INKJET UYGULAMALARI VE PAZAR GELİŞİMLERİ
INKJET APPLICATIONS AND MARKET DEVELOPMENT

Tim PHILLIPS
IMI Europe

Company backgrounds

• Organises conferences and courses worldwide for the digital printing industry
• “Collaboration and learning in inkjet”

• Technology marketing consultancy
• “Connecting technologies and markets to give a successful and profitable outcome”
Upcoming IMI Europe events

• Inkjet Winter Workshop
  - 22-26 January 2019, Valencia, Spain
  - Courses: Inkjet Academy, Inkjet Printing Software, Inkjet Ink Characterisation

• Inkjet Ink Development Conference
  - 8-11 April 2019, Hamburg, Germany
  - Plus Inkjet Academy and Ink Characterisation Courses

• Inkjet Summer School
  - 10-14 June 2019, Cambridge, UK
  - Courses: Inkjet Academy plus other courses TBC

• Digital Print Europe
  - 2019 date and location TBC
  - Including Digital Printing Conference and supporting events

Talk outline

• Packaging
• Décor
• Textiles
• Summary
Digital packaging and labelling

- Toner technology significant, inkjet emerging player
- Opens possibilities for
  - personalisation
  - regionalisation
  - product innovation

Market sizes

- Labels: 50bn m²
- Folding cartons: 360bn m²
- Flexible packaging: 100bn m²
- Corrugated packaging (all types): 225bn m²
- Aluminium cans: 200bn per year
- Plastic bottles: 500bn per year
- All 2016 worldwide figures

Source: Keypoint Intelligence
Market trends

- Brands aim to improve
  - Demographic diversity
  - Geographic reach
  - Time to market
  - Inventory control
  - Supply chain efficiency
  - Quality standards
  - Security
- Drives mass customisation
- Environmental concerns becoming vital in supply chain

Source: Keypoint Intelligence

Brand strategies

- Versioning
- Short run printing
- Packaging innovation
- Personalised packaging
- Expand to corrugated packaging

Source: Keypoint Intelligence
“Anyone who wants to work with us should definitely buy a digital press, or they will find an uphill struggle in the future.”

Paul France, Principal Engineer for Printing and Decoration, Procter & Gamble
From Packaging News (UK) 2011

Application Estimates

<table>
<thead>
<tr>
<th>Category</th>
<th>Example</th>
<th>Approximate Start</th>
<th>Color Digital Print Value, EMEA 2016 (6K)</th>
<th>Print Value CAGR 2016-2021</th>
<th>Approximate EMEA 18, 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrugated</td>
<td>1980s, LJ (MP) 2014, LJ (3P)</td>
<td>276 LJ</td>
<td>45%</td>
<td>330 LJ (MP) 75 LJ (3P)</td>
<td></td>
</tr>
<tr>
<td>Direct-to-shape</td>
<td>2010 LJ Uncertain</td>
<td>50%</td>
<td>More?</td>
<td>200 LJ</td>
<td></td>
</tr>
</tbody>
</table>

Source: Keypoint Intelligence
Requirements and challenges

In no particular order:

• Availability of suitable systems (width, speed etc)
• Transport to handle different packaging types
• System reliability: nozzle redundancy, printhead management
• Colour consistency: job to job, machine to machine
• Media compatibility – ideally same as analogue
• Printed cost – ink cost
• Food safety – confidence
• Image quality – defects

Innovation

Silicon MEMS printheads

Up to 33% of machine costs

Most printhead companies are investing in Si-MEMS development for industrial applications

www.imieurope.com
Single pass printing

- Single pass print engine
  - Up to 300 m/min
  - Fast drying
  - Width up to 3 m
  - 600 x 600 dpi
  - Automated maintenance

- Partnership model
  - BHS for packaging

IMI Europe Digital Printing Conference, Sept 2018

Other OEMs

- Heidelberg (aqueous)
- Canon/Océ (aqueous)
- EFI Nozomi (UV LED)
- HP (aqueous)
Printhead compensation

- Printhead linearisation
- Missing nozzle compensation

Global Inkjet Systems
IMI Digital Printing Presses
Conference, May 2016

Curing

- Usually UV
- Arc lamp (excited gas) or LED (semiconductor)
- Issues
  - Absorption by ink colorants as well as photoinitiator
  - Penetration through ink layer
  - Oxygen inhibition
  - Waste heat
  - Odour
  - Food compatibility
- E-beam has potential
Décor: application challenges

In no particular order:

- Availability of suitable system (width, speed etc)
- System reliability (huge step forward from the past, question about single pass)
- System cost (single pass machines very expensive)
- Question about ink/compatibility with process
- Printed décor cost – ink cost
- ‘Open’ source vs single source?

Flooring Market to Reach $331.78 Billion by 2020
CAGR of 4.8% from 2015 to 2020

- 2015 market share of value
  - Asia-Pacific region 40%
  - Europe 23%
  - North America 20%
  - ROW 17%
- Asia Pacific leads in development and demand
  - Cities in the Asia-Pacific economies would hold 54% of the world’s urban population, thereby creating the largest workforce in the world.
  - The region held the second-largest share in infrastructure investment in 2015.
  - Construction spending in the Asia-Pacific region is projected to account for a share of 31% in 2015 and is projected to increase to 46% by 2020.

Source: Keypoint Intelligence
Demand for Decorative Materials/Surfaces

Source: Keypoint Intelligence

Addressing Orders Below 1 Ton!

Source: KBA • Business Development Digital Web-Presses KBA RotaJet 1, 2/ V-Series
Digital Printing A Step Towards - Mass Customization

<table>
<thead>
<tr>
<th>From Conventional...</th>
<th>... to Digital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long print runs</td>
<td>Short print runs</td>
</tr>
<tr>
<td>Screens, Cylinders, Plates</td>
<td>No printing consumables needed</td>
</tr>
<tr>
<td>Fixed design and patterns</td>
<td>Variable design and patterns</td>
</tr>
<tr>
<td>Longer lead times</td>
<td>Short lead times</td>
</tr>
<tr>
<td>High inventory</td>
<td>Low inventory</td>
</tr>
<tr>
<td>High distribution costs</td>
<td>Lower distribution costs</td>
</tr>
<tr>
<td>High inventory write-offs</td>
<td>Low wastage</td>
</tr>
<tr>
<td>Long make ready and tooling</td>
<td>Short make ready</td>
</tr>
<tr>
<td>Costly environmental mitigation</td>
<td>Improved environmental impact</td>
</tr>
</tbody>
</table>

Digital décor solutions

[Logos of Barberán, Palis, Cefla, KBA, EFI, and Hymmen]
Inks

- Reliable pigmented inks essential for décor
- Requirements
  - Light-fastness
  - Reliability for single pass
  - Compatibility with production process
  - Cost
- For most this means an aqueous ink
  - E.g. Sun Chemical, Fujifilm IC, Sensient, Mexar

www.imieurope.com
New technologies

- New jetting technology for digital coatings
  – Alchemie, Archipelago

Key market facts

- Global apparel market is estimated at US$1.7 trillion
- Global apparel market is expected to reach US$5 trillion by 2025
- Top 8 economies from apparel consumption constitute 70% of the global consumption
- Apparel consumption in EU led by UK, Germany and Italy
- Apparel consumption CAGR for China and India, 10% and 12%, respectively by 2025

* WITIN Intelligence: Digital Textile
Top exporters

**Textiles**
- China
- EU
- India
- US
- Turkey
- South Korea
- Taipei
- Hong Kong
- Pakistan
- Japan

**Apparel**
- China
- EU
- Bangladesh
- Vietnam
- Hong Kong
- India
- Turkey
- Indonesia
- Cambodia
- US

*WTN Intelligence: Digital Textile*

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Trends fuelling growth

**Industry 4.0**

**The Millennial Effect**

**Growing Middle Class**

**Athleisure Apparel**

*WTN Intelligence: Digital Textile*

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By 2022, India’s population will have overtaken China’s to become the largest in the world. Half of the population is considered middle class.

76% of China’s urban population will be considered middle class by 2022, amounting to a minimum of 550 million people in the urban population.

* WITIN Intelligence: Digital Textile
China

China 2025
- Medium and high-value add production
- Rise in production of technical textiles
- Financial support from government
- Smart manufacturing

Offshoring/Investment
- Large manufacturers investing in other geographies
  Ex. Shandong Ruyi Technology Group, one of the largest textile manufacturers in China

India

Amended Technology Upgradation Fund (ATUF) scheme
- Government subsidy for investment in new textile and garment machinery

Scheme for Integrated Textile Parks (SITP)
- Infrastructure development

Growth of online retailers
- E-commerce sales of fashion products to reach over US$21bn by 2020

WTI Intelligence: Digital Textile
High growth markets

* WTiN Intelligence: Digital Textile
Digital textile printing in Asia

- 660 million sqm annual capacity
- 16,000+ digital textile printers currently installed
- 37% global share in terms of output
- 43% global share in terms of installed units

* WITN Intelligence: Digital Textile
Single Pass Phenomenon

Digitally Colouring a Single Thread
Summary

• Excellent growth opportunities in key markets
• Further understanding of market requirements
• New technology developments
• Exciting future still in place