Using Digital Printing Technology to Convert Flexible Packaging

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SPE FlexPackCon® October 2018 Phoenix, AZ
• Formed in 2017
• Flexible packaging industry veterans
• Vision: to innovate and streamline flexible packaging converting
• Mission: to bridge the gap between label press owners and flexible packaging converters
• Act as a conduit for:
  ✓ Packaging structures design and engineering
  ✓ Conventional and digital printing
  ✓ Materials – resins, substrates, coatings, primers, adhesives
  ✓ Processes – lamination, extrusion, coating
  ✓ Good Manufacturing Practices (GMP)
  ✓ Food Safety
Consumer buying preferences: E-commerce, quick delivery, in-store/curbside pick-up

Proliferation of new SKUs from large and small brands

Consumer impatience, attention span, demand for authenticity, transparency, social purpose

This all drives a need for increased customization and faster time to market for packaged products.
Conventional converting joins a pre-printed web to a sealant web via adhesive lamination (or extrusion lamination)

✓ Optimized to be highly efficient and cost effective for long runs
✓ Vast variety of substrates and material choices

✗ Too many substrates and material choices – redundant, confusing
✗ Inefficient for short runs and turnaround times
✗ Adhesives require mixing and curing
✗ High value pre-printed web suffers waste in adhesive lamination
✗ Ink/adhesive interface is prone to quality problems later on

Slow, wasteful and impractical for short runs.
Digital Printing Presses are Well-Positioned to Capture Flexible Packaging Business

• Many installations are already making labels
  ➢ Label producers are skilled at making short and customized orders
  ➢ Experts at surface printing
• Minimal waste & fast turnaround times
• Highest print quality
• Flexible packaging can be made on narrow and mid-web printing presses by reconfiguring the steps in traditional converting
• Prerequisite: if not already making food, establish Good Manufacturing Practices (GMP) to ensure food safety
Think Differently
Act Differently
Conventional Package:

Pre-printed Film

Pre-printed Film

New Package:

Pre-laminate

Pre-laminate
Standardize with Pre-laminates, Customize with Surface Printing

- Unprinted, pre-fabricated basis of a flexible package
- Ready stock of streamlined choices to meet most needs
- Product resistivity is built-in
  - Build gas barrier into printable web (metal, coatings)
  - Build moisture barrier into sealant layer
- Two clean films have been adhesive laminated together
  - No ink/adhesive interface to cause adhesion or migration issues in the final package
- Adhesive is fully cured for fast quality control and product safety
- Rolls may be immediately sent out for filling and distribution

Reduced threat of delamination, simplified converting steps, reduced production time.
Selecting a Pre-Laminate

- Identify package format, design, size, appearance, fitments
- Categorize the contents (often food) to determine filling, barrier and storage requirements
- About a dozen combinations will suffice to package 80% of products

<table>
<thead>
<tr>
<th>Sealant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adhesive</td>
</tr>
<tr>
<td>Printable Film</td>
</tr>
</tbody>
</table>
Thermally Activated Protective Film

- Transparent BOPET with thermally activated adhesive
- Hot nip to the printed web
Overprint Varnishes (OPV)

- Water based: Additives to control foaming, wet out, leveling, drying
- Solvent based: Tougher, better adhesion, better chemical resistance than water based
- Energy curing: Best durability and gloss
  - Ultraviolet UV – photoinitiator odor can affect food
  - Electron Beam EB – similar chemistry to UV but food safe

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![Diagram of package layers]

Inside of package:
- Pre-laminate
- Sealant
- Adhesive
- Printable Film

Outside of package:
- Corona Treat
- Primer
- Ink
- OPV
Examples

- **48 ga metallized BOPET/adhesive/1.5 mil LLDPE** for snack bar or unflavored coffee frac pack
  - Surface print, protect with WB OPV (water based overprint varnish)

- **48 ga BOPET/adhesive/3.0 mil white EVOH-LLDPE** for white stand-up pouch for nuts or flavored coffee
  - Surface print, protect with EB OPV (electron beam overprint varnish)

- **48 ga BOPET/LDPE/foil/barrier adhesive/1.25 LLDPE** for hard to hold foods and cosmetics
  - Print, protect with thermal lamination to BOPET film
Conventional Adhesive Lamination
• Unwind printable film
• Print
• Rewind
• Unwind printed film
• Treat
• Apply adhesive
• Laminate to sealant web
• Rewind
• Cure in hot room
• Slit

Print and Protect Pre-Laminate
• Unwind printable pre-laminate
• Treat
• Prime
• Print
• (Rewind)
• Varnish

Slash Converting Time
Consolidate Production Steps

Conventional Adhesive Lamination

1. Unwind printable film
2. Print
3. Rewind
4. Unwind printed film
5. Treat
6. Apply adhesive
7. Laminate to sealant web
8. Rewind
9. Cure in hot room
10. Slit

Print and Protect Pre-Laminate

1. Unwind printable pre-laminate
2. Treat
3. Prime
4. Print
5. (Rewind)
6. Varnish
## Shorten Printing to Slitting Time

<table>
<thead>
<tr>
<th>Conventional Adhesive Lamination</th>
<th>Print and Protect Pre-Laminate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Film gets printed (wide-web flexo/gravure)</strong></td>
<td><strong>Pre-laminate gets printed (narrow-web digital or flexo)</strong></td>
</tr>
<tr>
<td>1 day</td>
<td>1-8 hours</td>
</tr>
<tr>
<td><strong>Job goes into laminating queue</strong></td>
<td><strong>Job sits in queue, then is OPV-varnished</strong></td>
</tr>
<tr>
<td>5-10 days</td>
<td>1 day</td>
</tr>
<tr>
<td><strong>Job gets solventless laminated to clear film</strong></td>
<td><strong>Job gets slit</strong></td>
</tr>
<tr>
<td>1 day</td>
<td>1 day</td>
</tr>
<tr>
<td><strong>Job goes into queue for curing</strong></td>
<td><strong>Sum of days</strong></td>
</tr>
<tr>
<td>0-3 days</td>
<td>2 – 3 days</td>
</tr>
<tr>
<td><strong>Job gets slit</strong></td>
<td></td>
</tr>
<tr>
<td>1 day</td>
<td></td>
</tr>
<tr>
<td><strong>Sum of days</strong></td>
<td>9 - 16 days</td>
</tr>
</tbody>
</table>
Summary

➢ Rapidly growing flexible packaging segment is overdue for innovation

➢ Short runs best to meet demand created in the new, fast-paced Amazon world

➢ Narrow and mid-web press owners are positioned for success

➢ Standardize the substrates, customize through the artwork

➢ Stock pre-laminates, inks and varnishes for instant order fulfillment

➢ Reduce threat of delamination or quality defects

➢ Shorten production from weeks to days
Thank you
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