

Textile Printing – The Past and The Present

紡織印花 – 從前與現在

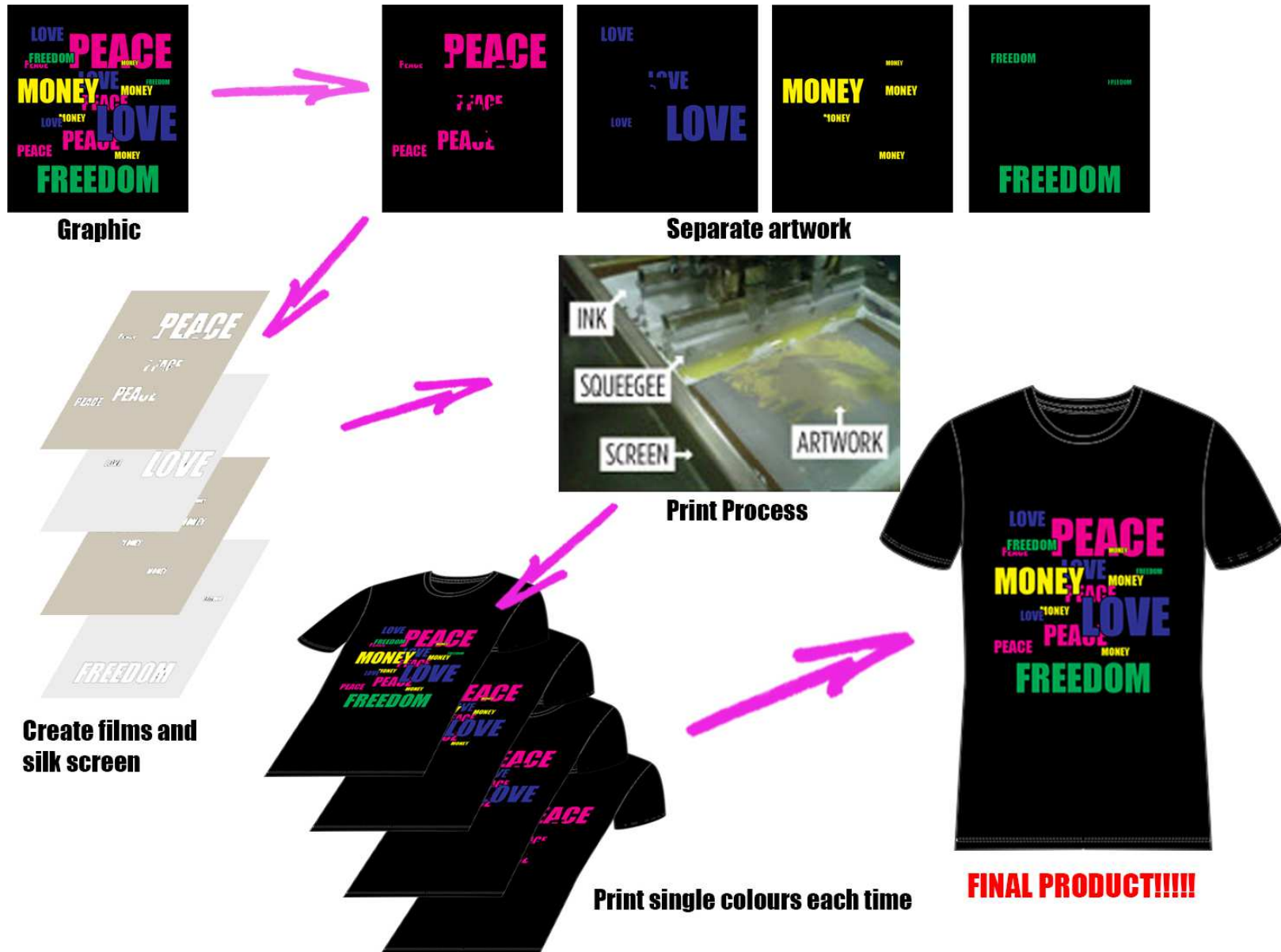
What is Textile Printing?

- ▶ Textile printing is the name given to certain processes which are used to **produce single or multi-coloured patterns on fabrics**.
- ▶ Textile printing is normally **carried out at the fabric stage** and sometimes at the garment stage

How Fabrics are Printed ?

- ▶ Fabric preparation
- ▶ Design
 - ▶ artworks 描稿
 - ▶ colour separation 分色
 - ▶ exposure 晒網
- ▶ Printing paste 打漿
- ▶ Printing
- ▶ Fixation 固色
- ▶ Washing-off 後洗

Traditional Screen Printing



Printing Paste

- ▶ Highly concentrated dye solution
- ▶ Thickened to prevent excessive stike-through and bleeding
- ▶ Fixation chemicals added
- ▶ Dyestuff must be chosen for the fiber type.

Recipe

- ▶ Dyestuff
- ▶ Solvent
- ▶ Thickener
- ▶ Fixation chemical

Example: Cotton

- ▶ Reactive dye (Procion H)
- ▶ urea
- ▶ water
- ▶ sodium alginate thickening
- ▶ Resit Salt L
- ▶ sodium bicarbonate
- ▶ print>dry>steam>soaping

Example: silk

- ▶ Basic dye
- ▶ Glydote BN
- ▶ acetic acid
- ▶ water
- ▶ tartaric acid
- ▶ thickener
- ▶ Print>dry>steam>rinse

Example: polyester

- ▶ Disperse dye
- ▶ sodium alginate thickener
- ▶ emulsion thickener
- ▶ Perminal KB (fiber swelling agent)
- ▶ print>dry>steam>soaping

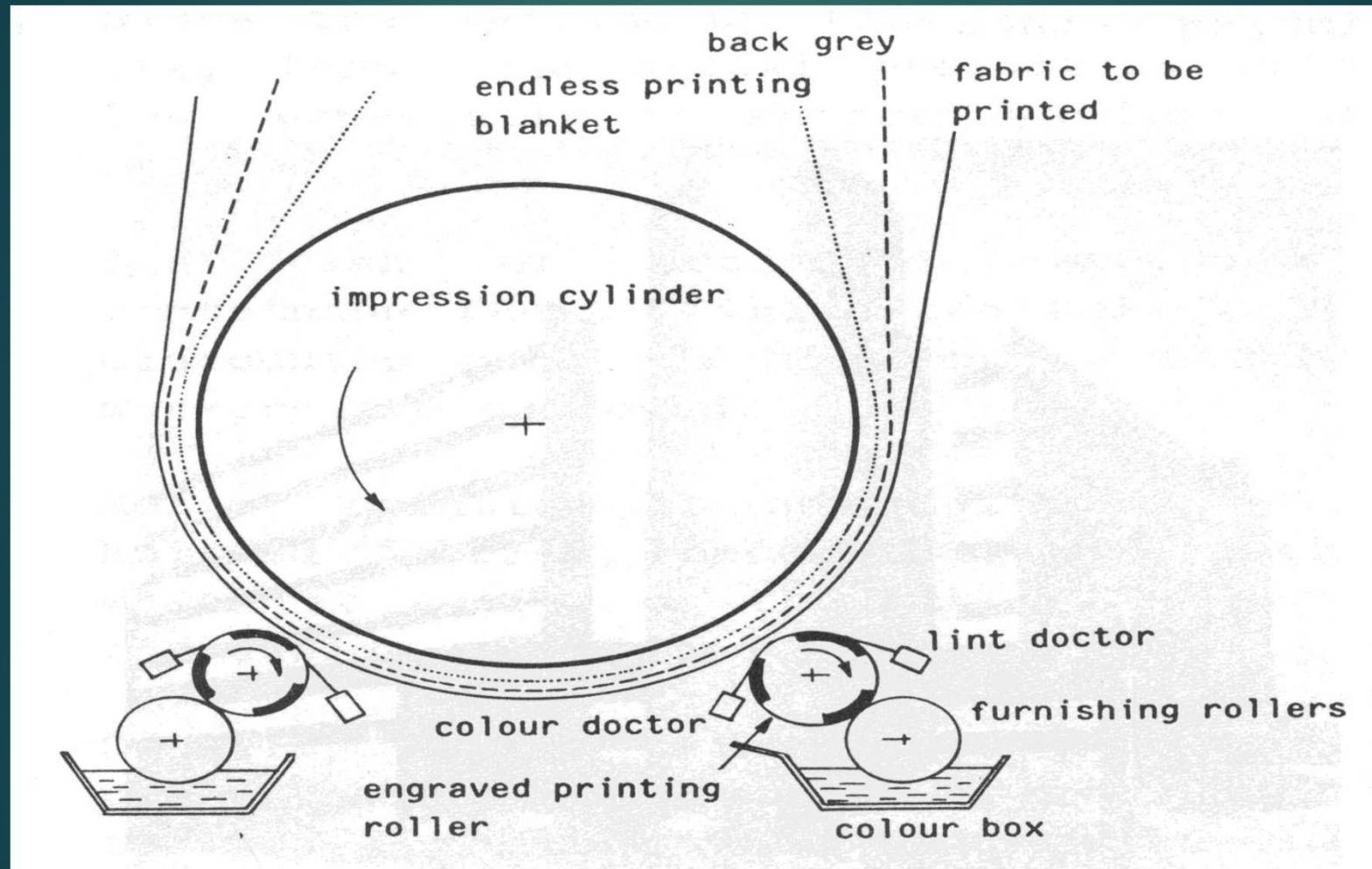
Traditional Textile Printing Technologies

- ▶ Roller Printing 輥印
- ▶ Screen Printing 網印
 - ▶ Flat screen 平網: hand, automatic
 - ▶ Rotary screen 圓網: automatic

Roller Printing 輥印

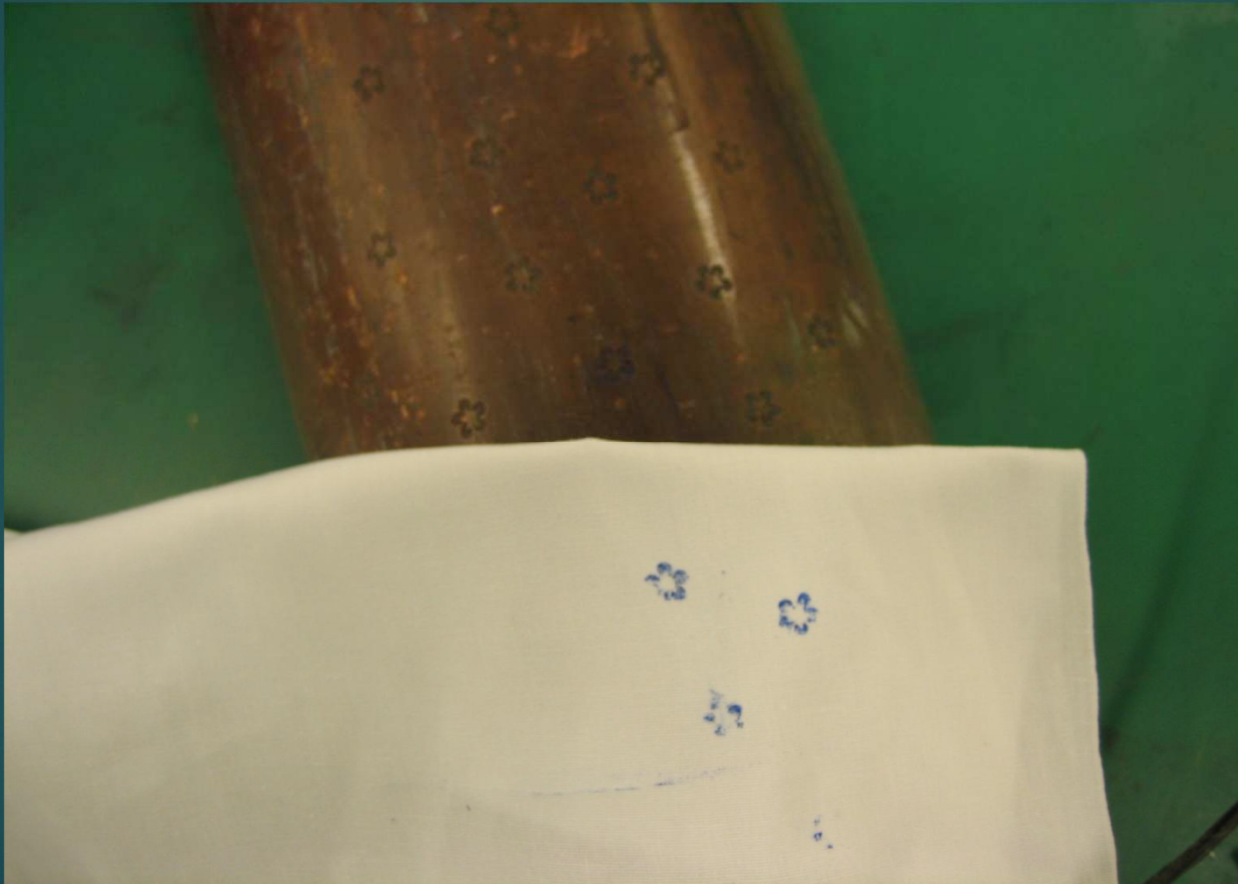


Roller Printing 輥印

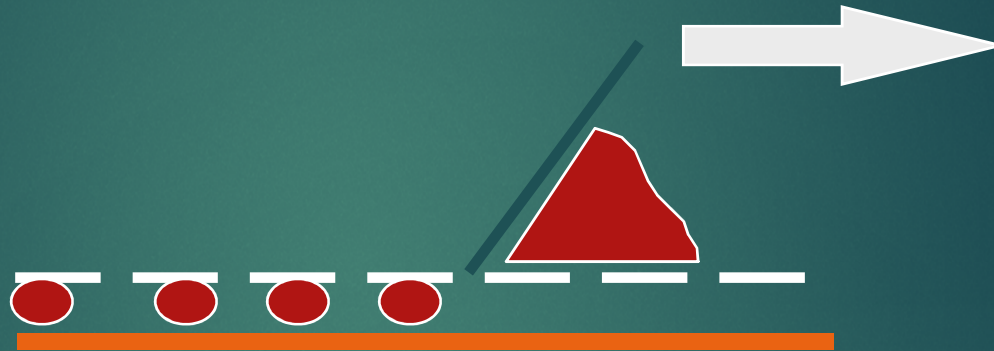


Two-color copper roller printing machine

Roller Printing 輥印

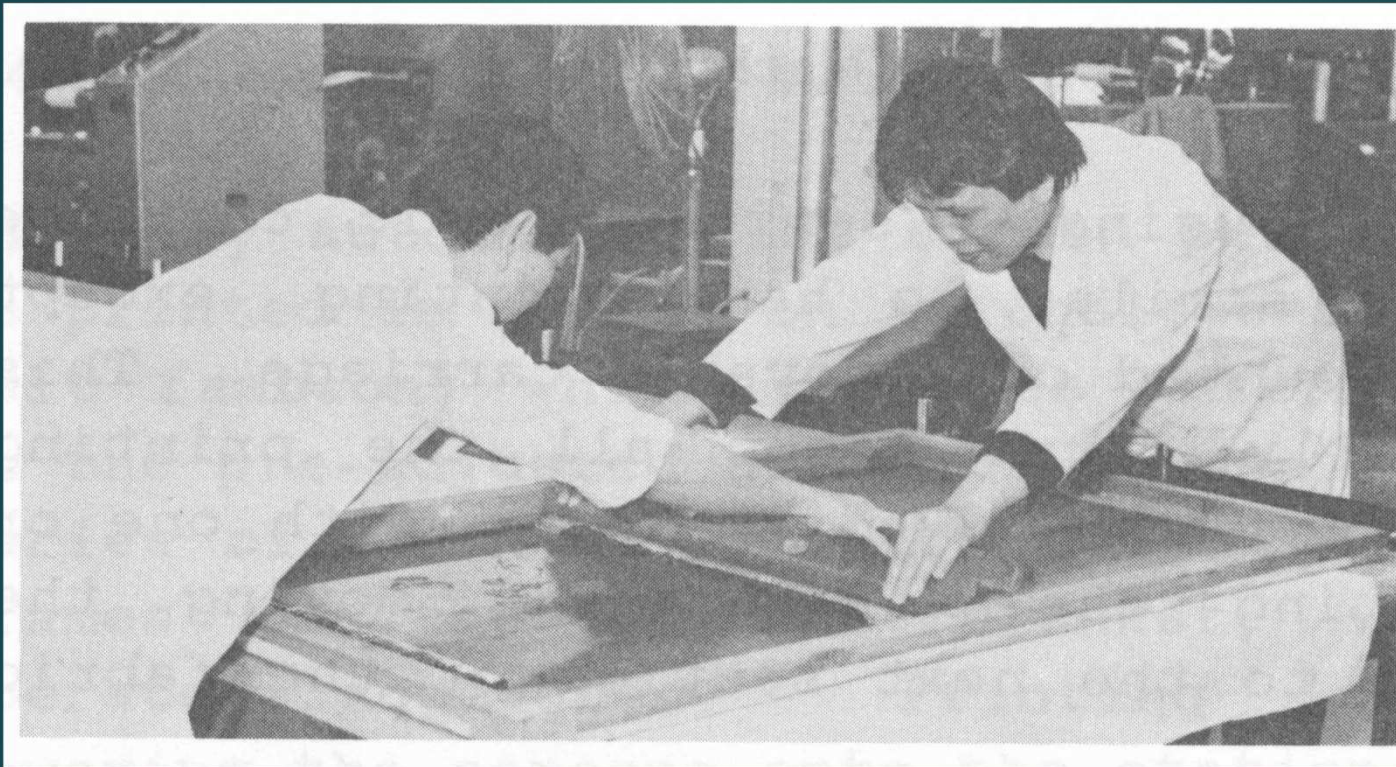


Flat screen 平網



Flat screen 平網

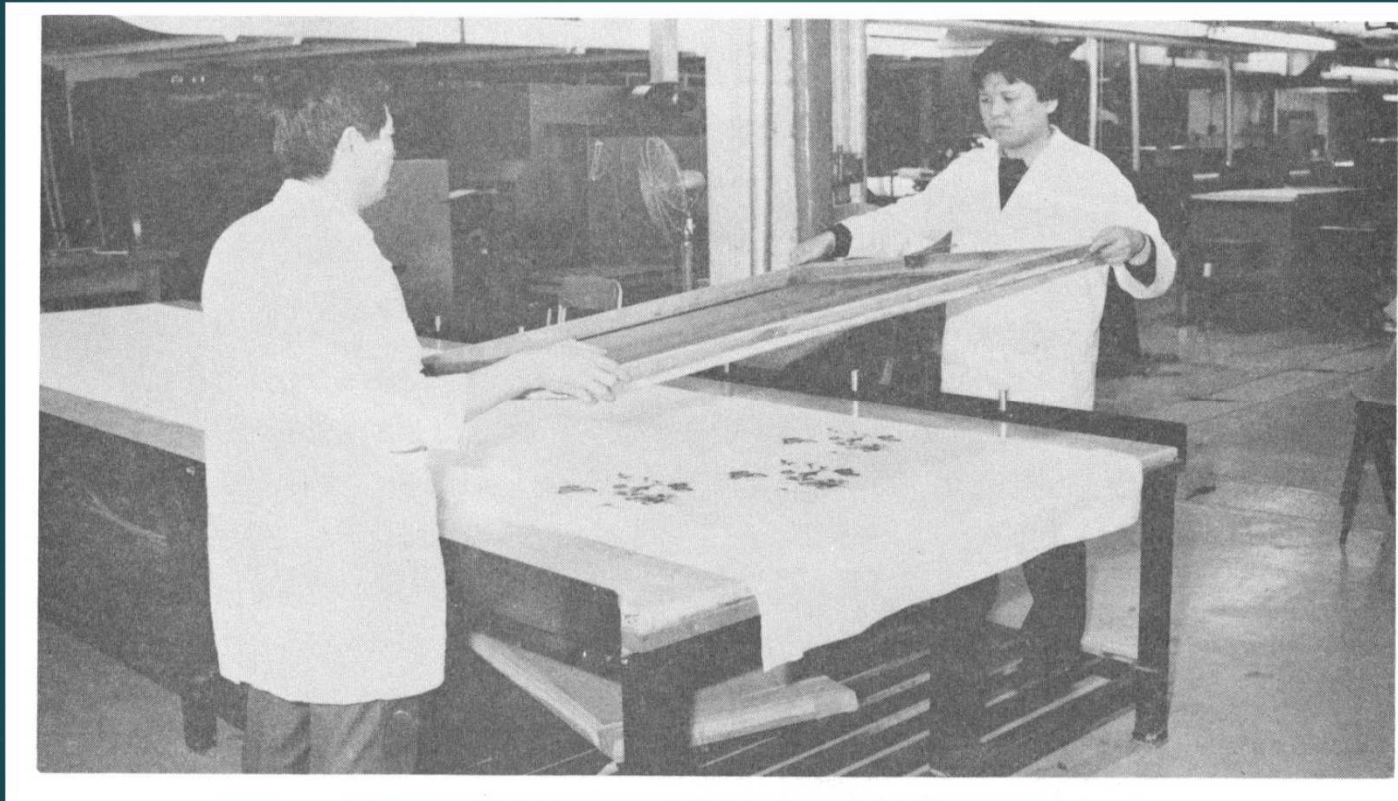
Hand Screen Printing – Step 1



Brushing print paste across screen

Flat screen 平網

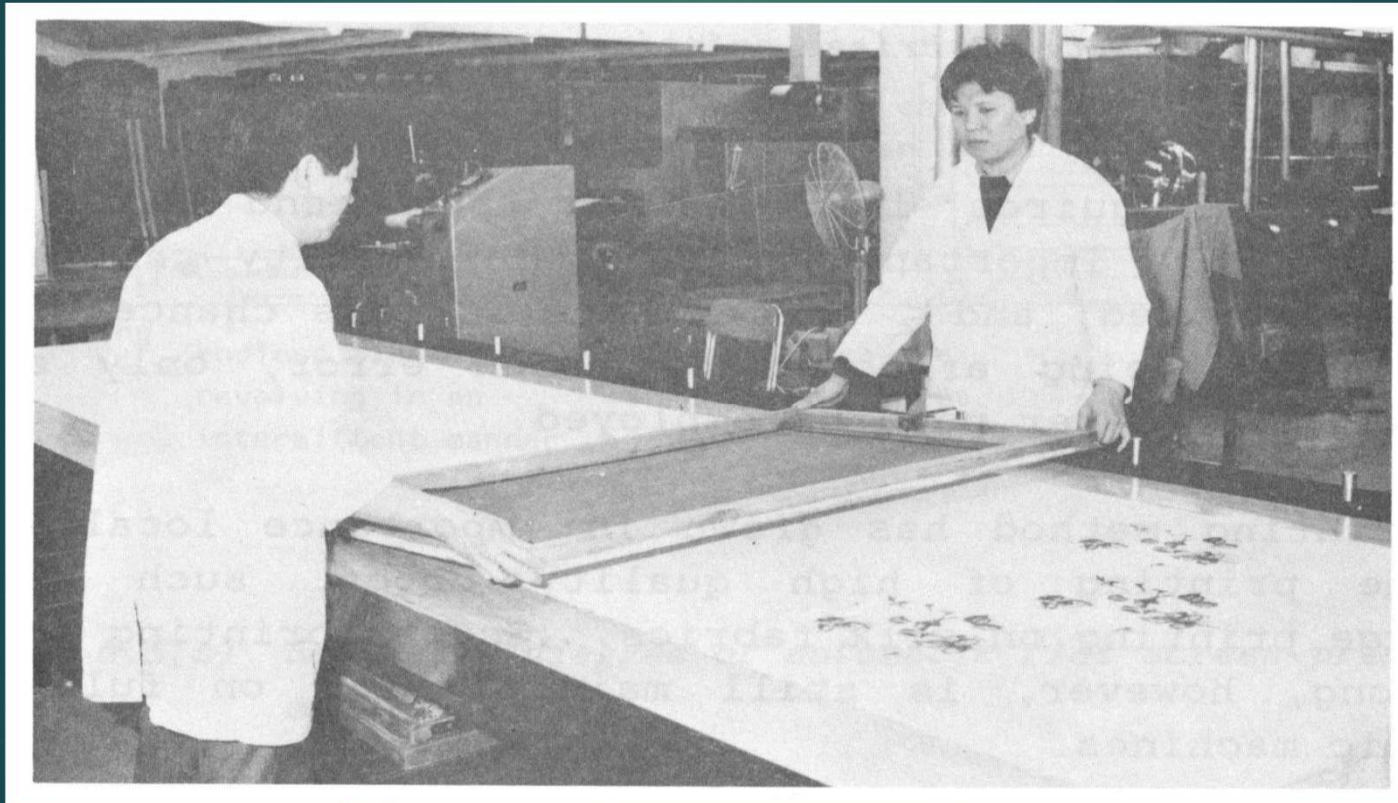
Hand Screen Printing – Step 2



Raising the frame after printing

Flat screen 平網

Hand Screen Printing – Step 3



Repeating the printing process

Flat screen 平網

Automatic Screen Printing - Garment



Flat screen 平網

Automatic Screen Printing - Fabric

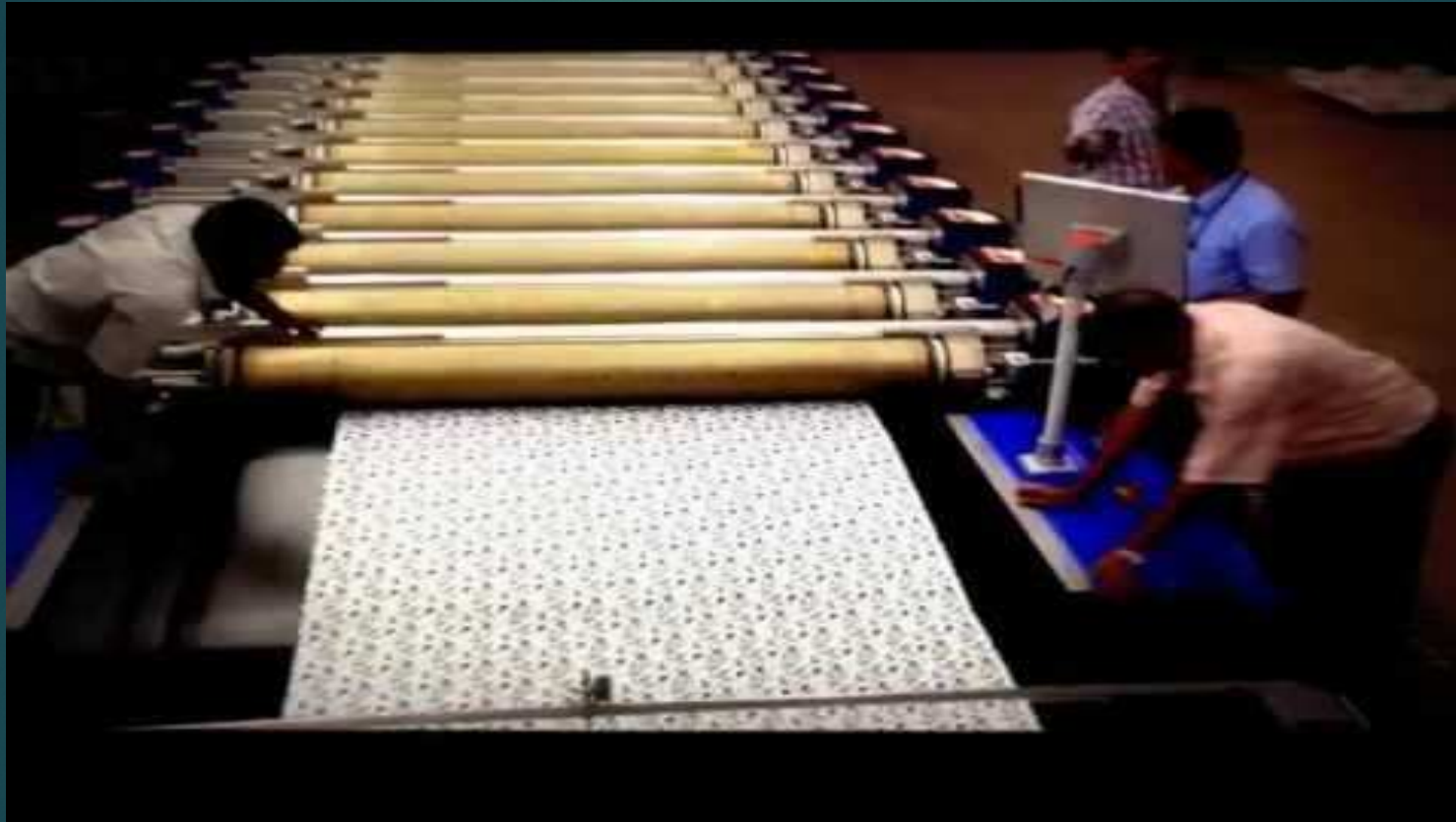


Rotary screen 圓網



Fabric

Rotary screen 圓網



Traditional Textile Printing



In traditional textile printing the build-up of dyes has to be considered and is influenced by the following factors:

substrate

pretreatment of material

print paste composition

amount of paste applied

fixation

etc.

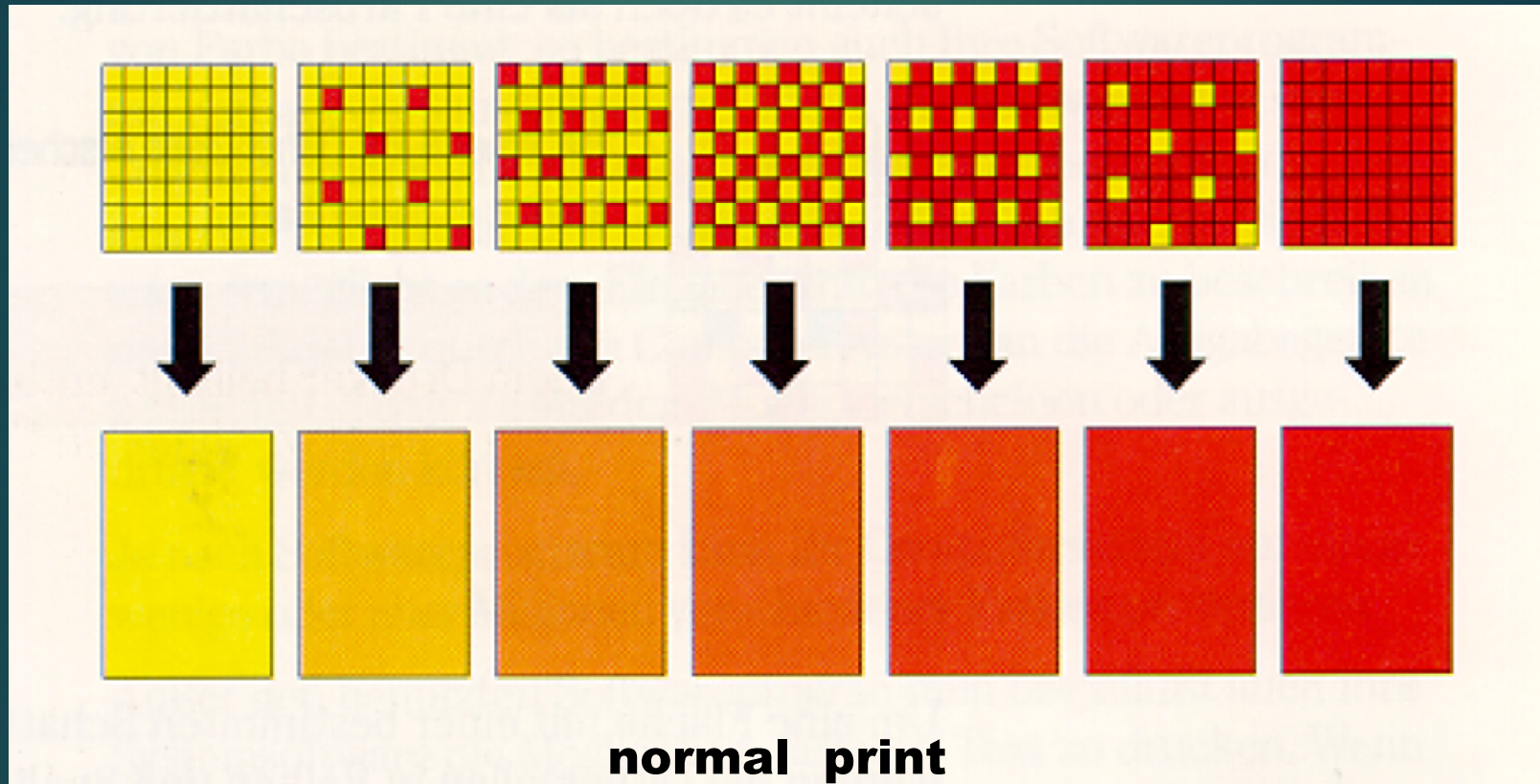
From the Past



To the Present

Digital Printing 數碼印花

Ink-Jet



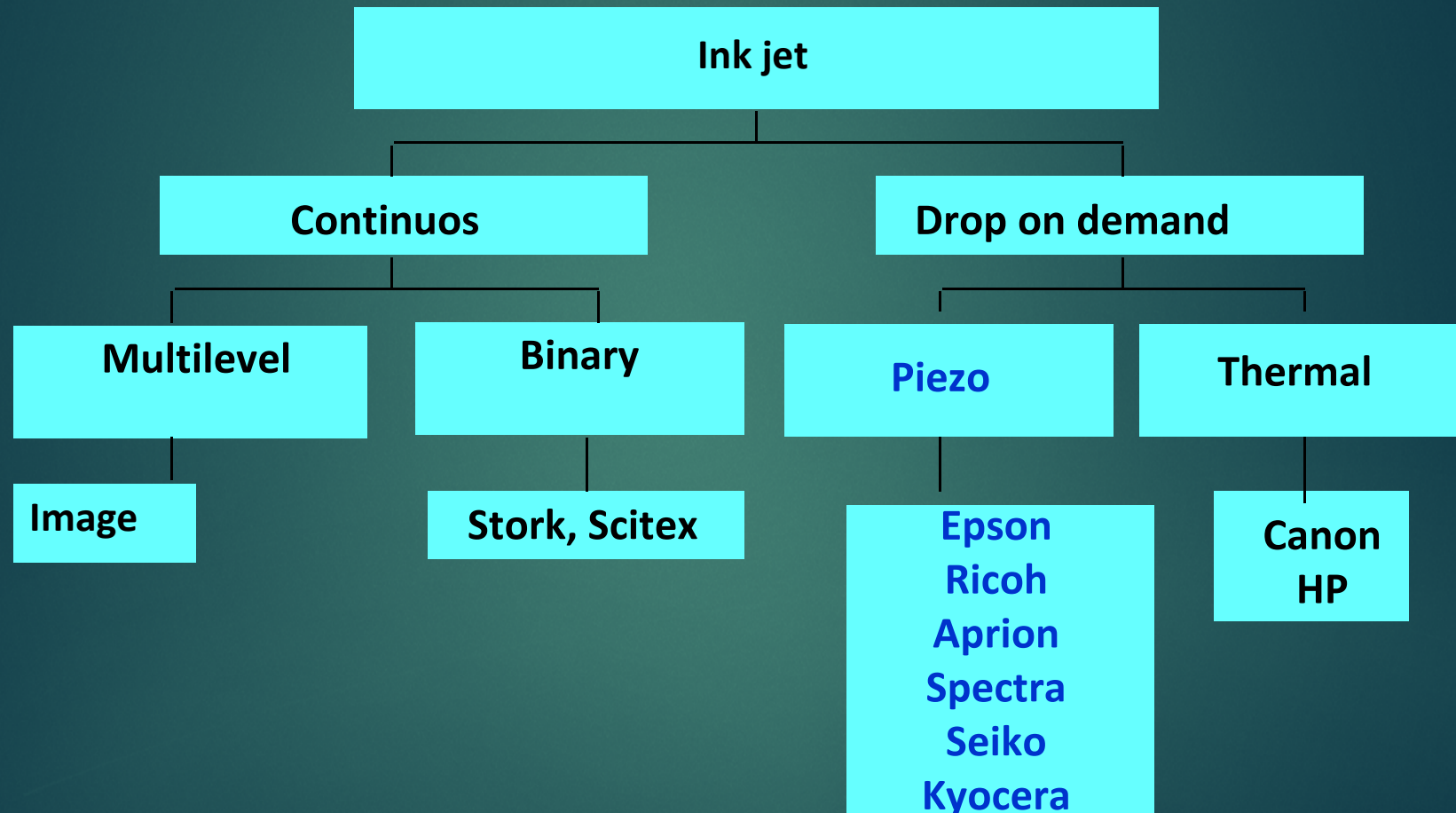
The inks

“ A liquid or semi-liquid material used for writing, drawing or printing”.

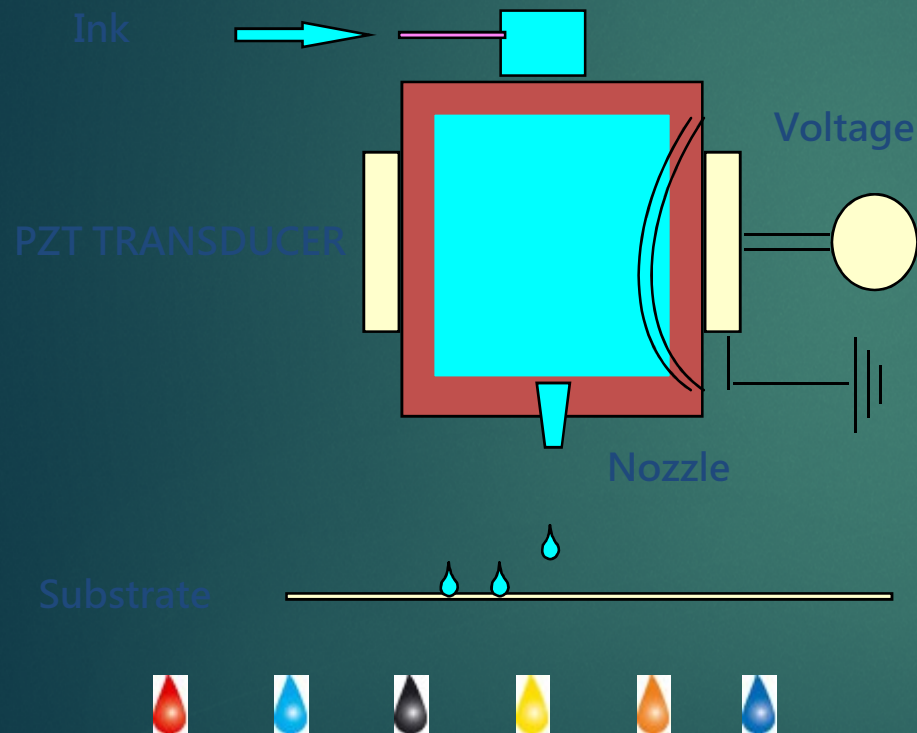


A complete ranges of inks and auxiliaries
For all textile substrates and application

Hardware : The 'core':printing heads



Printing heads : Piezo Technology



→ Many jets actuators using a single

PZT for each channel

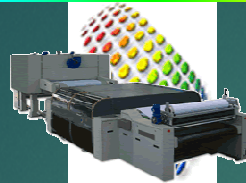
→ All jet fired simultaneously and run
at high frequencies

→ Wide range of inks are supported

Advancing Machine Technology



Ichinose



Reggiani Dream



MS JP Series



MS LA RIO



Mimaki TX1



Monnalisa



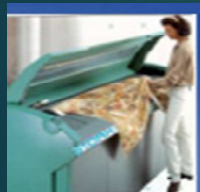
Konica Minolta



Konica



Reggiani Renoir



Stork



Encad



Ichinose



Mimaki TX 2



Mimaki JV5



Zimmer

1995

1999

2004

2007

2010

2012

1 sqm/h

2 – 4 sqm/h

15 – 50 sqm/h

250 – 500 sqm/h

up to 75m/min

The Latest Digital Textile Printing Technology



Worldwide Textile Printing Market : Market Trend

Orders for designs decrease

Shift to higher value

Shorter fashion cycle

Shorter lead time

Price pressure increasing

Growing costs for sampling and small orders

Environmental pressures continually magnify



Why DTP?

- ✦ 'flexibility' in production

Traditional printing can be efficient if you need to produce 20000 mts. of one design, but what if you need 1000 mts. of 10 designs?

- ✦ "GREEN"Technology

Dramatically reduced waste of dyes & chemicals:

Few g/sqm consumption with low unfixed dye amount to be removed
No need for color kitchen – process color concept


Less energy/water needed for processing:

Size of machinery adequate to digital
Safety...and comfort in printing environment

Color Reproduction



Main Advantages of Digital Printing

- 
- **Digital is a way to overcome the limitations of traditional printing**
 - No limitation in numbers of colors
 - Excellent Shade gradations & 3D effects & length of rapport
 - Low cost sampling, screen print sampling unstainable, low hit rates
 - No color kitchen, no screens, colors mixed on fabric
 - No minimum orders
 - **Just in Time Printing**
 - Minimal time between sample approval and production
 - Fast response to ever changing design collections
 - Lower stocks for whole supply chain
 - **Sustainable technology**
 - Low amount of unfixed dyes, less water and energy for washing, less color in effluent

The New Scenario



IS THIS THE END FOR THE FLAT SCREEN PRINTER?!

No one among the manufacturers will invest money to develop new improvements on the conventional machines.

DTP means

BIG SAVINGS

- ✦no engraving
- ✦no stock of screens/cylinders
- ✦no colour kitchen

LESS INVESTMENTS

- ✦small working area
- ✦machines's prices
- ✦less consumption

MORE PROFIT

- ✦sampling cost is like producing cost
- ✦sampling offer dramatically increases

SUSTAINABILITY

- ✦low energy consumption (electricity, water)
- ✦low enviromental impact
- ✦easy washing off
- ✦friendly chemistry

Comparison process Traditional vs Digital

	Traditional	Digital
Number of Colour	Limited to the number of Cylinder & Screen (8/15)	Unlimited
Max Dimension of the design	Repeat 640 mm most common Repeat 1180 very rare	Unlimited
Type of the design and shades	Limited to the type of mesh (Cost) Of the cylinder	Very detailed with linear shades due to the perfect gray scale
Defects and selvedge banding	Sometimes difficult to avoid or eliminate	Not existing
Ecology impact	Very High due to the waste for washing cylinder & engraving and printing paste	Near to Zero
Minimum quantities & order quantities & order	Very high cost per meter influenced by cost of the cylinder	Practically Zero
Dead Time setting for changing design	Very high depending on no. of cylinder & washing	Zero
Personel Involved	2 man for Machine plus 1 for Colour Kitchen plus 1 for service	1 person for an industrial mach.
Time for Sampling design	Depending on engraving but in general 3/4 weeks	Real time
Cost of collection and sampling	Very high due to the people involved engraving time	Very low
Performance of the Machine	Up to 50 m / min	up to 75 m/min

Digital Textile Printing Market Today



- ▶ **Fastest growing application** sector in textile coloration
- ▶ **Technology has replaced automatic flat-bed screen printing** in terms of cost and efficiency
- ▶ EU traditional screen printers started conversion to digital 10 years ago leading the way
- ▶ Technology has enabled textile printing to remain and thrive in EU
- ▶ **Apparel printing on CEL, Silk & PES** coupled with intricate digital design fueling the growth.
- ▶ Home textiles, outdoor articles, flags, soft signage, automotive, sportswear, T-Shirts all existing and developing sectors

Conversion from Screen Printing to digital is taking place in all Markets

END