THE FUTURE OF THE BOX MARKET:
E-COMMERCE, ECONOMICS, EVERYTHING ELSE

A STRATEGIC VIEW

VOLUME 2 of a 2-volume study

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SOME NOTABLE CAPACITY ADDITIONS...

- PCA will be completing DeRidder, LA conversion and first stage of the Wallula, WA conversion.
- Hood expansion at St. Francisville, LA.
- Former Appleton Coated Papers renamed Midwest Paper Group, producing containerboard grades on machines in Combined Locks, Wisconsin.
- Verso mill in Jay, Maine converting to produce packaging grades.
...ANNOUNCED ADDITIONS

- IP Selma conversion
- WestRock new kraft linerboard at Florence, SC to replace 3 legacy machine, modest net capacity gain
- Green Bay Packaging’s new recycled machine to replace existing in WI
- Cascades White Birch Paper's Bear Island acquisition and conversion
- McKinley Paper project in Port Angeles, WA was on hold, now a “go”
...AND SOME OWNERSHIP CHANGES

- DS Smith acquired 80% of Interstate Resources, Inc.
- WestRock acquiring KapStone Paper.
- Chinese acquisitions—for pulp, containerboard or a combination
- New-Indy purchase/conversion of the Catawba mill
FOR SHIPMENTS, IT’S BEEN A ROCKY ROAD

- Shipments grew steadily between 1983 and 1999, the peak year.
- 2001, volume dropped more than 5%, struggled for the next 6 years to regain momentum.
- “Great Recession,” impact on boxes striking.
- Economy—gradual recovery; boxes—not so much.

“On a per capita basis, box shipments had been declining since 2000. Had we maxed out box penetration growth in the US?”
WHAT TURNED OUR BUSINESS AROUND?

Our view: 3 factors, one notably more impactful than the other two.

• The economy
  – Since 2012, the economy has shown a general strengthening trend, with a few stumbles in 2015 and 2016
  – PMI reached its highest levels since 2003 in the third and fourth quarters of 2017

• Reversing the off-shoring trend
  – The tidal wave of offshoring underpinned many of the manufacturing decisions in the 1960s, 1970s and 1980s.
  – The tide has turned—Off-shoring not worth the costs, risks and strategic impacts previously ignored.
THE NUMBER ONE FACTOR

Manufacturing Sub-Segments: equal 74.0%, 65.9% and 66.4% respectively, in 2010, 2015, and 2016

NAICS Major Categories, equal 100%

Retail Trade

THE CHANGING INDUSTRY STRUCTURE

- The incredible shrinking independent sector
- Companies with an “equity stake” in a mill versus those without. In 2014, 2015, 2016 and 2017 the consumption by companies without was 12.4%, 12.3%, 12.2%, and 11.9% respectively
- A “Feeding Frenzy”?
  - P&PW counted 13 independents in 2017
  - Five through mid-March 2018
- Yes, the number of box plants is declining

<table>
<thead>
<tr>
<th>Year</th>
<th>Buyer</th>
<th>Converting Assets</th>
<th>Price (Millions)</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>Hood Container</td>
<td>Cardinal Container</td>
<td>N/A</td>
<td>Buys full-line corrugator plant in Columbus, OH</td>
</tr>
<tr>
<td></td>
<td>Welch Packaging Group</td>
<td>PackSpec</td>
<td>N/A</td>
<td>Buys Romulus, MI-based sheet plant serving Detroit area</td>
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<tr>
<td></td>
<td>Golden West Packaging</td>
<td>Fleetwood-Fibre Packaging and</td>
<td>N/A</td>
<td>Buys Southern California based independent packaging producer</td>
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<tr>
<td></td>
<td>WestRock</td>
<td>Plymouth Packaging</td>
<td>$198</td>
<td>Acquires three plants: fanfold for boxes on demand and corrugated capabilities in MI, TX and PA</td>
</tr>
<tr>
<td></td>
<td>Hood Container</td>
<td>Ideal Box</td>
<td>N/A</td>
<td>Buys Chicago-based independent full-line corrugator</td>
</tr>
<tr>
<td>2017</td>
<td></td>
<td>Four Coyle family sheet</td>
<td></td>
<td>Buys Corr-a-Box Packaging &amp; Design, Brown Packaging, Coyle Corrugated Containers, and Coyle Packaging in Ontario with 98% interest in participating mill</td>
</tr>
</tbody>
</table>
• Other inputs to converters include starch, adhesives, inks, chemicals, other.
• Suppliers of these materials are a key source of R&D and innovation.
• Equipment investments require big capital—need enough volume or efficiency/cost savings to earn a payback.

Other Material & Equipment Inputs
• Integrated companies own ~84% of corrugating plants in the US, the balance are owned by independents.
• Independents make their own decisions about prices and equipment investment, not a “what’s best for the system” mindset.
• But integrateds also expect their box plants to pull their own weight, not simply push board.
• Still, independents are squeezed the most in the value chain—only the best are reinvesting in R&D.
• Potential for sheet plants and independents to benefit from value-added services.
• Potential exists for alliances with suppliers and equipment manufacturers.
• Transport economics dictate that corrugated operations be close to packing/box-consuming plants.

Converting Plants
• Traditionally where most profit is made for integrateds.

Brand Owner/PackageSpecifier
• Has become much harder to determine who is steering the train.
• Packaging choice may reflect how the contents are branded and positioned—high-end, middle-of-the-road, bargain basement and a lot in between.
• Brand owners likely to make more than sellers, value-added potential for box converters.
• Mass e-commerce players, e.g., Amazon, make it up on volume?

Retailer/Merchandiser
• Converters’ goal is to reach the “specifier” to drive pull-through—who decides about the box.
• In Europe, retailers had typically made the greatest profit.
• In the US, brand owners currently make the greatest profit.
• B-E (Before e-commerce), brand owners and retailers were likely to make more than converters.
CONTAINERBOARD MILLS AS PROFIT ENGINES

- Integrated Mills Are Part of a System
  - Maximize run time, avoid shutdowns
  - Most profitable integrated companies consider demand drivers for boxes as well
  - Oversupplying the market with paper
  - What the numbers tell us

- Conversions
  - By established players
  - By paper makers new to the club
  - Impact of virgin conversions, of white paper conversions
OH, OH OCC!

**ESTIMATED OCC AND WOOD FIBER COSTS, U.S. SOUTH**

Headbox softwood fiber and OCC costs, (excludes chemicals, labor, maintenance, overhead, and other related costs)
MATERIALS, LABOR, VARIABLE INPUTS

- Containerboard 65-75% of typical converter cost structure.
- Labor 15-18% but varies significantly with type of plant and mix
- Starch, inks, adhesives 3-5%, but details can make the difference
- Waste: value-subtracted?
- Transportation: subject to many hard-to-control variables
THE BOX PLANTS: WHO, WHAT, WHERE

- The maps
  - From FBA Directory of Corrugated Plants, August 2017, updated through April 2018
  - Approximately 1,300 listed locations for the USA and Canada.
  - 20 maps and area enlargements
  - Full-line corrugating, sheet feeders and sheet plants by integrated company
  - Independent company corrugating locations

- Different approaches for converting mill output
  - High integration, high sheet plant count?
INDEPENDENT CORRUGATING LOCATIONS, 2012
INDEPENDENT CORRUGATING LOCATIONS, 2018
METRO NY, NJ, PHILADELPHIA INDEPENDENTS, THEN AND NOW

2012

2018
E-COMMERCE FOR SURE

- "Best thing for boxes since produce converted from wood crates"
- Definition and size
- Fastest growing segments
- Key statistic is box usage as a percent of segment value or units—don't know that yet

What kinds of boxes to make for e-tailers?
- **The Traditionalists.** Make simple, reliable, cost-effective boxes that get the job done; where the volume is
- **The Progressives.** Develop innovative structures and aesthetic features that "enhance the 'unbox' experience; where the added value is

NOTE: Other merchandise includes items such as collectibles, souvenirs, auto parts and accessories, hardware, lawn and garden equipment and supplies, and jewelry. Clothing and clothing accessories includes footwear. Nonmerchandise receipts includes items such as auction commissions, customer training, customer support, advertising, and shipping and handling. For a limited number of years, data are unavailable for some merchandise lines. For years with data in surrounding years, data for missing years is imputed. For years at the end of the series, values are left blank.

**SOURCE:** U.S. Department of Commerce, Office of the Chief Economist using data from the Census Bureau
SUSTAINABILITY

The economics still have to work
BASIS WEIGHTS

- Linerboard basis weights continue to decline
- Medium declining as well, but at a slower rate
- Average box weights hardly declining
  - Probably influenced by several factors, some hard to measure
  - One we can measure—weights of linerboard and medium in the structure
WHITE TOP

- ~2.1 million tons, 10% NA linerboard capacity
- There has been almost no change for the last five years
- IP to convert uncoated freesheet machine in Selma, AL to produce “high-quality” white top

Key segments

- Produce and protein
- Wine and upscale beer
- Displays and point-of-purchase packaging
- Retail-ready/shelf-ready packaging (RRP/SRP)

E-commerce—white packaging makes a statement
FINAL THOUGHTS ON E-COMMERCE...

- E-commerce distribution model—a very positive influence on box demand, since products need to be contained and protected until they reach the final purchaser rather than the retailer.
- For the future, will depend on how products are shipped and received—a lot of possibilities.
- Cost/benefit trade-offs and how these are measured.
- Staying ahead of the normal life cycle—some ideas become trends, some become keepers.
...AND ON WHAT WILL DRIVE BOX DEMAND

-1%  +3%

-  ECONOMY

-  NATURALLY OCCURING EVENTS

+  GLOBAL EVENTS

-  E-COMMERCE

-1%  +3%
THE CONVERTERS WEIGH IN

- Data and analysis from a survey of independents done 4 years ago and revisited in 2018
- Focused on substrate choices, basis weight changes and customer perceptions
- Detailed presentation of results, including # of participants, geographical distribution, and type of operation
- Primary research not available elsewhere
WHAT HAVE WE LEARNED?

- What Customers Think
  - Conventional wisdom: they want the most for the least
  - Sustainability
  - Innovation and technology
  - A collaborative approach to solving customer problems
WHAT HAVE WE LEARNED?

- What We Think
  - Consolidation
  - China—Will It Substantially Change the Way North America Does Business?
WHAT HAVE WE LEARNED?

- What We Think
  - China—Will It Substantially Change the Way North America Does Business?
  - Impact of offshore based companies in the US
  - The Converting Business—Better, Worse or About the Same?
“UNBOXING” EXPERIENCE...

...OR SUSTAINABILITY BLUNDER?