Material & Process Tracking
A Track & Trace Application in Support of Food Safety

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PUBLIC
Agenda

- Food Safety Modernization Act (FSMA)
- Food Industry Business Drivers
- Tracking Application
- Implementation Process
Agenda

Food Safety Modernization Act (FSMA)
Food Industry Business Drivers
Tracking Application
Implementation Process
Food Safety Modernization Act (FSMA)

- Most comprehensive changes to food safety regulation since the 1930’s
- Stemmed from number of high-profile outbreaks of food borne illnesses over the past decade
- FSMA will affect stakeholders across the food supply chain, including food packaging and equipment manufacturers
- Changes the focus from reacting to contamination incidents (recalls) to prevention of incidents
- The law will be governed and implemented by the FDA – giving it new powers to enforce compliance

- FDA proposes rules
- Public Comment Period
- Incorporation of Public Comments
- Publication of Final Rules
- Implementation & Enforcement

Food Safety Modernization Act (FSMA)

- Three main aspects of FSMA most likely to impact food producers and equipment manufacturers:
  - Record Keeping and Traceability – show compliance to the food safety plan and that operations are within preventive control limits. Expected to be one of the greatest costs of FSMA compliance.
  - Preventive Control – implement a written food safety plan that focuses on preventing hazards. Clear understanding of the hazards that may occur and have preventive controls to minimize or prevent the hazard.
  - Sanitary Equipment Design – new equipment design considerations to prevent bacteria harborage and ease to clean/sanitize
Agenda

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- Food Industry Business Drivers
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- Implementation Process
Maximize Yield

- 80% of the cost in production is cost of Milk.
- Milk prices continue to be volatile and at all time highs. Also true for many raw material ingredients used in food processing.

Maximizing Yield Critical to Profitability
Confident Quality Assurance

- Data Collection in support of CCP’s & other data parameters linked to material in process
- Increased number of food borne illnesses - CDC estimates that food borne diseases sicken 1 in 6 Americans (48 million) and kills 3,000

Link CCP’s (and all process data) to Material in Process
Business Challenges in Food Processing Record Keeping  FSMA

- **Supplier to Table**
  - Modern traceability systems can **reduce liability**. Can show which supplier shipments it took in and where products went.
  - When recalls do occur, traceability systems can make these recalls “surgical,” with **only affected products** having to be pulled from shelves.

Genealogy & Traceability to Packaged Unit Produced (Narrows Recall Bracket)

11 Recalls Reported Already 1/1/16- 1/14/16

The Main Reasons for Reportable Foods

1. Undeclared allergens were the primary hazard for the most recent twelve month reporting period. They accounted for 85 of the total of 224 reportable foods. That’s 37.9 percent.
2. Second was contamination with Salmonella, 63 reports and 28.1 percent.
3. Third was contamination with Listeria monocytogenes, 48 reports and 21.4 percent. Another bacterial contaminant, but with a much lower incidence rate, was E. coli O157:H7 (4 reports, 1.8 percent).
Agenda

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Challenge – Material Tracking Through Many Types of Manufacturing Processes

- Batch Processing
- Continuous Processing
- Motion Control
- Discrete Control
- Spray/Salting
- Forming/Baking
- Packaging
- Cooling/Stacking
- Mixing
- Motors/Drives
- Safety
<table>
<thead>
<tr>
<th>Functions / Features</th>
<th>NGT²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material Receiving</td>
<td>✓</td>
</tr>
<tr>
<td>Material Inventory Management (Raw, WIP, Finished)</td>
<td>✓</td>
</tr>
<tr>
<td>Material Tracking &amp; Traceability</td>
<td>✓</td>
</tr>
<tr>
<td>Material Dispositioning &amp; Quality Sampling</td>
<td>✓</td>
</tr>
<tr>
<td>Data Collection at Process Steps (Manual &amp; Automated)</td>
<td>✓</td>
</tr>
<tr>
<td>Real-Time Yield Analysis</td>
<td>✓</td>
</tr>
<tr>
<td>Product Genealogy &amp; Traceability</td>
<td>✓</td>
</tr>
</tbody>
</table>
Track & Trace Application
Software Architecture

- FactoryTalk Transaction Manager: Manages data flow between control layer and information layer. Also incorporating the use of AOI’s in next version.
- FactoryTalk Historian: Time Series process data collection
- FactoryTalk VantagePoint: Enterprise-wide process manufacturing dashboards
The Track & Trace Application is tracking material through a manufacturing process beginning with raw material receiving, storage, movement and transformation of material into final product.
Inventory Management
# Inventory Management

## Inventory Management Interface

The interface appears to be a system for managing inventory in a manufacturing or supply chain context. The interface includes options for home screen, graphical display, raw material inventory, and simulator. It also includes buttons for refresh, filter, receive, sample, move silo, reject, and genealogy.

### Inventory Table

<table>
<thead>
<tr>
<th>Lot</th>
<th>Supplier</th>
<th>Status</th>
<th>Material</th>
<th>Location</th>
<th>Amount</th>
<th>UOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>RM0212015</td>
<td>Supplier1</td>
<td>Normal</td>
<td>Rawliq</td>
<td>Silo 5</td>
<td>33,000.00</td>
<td>GAL</td>
</tr>
<tr>
<td>RM138</td>
<td>Supplier3</td>
<td>Normal</td>
<td>Rawliq</td>
<td>Silo 1</td>
<td>0.00</td>
<td>GAL</td>
</tr>
<tr>
<td>RM777</td>
<td>Supplier1</td>
<td>Normal</td>
<td>Rawliq</td>
<td>Silo 4</td>
<td>0.00</td>
<td>GAL</td>
</tr>
<tr>
<td>RMLot1</td>
<td>Supplier1</td>
<td>Normal</td>
<td>Rawliq</td>
<td>Silo 1</td>
<td>0.00</td>
<td>GAL</td>
</tr>
<tr>
<td>RMLot12</td>
<td>Supplier3</td>
<td>Normal</td>
<td>Rawliq</td>
<td>Silo 3</td>
<td>0.00</td>
<td>GAL</td>
</tr>
<tr>
<td>RMLot13</td>
<td>Supplier2</td>
<td>Normal</td>
<td>Rawliq</td>
<td>Silo 3</td>
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<td>GAL</td>
</tr>
<tr>
<td>RMLot22</td>
<td>Supplier1</td>
<td>Normal</td>
<td>Rawliq</td>
<td>Silo 2</td>
<td>29,000.00</td>
<td>GAL</td>
</tr>
<tr>
<td>RMLot7</td>
<td>Supplier5</td>
<td>Normal</td>
<td>Rawliq</td>
<td>Silo 1</td>
<td>0.00</td>
<td>GAL</td>
</tr>
<tr>
<td>RMLot88</td>
<td>Supplier5</td>
<td>Normal</td>
<td>Rawliq</td>
<td>Silo 2</td>
<td>0.00</td>
<td>GAL</td>
</tr>
<tr>
<td>RMLot99</td>
<td>Supplier3</td>
<td>Normal</td>
<td>Rawliq</td>
<td>Silo 3</td>
<td>46,000.00</td>
<td>GAL</td>
</tr>
<tr>
<td>RMLotA</td>
<td>Supplier4</td>
<td>Normal</td>
<td>Rawliq</td>
<td>Silo 1</td>
<td>0.00</td>
<td>GAL</td>
</tr>
<tr>
<td>RMLotB</td>
<td>Supplier4</td>
<td>Normal</td>
<td>Rawliq</td>
<td>Silo 3</td>
<td>0.00</td>
<td>GAL</td>
</tr>
<tr>
<td>RMLotBB</td>
<td>Supplier1</td>
<td>Normal</td>
<td>Rawliq</td>
<td>Silo 4</td>
<td>40,000.00</td>
<td>GAL</td>
</tr>
<tr>
<td>RMLotC</td>
<td>Supplier2</td>
<td>Normal</td>
<td>Rawliq</td>
<td>Silo 5</td>
<td>34,000.00</td>
<td>GAL</td>
</tr>
<tr>
<td>RMLotX</td>
<td>Supplier2</td>
<td>Normal</td>
<td>Rawliq</td>
<td>Silo 1</td>
<td>0.00</td>
<td>GAL</td>
</tr>
</tbody>
</table>
Inventory Receiving - Manual
## Inventory Receiving - Sampling

### Raw Material Inventory

<table>
<thead>
<tr>
<th>Lot</th>
<th>Supplier</th>
<th>Lot Status</th>
<th>Material</th>
<th>Location</th>
<th>Amount</th>
<th>UOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>RM03212015</td>
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<td>Normal</td>
<td>RawLiq</td>
<td>Silo 5</td>
<td>22,000.0</td>
<td>GAL</td>
</tr>
<tr>
<td>RM138</td>
<td>Supplier3</td>
<td>Normal</td>
<td>RawLiq</td>
<td>Silo 1</td>
<td>0.00</td>
<td>GAL</td>
</tr>
<tr>
<td>RM777</td>
<td>Supplier1</td>
<td>Normal</td>
<td>RawLiq</td>
<td>Silo 4</td>
<td>0.00</td>
<td>GAL</td>
</tr>
<tr>
<td>RMLot1</td>
<td>Supplier1</td>
<td>Normal</td>
<td>RawLiq</td>
<td>Silo 1</td>
<td>0.00</td>
<td>GAL</td>
</tr>
<tr>
<td>RMLot12</td>
<td>Supplier3</td>
<td>Normal</td>
<td>RawLiq</td>
<td>Silo 3</td>
<td>0.00</td>
<td>GAL</td>
</tr>
<tr>
<td>RMLot13</td>
<td>Supplier2</td>
<td>Normal</td>
<td>RawLiq</td>
<td>Silo 5</td>
<td>0.00</td>
<td>GAL</td>
</tr>
<tr>
<td>RMLot22</td>
<td>Supplier1</td>
<td>Normal</td>
<td>RawLiq</td>
<td>Silo 2</td>
<td>29,000.0</td>
<td>GAL</td>
</tr>
<tr>
<td>RMLot7</td>
<td>Supplier5</td>
<td>Normal</td>
<td>RawLiq</td>
<td>Silo 1</td>
<td>0.00</td>
<td>GAL</td>
</tr>
<tr>
<td>RMLot825A</td>
<td>Supplier3</td>
<td>Normal</td>
<td>RawLiq</td>
<td>Silo 1</td>
<td>78,000.0</td>
<td>GAL</td>
</tr>
</tbody>
</table>

### Add Incoming Inspection Result

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Lot</th>
<th>Date</th>
<th>Item1</th>
<th>Item2</th>
<th>Item3</th>
<th>Item4</th>
<th>Item5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RMLot825A</td>
<td>8/25/2013</td>
<td>0.100</td>
<td>0.360</td>
<td>0.010</td>
<td>0.900</td>
<td>0.030</td>
</tr>
</tbody>
</table>

**OK**  **CANCEL**
### Lab Sample – Grid View

The image displays a table with columns for Actual Time, Supplier, Lot, Item1 (ppm), Item2 (ppm), Item3 (ppm), Item4 (ppm), and Item5 (ppm). The data includes dates ranging from 08/24/2015 to 08/25/2015, suppliers, lots, and ppm values for items 1 to 5.

<table>
<thead>
<tr>
<th>Actual Time</th>
<th>Supplier</th>
<th>Lot</th>
<th>Item1 (ppm)</th>
<th>Item2 (ppm)</th>
<th>Item3 (ppm)</th>
<th>Item4 (ppm)</th>
<th>Item5 (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>08/25/2015</td>
<td>Supplier3</td>
<td>RMLot825A</td>
<td>0.100</td>
<td>0.360</td>
<td>&gt;0.010</td>
<td>&lt;0.000</td>
<td>0.030</td>
</tr>
<tr>
<td>08/24/2015</td>
<td>Supplier2</td>
<td>RMLotC</td>
<td>0.010</td>
<td>0.700</td>
<td>1.200</td>
<td>0.800</td>
<td>0.000</td>
</tr>
<tr>
<td>08/24/2015</td>
<td>Supplier1</td>
<td>RMLotB</td>
<td>0.100</td>
<td>0.800</td>
<td>0.600</td>
<td>0.020</td>
<td>0.000</td>
</tr>
<tr>
<td>08/24/2015</td>
<td>Supplier3</td>
<td>RMLot12</td>
<td>0.020</td>
<td>0.750</td>
<td>0.200</td>
<td>1.200</td>
<td>0.100</td>
</tr>
<tr>
<td>08/24/2015</td>
<td>Supplier1</td>
<td>RMLot1</td>
<td>0.017</td>
<td>0.770</td>
<td>0.210</td>
<td>1.270</td>
<td>&gt;0.100</td>
</tr>
<tr>
<td>08/24/2015</td>
<td>Supplier3</td>
<td>RMLot12</td>
<td>0.022</td>
<td>0.769</td>
<td>0.210</td>
<td>1.240</td>
<td>0.100</td>
</tr>
<tr>
<td>08/24/2015</td>
<td>Supplier2</td>
<td>RMLot13</td>
<td>0.026</td>
<td>0.670</td>
<td>0.210</td>
<td>1.300</td>
<td>0.100</td>
</tr>
<tr>
<td>08/24/2015</td>
<td>Supplier5</td>
<td>RMLot7</td>
<td>0.018</td>
<td>0.739</td>
<td>0.200</td>
<td>1.200</td>
<td>0.000</td>
</tr>
<tr>
<td>08/24/2015</td>
<td>Supplier3</td>
<td>RMLot99</td>
<td>0.021</td>
<td>0.750</td>
<td>0.200</td>
<td>1.200</td>
<td>0.010</td>
</tr>
<tr>
<td>08/24/2015</td>
<td>Supplier4</td>
<td>RMLotA</td>
<td>0.030</td>
<td>0.670</td>
<td>0.200</td>
<td>1.400</td>
<td>0.020</td>
</tr>
<tr>
<td>08/24/2015</td>
<td>Supplier4</td>
<td>RMLotB</td>
<td>0.020</td>
<td>0.770</td>
<td>0.300</td>
<td>1.200</td>
<td>0.000</td>
</tr>
<tr>
<td>08/24/2015</td>
<td>Supplier5</td>
<td>RMLot88</td>
<td>0.200</td>
<td>0.220</td>
<td>0.990</td>
<td>0.300</td>
<td>0.100</td>
</tr>
<tr>
<td>08/19/2015</td>
<td>Supplier2</td>
<td>RMLotX</td>
<td>&gt;0.010</td>
<td>0.900</td>
<td>&gt;1.000</td>
<td>6.000</td>
<td>0.800</td>
</tr>
</tbody>
</table>
Material Movement Between Inventory Locations
# Inventory Reject

## Graphical Display

The image shows a screenshot of an inventory management system. The interface includes options for refreshing, filtering, receiving, sampling, moving silos, rejecting, and genealogy. The main table displays inventory details:

<table>
<thead>
<tr>
<th>Lot</th>
<th>Supplier</th>
<th>Lot Status</th>
<th>Material</th>
<th>Location</th>
<th>Amount</th>
<th>UOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMLotB25A</td>
<td>Supplier3</td>
<td>Normal</td>
<td>RawLiq</td>
<td>Silo 1</td>
<td>70,000.00</td>
<td>GAL</td>
</tr>
<tr>
<td>RMLotB25A</td>
<td>Supplier5</td>
<td>Normal</td>
<td>RawLiq</td>
<td>Silo 3</td>
<td>46,800.00</td>
<td>GAL</td>
</tr>
<tr>
<td>RMLotB25A</td>
<td>Supplier2</td>
<td>Normal</td>
<td>RawLiq</td>
<td>Silo 4</td>
<td>40,000.00</td>
<td>GAL</td>
</tr>
<tr>
<td>RMLotB25A</td>
<td>Supplier1</td>
<td>Normal</td>
<td>RawLiq</td>
<td>Silo 5</td>
<td>14,000.00</td>
<td>GAL</td>
</tr>
<tr>
<td>RMLotB25A</td>
<td>Supplier4</td>
<td>Normal</td>
<td>RawLiq</td>
<td>Silo 2</td>
<td>33,000.00</td>
<td>GAL</td>
</tr>
<tr>
<td>RMLotB25A</td>
<td>Supplier3</td>
<td>Normal</td>
<td>RawLiq</td>
<td>Silo 1</td>
<td>29,000.00</td>
<td>GAL</td>
</tr>
<tr>
<td>RMLotB25A</td>
<td>Supplier2</td>
<td>Normal</td>
<td>RawLiq</td>
<td>Silo 3</td>
<td>8,000.00</td>
<td>GAL</td>
</tr>
</tbody>
</table>

A reject window is also visible, showing the amount (8000.00 GAL), reject location (R3), and reject reason (PH Low).
## Consume & Produce

### Table

<table>
<thead>
<tr>
<th>Name</th>
<th>WorkCenter</th>
<th>Material</th>
<th>Amount</th>
<th>UOM</th>
<th>StartTime</th>
<th>EndTime</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>PartWO1</td>
<td>Pasteurizer 1</td>
<td>RawLiq</td>
<td>20000.00</td>
<td>GAL</td>
<td>8/19/2015 10:34:49 PM</td>
<td>8/24/2015 11:03:32 PM</td>
<td>Normal</td>
</tr>
</tbody>
</table>

### Work Center:

Yield: 0.00
## Consume & Produce

### Consumption Summary

<table>
<thead>
<tr>
<th>WorkCenter</th>
<th>Equipment</th>
<th>Material</th>
<th>Amount</th>
<th>UOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pasteurizer 1</td>
<td>Pasteurizer 1-1</td>
<td>RawLiq</td>
<td>75,000.00</td>
<td>GAL</td>
</tr>
<tr>
<td>Pasteurizer 1</td>
<td>Pasteurizer 1-1</td>
<td>RawLiq</td>
<td>124,000.00</td>
<td>GAL</td>
</tr>
</tbody>
</table>

### Production Summary

<table>
<thead>
<tr>
<th>WorkCenter</th>
<th>Equipment</th>
<th>Material</th>
<th>Amount</th>
<th>UOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pasteurizer 1</td>
<td>Pasteurizer 1-1</td>
<td>PastLiq</td>
<td>72,765.75</td>
<td>GAL</td>
</tr>
<tr>
<td>Pasteurizer 1</td>
<td>Pasteurizer 1-1</td>
<td>PastLiq</td>
<td>117,395.41</td>
<td>GAL</td>
</tr>
</tbody>
</table>

Work Center: Pasteurizer 1  
Yield: 95.62
Forward Genealogy
Backward Genealogy
Agenda

- Food Safety Modernization Act (FSMA)
- Food Industry Business Drivers
- Tracking Application
- Implementation Process
We don’t Shortcut the Implementation Process

- It takes less time than a more comprehensive track and trace implementation might take.
Task Sequence Diagram

Task 0 Project Management
Subtask 0.1 Project Administration
Subtask 0.2 Project Management
Subtask 0.3 Project Status Meetings

Task 1 Implementation Planning
Subtask 1.1 Project Kick-off Meeting
Subtask 1.2 Project Management Plan (PMP)

Task 2 Functional Requirements
Subtask 2.1 Develop Functional Specification
Subtask 2.2 Issue to Customer for Approval
Subtask 2.3 Scope & Work Plan Review (Toll Gate)

Task 3 System Design
Subtask 3.1 System Design Specification (SDS)
Subtask 3.2 SDS Review
Subtask 3.3 Site Acceptance Test Specification (SATS)
Subtask 3.4 Work Plan / Scope Review (if needed)

Task Sequence Diagram

Task 4 Application Programming / Development
Subtask 4.1 Plant Model
Subtask 4.2 Material Receiving
Subtask 4.3 Production / Consumption
Subtask 4.4 Data Collection
Subtask 4.5 Interfaces (LIMS, Weigh Scales, Printers...)
Subtask 4.6 Visual Displays / GUI's

Task 5 Application Testing
Subtask 5.1 Unit Testing & Integration Testing
Subtask 5.2 Factory Acceptance Testing

Task 6 Acceptance Testing
Subtask 6.1 Site Acceptance Testing
Subtask 6.2 Deployment

Task 7 Documentation & Training
Subtask 7.1 System Documentation (FS & SDS)
Subtask 7.2 System Training

Project Closeout
Subtask 8.1 Project Acceptance
Subtask 8.2 Final Project Closeout

Development & Testing Process

Technology Transfer & Deployment

System Planning

Track & Trace System

System Planning

Task Sequence Diagram

Task Sequence Diagram
Implementation Resource Model

- Account Manager
  - Rockwell Automation
- Project Sponsor
  - Customer
- Project Manager
  - Rockwell Automation
- Project Manager
  - Customer
- System Architect
  - Technical Lead
  - Rockwell Automation
- Project Engineer
  - Rockwell Automation
- Technical Lead
  - Customer
- Operations Lead
  - Customer
- SME (Process)
  - Customer
- SME (Other)
  - Customer

Support Model:
- Customer Change Management Committee
- Customer Support Team
- Rockwell Application Support
Questions?