior results for digital textile printing – brilliant colors, excellent fastness properties, and robust print reliability.

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COT Digital Printer





Advantages of Digital Printing & Using Digital Technology

<http://www.techexchange.com/thelibrary/academia.html>

- Digital printing allows the artist to increase the complexity of their designs
- Relieves the artist of the sometimes harmful repetitive motion entailed with hand printing
- Reduces the artist's and the environment's exposure to chemicals
- Increases the speed at which the artist can produce intricate designs
- Allows for the creation of designs that are not possible by hand.

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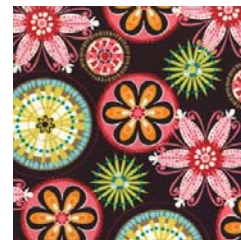
Problems Using Digital Printing & Digital Technology

- Costly investment for the technology (computer, textile design software, digital printer, inks and dyes, color management software and tools)
- The artist loses intimacy with the materials
- The absence of hand control in the application of color can jeopardize surface interest created by the human touch
- The separation from the materials can be a compromise to the artist
- Every artist has a unique attraction to the tools and tactile elements of their chosen medium. Advanced technology separates the artist from the tactile senses

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Interesting Websites:

- http://www2.dupont.com/Artisri/en_US/sales_support/printers/cp_home_furnishings.html
- <http://tiger.uic.edu/~hilbert/Glossary.html> - Digital Printing Terms
- Future technologies
 - 3-D printing to create textiles with laser sintering technology
 - Freedom of Creation <http://www.freedomofcreation.com/>



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Resources Used:

- Tait, Nikki. (2008). Design freedom. *Textile Network*, 4:27.
 - Source: Ross, T. (2001). *A primer in digital textile printing. Imagine that!*.
 - Ujiie, H. (2006). *Digital printing of textiles*. Cambridge England: Woodhead Publishing Limited.
 - Gordon, S. (2001). Color Management and RIP Software for Digital Textile Printing
Managing Color for Optimal Results. Retrieved online from
http://www.techechange.com/thelibrary/DTPColorMgmt_RIPS.html
 - Kholiya, R., Jahan, S., Raghuvanshi, R. (2008). Implementation of CAD in printing. *Colorage Supplement*, LV(6).
- **Websites:**
- Texexchange.com (TC2)
 - <http://www.digitaltextile.com/>

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