Gravure In Flexible Packaging
Meeting the Challenge

Robert Eller
FlexPack Is A Major Market For Gravure Printing

Flexible Packaging by Process and Region

North America
$175MM
Gravure 23%
Flexo 75%

Europe
$240MM
Gravure 41%
Flexo 57%

Asia Pacific
$132MM
Gravure 85%
Flexo 10%

Source: Courtesy of DuPont Cyrel®

Global Print Form Market $595MM

Gravure dominated
Flexo dominated

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The Challenge Of Packaging

• Intense competition to stand out on the retailer’s shelf
  – Dozens of product choices in every category
  – Buying decisions made in <2 seconds

• Huge variety of substrates driven by functional requirements
  – Product protection
  – High speed forming, filling, and sealing

• Extremely demanding supply chain
  – Packaging is the longest leadtime ingredient for most consumer packaged goods
  – Forecasting consumer demand is a constant problem
  – Losing sales due to product unavailability is a cardinal sin for product managers

• Relentless press to drive down cost
  – Cascading from the demands of big box retailers
### Meeting The Challenge

**One Goal: Faster, Better, Cheaper**

<table>
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<tr>
<th>Faster, Better, Cheaper in Package Printing</th>
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</table>
| **Faster** | • Supply Chain – Quickly respond to changing demand; avoid lost sales  
• Cost – Shorten supply chains, reduce inventories and write downs |
| **Better** | • Shelf Appeal – Differentiated appearance (colors, graphics, content)  
• Substrate Compatibility – Consistent appearance across substrates |
| **Cheaper** | • Cost Reduction – Lower cost without sacrificing quality and service |

*Any combination of two is easy. Combining all three is a breakthrough.*
# Breakthroughs In The Printing Process

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<th>Flexography</th>
<th>Gravure</th>
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<td><strong>Prepress</strong></td>
<td>• Digital Prepress Technology</td>
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<td><strong>Print Form Fabrication</strong></td>
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<td><strong>Press Design</strong></td>
<td>• Fast Changeover Presses</td>
<td>• Fast Changeover Presses</td>
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<td><strong>Printing Process</strong></td>
<td>• Extended Gamut Printing</td>
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Product Life Cycle

- **Birth**
- **Growth**
- **Maturity**
- **Decline**

Penetration vs. Time
Product Life Cycle

Penetration

Birth | Growth | Maturity | Decline

Time

Innovators | Early Adopters | Early Majority | Late Majority | Skeptics
Product Life Cycle

Penetration

Birth | Growth | Maturity | Decline

Time

Extended Gamut Printing (Flexo)

Laser Engraving

Fast C/O Presses

Photopolymer Plates

Digital Prepress

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Conventional Printing

- **Changeover**
  - Ink Room – Color match 6 custom colors (from ~15 color bases for this ink system)
  - Remove 10 printforms
  - Drain, wash down, and thoroughly clean 6 ink stations
  - Mount 10 new printforms
  - Refill 6 ink stations with new inks and adjust ink viscosities to target values
  - Start-up press and bring 10 stations into register. Fix any printing issues.
  - Color match 6 custom colors. Adjust CMYK inks to target ink densities.
Extended Gamut Printing

CMYKOGV
Extended Gamut
Process Colors

• Changeover
  – Ink Room – Eliminate color matching custom inks
  – Remove 7 (versus 10) printforms
  – Eliminate draining, washing down, and cleaning custom ink stations
  – Mount 7 (versus 10) new printforms
  – Eliminate filling custom ink stations and viscosity adjustments
  – Start-up press and bring 7 (versus 10) stations into register. Fix any printing issues.
  – Eliminate custom ink color matching. Adjust CMYKOGV inks to target densities.
Extended Gamut Printing

![Extended Gamut Printing Diagram]

**Figure 3.** Running items in combination, which expanded gamut printing more easily facilitates, can reduce production times by as much as one half.
Faster, Better, Cheaper with Extended Gamut

• Faster
  – Enhance scheduling flexibility by eliminating the use of custom inks

• Better
  – Photorealistic images become as colorful as pictures
  – Demanding vignettes become easier
  – Enhanced graphic effects (flames, clouds, oranges, etc.) become possible

• Cheaper
  – Reduce ink inventory and simplify ink make-up
  – Eliminate ink changeovers: save time and waste
  – Gang jobs: eliminate some changeovers entirely
  – Gang jobs: reduce minimum run sizes (reduce inventory carrying costs)

Savings Opportunities Are Substantial On Dedicated Presses
# Savings Opportunities – Dedicated Flexo Press

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<th>Metric</th>
<th>Potential Benefit of Extended Gamut Printing¹</th>
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<tr>
<td>Number of Changeovers</td>
<td>30% Reduction</td>
</tr>
<tr>
<td>Make Ready Downtime</td>
<td>60% Reduction</td>
</tr>
<tr>
<td>Value of Time &amp; Waste Saved ($/Yr)</td>
<td>$1,050,000</td>
</tr>
<tr>
<td>Margin on Incremental Sales ($/Yr)</td>
<td>$800,000</td>
</tr>
<tr>
<td>Total Opportunity ($/Yr)</td>
<td>$1,850,000</td>
</tr>
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</table>

¹. Estimated savings for a 60” wide, high speed, fully loaded packaging press running 100% in extended gamut mode versus the same press running 100% in conventional mode. Actual saving will vary based on the specifics of the situation being modeled.
Development Status

• **Flexography**
  – Pioneered by Alcan and PepsiCo (Frito Lay)
  – Adopted and fully implemented by Frito Lay and its converters
  – Active developments by other Brand Owners
  – Pioneering efforts by smaller converters exploiting quality and service benefits
  – Approximately 10% of all consumer facing flexible packaging printed using flexography is currently printed using extended gamut

• **Gravure**
  – Some experimentation with substantial customer interest, but no commercial applications

*If the benefits of extended gamut printing are so compelling, why aren’t gravure printers adopting this new technology?*
The Answer Appears To Be Moiré

• Because perfect dot registration is not possible on conventional presses, each process color is printed at a different screen angle.

• Moiré arises when overlapping screens create objectionable interference patterns.

![Moiré patterns and effect on bird feathers]
Moiré in Extended Gamut Printing

• Moiré is more problematic in extended gamut printing
  – Moiré is a well understood problem in 4-color printing
  – By selecting the proper screen angles, objectionable moiré can be minimized when printing four color process using either flexo or gravure
  – In both cases, the solutions takes advantage of the fact that one of the colors (yellow) is light and does not contribute significantly to objectionable patterns
  – When printing 7-color process, we are sometimes faced with the necessity to overprint 4 dark screens (e.g. cyan, blue, magenta, and black) ... this is a more difficult problem to solve

• Flexo is advantaged by a broader choice of screen angles
  – Flexo plates can be engraved using any angle between 0° and 90°
  – Conventionally engraved gravure cylinders are limited to the use of angles between 30° and 60°
  – Avoiding moiré with this limited range of screen angles is a major challenge for gravure printer wanting to adopt extended gamut printing
Overcoming Moiré

• New technology, particularly laser engraving, appears to have the potential to overcome these barriers
  – More flexibility in choosing engraving angles
  – More flexibility in choosing cell geometry

• Extended Gamut Printing is currently a threat to gravure printing in the flexible packaging industry.

• With the right research agenda, the gravure industry has every possibility of turning this threat into an opportunity

Historically, packaging has been a major market for gravure printing ... it’s up to us to keep it that way.
Q&A