THE NEED FOR

INTELLIGENT REUSABLE

TRANSPORT ITEMS

The Need for Intelligent RTIs in Today's Cold Chain

The critical benefits of actionable cold chain data are now increasingly recognized across the food and pharmaceutical industries. Actionable data about the condition and location of products enables the intelligent supply chain to improve operational efficiencies and drive out waste. Recent research indicates that such data is best captured at the pallet, bin or tote level – the domain of the reusable transport item, or RTI.

RTIs, also commonly referred to as reusables, have already been proven to play a powerful role in reducing the cost-per-trip of transport packaging through repeated reuse, as well as dramatically reducing solid waste and other negative environmental outcomes. RTIs cover a wide variety of durable, reusable assets, including items such as reusable plastic containers (RPCs), pallets, roll cages and totes.

One third party study, reviewing the use of RPCs versus corrugated display ready packaging for 10 fresh produce commodities, concluded that RPCs required 39 percent less total energy, created 95 percent less solid waste, and generated 29 percent less total greenhouse gas emissions than corrugated display ready containers.[i]

The use of reusable packaging has played a key role in the solid waste reduction strategies in many industries such as automotive, while providing the durability needed for demanding applications such as dairy and other temperature sensitive products.

An intelligent RTI or iRTI is a reusable transport item that is embedded with an RFID tag (such as a sensor-enabled Class 3 Battery Assisted Tag as not all types of RFID provide the necessary capabilities) to collect and capture information about the RTI itself as well as its contents. When integrated into a software system, the iRTI provides important actionable data. We believe that this application of RFID sensors to RTIs can help address some of the key challenges in today's perishable supply chains and provide a rapid ROI.

The current lack of visibility and actionable data in many cold chain applications imposes a strategic blind spot to participants struggling to manage avoidable product loss, liability exposure, ineffective product recalls, and legislative compliance with respect to emerging requirements such as the Food Safety Modernization Act and e-Pedigree, the proposed track and trace legislation for California's pharmaceutical supply chain. Actionable data from RTIs addresses these issues and promotes more effective container management, offering the

opportunity for broader use of iRTI pooling and the convenience that such programs provide.

How iRTIs Work in the Cold Chain

The use of iRTIs enables data to be automatically collected throughout the food cold chain, from point of harvest to the retail shelf.

Without iRTIs, the same processes of product storage, shipment and distribution take place, but quality assurance is typically limited to visual inspection and ambient air temperature records. As such, the ability to fast track product with the shortest shelf life or promptly divert compromised product is inadequate. In the pre-intelligent cold chain, produce is precooled, and then loaded onto refrigerated trailers for shipment across the country. Pallets of produce are unloaded at distribution centers, and then often built onto pallets of mixed produce for distribution to a retail or foodservice customer, typically on a 'first in first out' basis, without knowledge of important temperature variances that significantly impact product shelf life.

With actionable temperature data, however, several action points can be leveraged along the cold chain to optimize shelf life and sales. Pallets of product that have been identified as having a relative shorter shelf life due to inadequate precooling at the packing house can be allocated to a closer distribution center.

Likewise, as pallets of product arrive at the distribution center receiving dock and cross the electronic portal, those identified as having relative shorter shelf life due to uneven cooling in the trailer can be allocated to the retail outlets where they will be placed on the shelf the fastest. Through actionable data, cold chain participants can help ensure that the product with the shortest shelf life is on display the soonest, thus providing the opportunity to maximize sales and minimize unsaleables.

Similarly, iRTIs can be employed to improve quality and efficacy in the temperature sensitive pharmaceutical supply chain.

The Importance of Effective Recalls

As I write this paper, yet another massive cold chain perishable recall is underway. After several reported cases of illness, more than a week of confusion follows. The initial days pass as additional information continues to surface with respect to what countries the product has been shipped to as well as what quantities and corporate brands are involved. Such updates and corrections fuel additional jitters to an already anxious public, even as a new management team is airlifted onsite to take over plant operations. Only later do harried executives have time to assess the long term damage to the corporate brand and company valuation.

To be sure, intelligent reusable transport items (RTIs) cannot prevent the placement of already contaminated products into transport packaging. They can, however, play a powerful role in providing the visibility required to swiftly identify and isolate products and quantities involved. This data empowers cold chain participants to swiftly target their recall response, and most importantly, to restore confidence in consumers that all potentially compromised product has been removed from the shelf and isolated. Intelligent RTIs are an important early step in your brand protection strategy.

Strategic Drivers of Intelligent RTI

Actionable data provided by iRTIs is increasingly being recognized as a key opportunity to promote optimal freshness and quality, while improving delivery management, ease of recalls, brand value, and regulatory compliance. iRTIs offer the following benefits:

- *Promoting freshness and quality while reducing waste*
- *Improving Delivery Management*
- *Mitigating Risk and Brand Protection*
- *Addressing Regulatory Compliance*

Promoting freshness and reducing waste

Food waste is a serious issue – one that can and should be addressed at the iRTI level. One study has noted that supermarkets, convenience stores and restaurants in the U.S. generate 27 million tons of food waste, representing $30 billion, according to 2007 information.[ii] The U.S. EPA reports that the U.S. creates more than 34 million tons of food waste annually, costing roughly $1 billion for disposal alone.

Temperature abuse in the cold chain is a significant contributor to the loss of perishable product, resulting in lost sales and diminished customer experience, extra handling and transportation, as well as product disposal costs. Research from Intelleflex, a cold supply chain vendor, has discovered that, in a single shipment, as many as 19 percent of pallets to have significant temperature deviations from the rest of the load, and 30 percent of palletized

product to have been compromised before even leaving the packing house.

By knowing the relative remaining shelf life of product at the pallet or iRTI-level before it is shipped, the shipper can take key steps to reduce product loss.

Improving Delivery Management

Operational efficiencies can be enhanced by intelligent RTIs by instantly providing delivery data such as GTIN, SSCC, tare weights, sanitation records and manifest data, as well as integrating with WMS and ERP applications. All of this data is associated directly with the iRTI itself and, using the embedded RFID temperature monitoring tags, be read automatically without requiring bar code reading and line-of-sight access. This automation simplifies deployments and reduces costs by greatly minimizing impact on supply chain processes.

Mitigating Risk and Brand Protection

Intelligent RTIs can help reduce risk and promote brand protection in two important ways. Firstly, they can help to more easily identify any temperature excursions in the cold chain that will compromise the safety of product. Equally importantly, once a recall is initiated, intelligent reusables can improve traceability by providing accurate shipment information, helping to quickly pinpoint the location of product and thus restore consumer confidence.

Recalls can have serious financial implications. As can be seen by the table below from a 2011 GMA study, 52 percent of recalls have a cost impact $10 million or more in terms of direct cost and lost sales,

Recall Cost

less than $9M
$10M to $29M
$30M TO $49M
$50M to $99M
Over $100M
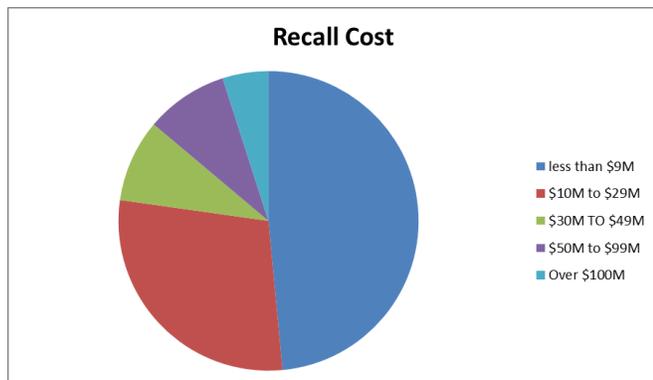
Source: *Measuring and Capturing Recall Costs*, GMA 2011

while 5 percent total are over $100 million in cost.[iii]

Addressing Regulatory Compliance

Intelligent RTIs present an elegant way of ensuring a best in class approach to track and trace requirements of the Food Safety Modernization Act and the anticipated e-Pedigree pharmaceuticals legislation in California. For many progressive companies, it is no longer considered adequate to be able to trace one movement upstream and downstream, with reliance on intermediaries and trading partners to quickly provide accurate information on demand when needed.

Synergies Between Actionable Data and iRTIs

With the most efficient level of actionable data at the pallet, bin or tote level, the iRTI lends itself perfectly as the host of a reusable RFID sensor that can deliver this information, without the need to physically place or remove RFID sensors for each shipment. This advantage, in addition to the other benefits of RTIs outlined above, make

the combination of sensors and iRTIs a powerful one two punch.

Emerging from the Dark Ages of Cold Chain Packaging

How fast we come to embrace unexpected new technologies, and as we unconsciously clutch our wireless devices, equally quickly come to ponder how we ever existed without them. With the RFID market projected to generate over $70 billion in sales over the next 5 years, we are rapidly approaching the point of a similar technology assimilation with respect to cold chain packaging and intelligent RTIs.

Without the visibility provided by actionable data, we cannot know with certainty what is going wrong in essentially is a 'lights out' supply chain.

For this reason, vendors of reusable packaging increasingly are offering the option of intelligent packaging to their customers.[iv]

The Mutual Reinforcement of iRTIs and Actionable Data

In this paper, we have looked at the need for actionable data, and how in many applications this is best captured by intelligent RTIs in perishable supply chains.

Actionable data associated with iiRTIs provides a host of benefits to supply chain participants, including actionable cold chain

management data, ease of recalls, brand protection, and regulatory compliance.

Additionally, other benefits of RTIs have been outlined, including rapid product cooling, product protection and durability. While current RTI deployment has been limited due to challenges in managing pools in complex supply chains, the deployment of intelligent RTIs has been proven to significantly reduce loss and dwell time inefficiencies, thus offering the potential for the successful introduction of RTIs into many new applications.

As such, we are seeing the beginning of a cycle of mutual reinforcement. The growing urgency for actionable data will continue to drive demand for the use of sensors at the

pallet, tote and bin level. At the same time, such actionable data will help increase the opportunity for the broader introduction and better management of reusable pallet and container pools, thus promoting a virtuous cycle between iRTI need and availability.

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[i] *LIFE CYCLE INVENTORY OF REUSABLE PLASTIC CONTAINERS AND DISPLAY-READY CORRUGATED CONTAINERS USED FOR FRESH PRODUCE APPLICATIONS FINAL REPORT* Sourced at http://www.usereusables.com/downloads/LCI%20Preface%20&%20Executive%20Summary.pdf

[ii] *All About: Food Waste*, September 24, 2007, sourced at http://articles.cnn.com/2007-09-24/world/food.leftovers_1_food-waste-greenhouse-gas-methane-emissions?_s=PM:WORLD

[iii] Capturing Recall Costs
Measuring and Recovering the Losses, GMA 2011, sourced at http://www.gmaonline.org/file-manager/images/gmapublications/Capturing_Recall_Costs_GMA_Whitepaper_FINAL.pdf

[iv] *Rehrig Pacific Company and Intelleflex Partner to Offer Intelligent Cold Chain Management Solutions*, October 12, 2012, sourced at http://www.prnewswire.com/news-releases/rehrig-pacific-company-and-intelleflex-partner-to-offer-intelligent-cold-chain-management-solutions-175697711.html