Intelligent Packaging

Simo Siitonen, Project Manager, Stora Enso Intelligent Packaging Flagship
Growth story.
World’s oldest company goes digital

**IoT.** Driving internet connectivity to all packages. Renewing several business functions and foster digitalisation in packaged goods.

**Packaging business** becomes largest profit area within Stora Enso. Ranked as global #3 in packaging industry by size.

**Rethink!** Transformation from paper to renewable materials company 2006-2016.

Founded in 1288 as Stora AB
Internet of things

Connectivity

Intelligent Packaging

Digitalisation

RFID

NFC

Cloud platform

Data

Apps
Intelligent Packaging

- Intelligent Packaging is an **extension of communication function of packaging**

- Our Intelligent Packaging is with **RFID (NFC and UHF)** technologies

---

**Basic Functions of Packaging**

- **Convenience**
- **Protection**
- **Containment and preservation**

---

**Smart Packaging**

- **Communication and identification**
  - RFID, NFC
  - QR, AR codes

- **Active Packaging**
  - Moisture scavengers
  - Antimicrobial agents
  - Etc
2013-2015 ZARA has deployed over billion RFID-tags
Latest technology and market developments

RFID market development example – Macy’s

“men’s and women’s undergarments, men’s slacks, denim apparel and women’s shoes”

“All lines of businesses at its stores, except for jewelry and cosmetics.”

“all items in every store tagged”

Macy’s Inc. to Begin Item-Level Tagging in 850 Stores

The company plans to RFID-enable its Macy’s and Bloomingdale’s stores in 2012, and will tag garments in the stores’ Macy’s Inc. retail brand. The company plans on using both brands, announced today that it will roll out “Tag Technology for Merchandise (RFID) system,” RIS-tag, for in-store inventory management. Macy’s Inc. stores will use the RIS-tag system in 2012.

Since late 2006, the company has been testing RFID technology by reading tags on garments, according to Bill Goodwin, Macy’s Inc. senior VP of logistics and operations. Initially, he says, the technology was tested at a Bloomingdale’s location in New York City’s SoHo neighborhood. At that time, the store’s inventory was damaged, and accuracy was compared against those of another control store at which no RFID tags were applied (see Bloomingdale’s Tests Item-Level RFID). The pilot was then expanded to include seven additional stores and nine distribution centers. According to the company, the testing found that inventory accuracy—knowing which goods were located at which specific spot—was raised to 87 percent thanks to the increased application of RFID tags, as well as the reading of those tags for inventory cycle counts, both within stores and at DCs.

With the permanent roll out of RFID at all Macy’s and Bloomingdale’s stores, suppliers will be asked to apply RFID tags to their “merchandise levels”-products regularly restocked, and automatically resupplied when sold to consumers, and accounting for approximately 30 percent of Macy’s Inc.’s sales. The items to be tagged will consist of merchandise replacement categories, such as men’s and women’s undergarments, men’s slacks, denim apparel and women’s shoes.

30% 2012

60% 2016

100% 2017

Macy’s to RFID-Tag 100 Percent of Items

In June of last year, Macy’s began testing in theatrical and upscale stores, Bill Goodwin, senior VP of logistics and operations, said that the company plans to have 10 percent of all items in every store tagged by the end of 2012. To achieve this goal, the store is using all of its own products or supply chains already linked with the system.

In 2013, Macy’s announced that it was expanding its RFID tagging deployment to all lines of businesses at its stores, except for jewelry and cosmetics. Some categories were not a focus since there were challenges finding tags that worked effectively and could not reasonably impact the in-store presentation. “We are now working with RF vendors and are testing the application of tags on those shoes and accessories. We can then move to different products in another category,” Goodwin said, adding that the company will look at the technology to bring it to other store departments.

By the end of this year, the store’s Bloomingdale’s retailer, more than 60 percent of all products in Macy’s stores will be RFID-tagged and all items in every store tagged by the end of 2017. Now, the retailer is working with suppliers to get the technology in its stores.

The reason for a “consumer experience, better pricing and better understanding of the inventory” among suppliers, Goodwin explained. “There is a momentum that supports it that we are pretty much the tipping point.”

Source: RFID Journal October 2016
From customer experience point of view, online and offline should contribute to same experience.
Not just experience - Positive impact on business

**IMPROVEMENT IN KEY RETAIL METRICS/ KPIs BEFORE AND AFTER RFID ADOPTION**

<table>
<thead>
<tr>
<th>BEFORE RFID</th>
<th>AFTER RFID</th>
<th>IMPROVEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inventory Accuracy</td>
<td>67.4%</td>
<td>84.5%</td>
</tr>
<tr>
<td>Customer Satisfaction</td>
<td>64.6%</td>
<td>71.7%</td>
</tr>
<tr>
<td>Store Out-of-Stocks</td>
<td>16.5%</td>
<td>9.8%</td>
</tr>
<tr>
<td>Shrinkage</td>
<td>17.8%</td>
<td>11.8%</td>
</tr>
<tr>
<td>Profit Margin</td>
<td>8.9%</td>
<td>14.3%</td>
</tr>
<tr>
<td>Average Markdown</td>
<td>14.8%</td>
<td>11.9%</td>
</tr>
</tbody>
</table>

* Improvement is reflected by reduction

Source: EKN—Kurt Salmon RFID in Retail Survey, 2016
Application is Done in Collaboration with Specialist Planning Firms

Owner of a brand, product and an opportunity. Business acumen!

Creative Agencies to design interactions, journeys, messaging and create digital services. Imagination!

Management Consultancies to plan and calculate savings in Supply Chain operations. Specialist skills!

Capability to connect product, data and offline channel. Industrialisation!
Intelligent Packaging

- Consumer Engagement
- Brand Protection
- Supply chain management
Our offering
A one-stop-shop solution

1. Solution design
   Customer needs, system topology, technology selection, data flow.

2. Package design
   Package structure, functionality, RF properties, electronics placement, features.

3. Tag design
   Tag design, selection, sourcing, qualification, quality control.

4. Personalization
   Tag programming, Variable Information Printing.

5. Integration
   Physical integration of tag into package.

6. Connect
   Cloud platform, data collection, data management.

7. Analysis
   Data analytics and dashboards.

8. Apps and Installations
   Customer-tailored smartphone apps, system installations – with partners.
Tag embedding
Integration System

Integration system is crucial step change enabler in automated sleeve tagging, data management and secures rapid commercialization for the SE Intelligent Packaging

<table>
<thead>
<tr>
<th>Tag Integration System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicator</td>
</tr>
<tr>
<td>Bad tag removal</td>
</tr>
<tr>
<td>RFID reader, writer and tester</td>
</tr>
<tr>
<td>Visual identifier</td>
</tr>
<tr>
<td>Barcode etc.</td>
</tr>
<tr>
<td>Graphical user interface</td>
</tr>
<tr>
<td>Remote hosting by</td>
</tr>
<tr>
<td>Stora Enso</td>
</tr>
<tr>
<td>Data management</td>
</tr>
<tr>
<td>ID collection and option for SKU match</td>
</tr>
<tr>
<td>Quality control</td>
</tr>
</tbody>
</table>

Sheet Integration System. **Offline or online, depending on the use case**
Capabilities
Tag Design

Tag Design:
Antenna Simulation Software

Tag Prototyping:
Antenna Fabrication Laboratory IC Assembly

Tag Characterization:
Full-sized RF shielded Anechoic Chamber
Capabilities
Tag Sourcing & Qualification

Tag Sourcing:
• Network of >100 vendors
• 5-10 active
• Cumulative 30 years experience in tag manufacturing industry

Tag Qualification:
Design
• Application Test Equipment

Tag Qualification:
Manufacturing Quality
• 100% reel-to-reel parametric testing
• Temperature & Humidity stress tester
• Tag bending stress tester
• Failure Analysis equipment
Capabilities
Tag Testing and Encoding

Tag Testing and Encoding:
Testing and Encoding recipe creation (remote) and upload
UI for local operator
100% parametric testing of UHF & NFC tags
Encoding of UHF & NFC tags
Defect tag handling (marking, sorting).

System:
HW and SW
Applicable to various production lines
Test Data upload to cloud, global operation
Replications and back-ups
Remote monitoring
Intelligent Packaging

Digitalizing your business throughout the supply chain

Manufacturing
Inventory
Retail
Post-Sales
# Solution Portfolio

<table>
<thead>
<tr>
<th>Manufacturing</th>
<th>Inventory</th>
<th>Retail</th>
<th>Post-Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping &amp; Receiving</td>
<td>Stock Taking</td>
<td>Smart VMI</td>
<td>Smart Shelf</td>
</tr>
<tr>
<td>Anti-Tamper</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Campaign Enhancement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product Enhancement</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Home
About the product
Usage instructions
Reward program
Facebook Latticini
Latticini first milk

Inspired by 40 years of research, our team of scientists have developed Latticini hungry milk. Suitable from birth, it is nutritionally tailored for babies who are combination feeding or not being breastfed.

Latticini baby milk powder

Baby milk powder Latticini Baby is produced in Finland on high-end manufacturing equipment where every step is carefully controlled, from milk gathering at the own farms to the packaging and shipping them into shops. Best Finnish specialists has developed the Latticini Baby milk mixing action.

Usage instructions

Milk powder 2 level scoops

Water 60ml

Age of baby 2 weeks

Weight of baby 4 kg

Other important instructions

1. Wash your hands before cooking the mixture.
2. Cook Latticini brand formula in the bottle.

Reward program

After collecting 5 points, we will reward you with a free gift from Latticini.

Your status

Only 2 left to get the prize!

Baby crying? - Play a cartoon!
Intelligent Packaging videos

Detailed: https://youtu.be/2eqtHLa8Bgw

More inspirational: https://youtu.be/5iZ_6rVNIAc
Thank you!