TRACEABILITY FOR MANUFACTURING: MUST-KNOWS THAT PROTECT YOU AND YOUR CUSTOMER
In recent years, manufacturing has come under intense pressure due to increased competition, globalization of the supply chain and related safety concerns, stricter government regulations, the demand for higher value at lower cost, and a more discerning and socially conscious consumer base.

With product recalls from automobiles to food products in the news almost daily — and the potential financial risk high — manufacturers need an innovative approach to their supply chain: one that provides a real-time view into operations and enables businesses to respond at a moment’s notice.

Traceability helps manufacturers ensure compliance with government regulations; better protect their brand and consumers; and perform rapid, focused and cost-effective recalls that minimize financial impact.

This Quick Reference Guide is your key to understanding traceability in manufacturing. It provides third-party data, presents real-world case studies, lists key considerations and outlines components needed for a traceability solution — all in an easy-to-understand, easy-to-read format.

**TRACEABILITY: DEFINED**

According to ISO 8402, traceability is “the ability to trace the history, application or location of an entity by means of recorded identifications.”

For discrete manufacturers, this means you can track and trace each component that comprises your product — from suppliers and manufacturers through assembly and final delivery to customers by creating an as-built genealogy. And for food and other process manufacturers, it’s the ability to trace each ingredient of a product from “farm to fork” through the creation of a batch genealogy. There are multiple ways this can be accomplished including using technologies such as direct part marking for discrete manufacturers, where parts and components receive a permanent mark either as they enter assembly or by suppliers. The most common methods for applying permanent marks include dot peen, laser etching, molding and stamping, or casting. Other technologies that enable traceability for all manufacturing types include 1D and 2D bar codes and radio frequency identification (RFID). Once you have chosen a traceability method, you can determine if Global Trade Item Number (GTIN), lot or serial level identification is needed based on your operations.

**UNNECESSARY FOOD RECALLS**

Track-and-trace solutions not only aid in managing food recalls, they also help stop unnecessary recalls.

In 2008, a salmonella outbreak sparked the recall of tomatoes across much of North America over a three-month period. Unfortunately, the outbreak was later attributed to jalapeno and serrano peppers, not tomatoes. In this case the estimated loss to the tomato industry as a result of the initial recall has been estimated at over $200 million.¹

“General Motors paid a $1 million civil penalty for failing to conduct a timely recall of failed windshield wiper components on more than a half-million vehicles.”²
PRIMARY DRIVERS OF ADOPTION: COSTS, COMPLIANCE AND RECALLS INCREASE THE NEED FOR TRACEABILITY

With competitive pressures on the rise and consumer confidence becoming harder to earn and maintain, companies are finding that now, more than ever, there is a need to protect their brands and reputations. Completely negating or being able to minimize the impact of recalls is critical to maintaining customer and distribution channel loyalty and minimizing costs.

In addition, compliance mandates are increasing as are the associated fines for non-compliance. The Federal Transportation, Recall Enhancement, Accountability and Documentation (TREAD) Act passed in 2000 requiring vehicle and equipment manufacturers to report to the National Highway Traffic Safety Administration (NHTSA) a wide variety of information that could indicate the existence of a potential safety defect. There also are rising pressures from the U.S. Department of Defense, which requires suppliers to complete Universal Identification (UID) marking of all legacy items. Not to mention the aerospace Spec 2000 and SEMI standards and regulations that also must be met.

Food manufacturers must now review the impact of The Food Safety Enhancement Act, signed by president Obama in January of 2011, which expands the FDAs authority over the national food supply and food providers by implementing traceability in industry and imposes the mandatory recall of unsafe food products. It also calls for an increased frequency of inspections, extends oversight authority by the FDA, and requires the implementation of risk-based controls that prevent food hazards.

Further, the pending Food Safety & Tracking Improvement Act will establish a national traceability system under FDA jurisdiction at all stages of manufacturing, processing, packaging, and distribution of food products. The produce industry itself is leading an effort through the Produce Traceability Initiative to outline a course of action to achieve supply chain-wide adoption of electronic traceability of every case of produce by the year 2012.

Manufacturers can no longer think of themselves as separate entities – but rather as part of a larger supply chain that involves suppliers, distribution centers, warehouses and transportation operations. Many manufacturers are turning to traceability solutions to help close some of the information gaps that exist in disparate supply chains, track warranty data and meet customer safety and demand requirements.

### Recall Costs

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<td>Media costs associated with contacting customers</td>
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<td>Costs associated with recovering or destroying product</td>
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<td>Cost to recover product replacement or customer credit</td>
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<td>Regulatory compliance costs (fees, additional testing and inspection costs)</td>
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<th>Indirect Costs Include:</th>
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<td>Damage to reputation and brand</td>
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<td>Long-term losses to a product category</td>
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<td>Added marketing and advertisement costs to recover market and market share</td>
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<td>Increased regulatory and testing costs</td>
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<td>Permanent increases in testing or sampling costs</td>
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## COMPONENTS FOR TRACEABILITY SOLUTIONS

Being able to track and trace critical components within the manufacturing process begins with both process and technological changes. In order for traceability to be effective, companies must shift from error-prone manual processes to automated ones—capturing, storing and managing information automatically. Advances in industry standards and improved auto ID hardware and software are making the transition easier than in the past. When looking at traceability solutions, system capabilities may include serialized container and individual part tracking; built-in bar code printing and scanning, RFID, and direct part marking; and detailed traceability from any point in the manufacturing process. The chart below outlines the necessary components of a traceability solution:

<table>
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<tr>
<th>Component</th>
<th>Description</th>
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| Manufacturing Execution System (MES) | • Provides detailed historical information related to production, inspection, genealogy and usage  
• Captures component lot/serial numbers per finished assembly  
• Documents variables at the time of manufacture such as temperature, pressure, etc.  
• Identifies a specific person on a specific production shift  
• Creates a template for the manufacturing system to guide all steps in production  
• Tracks work in process (WIP) and provides insight into production of all current orders and the status at each stage of production |
| Enterprise Resource Planning (ERP) System | • MES layer integrates with the ERP system  
• The ERP has the master information on materials, suppliers and vendors, while the MES tracks the production shop orders including component consumption, WIP and finished goods |
| Data Capture and Mobility Hardware | • Mobile computers, bar code scanners, RFID tags and readers, and industrial wireless local area network (WLAN) work in sync to capture build information. This allows the MES and ERP system data to be available to mobile workers in real time.  
• Devices to capture all traceability methods, including:  
  o 1D and 2D bar codes  
  o RFID  
  o Direct part marking: laser etch, dot peen, chemical edge, stamped |
| Additional Software Systems | • Applications that create mobile and fixed reader front-end interfaces to MES and ERP systems, quality and lab systems. This allows users to access key enterprise applications on mobile devices such as handheld mobile computers or allow for automated data capture via fixed readers.  
• Management software to:  
  o Manage, maintain and monitor mobile devices (Motorola Mobility Services Platform)  
  o Manage, monitor, and ensure security and compliance within wireless networks (Motorola AirDefense Suite) |
| Professional Services | • Designs and implements traceability solutions within manufacturing environments through consulting, project management and vendor selection |

### 2009 Peanut Recall

In 2009, a salmonella outbreak tied to peanuts prompted a widespread recall:

- Approximate cost to peanut industry alone = $1 billion
- Over 200 companies recalled approximately 2,100 products
- The recall impacted everything from cakes, ice cream, candy bars and peanut butter to crackers and pet food
ENTERPRISE MOBILITY TRACK-AND-TRACE SOLUTION COMPONENTS

Coordinating with suppliers, distributors and shippers from around the world, as well as meeting the demands of various government regulatory agencies is a challenge the industry faces together, even as ultimate accountability falls upon individual businesses within the supply chain. Fortunately, there are cost-effective, track-and-trace solutions available to help manage the enormous amounts of data needed to effectively manage the supply chain.

Mobile data capture technologies enable real-time synchronization of information related to products within the supply chain and create a common conduit of information. Track-and-trace technologies support food manufacturing and processing by increasing visibility in areas such as receipt of goods, raw materials processing, work in progress, finished good inventories, and even delivery to the customer. Through the use of radio frequency identification (RFID) tags, bar code scanning technologies, and real-time locating systems (RTLS), the burdens of maintaining data accuracy and safety of the food supply chain is significantly mitigated.

Real-time systems (RTLS)

When combined with a robust data management system, RFID and bar code scanning solutions can create a versatile RTLS. An effective RTLS enables businesses to trace items within the supply chain – what has been shipped to where and what has been received from where, as well as which goods are in transit. Information can be updated throughout the supply chain and production process. This key component allows businesses to ensure the quality of goods and effectively manage recall events.

RFID and bar code scanning

RFID and bar code scanning solutions address many key business data requirements, such as:

- Global trade identification numbers (GTINs)
- Ranch, feedlot, auction house, and processor locations
- Condition, quantity and historical data within the supply chain
- Handling instructions
- Lot/batch numbers
- Authentication codes
- Inspector IDs
- Transportation information

Real-time transparency

Implementing a wireless local area network (LAN) within a production or staging facility enables a business to collect and correlate the various data in real time as it moves to, from and throughout a facility. When using mobile computers equipped with voice, RFID and/or bar code scanning, workers can respond instantly to the needs of the business. The real-time transparency provided by these tools enables businesses to ensure the correct ingredients and goods, from the correct distributor are received into, transferred within and shipped from a facility. In the event of food contamination and product recall, these solutions enable rapid notification and suspension of product fulfillment, limiting the scope and impact of the recall.

“Reducing recalls is a compelling reason to start thinking about traceability in automotive,” says Alison Smith, senior research analyst at AMR Research Inc. “If 12 cars have a problem, you don’t want to recall 30,000 cars. You want to recall 50.”

Did You Know:

Each year, foodborne pathogens cause an estimated 76 million illnesses, 325,000 hospitalizations, and 5,000 deaths in the United States.
**QUICK REFERENCE GUIDE**
**TRACEABILITY FOR MANUFACTURING: MUST-KNOWS THAT PROTECT YOU AND YOUR CUSTOMER**

**BENEFITS: GREATER CUSTOMER SATISFACTION, COST SAVINGS AND BRAND PROTECTION DELIVERED THROUGH TRACEABILITY**

Being able to identify the origin of a particular unit located within the supply chain is changing the way businesses operate. Traceability technologies and processes ensure product quality standards are met and give real-time information about production and equipment. It enables you to track production information back to the exact date, time, supplier components, operator and machines used.

The result is increased revenues, improved customer satisfaction, and reduced manufacturing liabilities. The adoption of traceability requires time, effort and resources, but the returns companies realize outweigh the investment.

**Increase customer satisfaction and safety**
- In the event a recall does take place, manufacturers are able to minimize the impact by only recalling those items with the specific serial numbers that were built with the faulty component, material or process – thus significantly reducing expenses and customer impact.

**Meet government and compliance mandates**
- Traceability can ease the burden and lessen the chances for fines and penalties associated with noncompliance. Real-time visibility helps food manufacturers meet the challenges of stricter government regulations, and general manufacturers can manage detailed product histories to meet discrete and process manufacturing standards and regulations.

**Improve data accuracy**
- The element of human error is significantly reduced as components or ingredients are handled within the manufacturing plant with the use of mobile computers, bar code scanners, RFID and wireless data technology. Product, ingredient, part, employee number, quantity and supplier information can be automatically captured accurately and timely rather than written on a tablet and transcribed into a computer system.

**Increase operational productivity**
- In addition to the efficiencies gained through the removal of manual processes, businesses can save millions in lost revenue, recall costs, damage control campaigns, litigation and fines through the use of traceability solutions to prevent quality issues. And, from an operations perspective, automated KanBan for just-in-time (JIT) line side replenishment of component parts can also significantly increase productivity.

**Protect your brand and bottom line**
- With consumers accessing and sharing greater amounts of information online, reputations are more vulnerable than ever. Mobile track-and-trace solutions can prevent quality issues before they occur or, in the event of a product recall, allow manufacturers to act swiftly as well as narrow the scope of the recall to reduce exposure to negative brand impressions and damage to revenues.

**Reduce warranty claim costs**
- Warranty claims can significantly impact a business’s bottom line. Traceability enables manufacturers to accurately analyze the root cause of a product or part failure to recover warranty costs from liable suppliers. This not only reduces warranty costs, but also can contribute to improved product quality in the future.

**Focus on generating revenue**
- While cutting costs is one way to improve your bottom line, increasing revenue is another. With automation and traceability solutions for discrete manufacturers you can track warranty and part information to up-sell and crosssell complementary products and services. In addition, labor hours can be reallocated to focus on revenue-generating activities versus the double reporting that occurs when data is collected manually and then later transferred into a computer system. And for process manufacturers, retailers are increasing their track-and-trace initiatives and supplier requirements, thus setting the stage for businesses that are proactive in taking steps to meet these changing demands to have a competitive advantage.

“Warranty costs in the automotive industry exceed $9 billion per year.”

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PROFESSIONAL ASSOCIATIONS

The associations listed below are dedicated to educating manufacturing and supply chain professionals. When you become a member, you have access to education and research material to help improve your business operations and stay up to date with the latest trends.

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CONTACT US

To learn more about how Motorola can help your organization innovate to improve traceability, and boost visibility, connectivity, and control throughout your operations, visit http://www.motorolasolutions.com/manufacturing or call +1.866.416.8593

REFERENCES

1. State Surveillance of Foodborne Illness; Produce Safety Project; www.producesafetyproject.org
2. "Parts tracing drives automotive supply chain government regulations and rising recall costs force suppliers to get a better handle on parts data," Frontline Solutions, Brian Albright, April 2005
5. National Center for Zoonotic, Vector-Borne, and Enteric Diseases