Impacts of E-Commerce on the Material Handling Industry

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Advantages of Ecommerce

➢ Convenience
➢ Price
➢ Product knowledge
➢ Selection
➢ Total cost
Growth in Ecommerce

Amazon responsible for 44% of internet sales in 2017
E-commerce → from boxes to polybags

- As e-commerce continues to expand, distribution strategies need to be flexible to meet changing needs of consumers
- Macro trend towards shipping in bags vs. boxes
  - UPS and FedEx migrating towards “DIM” pricing
  - Bulk packages shipped to big box retailers -> Individual packages direct to consumer
• DIM pricing is the new standard for package handling companies
  – DIM pricing bases shipping costs on size versus weight
  – Drive trend towards smaller package size
  – UPS, FEDEX, DHL, USPS have all adopted some form of DIM pricing
• E-Commerce retailers drive costs down by reducing packaging size
  – Trends towards shipping in bags vs. boxes for soft goods
• Conveyor industry feedback
  – 60% of products will be polybags by 2018
  – 30% of their sensors will need to detect polybags
Conveyance and delivery objectives

**Consumer needs**
- Faster!
- What’s the status?
- It has to be on time
- What was ordered is what was shipped
- Return options

**Shipper need**
- Efficient process
- Cost savings
- Labor efficiency
- Competitive edge
- Predictability
Impacts of Ecommerce to Material Handling

- Conveyors
- Storage - ASRS
- Sortation
- AGV
- Palletizing
- Robotics
- Picking and putting systems
Retail Stores → E-commerce

- New Product Types Include:
  - Smaller product being conveyed
  - Polybags
  - Blister packs
  - Envelopes
  - Cylindrical items including bottles and tubes

Products previously considered non-conveyable are now being conveyed!
Retail Stores → E-commerce
Package Handling Challenges

- Conveying Challenges & Solutions
- Sorting Challenges & Solutions
Package Conveying Challenges

- Transitions between conveyors and equipment
Package Conveying Challenges

- Guide rails requiring full containment for small product
Package Conveying Challenges

• Non-rigid package bottoms

Close roller centers
Or
Belt
Package Conveying Challenges

• Accumulation
  – Products sticking together or riding on top of one another
Package Conveying Challenges

- Accumulation
  - Consider using belted accumulation
Package Conveying Challenges

- Inclines / declines
  - Cylinders in polybags have a propensity to roll
Package Conveying Challenges

• Weight distribution varies
  – Package size is larger than product size
  – Difficult to economically sense leading and trailing edge of packages
Package Conveying Challenges

- **Alignment**
  - Product can bunch and hide barcode
Sorting Solutions for Ecommerce
Sorting Challenges

- Small items to convey and to sort
- Sorting to more destinations
- Higher rates due to small items rather than cases
- Varying product types – small packages, polybags, jiffy packs, padded envelopes, etc.
E-commerce → Singles vs. Multi’s

- E-commerce companies are continuing to offer free shipping memberships regardless of order quantity which has encouraged single item orders.
- Single item orders have naturally lead to distribution centers needing to increase the amount of packages they ship out per minute (rate) which has put a strain on many traditional conveying and sorting solutions.
- The demand to handle challenging product types at faster speeds has lead the industry to innovate new technologies.
Sorting Solutions

- Broad spectrum of packages
- Close density of diverts
Sorting Solutions

- Small item sliding shoe sorter
- Broad spectrum of packages
- Close density of diverts
After-sort - Chutes
After-sort - Chutes
Conveyor sensing needs – historical state

- Traditionally, consumers purchased goods from brick and mortar stores
  - Larger shipments of products to fewer locations
  - Larger qty of products combined and shipped in single package
    - Common method is the corrugated box
- Larger, rectangular, boxes are rather simple to detect on a conveyor
  - Simple photoelectric sensors are most common technology
    - Primary focus to sense presence or absence of the edges of a box
Careful selection of Sensors can help solve problems with:

- Side-by-side items
- Jamming
- Piggy-back and overlap
- Poly bags
- Other irregulars
Code reading

• Low contrast
• Wrinkled labels
• Shiny materials
• Small codes

• All can be addressed with today’s camera-based reading technology for continued high read rate performance
Migration to polybags is creating challenges for traditional sensors

- Conveyor manufacturer’s objective is to use low-cost sensing to detect the leading and trailing edge
- Polybags are non-consistent in shape
  - Leading / trailing edge located at different heights per package
    - Traditional sensors sense a fixed location only
    - Edge detection is important to prevent packages from running into each other
E-commerce change drivers in the DC

• Deliver goods:
  – at higher volumes
  – to more locations
  – in smaller and irregular sizes
  – faster (same day! Less than an hour!)
  – while keeping the consumer informed
  – WITHOUT BOTTLENECKS TO MAXIMIZE CUSTOMER SATISFACTION AND PROFITS
Enablers

- New conveying concepts and designs
- More data availability through smart devices (sensors)
- Enhanced control, data storage and remote accessibility
Small item detection  Protrusion monitoring  Zone control  Irregulars

Gap measurement  Volume measurement  Leading Edge  Static Volume
The role of sensing technologies

- Generate data and information to enable detection and identification in the networked process chain
- Smart devices record and process captured data to gain an overview of processes through order fulfillment and delivery
- Accurate information about location and condition of each product
Emergence of new capabilities

• Transformation of process and connectivity through Industry 4.0/IoT
• Enhance existing processes
  – Information in real-time
  – Better visibility
  – More autonomy/less labor
  – Predictability
Conclusions

– E-commerce will continue to grow
– Package types will continue to get smaller and more challenging
– Rates will continue to increase as customer’s demand faster shipments with more visibility
– Material Handling companies will continue to innovate equipment and solutions that meet these needs.

Please feel free to reach out to any of us or the Conveyor and Sortation Systems Group (CSS) of MHI to learn more.
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