iPCBs and Printing

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Today’s Agenda

• What is Printing?
• Why Print?
• Role of Color in Marketing
• Role of Ink In Print
• Print Technologies
• Sustainability in Printing and Packaging
What Is Printing?

• Application of text & images for mass communication

• Printing’s advantages
  o Inexpensive to mass produce
  o Produces exact duplicates
  o Inexpensive to distribute
  o Easy to spread awareness
  o Can be limited to geographical areas
  o Retention and literacy
  o Convenient to consume
  o Communicates message
  o Durable and stylish
  o Don’t need a power source!
Why Print?

PRINT IS UBIQUITOUS AND INTEGRATED INTO BUSINESS

Brand Support & Awareness

Primary Message & Product Carrier

Allows for Business Growth
Role of Color In Marketing

• Different colors have a different phycological effect on consumers
  o **Red** is exciting, action-oriented, passionate, energetic, encourages appetite
  o **Blue** provides a sense of security, trust, strength,
  o **Green** stimulates harmony, peace, health
  o **Orange** promotes enthusiasm, creativity, adventure, success, balance
  o **Purple** is associated with nobility, power, luxury, spirituality, wisdom

• **93%** of buyers focus on the visual appearance of a product
• **84.7%** of buyers claim color is the primary draw for a product
• **80%** believe color is responsible for brand recognition

• Source - https://digitalsynopsis.com/advertising/psychology-of-colors-in-marketing/
Role of Color In Marketing
Role of Ink In Print

• Imparts text and images
• Provides decorate and functional layer
• Need four different colored inks for CMYK printing
  o Print can’t reproduce continuous tone (photographic) images
• Can use “spot colors” commonly referred to as Pantone Matching System (PMS) for specific colors
  o Now over 2,100 separate colors
• Printed pieces can be 1-4 colors and can include one or more PMS colors
  o Based on customer specifications, purpose of piece, graphics
Role of Ink In Print

• Ink is ordered to meet color specifications set by customer
  o Printers do not delve into pigment specifics

• Ink can be ordered based on performance specifications
  o Drying time, coating compatibility, scuff resistance, light fastness, weatherability, direct food contact, thermochromatic, conductive, etc.

• Ink is formulated to meet specific application technology
  o Not interchangeable - based on printing process and application method
Printing and Print Technology

**Conventional**
- Relief Processes
  - Letterpress
  - Flexography
- Intaglio
  - Gravure
- Serigraphic
  - Screen Printing
- Planographic
  - Offset Lithography

**Digital**
- Ink Jet
- Xerography - Dry Toner
- Liquid Electrophotography – Indigo
- Dye Sublimation
- Nanography
Printing and Print Technology

**Conventional**

- Large quantities can be printed cost effectively
- Unit cost goes down as the quantity goes up
- A large variety of paper types with custom finishes can be used
- Special custom inks such as metallic and Pantone colors are available
- Highest possible printing quality, with greater detail and color fidelity

**Digital**

- Setup costs are lower for short runs
- Print only the amount you need, when you need it
- Lower minimum quantities (as low as 1)
- Variable data capability (names, addresses, codes or numbering can be done easily)
- Improved technology has made digital quality acceptable for more uses
Selection of Print Technology

• Product requirements
  o Certain products can only be produced with specific technology

• Print quality
  o Technical limitations such as color matching and customer demands can dictate print process

• Run length
  o Number of required units

• Cost
  o Image carrier, set up/make ready, coating

• Customization with spot colors, special effects, variable data, etc.
Digital Printing Labels and Packaging

New North American Press Installations in 2013 & 2018
Conventional vs. Digital

2013

2018

Color Digital 2013

Color Digital 2018

Conventional 2013

Conventional 2018

Reasons for using digital printing

- Short runs 18%
- Distributed printing 21%
- Turnaround time 10%
- Versioning 21%
- Variable data/personalising 30%

https://pslabels.com/flexo-vs-digital-market-share/
Print Technology for Packaging & Newspapers

**Conventional**
- Relief Processes
  - Flexography
- Intaglio
  - Gravure
- Planographic
  - Offset Lithography

**Digital**
- Ink Jet
- Xerography - Dry Toner
- Liquid Electrophotography – Indigo (aka liquid toner)
Relief Process: Flexography

- Image area receiving ink is raised above the non-image area
- Utilizes flexible rubber or polymer plate and fluid ink
- Ink applied via anilox roll and doctor blade system
- Inked image directly applied to substrate
- Commonly used to produce
  - Flexible packaging
  - Folding paper boxes
  - Corrugated boxes
  - Some newspapers
Intaglio Process: Rotogravure

- Image engraved into cylinder
- Fluid ink transferred from cells on surface of metal cylinder
- Excess ink removed with doctor blade
- Inked image directly applied to substrate
- High consistency and long print runs
- Commonly used to produce
  - Flexible packaging
  - Folding paper boxes
  - Labels
  - Magazines, catalogs, greeting cards
  - Specialty – wall coverings, laminates, wrapping paper, paneling, flooring
Planographic Process: Offset Lithography

- Image and non-image area in the same geographical plane
  - Based on the fact that oil & water do not mix
- Paste ink (oil) is applied to the image area and fountain solution (water) to the non-image area
- Inked image transferred from plate to blanket and then to substrate
- Commonly used to produce
  - Folding paper boxes
  - Labels
  - Commercial printing – books, flyers, magazines, catalogs
  - Metal cans
Digital Printing: Liquid Electrophotography – Indigo

- Photo Imaging Plate is a dynamic light sensitive plate that can be re-imaged on every revolution of the printing cylinder
- Liquid ink is attracted to the PIP by an electrical charge
- Ink is transferred 100% to a blanket then to the substrate
- Commonly used to produce
  - Folding paper boxes
  - Some flexible packaging
  - Labels
  - Commercial printing – books, flyers, magazines, catalogs, etc.
Digital Printing: Xerography – Dry Toner

- Photosensitive imaging drum is charged with the image from a scan via light or directly charged.
- Dry toner is attracted to the electrical charge
- Toner is transferred directly to the substrate
- Toner is fused to substrate
- 4-5 color units
- Commonly used to produce
  - Folding paper boxes
  - Labels
  - Commercial printing – books, flyers, magazines, catalogs
Digital Printing: Ink Jet

- Extremely small droplets of ink are applied to a substrate
- Software controls discharge of ink from ink jet head
- Separate nozzles are used for each color
- Ink is applied directly to the substrate
- Ink can be dried or cured
- Commonly used to produce
  - Folding paper boxes
  - Labels
  - Commercial printing
  - Other – POP, banners, textiles, flooring, etc.
Sustainability In Print & Packaging

• Product
  o Substrate (Traditional customer focus)
  o Ink
    • “Soy” or other vegetable oil-based inks (litho only)
    • Heavy metal-based pigments
    • Recyclability (paper-based products)
  o Coatings
    • Recyclability (paper-based products)
  o Adhesives
    • Recyclability (paper-based products)

• Process
  o Printing manufacturing operation and support activities
Sustainability In Print & Packaging

• Impact of China Blue Skies (aka Sword) decision
  o Changes in basic packaging materials
    • Move away from plastics
    • New polymers and recycling processes
  o Extended Producer Responsibility
  o Mandatory recycled material content

• Chemical composition
  o PFAS in food packaging
  o BPA in food packaging
  o CA Proposition 65
Questions and Answers
Thank you for listening!

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