Autonomous Mobile Robots: The cutting Edge of Order fulfillment Technology

Presented by: Conveyco Technologies
Presenter

Dave Lodwig
Account Manager
Conveyco Technologies
Objectives

• How AMRs can be used to improve your order fulfillment process

• Understand the different types of AMRs and how they are used

• Applying AMRs to tasks other than order fulfillment
What is an AMR and What Does It Do?

Autonomous Mobile Robot

• Mobile vehicles capable of navigating in an uncontrolled environment without the need for physical or electro-mechanical guidance devices.

• How is that different from an AGV
Types of AMRs

- **Conveyor Top**
- **Shelf or Cart Top**
- **Sortation**
- **Unitload**
AMR Applications

• Pickup Drop Off
  o Split case orders
  o Full case picks
  o Sort cartons or totes at shipping or packing

• Shelf or Cart Top
  o Split case orders
  o Full case picks
AMR Applications

• Sortation
  o Split case orders
  o Full case picks
  o Sort to packing or shipping
AMR Opportunities in Fulfillment

• Split Case Order Picking
  o High SKU count ~5,000+
  o ~ Less than 10,000 orders per day

• Split Case Replenishment

• Unit sortation

• Shipping Sortation
AMR Opportunities in Fulfillment
How Are They Used?

• Split Case Order Picking
• Pickers travel to start and complete order(s)
• Travel time = Unproductive time
Split Case Order Picking

- Pickers work in zones
- Goods-to-Person
- Pickers stay in aisles picking
- Travel can exceed 50% of pick cycle time

Eliminate This Travel
Replenishment

- Mixed or Solid SKU Cases/Totes
- Interleaved with picking tasks
Sortation: Multi-Level

1F Packing Layer

Height of Packing Layer ≥ 8’-0”

2F Sorting Layer

Height of Sorting Layer ≥ 7’-0”
Sortation: Single Level
Induction Station
Where is the Magic?

Planning & Analysis

- Volumes
  - Identify peaks- Seasonal and daily

- Order profiles
  - How many? What do they look like?

- SKU velocities
  - How many move how fast?

- Slotting strategy

**Summary Statistics**

- **Orders Given**: 417,785
- **Total Orders**: 1,248,810.00
- **Total Lines**: 1,267,864.00
- **Unique Probable Units**: 1,983,360.00

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Average</th>
<th>Maximum</th>
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<tr>
<td>Orders per Day</td>
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<td>2,095</td>
<td>8,858.00</td>
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<td>Lines per Day</td>
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<td>13,002.00</td>
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**Daily Percentage of Annual Orders**

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<tr>
<th>Description</th>
<th>Sunday</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
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<tbody>
<tr>
<td>Percentage of Orders</td>
<td>0.00%</td>
<td>24.00%</td>
<td>25.39%</td>
<td>16.34%</td>
<td>15.78%</td>
<td>15.79%</td>
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<tr>
<td>Percentage of Lines</td>
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<td>24.35%</td>
<td>19.38%</td>
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<td>15.93%</td>
<td>16.02%</td>
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<tr>
<td>Percentage of Probable Units</td>
<td>0.00%</td>
<td>24.12%</td>
<td>19.38%</td>
<td>16.05%</td>
<td>15.94%</td>
<td>16.03%</td>
<td>8.20%</td>
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</tbody>
</table>

**Average Day Volumes**

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<thead>
<tr>
<th>Description</th>
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<th>Friday</th>
<th>Saturday</th>
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</thead>
<tbody>
<tr>
<td>Orders per Day</td>
<td>312.25</td>
<td>461.18</td>
<td>625.21</td>
<td>496.04</td>
<td>581.94</td>
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<td>986.08</td>
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<tr>
<td>Probable Units per Day</td>
<td>979.04</td>
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<td>906.21</td>
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<td>Lines/Order per Day</td>
<td>1.37</td>
<td>1.30</td>
<td>1.30</td>
<td>1.31</td>
<td>1.31</td>
<td>1.30</td>
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<tr>
<td>Probable Units/Order per Day</td>
<td>1.32</td>
<td>1.30</td>
<td>1.29</td>
<td>1.31</td>
<td>1.31</td>
<td>1.30</td>
<td>1.30</td>
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<tr>
<td>Probable Units/Line per Day</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
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Where’s the Magic

Planning and Design
- Productivity assessment
- Task definition
- Slotting & replenishment strategy
- Picking strategy
- Smart grouping of orders
Where’s the Magic

Software Coordination

• Order management
• Task management
  o AMRs
  o Labor
• Realtime Updating and Prioritizing

Host

WMS/ WES

• Order Planning & Management
  • Task Management

AMR Manager

Order Fulfillment

Packing & Shipping Manager

Host Interface

Order Planning & Management

AMR Manager

Order Fulfillment

Packing & Shipping Manager
Key Takeaways

• AMRs are flexible and scalable

• There are applications most have not considered

• Most fulfillment operations can benefit from
For More Information

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