Agenda

- How is barcode technology used?
  - History of barcode reading
  - Current trends
  - Types of Barcode Readers

- Barcode Reading in Factory Automation and Logistics
  - Application challenges
  - How to optimize evolving barcode technology in your company
  - What does it mean for your bottom line?

- What’s next?
  - IIOT
History of Barcodes
History of Barcodes (continued)
Main types of barcodes and their uses

- Barcode Types
  - 1D
  - 2D

- 3 main reasons for barcodes:
  - Traceability
  - Universally understood
  - Low cost

Common 1-D Barcode Types
- UPC-A
- Code 39
- Code 128
- Interleaved 2 of 5
- Codabar
- Pharmacode

Common 2-D Codes
- Data Matrix
- QR Code
- MaxiCode
- Aztec Code
Almost Half of Users Are Benefiting from Remote Access. Forty-four percent of barcode users surveyed said they make use of mobile/smart readers either in their facilities or out in the field.

Source: ID Barcode Use Trends Among Manufacturers survey by PMMI Media Group, sponsored by Cognex
Mobile Barcode Scanning Solutions
Types of Barcode Readers
Rising Trends in Barcode Technology

- Increase in demand for 2D barcodes in many industries such as healthcare, transport and logistics, and retail
- Increased use of data from barcode scanners to improve decision making
- Growing demand for rugged industrial barcode scanners
- Evolution of Industry 4.0

Source: MarketWatch
The need for barcode technology

Barcode reading applications are critical to:

- Prevent or correct label and shipping errors
- Drive up efficiency and throughput
- Lower maintenance and overhead costs
- Avoid disruption in supply chain
- Brand integrity
Challenges across Factory Automation and Logistics

- Poor read rates
- Barcode quality
- Extracting data
- Modularity
- Ease-of-use
- Efficiency and cost
Room for improvement?

- **Barcode Use Remains a Staple for Inventory Management—But More Strategic Applications Are Lagging.** Although 68 percent of barcode users surveyed leverage the technology to manage their inventory, far fewer are extending the use to more strategic applications, such as picking items (34 percent), automated sorting (20 percent) and kitting (13 percent).

<table>
<thead>
<tr>
<th>Application</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>Product identification</td>
<td>69%</td>
</tr>
<tr>
<td>Inventory management</td>
<td>68%</td>
</tr>
<tr>
<td>Product tracking/traceability</td>
<td>56%</td>
</tr>
<tr>
<td>Pallet scanning</td>
<td>42%</td>
</tr>
<tr>
<td>Picking items</td>
<td>34%</td>
</tr>
<tr>
<td>Shipping process sorting</td>
<td>29%</td>
</tr>
<tr>
<td>Automated sorting</td>
<td>20%</td>
</tr>
<tr>
<td>Multi-code reading</td>
<td>17%</td>
</tr>
<tr>
<td>Parcel delivery</td>
<td>14%</td>
</tr>
<tr>
<td>Kitting</td>
<td>13%</td>
</tr>
<tr>
<td>Other</td>
<td>6%</td>
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Source: ID Barcode Use Trends Among Manufacturers survey by PMMI Media Group, sponsored by Cognex
Why Read Rates Matter: Cost Impact

- Low-volume Distribution Center Assumptions*

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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<tbody>
<tr>
<td>Sorter Speed (feet/minute)</td>
<td>400</td>
</tr>
<tr>
<td>Average box size (inches)</td>
<td>20</td>
</tr>
<tr>
<td>Distance between boxes (inchies)</td>
<td>36</td>
</tr>
<tr>
<td>Operation (hours/day)</td>
<td>16</td>
</tr>
<tr>
<td>Utilization (days/year)</td>
<td>300</td>
</tr>
<tr>
<td>Boxes/second</td>
<td>1.43</td>
</tr>
<tr>
<td>Boxes/hour</td>
<td>5,148</td>
</tr>
<tr>
<td>Maximum boxes/day</td>
<td>82,368</td>
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*Based on a low-volume shipper
Why Read Rates Matter: Cost Impact

- Low-volume Distribution Center Read Rate/Labor Cost Analysis

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<th>Read Rate</th>
<th>No-Reads</th>
<th>Maximum Number of Packages/Day</th>
<th>Total Rework Time (Man Hours/Day)</th>
<th>Number of Operators Required to Handle Rework</th>
<th>Cost of Operators (USD/Year)</th>
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<tr>
<td>98%</td>
<td>1,648</td>
<td>80,720</td>
<td>41.20</td>
<td>5.15</td>
<td>$185,175.00</td>
</tr>
<tr>
<td>99%</td>
<td>824</td>
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<td>20.60</td>
<td>2.58</td>
<td>$92,587.50</td>
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<td>99.5%</td>
<td>412</td>
<td>81,956</td>
<td>10.30</td>
<td>1.29</td>
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| 99.9%     | 83       | 82,285                        | 2.08                              | 0.26                                          | $9337.50}
## Why Read Rates Matter: Cost Impact

### Low-volume Distribution Center Read Rate/Labor Cost Analysis

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What type of barcode reading technology is used?

Manufacturers Rely Heavily on Laser-Based Solutions.

Among users of the technology, 77 percent rely solely on laser-based or a combination of laser-based and image-based barcode solutions. Only 14 percent rely solely on image-based solutions.

44% Laser-based

33% Both

14% Image-based

8% Don’t know

Source: ID Barcode Use Trends Among Manufacturers survey by PMMI Media Group, sponsored by Cognex
Laser based

Barcode

Light Detector Signal

Digitized Signal
Laser Scanner Technology

- Hard to scan barcodes
  - Poorly printed
  - Defective/damaged
  - Low contrast
  - Specular reflections

- Unidirectional scanning
  - No omnidirectional (360°) or at least orthogonal (0° and 90°) reading

- Mounting and positioning constraints

- Moving parts are subject to failure

- No feedback for failed reads

- Cannot read 2D codes
Image-Based Barcode Readers
Image-Based Barcode Reader Technology

- No moving parts
  - Solid state device
  - Longer life than laser scanners

- High read rates
  - Reads damaged/properly marked codes
  - Omnidirectional reading
  - 2D Codes

- Performance feedback
  - Store No-Read images
How to optimize evolving barcode technology in your company

- Pay attention to product modularity and flexibility – "future proofing"
- Take advantage of the latest advances in connectivity and data flow
- Utilize images to understand why a code was missed!
Advancements in barcode technology

- HDR/HDR+
- High-speed liquid lens
- Multiple sensors in a single reader
- Interactive operator feedback
What’s Next?

- Users have their eye on IIoT—even above more traditionally held operational goals. Among ID Barcode users, 43 percent list communications/ connectivity as being among their top three priorities, while ease of use and image quality were far less important (35 percent and 17 percent respectively).

Source: ID Barcode Use Trends Among Manufacturers survey by PMMI Media Group, sponsored by Cognex
Predictions for 2020 and beyond

- Applications: faster line speeds, more product volume, smaller codes, more data included in each code
- Data: more images, more data, more network bandwidth
- Barcode Readers: faster processors, more resolution, more compact size, more useful information (grading, etc.)
Questions?