Determining Which Robotic Solutions Best Enable Your Business

Presented by:
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Your Business Challenge

• Labor Shortage / Turnover
• Market Demand for Speed
• “3Ds” Dull, Dirty, and Dangerous Jobs
• Space Utilization
• Order Quality / Accuracy
• SKU Proliferation
Your Business Fears

- Diversity of Technology
- Choosing the Wrong Tech
- Supplier Consolidation and Failure
- What is hype? What is real?
- Lack of Flexibility for Operations
- Ability to Maintain
- Single Point of Failure
- Proof of Concept (POC) Purgatory

There is no Silver Bullet!
### “Use Case” Funnel to Select Robotics

<table>
<thead>
<tr>
<th>Use Case Goals</th>
<th>Opportunity</th>
<th>Technology Selection (POC)</th>
<th>Pilot</th>
<th>Adoption</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Reduce Labor</td>
<td></td>
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<tr>
<td>• Reduce turnover</td>
<td></td>
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<tr>
<td>• Reduce training time required</td>
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<tr>
<td>• Increase throughput</td>
<td></td>
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<tr>
<td>• Increase space utilization</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>• Improve Safety and Ergonomics</td>
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</table>

*Focus on the Use Case!*
Robotics Solutions for Distribution Centers

- Autonomous Mobile Robots (AMR)
- Automatic Storage and Retrieval Systems (ASRS)
- Robotic Piece Picking
**AMR / AGV Overview**

**AMR:**
- Navigate Uncontrolled Space
- No Physical Intervention

**AGV:**
- Uses Fixed or Defined Paths
- Often Requires Physical Intervention

North American Market Forecast through 2025
CAGR = 34% from 2017

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4 Primary AMR Types

- **Picking** — Goods to Person or Person to Goods
- **Freight** — Point to Point Order Consolidation or Inventory Moves
- **Flexible Sortation** — Order Fulfillment, Returns, Kitting
- **UAV (Drones)** — Inventory or Equipment Management; Small Item High Speed Delivery
AMR Benefits

- Business Adaptability
- Operational Costs
- System Scalability
- System Portability
- Improved Speed and Accuracy
- Implementation Speed
- Potential RAAS (Robotics as a Service) Strategies
AMR Goods to Person

• Mobile Inventory Delivered to Picker
• Unified Inventory
  o Dynamic slotting
  o Can be configured as Multi-Deep
  o Does not Utilize Vertical Cube
• Labor Costs
  o Decrease 50%-75%
  o Improve Efficiency by 4 - 6x
  o Reduce injuries
• ROI is 1.5 - 3 year payback
• Deployment: 4 – 8 mos.
• Greater Flexibility (Open Space / Portable)
AMR Person to Goods

- Picker walking to slotted inventory
- Miles per day
- Traditional Inventory Storage w/Racking
  - No Dynamic Slotting
- Labor Costs
  - Decrease is minimal
  - Improve Efficiency by 2 – 2.5X
- ROI is 8 month - 1.5 year payback
  - Lower Long-Term Potential
- Deployment within 3 - 8 mos.
- Easier Implementation since Traditional Space Exists with Racks and Zones
AMR for Freight (Point to Point)

- Primary uses include Inventory Movement
  - Returns
  - Dock to storage
  - Order consolidation
  - Consolidation to Dock
  - Storage to Replenishment Station

- Labor Costs
  - Decrease Labor 40 – 50%
  - Improve Efficiency by 2 – 4X

- ROI is 8 months - 1.5 year payback
- Deployment within 3 - 8 months
- Flexible with Operational Requirements (order consolidation, pack-out, etc.)
- Scalable to Meet Throughput
ASRS Overview

• Places and retrieves loads

• Can handle case, bins of eaches, or pallets

• Defined / Flexible Storage Locations

North American Market Forecast through 2025
CAGR = 10% from 2017

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AS/RS Benefits

• High Volume Throughput

• High Storage Density

• Reduces Replenishment Labor and Transportation

• Increases Picking Accuracy

• Reduces Product Damage / Increases Security
ASRS Types

- Unit-load
- Mini-load
- Vertical lift modules (VLMs)
- Horizontal carousels
- Vertical carousels
ASRS Types

• Shuttles

• Cube-based Storage
## ASRS Comparison – Operation Factors

<table>
<thead>
<tr>
<th>Factor</th>
<th>Cube-Based</th>
<th>Shuttles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Capital Investment</td>
<td>Lower</td>
<td>Higher</td>
</tr>
<tr>
<td>Uptime Risk</td>
<td><strong>No single point of failure</strong></td>
<td>Single points of failure that prevents access from aisles of SKUs</td>
</tr>
<tr>
<td>Net Unit Payload (lbs)</td>
<td>66</td>
<td><strong>110</strong></td>
</tr>
<tr>
<td>Throughput</td>
<td>13,500 bins per hour</td>
<td>500 in/out per Aisle</td>
</tr>
<tr>
<td>Storage Type</td>
<td>Bin Only</td>
<td><strong>Bin and Carton</strong></td>
</tr>
</tbody>
</table>
# ASRS Comparison – Facility Factors

<table>
<thead>
<tr>
<th>Factor</th>
<th>Cube-Based</th>
<th>Shuttles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cubic Density</td>
<td>Best</td>
<td>Better</td>
</tr>
<tr>
<td>Expandability</td>
<td>Modular</td>
<td>Add other aisle</td>
</tr>
<tr>
<td>Additional Conveyor</td>
<td>Optional</td>
<td>Mandatory</td>
</tr>
<tr>
<td>Roof Clear</td>
<td>Shorter (&lt; 30’)</td>
<td>Taller (&gt; 30’)</td>
</tr>
<tr>
<td>System Shape</td>
<td>Any Shape (Square is optimal)</td>
<td>Rectangle only</td>
</tr>
<tr>
<td>Building Type</td>
<td>Greenfield / Brownfield</td>
<td>Greenfield / Brownfield</td>
</tr>
<tr>
<td>Temperature</td>
<td>Ambient / Cooler</td>
<td>Ambient / Cooler / Freezer</td>
</tr>
</tbody>
</table>
ASRS Application – Key Advantages

Shuttles
High bay utilization
Freezer capable
Cartons capable

Cube-based storage
Brownfield flexibility (including non-traditional facilities)
Easy to Expand
Lower clearance utilization
Additional conveyor is optional

Different Ends of the Spectrum
Traditional high-volume warehousing

Agile micro - fulfillment

What is your use case?
Order Picking Technologies

• Robot Piece Picking

• Voice Picking

• Vision Picking

North American Market Forecast through 2025
CAGR = 16% from 2017

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Robotic Piece Picking – Key Drivers

- Labor Shortage
- SKU Proliferation
- Picking Quality
- Throughput Efficiency
- Security
Robotic Picking Systems – 3 Key Attributes

• Strength of AI (picking algorithms)

• Vision System

• Robot Gripper / Payload
Robotic Piece Picking – Current Applications

- Put to Put Wall
- Sortation Picking
- Kitting
- Put to Auto-Bagger

Start learning today!
Enable Your Business with Robotic Solutions

There is no Silver Bullet!

Focus on the Use Case!

Start learning today!
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