Inkjet Textile Printing

History - Today – Tomorrow

Keys for Success to be the real industry

KonicaMinolta IJ Technologies
Managing Director : Akiyoshi Ohno
15.March 2006 Amsterdam
Contents

2. IJ Textile Printing / Printer
   1. What does it mean ? Are you sure ?
   2. Classification from various aspects
   3. About more or less “Main Stream”
3. Numbers
   1. Market
   2. Economy of IJ Printing
4. Short History
   1. Past – Today – Tomorrow
   2. Midrange
5. Prediction & Hints
Konica + Minolta ... Who?

FY2005 Target
1.3 trillion yen = $12 billion
Group Formation

Konica Minolta Holdings, Inc.

[Location of head office]
1-6-1 Marunouchi, Chiyoda-ku, Tokyo

[Business activities]
Holding company (Planning and promotion of the Group’s management strategies, audits of the Group’s management and other management & administration tasks of the Group)
Industrial Inkjet Application

Shuttle (Scan)

Production Machine
IJ Coater

Single Pass

Printed Electronics & Displays
3D Modelling

Sign & Display
Textile
IJ Photo
Ceramic
Wall Paper
Printing Plate

Coating

Package
Office Printer
Light Production Printer
Coding & Marking
IJ TEXTILE PRINTING

- CLASSIFICATION
- ADVANTAGES / CHALLENGES
- NUMBERS
- HISTORY
- CONSIDERATION
- CONCLUSION … not yet
CLASSIFICATION

1. Application
   – Garment
   – Home Furnishing
   – T-Shirt
   – Flag & Banner
   – Niche

2. Print method
   – Direct / Transfer

3. Printer Design
   – Roll-to-Roll (Print on Fabric) / Flat Bed (Print on Garment)

4. IJ Head
   – EPSON / Non-Epson PIEZO / Thermal

5. Ink
   • Acid Dye / Reactive Dye / Disperse Dye / Pigment / Dye-sub
Application

Textile Opportunities

Signage
- POP Signage
- Trade Show Graphics
- Other signage

Furnishings / Decorative Products
- Wallcoverings
- Upholstery
- Window treatments
- Bedding
- Decorative banners
- Other

Apparel / Accessories
- Clothing
- Scarfs
- Bags
- Other

Other
- Tents
- Automotive
- Boating products
- Other

Courtesy to
Application: Apparel/Garment/Fashion Items
Application: Home Furnishing
Application : Niche ( in Japan )

Sports Wear / Swim Wear

Japanese Traditional ( Kimono )

Train Seat / Bus Seat

Towel
Application : T-Shirt
Application: Flag & Banner
Roll-to-Roll / Flat Bed

REGGIANI : DReAM

KONICAMINOLTA : TPV

MIMAKI : TX1600 (TX2)

KORNIT : 931

SHIMASEIKI : SIP
## IJ Head: EPSON / Non-EPSON PIEZO

<table>
<thead>
<tr>
<th>IJ HEAD MANUFACTURER</th>
<th>PRINTER MANUFACTURER</th>
<th>MODIFIER</th>
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<tbody>
<tr>
<td>EPSON</td>
<td>Mimaki</td>
<td>d·gen</td>
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<tr>
<td></td>
<td>Roland</td>
<td>STORK</td>
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<td></td>
<td>MUTOH</td>
<td>Many Others</td>
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<tr>
<td></td>
<td></td>
<td>ROBUSTELLI</td>
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<tr>
<td>KONICA MINOLTA</td>
<td>KONICA MINOLTA</td>
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<td>SII</td>
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<td>AJ properties</td>
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<td>REGIAN</td>
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<td>Ciba</td>
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<td>DSG·AM</td>
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<td></td>
<td>HP</td>
<td>ColorSpan</td>
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<td>LEXMARK</td>
<td>ENCAD</td>
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<tr>
<td></td>
<td>Canon</td>
<td>Canon</td>
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</table>
ADVANTAGES / CHALLENGES

• Digital Technology Friendly
  – Computer to Direct Print

• Economy
  – General Rule of Inkjet vs. Conventional Printing
  – Time is Money
  – Energy Effectiveness
  – Waste
  – Space: Data Storage vs. Screen Storage

• Environment Friendly
  – Natural Environment
  – Working Environment

• Infrastructure / Productivity / Cost / Product Life

• Who is the Key Technology Provider?
**Advantage:**

**General Rule: Inkjet vs. Conventional**

- **Inkjet**
  - Lower Initial Fixed Cost + Higher Ink Cost
- **Conventional**
  - Higher Initial Fixed Cost + Lower Color Paste
Run Cost as a Function of Speed and Ink Price

- **Printer = $100K, speed = 5 m²/hr, Ink = $200**
- **Printer = $100K, speed = 5 m²/hr, Ink = $30**
- **Printer = $500K, speed = 200 m²/hr, Ink = $200**
- **Printer = $500K, speed = 200 m²/hr, Ink = $30**
- **ROTARY**
Advantage: Time is Money

Diagram:

Left:
- Design concept
  - Plate-making / design edition done by traditional way
    - Approval
      - Plate-making
        - Color matching Ink
          - Strike-off
            - Approval
              - Production

Right:
- Design concept
  - Plate-making / design edition done by digital way
    - Strike-off
      - Approval
        - Production

Note: 1wk, 6~8wks, 2wks, Hrs
Advantage: Environment Friendly

Water Usage: - 30%

Waste Water: 1/33

Electricity Consumption: - 45%

Inkjet  Conventional
Advantage: Dye Consumption and Waste

Less Dye Consumption
Less Dye Waste

![Graph showing dye consumption and waste comparison]
**Advantage: Working Environment**

<table>
<thead>
<tr>
<th>KONICA MINOLTA</th>
<th>Ink A</th>
<th>Ink B</th>
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</thead>
<tbody>
<tr>
<td><strong>Y</strong></td>
<td><strong>M</strong></td>
<td><strong>C</strong></td>
</tr>
<tr>
<td>Ames test</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td><strong>N</strong>: Negative</td>
<td><strong>P</strong>: Positive</td>
<td></td>
</tr>
</tbody>
</table>

vs.

![Image of ink](image_url)
Advantage: Working Environment

Clean / Less Noisy / Safe ...
• Textile Print : Trend of Total Volume
• Textile Print : Geographical Distribution
• Digital Textile : > 1% of Total
Market of Textile Printing

Israel, Slovenia : 20 Bil m2
Netherlands, Switzerland : 40 Bil m2
Market of Textile Printing
Trend of Digital Inkjet Printing

Liechtenstein: 160 Mil m²
Virgin Islands: 153 Mil m²
HISTORY

- Overview: Where Are We?
- Early Attempts
- Market Opener
- Beginning of Nest Generation
History Overview: Where are we?

- Past
- Now
- Next

Levels:
- High
- Mid
- Low

Locally Modified

Brands:
- Konica
- Mimaki
- Mutoh
- ColorSpan
- ENCAD

Questions:
- ?
- ?
- ?

Future Focus:
- REGGIANI

Brands (Future):
- d-gen
Early Attempts: All failed

- Thermal Head (HP / Canon / Lexmark) : Not Suitable?
- Too Early?
- Technology ... not matured enough?
- Too small return to cover the resource required?

ColorSpan : Fabrijet XII

Canon : Bubble Jet Textile Printer
MIMAKI : Market Opener / Cultivator

- EPSON Piezo Head Equipped
- More than 1,500 units was shipped
- Most of them were modified by Partner / End User
  - Ironically, MIMAKI improved by themselves (TX2->TX3) but not warmly accepted
- Opened Market for “Third Party Ink Suppliers”
  - Ironically, MIMAKI lost Ink Revenue
- Opened Market for “Local Modification Provider”
- People learned “IJ Textile Printing Business”
Mid-range Printers

- Industrial PIEZO Head Equipped
- Being Warmly Accepted by “Educated Users”
- IJ Textile Printing: From Trial Phase to Real Business
- Application is Expanding: Apparel …Flag & Banner, Home Furnishing
  - KonicaMinolta “TP-V” : IJ Technology Supplier Driven
  - DuPont “Artistri” : Ink Vendor Driven
High End Attempts

Reggiani: DReAM

OSIRIS (Continuous IJ)
CONSIDERATION

- Key Parts : Aqueous Capable IJ Head
- Technology Consistency vs. Patchwork ?
- Open or Closed Oriented ?
- Think : Life of Digital Products
Key Device: Aqueous Capable Head

Pre-History
(Thermal IJ)

EPSON Head Age

Industrial PIEZO Head Age

- Canon
- Lexmark
- EPSON
- Reggiani Macchine
- Ciba
- Dupont
- SII
- RICOH
- Konica Minolta
- Mimaki
- Mutoh
- Roland
- STORK
- d-gen
## Technology Consistency vs. Collaboration

<table>
<thead>
<tr>
<th>VENDOR</th>
<th>PRINTER</th>
<th>HEAD</th>
<th>INK</th>
<th>OPEN POLICY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robstelli</td>
<td>Robstelli</td>
<td>EPSON</td>
<td>EPSON</td>
<td>- Softwares</td>
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<td></td>
<td></td>
<td>- Options</td>
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<tr>
<td>DU PONT</td>
<td></td>
<td>SII</td>
<td>DU PONT</td>
<td></td>
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<tr>
<td>REGGIANI</td>
<td>REGGIANI</td>
<td>SCITEX VISION</td>
<td>Ciba</td>
<td></td>
</tr>
<tr>
<td>Mimaki</td>
<td>Mimaki</td>
<td>EPSON</td>
<td>(Original)</td>
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<td></td>
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<td></td>
<td>(Local)</td>
<td></td>
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<tr>
<td>d·gen</td>
<td>Roland</td>
<td>EPSON</td>
<td>(Original)</td>
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<td>(Local)</td>
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<tr>
<td>STORK</td>
<td>MUTOH</td>
<td>EPSON</td>
<td>STORK</td>
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</table>
**Open or Closed?**

Can Closed Culture fit to Open Market?

<table>
<thead>
<tr>
<th>Open System</th>
<th>Intermediate Media</th>
<th>Consumables</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFFSET</td>
<td>Independent Printing Machine Maker</td>
<td>Independent Offset Ink Supplier</td>
</tr>
<tr>
<td>SCREEN</td>
<td>Independent Printing Machine Maker</td>
<td>Independent Screen Ink Supplier</td>
</tr>
<tr>
<td>SCREEN TEXTILE</td>
<td>Independent Printing Machine Maker</td>
<td>Independent Printers' Own Ink Kitchen</td>
</tr>
</tbody>
</table>

- **Closed System**
- Printer Maker provide/protect its own Ink
- Printer Maker provide/protect its own Toner

**Home Inkjet**
- Closed System
- Third Party Consumables
Think : Life of Digital Products

• How old is your PC? CPU ... Pentium II?
• Do you still use Window 95?
• How old is your Digital Camera? 2M Pixels?
Summary

1. **IJ Textile Printing Business is finally taking off**
   1. Market is well cultivated by Entry Models
   2. Players are increasing / Application is expanding
   3. Realistic Mid-Range is asked in the main stream (Apparel / S&D)

2. **Best Fitted Technology is required**
   1. Aqueous capable PIEZO Head for industrial use … not for home
   2. Ink / Pre-, Post- Treatments / Infrastructure should be improved
   3. Shorter Product Life to be considered
   4. Printer Manufacturer should take Leadership and well rewarded, otherwise Motivation for further development would be lost

3. **Further Trial & Error**
   1. Consistency or Collaboration?
   2. Open or Closed?