

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
 - Inexpensive to mass produce
 - Produces exact duplicates
 - Inexpensive to distribute
 - Easy to spread awareness
 - Can be limited to geographical areas
 - Retention and literacy
 - Convenient to consume
 - Communicates message
 - Durable and stylish
 - 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 psychological effect on consumers
 - **Red** is exciting, action-oriented, passionate, energetic, encourages appetite
 - **Blue** provides a sense of security, trust, strength,
 - **Green** stimulates harmony, peace, health
 - **Orange** promotes enthusiasm, creativity, adventure, success, balance
 - **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/>

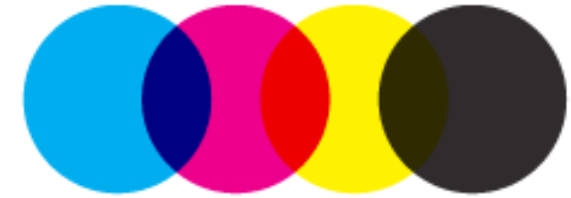
Role of Color In Marketing

COLOR EMOTION GUIDE



Role of Ink In Print

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



C = Cyan (blue), M = Magenta, Y = Yellow, K = Black



Role of Ink In Print

- Ink is ordered to meet color specifications set by customer
 - Printers do not delve into pigment specifics
- Ink can be ordered based on performance specifications
 - Drying time, coating compatibility, scuff resistance, light fastness, weatherability, direct food contact, thermochromatic, conductive, etc.
- Ink is formulated to meet specific application technology
 - Not interchangeable - based on printing process and application method



C = Cyan (blue), M = Magenta, Y = Yellow, K = Black



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

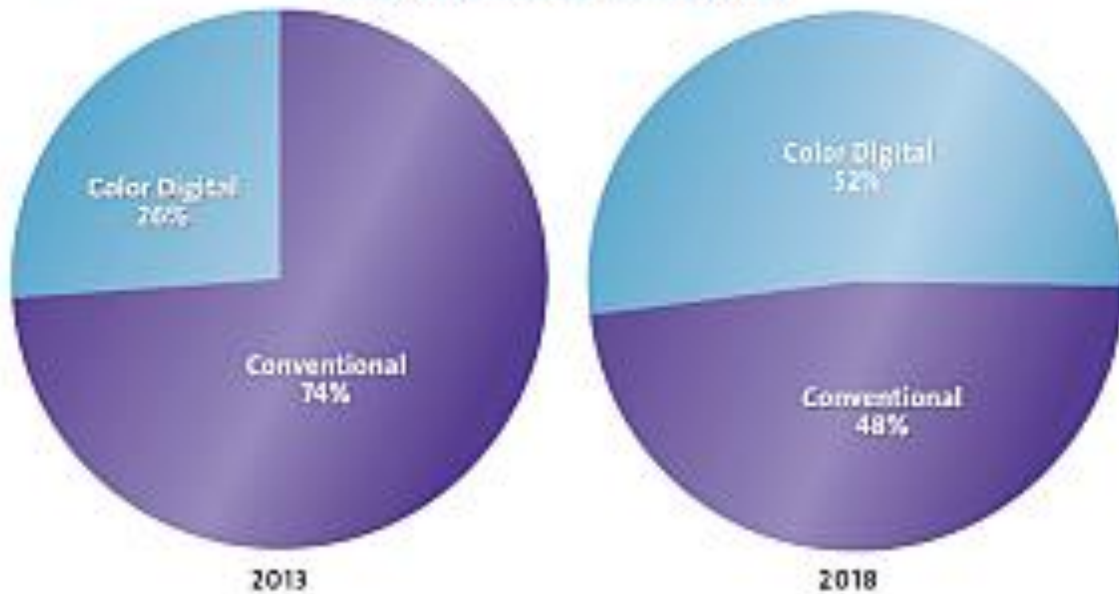
Selection of Print Technology

- Product requirements
 - Certain products can only be produced with specific technology
- Print quality
 - Technical limitations such as color matching and customer demands can dictate print process
- Run length
 - Number of required units
- Cost
 - Image carrier, set up/make ready, coating
- Customization with spot colors, special effects, variable data, etc.

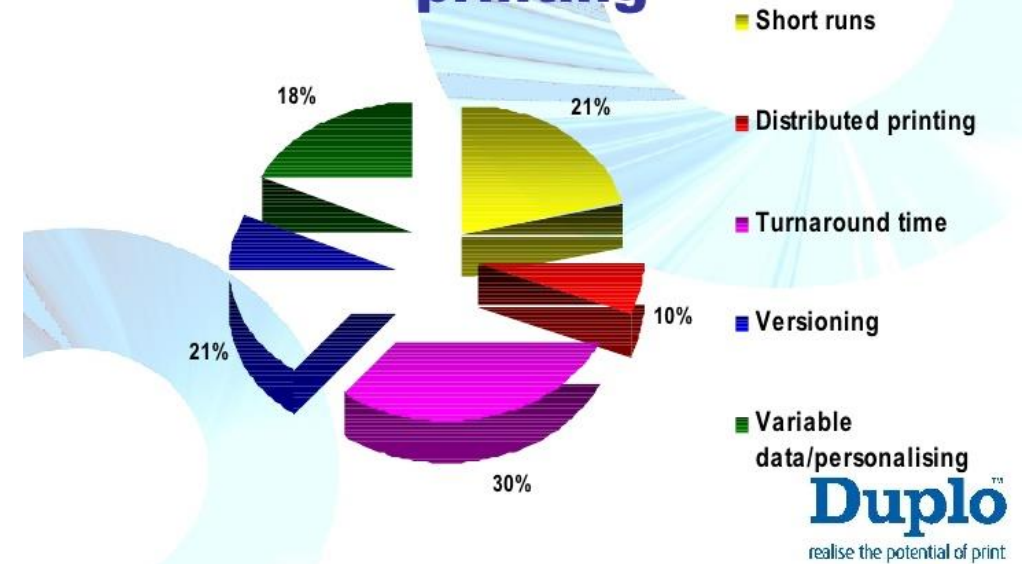


Digital Printing Labels and Packaging

NEW NORTH AMERICAN PRESS INSTALLATIONS IN 2013 & 2018
CONVENTIONAL VS. DIGITAL



Reasons for using digital printing



<https://pslabels.com/flexo-vs-digital-market-share/>

Print Technology for Packaging & Newspapers

Conventional

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

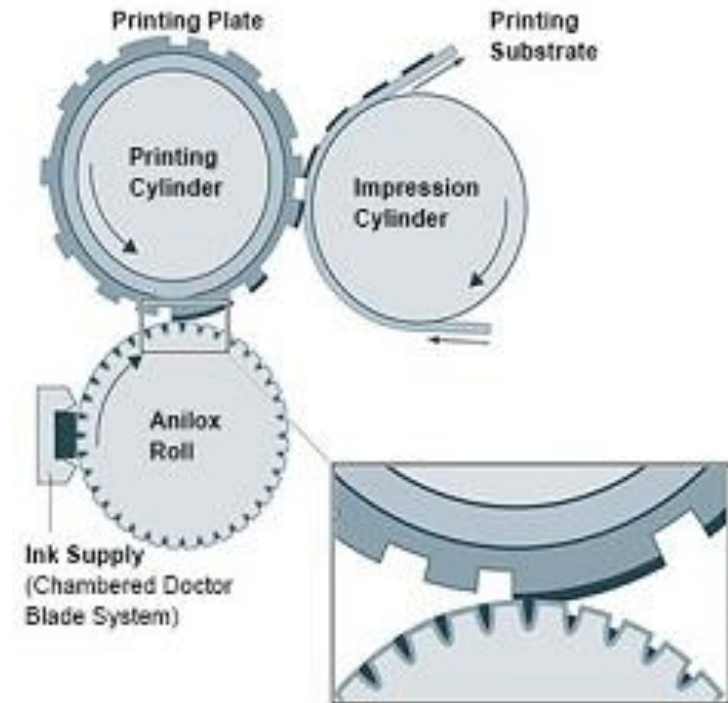
Digital

- Ink Jet
- Xerography - Dry Toner
- Liquid Electrophotography – Indigo (aka liquid toner)



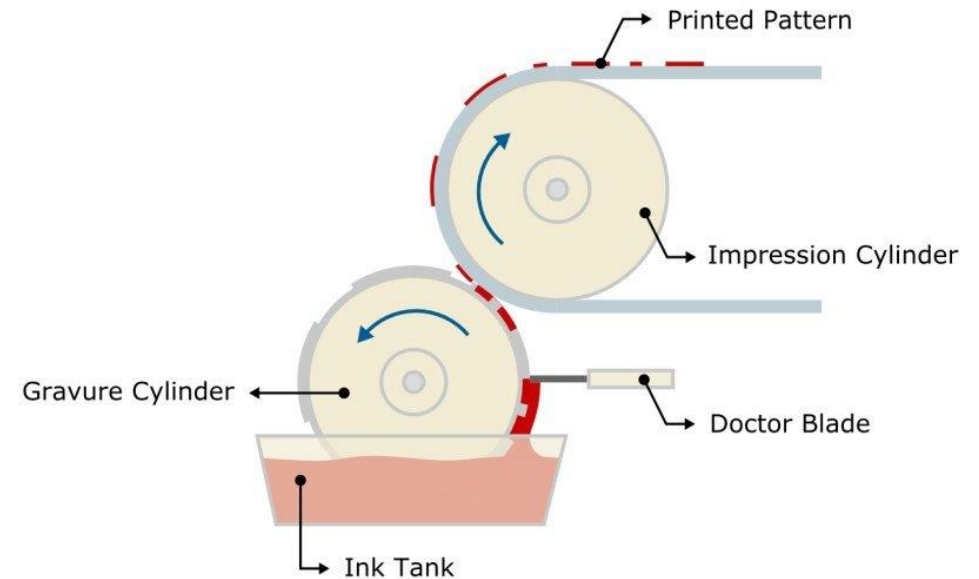
Relief Process: Flexography

- 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



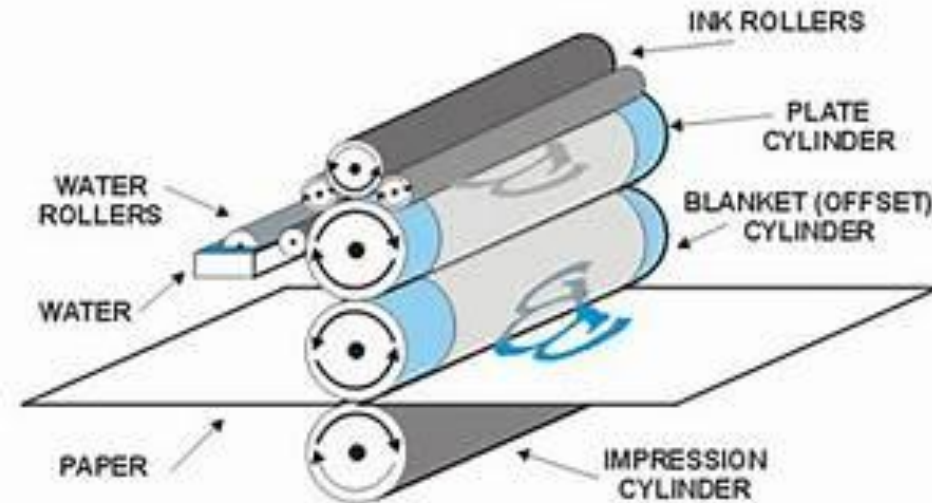
Intaglio Process: Rotogravure

- 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 same geographical plane
 - Based on fact that oil & water do not mix
- Paste ink (oil) is applied to image area and fountain solution (water) to nonimage 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

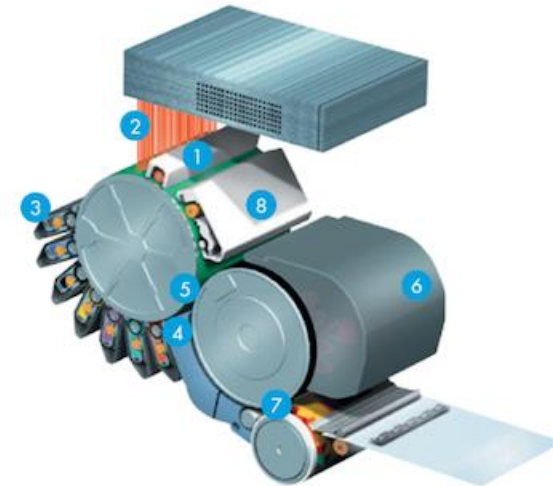


Digital Printing: Liquid Electrophotography – Indigo

- 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.

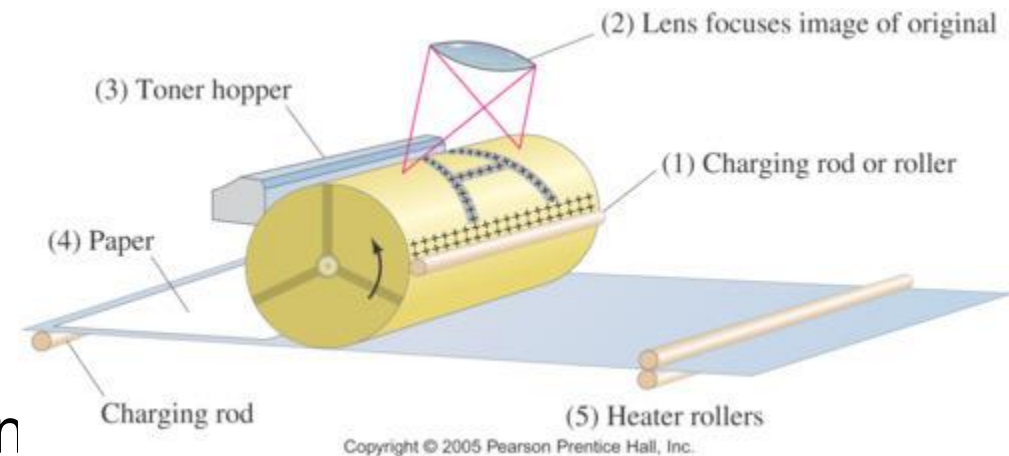
HP Indigo digital press printing cycle

1. Charging station
2. Laser exposure
3. Binary Ink Developer units (BIDs)
4. Pre-transfer erase unit (PTE)
5. First transfer (PIP to blanket)
6. Blanket heating
7. Second transfer (blanket to substrate)
8. Photoconductor cleaning station



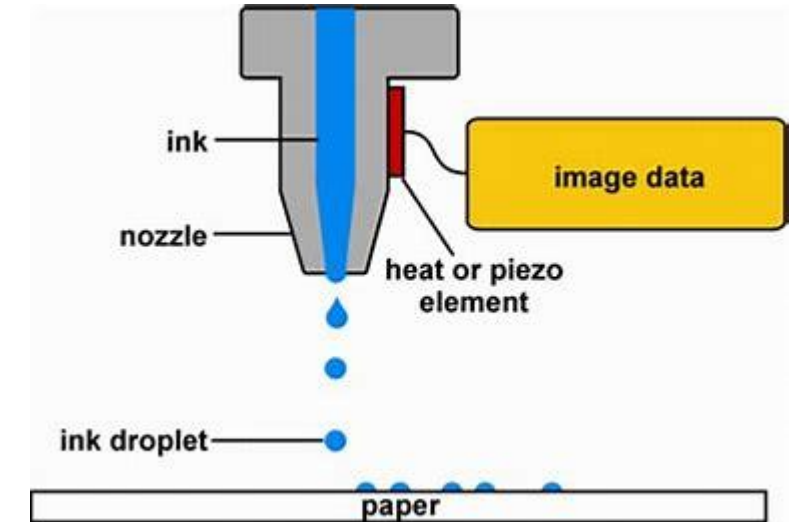
Digital Printing: Xerography – Dry Toner

- 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, magazine 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
 - Substrate (Traditional customer focus)
 - Ink
 - “Soy” or other vegetable oil-based inks (litho only)
 - Heavy metal-based pigments
 - Recyclability (paper-based products)
 - Coatings
 - Recyclability (paper-based products)
 - Adhesives
 - Recyclability (paper-based products)
- Process
 - Printing manufacturing operation and support activities



Sustainability In Print & Packaging

- Impact of China Blue Skies (aka Sword) decision
 - Changes in basic packaging materials
 - Move away from plastics
 - New polymers and recycling processes
 - Extended Producer Responsibility
 - Mandatory recycled material content
- Chemical composition
 - PFAS in food packaging
 - BPA in food packaging
 - CA Proposition 65



Questions and Answers



Thank you for listening!

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