RFID and barcode technology in GMP

John Nesbitt, Wayahead Systems

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What is RFID?
Where is RFID used in industry?

RFID systems can be used just about anywhere, from clothing tags, to missiles, to pet tags, to food -- anywhere that a unique identification system is needed.

The tag can carry information as simple as a pet owners name and address or the cleaning instruction on a sweater, to complex instructions, on how to assemble a car.

This presentation will try to focus on manufacturing, to align with GMP and warehousing or facilities management.
What is barcode technology?

Types of barcodes used by industry:

<table>
<thead>
<tr>
<th>Barcode Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAN128</td>
<td>Short barcode, with 2 black lines for each 2 characters</td>
</tr>
<tr>
<td></td>
<td>Used in retail, contains country, company, product</td>
</tr>
<tr>
<td>CODE3of9</td>
<td>Longer barcode, with 5 black lines for each character</td>
</tr>
<tr>
<td></td>
<td>MS Word has a Code3of9 font, but it is hard to use</td>
</tr>
<tr>
<td>PDF417</td>
<td>Rectangular barcode, which can hold 2000 characters</td>
</tr>
<tr>
<td></td>
<td>This barcode can be scanned on your mobile phone</td>
</tr>
</tbody>
</table>
What does each barcode look like?

Types of barcodes used by industry:

**EAN128**

Example GS1-128

**CODE3of9**

*WIKIPEDIA* encoded in Code 39

**PDF417**

Product Number: 12345
Product Name: Angel Soap
Ingredients: Water, Salt, Sugar, Rye, Vegetable Oil, Egg, Milk
As per ISO standard
Net Weight 250g
Address: Angel Products Ltd. 25-40 Totara Road, Sydney, Australia.
PDF417 barcode example
Material label at pharmaceutical site

ANTI-COUGH LOZENGE
STORE BELOW 30°C
ACME PHARMACEUTICALS
CONTENTS: 100 x 50MG TABLETS

930456912746
BATCH NO: 035804
EXPIRY-DATE (yy/mm): 09/04

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RFID vs barcode technology.

RFID advantages

Eliminates the need for line-of-sight reading, no data is visible
Eliminates the need for line-of-sight scanning
RFID tags can be re-used with changed information

Barcode advantages

You can view all data on a barcode label, for visual confirmation
Cheaper option as barcode labels & ink cost less than RFID tags or cards
RFID vs barcode technology.

RFID dis-advantages

You cannot view data on an RFID tag or card, for visual confirmation
RFID tags or cards are more expensive than barcode label printing
Reader or Tag collision when two tags are read at the same time

Barcode dis-advantages

Barcode scanner must be close (ie: 2m) from the barcode label
Barcode labels can be damaged, making them un-usable
Labour intensive, requires a scan of every barcode label
Let’s focus on GMP and warehouse / facilities mgt
What level of technology have you reached?

Most industry sites already use barcode labels for identification of materials & lots. YES or NO?

Minimal sites already use RFID technology. YES or NO?

Where else could RFID cards or barcode labels be helpful?

- Location identification & confirmation
- Operator tracking. What about passwords in barcode format?
- Order identification & confirmation, finished goods TUN labels
Where could you use RFID for GMP?

Most likely first use is to scan, check, record Operator information.

Operator RFID scan is completed, successfully, in one swipe.
Pfizer and Viagra - the RFID initiative

Pfizer attached an RFID tag to each bottle of Viagra. The tag was confirmed and updated during production & dispatch. Each pharmacy can then read the Viagra bottle’s RFID tag, to confirm the product is not counterfeit. Operational since 2009.
**Wayahead experience**

### Dispensing Detail Report

**BATCH:** 1024126 -- KIT DANONE D3P 231

<table>
<thead>
<tr>
<th>Formula</th>
<th>70175225</th>
<th>Job No.</th>
<th>Start</th>
<th>02/05/2013</th>
<th>By:</th>
<th>Expiry</th>
<th>12/06/2013</th>
<th>By:</th>
<th>WEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edition</td>
<td>1</td>
<td>Yielding:N</td>
<td>Finished</td>
<td>Date</td>
<td>Make Sys:</td>
<td>Mfg By:</td>
<td>Date:</td>
<td>Mfg Location</td>
<td>By:</td>
</tr>
<tr>
<td>Type:</td>
<td>RAW</td>
<td>Make Sys:</td>
<td>Start:</td>
<td>19/10/2013</td>
<td>Factor:</td>
<td>100.000%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Item: 1**

- **70173739 -- MIN CALCIUM HYDROXIDE FG 25...**
- **Reqd:** 79.681154
- **Frt:** 79.350000
- **Act:** 79.350000
- **UOM:** gm
- **Accepted:** Y

<table>
<thead>
<tr>
<th>Weigh #</th>
<th>Lot No.</th>
<th>Expiry Date</th>
<th>Tare Wt.</th>
<th>Gross Wt.</th>
<th>Nett Wt.</th>
<th>Date Weighted</th>
<th>Disp By</th>
<th>Dispensary</th>
<th>Post</th>
<th>Balance</th>
<th>Serial No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (T)</td>
<td>992088</td>
<td>14/09/2015</td>
<td>0.265 000</td>
<td>25 221 000</td>
<td>24.956 000</td>
<td>03/05/2013 10:40</td>
<td>BERNIEM</td>
<td>MICRO5</td>
<td>2</td>
<td>Mettler</td>
<td></td>
</tr>
<tr>
<td>2 (T)</td>
<td>992088</td>
<td>14/09/2015</td>
<td>0.265 000</td>
<td>25 517 000</td>
<td>25.252 000</td>
<td>03/05/2013 10:41</td>
<td>BERNIEM</td>
<td>MICRO5</td>
<td>2</td>
<td>Mettler</td>
<td></td>
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<tr>
<td>3 (T)</td>
<td>992088</td>
<td>14/09/2015</td>
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<td>25 222 000</td>
<td>24.957 000</td>
<td>03/05/2013 10:41</td>
<td>BERNIEM</td>
<td>MICRO5</td>
<td>2</td>
<td>Mettler</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>992088</td>
<td>14/09/2015</td>
<td>0.089 000</td>
<td>4 274 000</td>
<td>4.185 000</td>
<td>03/05/2013 10:43</td>
<td>BERNIEM</td>
<td>MICRO5</td>
<td>2</td>
<td>Mettler</td>
<td></td>
</tr>
</tbody>
</table>

**Item: 2**

- **70173727 -- MIN POTASSIUM HYDROXIDE 25KG**
- **Reqd:** 0.944470
- **Frt:** 0.944000
- **Act:** 0.944000
- **UOM:** gm
- **Accepted:** Y

<table>
<thead>
<tr>
<th>Weigh #</th>
<th>Lot No.</th>
<th>Expiry Date</th>
<th>Tare Wt.</th>
<th>Gross Wt.</th>
<th>Nett Wt.</th>
<th>Date Weighted</th>
<th>Disp By</th>
<th>Dispensary</th>
<th>Post</th>
<th>Balance</th>
<th>Serial No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (T)</td>
<td>991337</td>
<td>01/12/2014</td>
<td>0.015 000</td>
<td>0.959 000</td>
<td>0.944 000</td>
<td>03/05/2013 10:42</td>
<td>TIMM</td>
<td>MICRO6</td>
<td>2</td>
<td>Mettler</td>
<td></td>
</tr>
</tbody>
</table>

**Shows weighing & mixing activities:**
- Dispensing user, date, time, location
- Staging user date, time, location
- Tipping (consumption) date, time, location

**Print Date:** 25/05/2015 12:16 PM

**Dispensing Detail Report.frx**
Feedback

Production Benefits

✓ Double checking and manual data recording eliminated.
✓ Reduction of rework/wastage.
✓ QC are able to focus on systems rather post production testing.
✓ Traceability and data recorded can assist with improving production.
RFID vs barcode labels  ---  Summary

RFID

RFID tags or cards or keyfobs, are useful for specific tasks, within a manufacturing site. But there are practical limitations, which probably means a site will use RFID + barcode labels, during production activities.

Barcode Labels

A manufacturing site can use barcode labels for many tasks, to identify people, locations, materials, etc. Barcode can be printed paper or on metal for permanent use.
ANY QUESTIONS?

Many thanks.

Please contact me at any time,

if you have any questions.

John.Nesbitt@WayaheadSystems.com
Example of a tablet-based Operational Dashboard

Various graphs are available
More details in following slides

Material shortage checks are available
Click on Shortage to view report, by Order
Graph-1  Total weight in KG, by operator

Main operators by volume are:  12657,  13076,  20249  &  40170
Graph-2  Total no of weighing activities, by operator

Main operators, by no of weighing steps are:  12657, 13076, 20249 & 40170
Graph-3  Average weighing time in minutes, by operator

All main operators, average ONE weighing activity, every 3 minutes

Operator weighing times:

- 12657  -  averages 2.77 mins per weighing
- 13078  -  averages 2.73 mins per weighing
- 20249  -  averages 3.22 mins per weighing
- 40170  -  averages 3.07 mins per weighing
### Shortages report

<table>
<thead>
<tr>
<th>Material</th>
<th>Material Name</th>
<th>Tot. Req’d(kg)</th>
<th>Available(kg)</th>
<th>Shortage (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT0002</td>
<td>WHITE SUGAR</td>
<td>15</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>MAT0005</td>
<td>MILK POWDER</td>
<td>20</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>MAT0006</td>
<td>VANILLA POWDER</td>
<td>5</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

Shortage report, displays materials
Available quantity vs Shortage quantity
Product breakdown can be reviewed, by formula or any other criteria, showing expected time, actual time, number of weighing steps, across each production order.

Check this order!