Opportunities and Challenges for Robotic Automation in the Food Industry

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Agenda

• Why the food market

• Unique challenges of the food industry

• Focus areas for robotic automation in food

• Food Application Case Studies
Why Food?

Produce sales continue to rise...

Source: Nielsen, 2015
But, the Field and Crop Worker Population is Aging

“The labor situation in the fresh produce industry is probably the most bleak it has ever been. And the future is not looking much better.”

JOE MARINO
Owner, Sun Valley Orchards, Swedesboro, New Jersey

Source: Partnership for a New American Economy California Research Bureau
Progress in Automation in the US

Model T assembly line, 1915

Model S assembly line, 2015

Strawberry harvesting line, ~1915

Strawberry harvesting line, 2015
The Fresh Produce Industry is Struggling to Keep Up

- Labor is increasingly scarce and expensive
- Safety/sanitation standards are driving costs up
- Drought is driving productivity down

The solution: Automate every aspect of the process that has a reasonable ROI
- Consistent, reliable labor
- Minimize transmission of bacteria
- Maximize efficiency of production and processing
Robotic System Costs Continue to Fall While Performance is Improving

**TOTAL SYSTEM COSTS OF A TYPICAL SPOT-WELDING ROBOT IN THE U.S. AUTOMOTIVE INDUSTRY**

<table>
<thead>
<tr>
<th>Year</th>
<th>Cost ($\text{thousands}^3)</th>
<th>Project</th>
<th>Systems Engineering</th>
<th>Peripherals</th>
<th>Robot</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>182</td>
<td>13</td>
<td>81</td>
<td>33</td>
<td>55</td>
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<tr>
<td>2010</td>
<td>155</td>
<td>11</td>
<td>62</td>
<td>40</td>
<td>43</td>
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<tr>
<td>2014</td>
<td>133</td>
<td>9</td>
<td>46</td>
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<tr>
<td>2020</td>
<td>117</td>
<td>8</td>
<td>39</td>
<td>30</td>
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<tr>
<td>2025</td>
<td>103</td>
<td>7</td>
<td>33</td>
<td>36</td>
<td>28</td>
</tr>
</tbody>
</table>

**FUTURE COST TRENDS**

- **Project Management**: Has consistently been 5–10 percent of total system costs; absolute costs are expected to decline.
- **Systems Engineering** (such as programming, installation): Cost reductions are expected to slow because possible gains in offline programming have mostly been achieved.
- **Peripherals** (such as safety barriers, sensors): Costs will continue to drop as a result of the removal of safety barriers.
- **Robot** (including software): Minimal declines are expected because pricing is close to material costs, and production volume for the auto industry is already high.

Unique Challenge in the Food Industry

• Robotics knowledge varies by segment
  • Some areas have little or no experience with robotic automation
  • Critical for integrator and supplier to educate the market

• Harsh working environment
  • Refrigerated and freezer warehouses present unique challenges
  • “High Care” areas require IP-69K robots with food safe paint and grease

• FDA/CE Food Safety Standards
  • Any system must be able to be cleaned according to standards
Focus Areas for Robotic Automation

• Palletizing
  • Traditional palletizing technology
  • May require wash-down or low temperature operations

• Secondary product handling / packaging
  • Case packing

• Primary product handling
  • Sorting
  • Product loading into flow wrapper
Certain Tasks Can Be Automated with Traditional Robotics

- Food-specific robots are becoming more commonplace (IP69k, etc)
- Today’s robots can pick, pack, and palletize **structured** objects
  - Crates, cartons, boxes, cases, structured direct product, etc.

Palletizing robot to stack boxes

Delta robot using suction to pack cheese
Industrial Bakery Application – Raw Dough
Conclusions

• The food market is a large and fast growing segment for robotic automation

• Food safety and cleanliness requirements must be well understood for each individual application

• Some food segments are new to robotics and will have a steeper learning curve than the established robotics user base
Thank you

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