The Rise of Expanded Gamut Technology

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Extended vs Expanded
- Extended: Adding more CMYK
  - Like stretching your fingers, still have just 5 colors: CMYK
- Expanded: Adding new colors
  - Orange, Green, Violet ink

Expanded Gamut History
- Advantages
  - Flexo
  - Digital
  - Offset
- Driving forces for adoption
- Case Study: Litho Packaging

Expanded the Press Gamut – xGamut (xG)
- xG Advantages for Flexographic Printing
  - Anilox roll and ink inventories can be standardized
  - Fewer washes of ink pans and doctor rolls
  - No changing the anilox
  - Simple plate changes
  - Press efficiency goes up dramatically!

xG Advances in Digital Printing and Proofing
- xG also provides the ability to reproduce a greater range of spot colors using a fixed palette.
- A major step to industry adoption was the introduction of the Pantone Plus Series Extended Gamut Guide.
- xG printing is also a means to achieve other results. Measurable, more profitable results:
  - shorter changeover times
  - lower consumption of inks and plates
  - efficiencies gained from running multiple SKUs on the same form with little interruption.

xG Advantages in Digital Printing and Proofing
- Every device is different
  - CMYKOG – Screen
  - CMYKOGV – HP Production
  - CMYKOGV – Fuji Graphium
  - CMYKOGV – Domino
  - CMYKOG – Xerox
- No ISO Standard for CMYK +OGV

Brief History of Expanded Gamut Printing (xG)
- xG printing isn’t new.
  - 1995 - Pantone’s Hexachrome offered six color process printing by the addition of orange and green using specialized software in Adobe Photoshop.
  - Optional use CMY with RGB and the optional addition of black.
- Expanding the gamut allows for the creation of colors that are much more vibrant when converting from RGB, CMYK or CIELab.

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Anilox roll and ink inventories can be standardized
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xG Advantages for Offset Printing

- Ink inventories can be standardized
- Fewer wash-ups of ink trains
- No blanket changes
- Simple plate changes
- Gang Run Efficiencies

Press efficiency goes up dramatically!

xG Efficiency Study: March 2018

- Test consisted of 4 press runs
  - 1st Run – Characterize Brand Colors
  - 2nd Run – Characterize CMYKOGV
  - 3rd Run – 6 Color Efficiencies

**Resources**

- 8 Color press
- Runs at 5000 sheets per hour
- X Gamut profiling and workflow software
- Scanning spectrophotometer

**Processing Steps**

- Print and Measure the CMYK + Spot Characterization set
- Print and Measure the Expanded Gamut Data Set
- Map Spot color to xG Data Set
- Calculate the error metrics between the Spot and xGamut test colors

**Evaluation Steps**

- Confirm test colors are within metrics
- Calculate time/material savings
- Number of plates
- Press Changes
- Press Time

**20,000 pcs ea of 7 SKUs**

- 2 common colors + 7 brand colors and CMYK
- 22pt C1S Blister Board

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  - 4th Run – xG Conversion

1st Run: Characterization of Brand Colors

- 200 Line AM screening
- Spot colors printed to <2 \( \delta E \) using spot inks.
- CxF Data Wedges measured for each color and standards established
- CxF/x4 files exported to xGamut Software for Separations and Proofing

2nd Run: Press Characterization in xGamut

- 200 Line AM screening
- Print to G7 ColorSpace for CMYK
- Print to Lab for xG Colors
  - G7: 2.0

2nd Run: Gamut Comparison CMYK vs PMS

CMYK ProMatch
- Color Space = GRACoL
- Points = Pantone+ Coated
- 58% In Gamut

2nd Run: Gamut Comparison CMYK-OGV vs PMS

CMYK-OGV xG ProMatch
- Color Space = CMYK-OGV
- Points = Pantone+ Coated
- 90% In Gamut

3rd Run: 6-Color Efficiencies

- 200 Line AM screening
- Process Control to same densities as Run 2
  - CMYKOGV Test Chart
  - CMYKOGV Test Chart
  - CxF/x4 Data Wedges
- Customer can now calculate if a ganged job can be run efficiently with 6 color gamut rather than 7.
4th Run: Job converted to xG

- 200 Line AM screening
- Same PDF used as in Run 1
- All Spot Colors converted to CMYKOGV in xG Software
- Process Control to same densities as Run 2
- CxF Data wedges measured

4th Run: CxF/x4 Data Comparison

- 13 Spot Colors compared
- Average dE < 1.25
- Max dE < 4.25
- Meets all customer requirements

Post Run Analysis - Fixed Costs

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plates (each)</td>
<td>$20.00</td>
</tr>
<tr>
<td>Press Time per Hour</td>
<td>$200.00</td>
</tr>
<tr>
<td>Washups</td>
<td>$100.00</td>
</tr>
<tr>
<td>Spot Inks per lb</td>
<td>$25.00</td>
</tr>
<tr>
<td>Mixing Inks per lb</td>
<td>$20.00</td>
</tr>
</tbody>
</table>

Post Run Analysis - Spot Colors

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plates 13 @ $20</td>
<td>260.00</td>
</tr>
<tr>
<td>CMYK + 2 Common and 7 Brand Colors</td>
<td></td>
</tr>
<tr>
<td>Press Time 2 Hrs @ 200/Hr</td>
<td>400.00</td>
</tr>
<tr>
<td>Washups on 8C Press ½ Hr</td>
<td>0.00</td>
</tr>
<tr>
<td>Spot Inks</td>
<td>1125.00</td>
</tr>
<tr>
<td>Total</td>
<td>$2285.00</td>
</tr>
</tbody>
</table>

Post Run Analysis - xG

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plates 7 @ $20</td>
<td>140.00</td>
</tr>
<tr>
<td>Press Time 2 Hrs @ 200/Hr</td>
<td>400.00</td>
</tr>
<tr>
<td>Washups on 8C Press</td>
<td>0.00</td>
</tr>
<tr>
<td>XGamut Inks</td>
<td>900.00</td>
</tr>
<tr>
<td>15 lbs x 3 inks x $20.00</td>
<td>300.00</td>
</tr>
<tr>
<td>45 lbs – PMS Colors</td>
<td>1500.00</td>
</tr>
<tr>
<td>Total</td>
<td>$2285.00</td>
</tr>
</tbody>
</table>

Post Run Analysis - Savings from xG Printing

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spot</td>
<td>2285.00</td>
</tr>
<tr>
<td>xG</td>
<td>-1440.00</td>
</tr>
<tr>
<td>Total</td>
<td>845.00</td>
</tr>
</tbody>
</table>

35% Saving in Hard Cost!!!
- Makeready
- Press Time
- Only 1 press run
- Fewer plate changes and washups
- Less ink waste
- Less Environmental Impact

✓ Check Please
**xG Project Analysis**

- **Customer Satisfaction**
  - Met all customer requirements.

- **Greater Press Efficiencies – fewer changeovers**
  - Maintaining an extended gamut on a press allows for more jobs to be run during a shift, as blanket washes and ink train washups are eliminated.

- **Greater Inventory Efficiencies – fewer inks**
  - Less reliance on ink mill recipes.

- **Verification via CxF/x4 – cloud based, global**
  - Confirm if Gamut colors are accurate to the spot colors from anywhere in the world.

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**xG Implementation Resources**

- **Pantone Extended Gamut Coated Guide**

- **N-Channel Color Profiling Software**
  - ORIS X Gamut
  - GMG Color Server X
  - ORIS X Profiler

- **CxF/x4 Utilities**
  - ORIS CxF Toolbox and CxF Cloud

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**Blogs and Articles**

- **Narrow WebTech**
  - [https://narrowwebtech.com](https://narrowwebtech.com)

- **FlexoGlobal Blog, Richard Black**
  - [https://www.flexoglobal.com/blog/2016/01/16/flexos-future-expanded-color-gamut](https://www.flexoglobal.com/blog/2016/01/16/flexos-future-expanded-color-gamut)

- **X-Rite.com**
  - [https://www.xrite.com/blog/5-tools-to-print-extended-gamut](https://www.xrite.com/blog/5-tools-to-print-extended-gamut)