ALTANA Acquires Pioneering Label and Packaging Technologies

Wesel (Germany) / East Providence (U.S.), August 10, 2017

ALTANA acquires the technology portfolio and innovation team of U.S. based NuLabel Technologies, Inc. Mr. Antonio Lux, President of NuLabel, will join the ALTANA management team. NuLabel develops engineering and material science solutions to improve packaging design while using significantly less material. "We are very pleased to have found a new owner in ALTANA who is in a position to integrate our innovation pipeline into its core business and to bring it to market readiness," said Benjamin Lux, President of NuLabel Technologies, Inc. "We know that our innovation team and our environmentally friendly technologies allow for unique packaging design that uses considerably lower quantities of consumable materials. The acquired technologies will be integrated into ALTANA’s ACTEGA North America division, where they are to be developed to market maturity."

"They have the potential to provide new growth opportunities to our customers in the packaging industry, and, at the same time, to make an important contribution to sustainability." President and CEO of ACTEGA North America. "They have the potential to provide new growth opportunities to our customers in the packaging industry, and, at the same time, to make an important contribution to sustainability."

Schofield will continue leading NuLabel as interim CEO. ALTANA also takes over an interdisciplinary team of researchers. The parties have agreed not to disclose the purchase price.

NuLabel develops engineering and material science solutions to improve packaging design while using significantly less material. ALTANA, a leading global specialty chemical group headquartered in Wesel, Lower Rhine, Germany (Quandt family, major shareholder of BMW) owns 49 production facilities worldwide and, at the same time, to make an important contribution to sustainability. It comprises innovative technologies for the packaging industry, and, at the same time, to make an important contribution to sustainability.
Concept: Process
- Crystal utilizes an additive manufacturing on existing conventional printing assets to produce a unique no-label look decoration without a laminated facestock.
- Decorations can be supplied through the existing label supply chain to packaging sites.
- With the use of modified application hardware, Crystal decorations are transferred to rigid containers and the carrier film is released at the point of application.
- The result is an ultra-low-waste, premium no-label decoration previously unachievable with the dominant pressure sensitive label decoration techniques.
- The unique product and process delivers considerable value to brands and the supply chain:
  - Zero waste to landfill (>95% reduction in waste) for printers/converters
  - Ability to decorate at lower caliper than extruded films
  - Lowering the inbound raw material costs for printers

Concept: Joint Coatings & Application Hardware Approach
- Coatings + Hardware Approach
  - The Crystal Technology is a coatings and application hardware innovation to provide a new platform for container decoration.
  - To unlock the value of Crystal Media, design modifications need to be made to existing container decoration (labeling) hardware.
- Media
  - ANAT develops coatings to be utilized on existing narrow web printing assets that allow printers to build Crystal Media.
  - No press modifications required.
- Hardware
  - ANAT designs hardware modifications and partners with existing leading hardware suppliers.
- Brands/Packaging Sites
  - Supplied Crystal Media from existing media supplier.
  - Supplied Crystal Compatible Hardware from existing hardware supplier.

Concept: Pressure Sensitive Adhesives Labels - Schematic
- Carrier Film: The LLL is deposited onto the topside of an extruded (recyclable) polymeric film between 2-3 Mils in total thickness. Dependent of the supplier backside of the film either has a release coating or treatment that will come in contact with PSA during winding.
- Liquid Label Layer (LLL): The LLL is coating applied in register using the initial print station. This clear coating acts as the label substrate during application and overprint varnish once applied to a container.

Concept: Crystal Decoration - Schematic
- Print: Print (reverse) is applied in register using existing stations and inks.
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Pressure Sensitive: Adhesive is applied in register using an existing print station. The adhesive footprint mimics the LLL footprint.

<table>
<thead>
<tr>
<th></th>
<th>Conventional Clear PSA</th>
<th>Crystal Label</th>
<th>Crystal Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Label or Decoration Area</td>
<td>20 cm²</td>
<td>4 cm²</td>
<td>80%</td>
</tr>
<tr>
<td>Laminated Area</td>
<td>30 cm²</td>
<td>0 cm²</td>
<td>100%</td>
</tr>
<tr>
<td>Lined or Carrier Area</td>
<td>30 cm²</td>
<td>24 cm²</td>
<td>26%</td>
</tr>
<tr>
<td>Matrix/Waste Area</td>
<td>10 cm²</td>
<td>0 cm²</td>
<td>100%</td>
</tr>
<tr>
<td>Adhesive Area</td>
<td>30 cm²</td>
<td>4 cm²</td>
<td>86%</td>
</tr>
</tbody>
</table>

Raw Material Reduction to Printer: >60%

Applicator Phase 1 Test Results:
- Sustained runs of >1,000 containers with Flexo printed generic media
- Consistent average throughput of >45 containers per minute with bursts of >100 containers per minute decorating rigid:
  - PET Containers
  - Aluminum
  - Glass
- Burst run speeds of >95 cpm

Application Hardware
- A variety of styles/designs of PS Labelers exist in the market today
- Modifications to most existing Wrap-Around PS Labelers (focusing on the web path) are required to apply Crystal Labels to containers
- Crystal Compatible hardware will likely be provided as new machines

Above: Infeed rotary accumulator and label applicator.
**Concept: Crystal Decorated Containers**

- **Solvent Resistance:**
  - MEK double rub testing is a measure of fullness of cure of the liquid label layer (L3) which is the Crystal label decoration coating. All photopolymer based L3 formulations are developed to pass a minimum of 50 double rubs with MEK solvent.

- **Scratch Resistance:**
  - Crystal label decorations are less prone to scratching than the PET containers they get applied to. Scratch resistance is formulated into the L3 based on customer requirements.

- **Abrasion Resistance:**
  - For abrasion resistance, Crystal label decorations are tested via a Sutherland Rub tester simulating containers rubbing against each other while on packaging. Crystal label decorations (L3 with PSA applied to PET substrate) will survive >150 strokes before the label abrades.

When selecting a primary/secondary label stock for compatibility with PET recycling, the following considerations are taken into account:

- **Label stock impact on automated NIR sortation**
- **Can the label be “liberated” from the bottle and “separated” cleanly from the PET?**
- **Does the label impact the wash water used for recycling?**
- **How much waste and bale yield loss does the label create?**
- **Does the label contaminate the closure side stream?**
- **Will high surface area coverage labels be mis-sorted as colored bottles?**

**Recyclability:**

- Recycling Protocol used: "Thermoform Label Test PET-S-04" (Assoc. of Postconsumer Plastic Recyclers)
  - Tier 5 (full press build) test.
  - Once in contact with the recycle bath the Crystal label drops from the PET container and breaks up into small pieces that are removed with the effluent.

**Summary:**

- Crystal passes the protocol with excellent separation of the Crystal labels from PET.
- The decoration can be dissolved in recycling bath as part of the recycling process, thus helping to move towards a higher quality post consumer recycle stream for high volume rigid container plastics.

**Target Market: PET/HDPE Rigid Containers in the U.S.**

- Approximately, 5.9MM lbs. of PET bottles were sold in the United States in 2017.
- 1.7MM lbs. or 29.2% were collected through recycling programs and sold either to domestic or foreign markets. (Gross Recycling Rate)
- The total amount of PET recycled at U.S. material recovery facilities (MRF) has been in decline since 2014. Major causes of decline include:
  - rPET price erosion due to an increase in quality standards based on China Sword.
  - PET container light weighting
  - Bigger, faster material recovery systems leading to material misdirected
  - Increase in the use of single-stream collection leading to increased contamination rates.
Market Drivers

• In the U.S. the Ellen MacArthur Foundation is leading the New Plastics Economy – a three-year initiative to build momentum towards a plastic system that works. Applying the principles of the circular economy, it is bringing together key stakeholders to rethink and redesign the future of plastics, starting with packaging.

• As of October 2018, major brands and retailers signing the commitment include: Burberry Group, Carrefour, Coca-Cola, Colgate-Palmolive, Danone, Diageo, H & M, Henkel, L’Oréal, Marks and Spencer, Mars, Nestlé, Philips, SC Johnson, Sealed Air, Stanley Black & Decker, Target, Unilever and Walmart.

• Signatories also include major waste management companies: Suez and Veolia; a number of municipal and national governments, including Chile, France and the UK; and 150 or so endorsers.

New EU Packaging Directive Recycling Targets:

- Today: 22.5%
- 2020: 50%
- 2030: 100%

Single Use Packaging Directive:

- 90% bottles collected by 2030 (58% recycled today)
- 30% recycle content by 2030

In January 2018, the European Commission adopted the first-ever Europe-wide Plastics Strategy as part of its transition towards a more circular economy. Under new plans, all plastic packaging on the European Union market will be recyclable by 2030.

In December 2018, the European Commission launched a new “alliance” of key industry stakeholders covering the full plastics value chain as part of its efforts to increase the share of recycled plastics and stimulate market innovation in the EU.

Note: EU member states at risk of meeting 2020 target are: Bulgaria, Croatia, Cyprus, Estonia, Finland, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Sweden and Spain.

Summary

• Crystal decorating technology utilizes existing flexographic / digital inkjet printing assets to produce a unique no-label look graphic, without the need for laminated face stock at conventional press speeds.

• Crystal decorating technology reduces overall label material requirements by ~50% and under optimum conditions allows for the complete recycling of rigid plastic containers.

• Crystal coatings, inks, adhesives and carrier film can be supplied through the existing label supply chain to label and flexible packaging printing and converting locations.

• With the use of modified application hardware, Crystal decorations are transferred inline to containers. The carrier film is removed at the point of application and can be recycled.

• The result is a low-waste, low-cost, premium no-label look decoration previously unachievable with pressure sensitive label techniques.

Thank You!

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