



## Enhancing the Supply Chain with RFID

RFID has captured the attention of many leading companies today who are making significant investments of money and time to make this technology feasible in their operations. The goal, however, is to leverage internal RFID structures to capture and share real-time business information across entire enterprises and with trading partners. In other words, RFID deployments based on open, standardized EPC interfaces that enable interoperability and multi-vendor implementations may achieve the ultimate in global data sharing: Total asset visibility.



Zebra Technologies offers proven, ultra-reliable products backed with more than 30 years of success in developing supply chain printing solutions for business improvement and compliance applications. Aiding in the birth of bar coding, Zebra worked with retail grocery chains and the U.S. Department of Defense to adopt now-common bar code labeling systems and symbologies. Today, 90 percent of the Fortune 500 rely on Zebra's rugged printers.

Zebra® products are used in a wide range of industries, including consumer goods, manufacturing, automotive, healthcare, electronics, transportation, telecommunications, chemical, textiles, shipping, warehousing and distribution, military and government, food packaging and distribution, aerospace, education, security, construction, entertainment, hospitality, and retail.

With international headquarters in Vernon Hills, Ill., Zebra has sold 4 million printers worldwide. To underscore its commitment to quality and reliability, all of Zebra's design and manufacturing sites are certified to the ISO 9000 international standard for quality management.

Today, with more than \$500 million in annual sales, the company manufactures all of its printers in U.S.-based facilities located in Vernon Hills, Ill.; Camarillo, Calif.; Warwick, R.I.; and Wakefield, R.I. The company also manufactures and distributes Genuine Zebra Supplies from its facilities in Wisconsin, Rhode Island, and Preston, England.

Zebra's international distribution network encompasses more than 90 countries throughout Europe, Asia, the Americas, Africa, the Middle East, and the Pacific. Zebra Technologies Europe Limited, located in the United Kingdom, provides product and specialty label sales and support to European operations. Zebra also has sales and support offices in France, Germany, Italy, Denmark, China, Japan, South Korea, Australia, Singapore, South Africa, and Miami, Fla., which also serves Latin America along with offices in Brazil and Argentina.

Working closely with early bar code label adopters enabled Zebra to stay on the leading edge of product development to meet customer needs more than 30 years ago. The same holds true today as Zebra works with global industry leaders and their suppliers to conduct RFID pilots.

A proven pioneer in radio frequency identification (RFID) technology, Zebra has helped lead international development for eight years. As a member of EPCglobal, the DoD AIM RFID Expert Group, and other standards bodies, Zebra continues to play a leading role in the development of smart-label technology, standards, and solutions designed to help suppliers to major retailers and the U.S. Department of Defense (DoD) meet upcoming RFID Electronic Product Code (EPC) compliance labeling requirements. In fact, Zebra hosted a two-day meeting of key parties to define a consensus proposal for the EPCglobal Generation 2 RFID protocol standard.

Since the mid-1990s, when Zebra began to strategically research and develop RFID-related products, Zebra's leadership in providing the market with RFID smart-label printing/encoding product solutions has been steadily growing. Again, Zebra leads the way in making its mark on the industry, having placed RFID printer/encoders in pilots, deployments and test centers across the country.

- Zebra was the first to introduce a commercially available RFID smart label printer/encoder four years ago. Today, companies who use high-frequency (HF) RFID technology in their operations can utilize Zebra's newest 13.56MHz printer/encoder, the R2844-Z, which is ideal for lower printing volumes and offers a smaller footprint to fit neatly on desktops and countertops.
- In 2003, the company was first to market with a EPC UHF Class 1 printer/encoder—the R4Mplus.
- Zebra has been steadily expanding its range of RFID solutions to address the needs of companies operating worldwide. Zebra's high performance multi-protocol printer/encoders support worldwide bands and a wide range of tag formats including 13.56 MHz (HF) and UHF (EPC, ISO). Supporting desktop to mission-critical operations, Zebra printer/encoders offer unprecedented flexibility of tag placement in the label, helping keep existing label formats intact. As a result, Zebra RFID printer/encoders are ideal for a wide range of applications including compliance labeling, logistics, asset tracking, baggage and parcel tagging, retail labeling, and product and patient authentication. In addition, Zebra RFID printer/encoders offer XML-enabled printing for easy integration into leading enterprise software applications, such as those offered by Oracle and SAP, adding even more value in today's mission-critical supply chain environments.
- Delivering important investment protection, Zebra's new RFID Ready program allows companies to buy the bar code printers they need now while safeguarding a migration path to the RFID they will need in the future. The RFID Ready printers can be easily upgraded to incorporate a multi-protocol, EPC-compatible, UHF reader/encoder supporting the most current RFID protocols.
- For more information about specific offerings in your region, please visit [www.rfid.zebra.com](http://www.rfid.zebra.com), contact your local Zebra authorized RFID provider or the local Zebra office in your area.

## RFID Can Transform the Following Business Processes...



### Supply Chain Management

Thousands of inbound and outbound shipments can be identified with RFID smart labels that enable unattended identification, verification and sortation at different points in the supply chain across trading partners and distribution centers.



### Inventory Control

RFID can significantly deliver correct and current information about inventory levels to allow companies to ensure they can deliver what they have promised. In addition better inventory control reduces storage space and labor costs and improves asset utilization as well as enables faster billing cycles and contributes to cash flow.



### Asset Management

RFID promises more effective asset management by providing real-time information about location of assets ensuring employees always have equipment, tools and other resources when and where they need them.



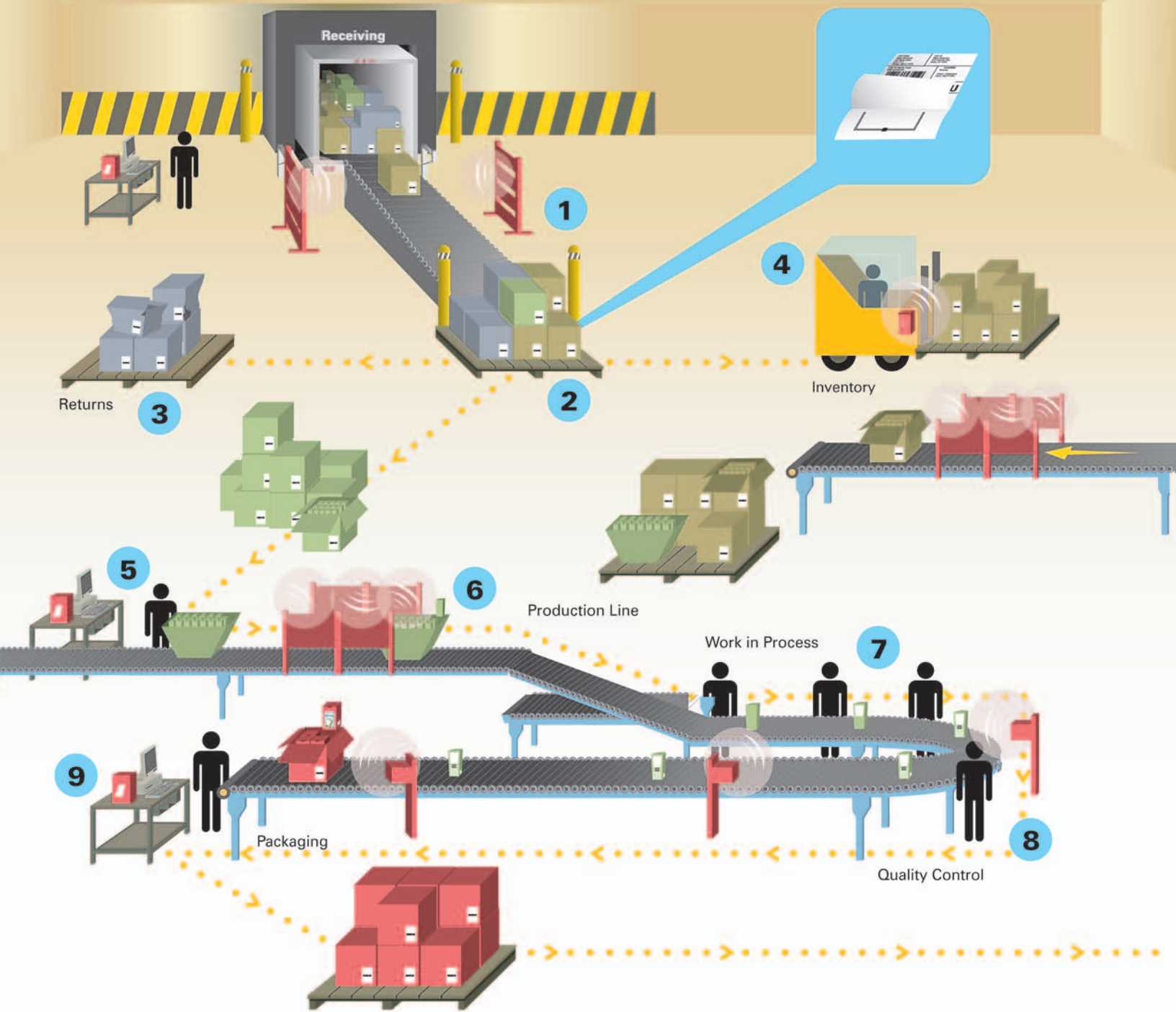
### Work in Process

Along the assembly line, tasks associated with WIP can be reported back to the systems with RFID, identifying that each step of the assembly process was completed and ensuring that quality control measures were taken reducing make-overs.



### Anti-Counterfeiting/Track & Trace

Materials authentication is another complementary asset management application. It provides a way to detect counterfeit products and can ensure that only authorized parts and supplies are used with equipment. Many organizations in the life sciences and pharmaceutical industries will use RFID to comply with FDA rules to create pedigrees to support drug traceability and security.



## » Manufacturing

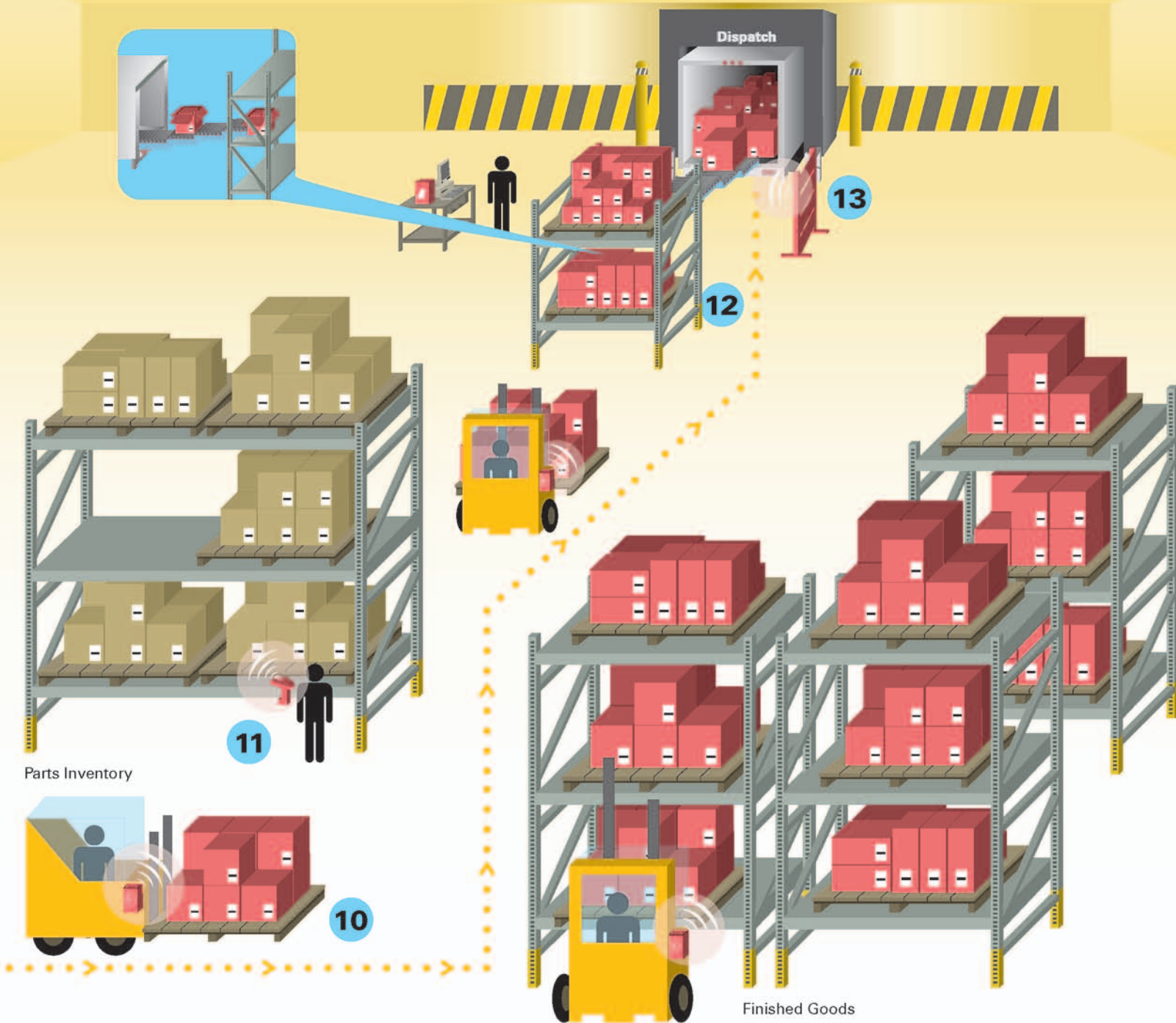
### RFID in the Retail Supply Chain

Wal-Mart and DoD suppliers are moving forward with EPC RFID implementations to gain operational improvements, such as:

- 100 percent inventory visibility
- major reduction in losses and shrinkage
- tracking lot and expiration dates
- work in process data management
- enabling tags to carry real-time databases of item information
- assigning unique serial numbers to items
- sharing EPC and other product data with partners in the supply chain

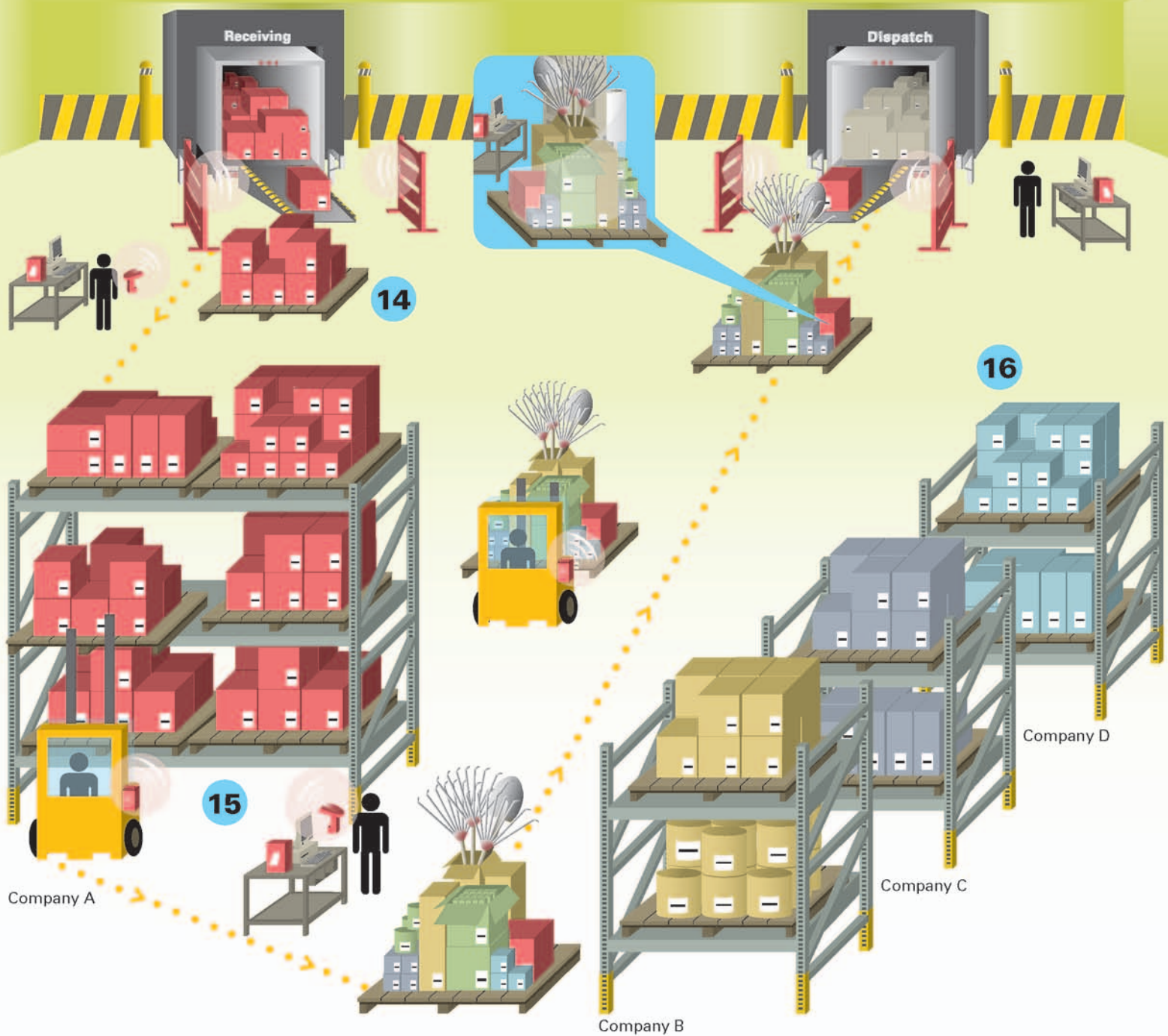
### Tracing Operational Improvements with RFID

1. In the **Manufacturing** plant, pallets arrive at the dock door where stationary readers pick up EPC numbers and other data about the shipment.
2. Received goods are checked against the Shipping Manifest and will go to one of three areas—**Inventory**, **Production** or **Returns**.
3. A new shipping smart label is created to ship **Returns** back to suppliers.
4. Inventory cases are read by a forklift reader that updates the system with product and location data where they will be stored in the **Warehouse**.



## » Warehouse

5. **Production** components are read at the case level, updating the system that these goods will be used immediately. Individual components needed to assemble new products are collected into bins at the start of the **Production Line**, allowing the manufacturer to link EPC data of raw materials with the finished products. A smart label is generated to identify the bin and its contents.
6. As the bins move toward the work-in-process line, they are read into the system by stationary conveyor-belt readers.
7. As workers assemble components into products, a smart label is attached to the product at the outset of **Work In Process**. Strategically positioned reader/encoders write data about each task that is completed to the read/write tag in the smart label.
8. At **Quality Control**, a reader picks up EPC numbers of products that have passed inspection. EPC numbers and product data are recorded in the manufacturer's database, providing QC documentation as goods move through the supply chain.
9. Finished goods go to **Packaging** and a smart label is created that contains specific new product data.
10. A fork-lift reader is used to update the system with information about the location where finished goods are stored.
11. **Inventory** is also stored in the warehouse. As cases are removed from shelves and used in manufacturing, a hand-held reader or forklift reader can be used to update the system.
12. In the **Warehouse**, finished goods destined for a particular **Distribution Center** are collected into pallets.



## » Distribution

13. As pallets leave the dock door, stationary readers at **Dispatch** take a final reading of the goods and update the system that they have been loaded on to a truck for shipping out.
14. Advance Shipping Manifests give **Distribution Centers** data about pallets of good that will arrive. Pallets are read by stationary readers that record the shipment and flag duplicate, unordered or suspect items.
15. Forklift readers/encoders update the system with the location of goods that are being stored. At any time, sensors can record conditions in the DC and add data to the smart label, allowing products to carry their own pedigree or history.
16. At the DC, goods from multiple suppliers are collected on pallets and targeted for a particular **Retail** destination. Pallets are shrink-wrapped to protect contents and keep them stable.
17. Stationary readers at the dock doors update the system to reflect what types of goods have been received, from whom and when. Again, goods that are accepted will be stored in the **Backroom** or placed directly onto shelves in-store.
18. Stationary readers or forklift readers update the system as goods transition from the backroom into the **Retail Store**.
19. Shelf readers report back into the system when items are low and shelves need restocking.
20. EPC numbers become inactive at the end of the supply chain when containers are recycled in **Compacting**, unless assets, such as pallets or cartons, will be reused.



» Retail (Store)

As a leading printer/encoder manufacturer, Zebra Technologies is committed to evaluating and supporting RFID transponder designs that support all EPC tag classes and RF communications protocols as they are developed, as well as determining their feasibility in RFID smart label applications.

For more information about Zebra's RFID products, visit [www.rfid.zebra.com](http://www.rfid.zebra.com)



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For more information on how Zebra can help you get your RFID pilot up and running,  
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