ZEBRA

6 Steps to a Modern Warehouse

Best practices for integrating mobile data capture and tracking technologies for faster, smarter order fulfillment

E-commerce drives need for integrated technology

The warehouse is the nucleus of your business. It is the hub through which nearly everything must pass, from receiving to shipping. With the sharp increase in e-commerce sales and and business-to-business demands, 87% of decision makers surveyed are in the process of, or planning to, expand the size of their warehouse space by 2024. Eighty-six percent indicated that increase in volume of items shipped was a driver for that space expansion, as well 83% believe they will have an increase in the number of stock-keeping units (SKUs) they will carry and cite that as a driver also.[1] Staying competitive means filling orders faster and more accurately than ever. An integrated system of mobile, data capture and tracking technologies allows you to have the visibility necessary to make data-driven decisions around workflow optimization and inventory management.

The Impact of a Fragmented Warehouse

Technical fragmentation—the use of the right technology in only a few operations—constrains warehouse operations from keeping up with the pace of e-commerce.

Businesses will feel the impact of technical fragmentation at the operational, customer relations and financial levels.

[1] Warehousing Vision Study, Zebra Technologies, 2019

Operational issues resulting from technical fragmentation:

- Inaccurate Information
- Reduced Productivity
- Increased Cost
- Reduced Customer Satisfaction
- Backlogged Order Fulfillment
- Lack of Visibility

Integration as a catalyst

To combat fragmentation and re-engineer operations to meet the demands of an e-commerce-driven economy, today's forward-looking warehouse and logistics professionals are integrating mobile, data capture, printing and tracking technologies throughout their operations. In addition to new levels of efficiency, accuracy and visibility, integration brings:

Significant reduction in paper processes

Improved accuracy in item selection, packing and shipping

More reliable tracking of materials and assets

Given the impact of e-commerce, employees need devices designed to fulfill orders with greater speed and accuracy.

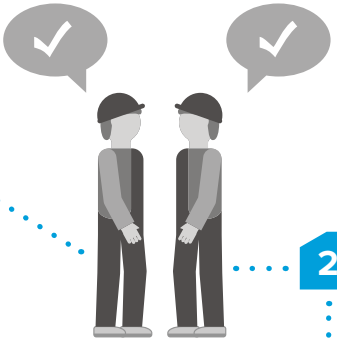
Multi-modal technology to allow users to perform multiple tasks on one device

Handheld, vehicle-mounted, wearable and hands-free devices for scanning, tagging, voice picking and more

Fixed and mobile printers to support tracking of assets and inventory

6 Steps to a modern warehouse

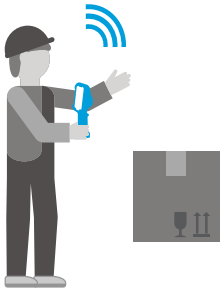
The path to the modern warehouse begins by examining and improving six critical areas. Throughout the process, you integrate state-of-the-art warehouse technology for a more collaborative, information-rich architecture that not only enables a leaner, more flexible warehouse operation, but a leaner, more profitable enterprise. Equally important, your enhanced warehouse mobility can serve as the foundation for implementing more efficient enterprise-wide visibility.



1 **Equip workers with modern mobile technology**

2 **Improve staff communication and management**

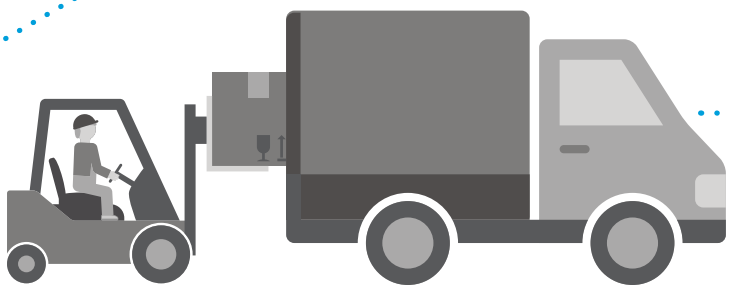
3 **Upgrade inbound handling operations**



4 **Track inventory from beginning to end**

5 **Streamline order-picking processes**

6 **Turn around outbound performance**



The Modern Warehouse

Step 1 Equip workers with modern mobile technology

Improved efficiency starts with better front-line worker technology. To fill orders with greater speed and accuracy, your front-line workers need tools that facilitate productivity, scanning precision, item-level picking and increased inventory visibility. Upgrading to modern enterprise mobile devices that combine scanning efficiency with touch-screen accuracy and ease-of-use enables them to validate data quickly and instantly locate the correct items. Connecting your front-line workers to each other and to the warehouse management system gives you the ability to gain basic control of operations by capturing every inventory move from receiving to shipping.

Implications of equipping workers with outdated technology

Extensive training requirements

Workers are accustomed to using highly functional touch screens and user-friendly applications on their smartphones. But training them to use outdated mobile devices with green screens, multi-step processes and keystrokes can add weeks to training time—and during peak season, time is of the essence.

Limited inventory visibility

Paper-based systems, fragmented mobility utilization and reliance on "systems of record" might have been adequate for managing order fulfillment in the pre-e-commerce economy, but today the speed of fulfillment requires an inventory "system of reality," which requires greater and more timely stock visibility.

Security compromises and disruptions

A lack of maximum enterprise-grade digital security and control on each device can cause warehouse operations to shut down, leading to a significant financial impact on the business.

Data double-touches

Before e-commerce disrupted retail—and, by extension, warehousing—many operations could manage activities from a desktop computer. In today's higher-volume warehouse, though, this technology configuration reduces flexibility, slows down productivity and leads to manually re-entering data.

E-commerce order backlogs

Outdated or fragmented hardware can support slower manual workflows, but not the faster, more streamlined workflows required for keeping up with higher e-commerce-driven volume that can cause order backlogs.

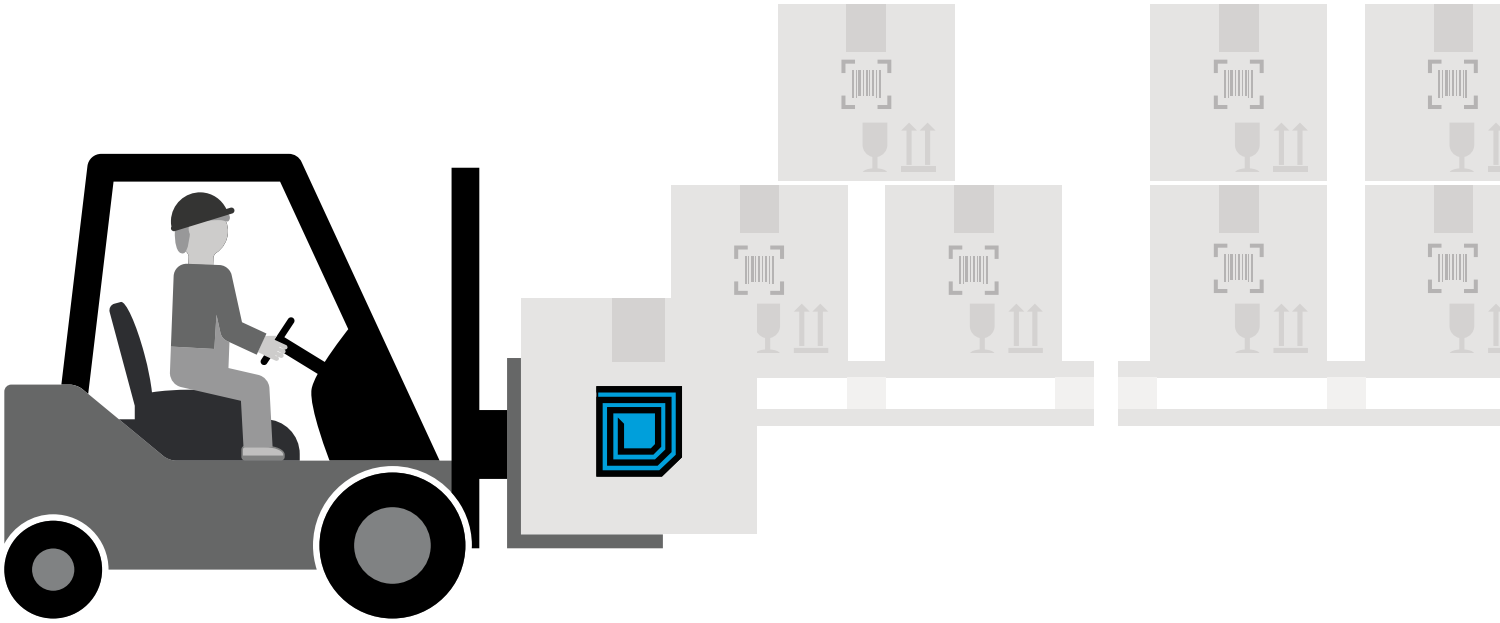
Sluggish order fulfillment

Older, outdated warehouse technologies running on legacy platforms don't have the memory, processing speed or scanning capabilities that today's intelligent, data-powered fulfillment requires.

Benefits of equipping workers with modern mobile technology

Modern touch-screen devices that enable fast data entry, scanning and worker training enable you to avoid common barriers to new device adoption. These devices allow you to seamlessly connect your front-line workers to the data they need to optimize your operation for today's greater speed and accuracy demands.

- Decrease worker training time with an intuitive touch-screen interface and provide consistent support with on-screen instructions and single-button commands.
- Optimize workflows to gain speed and efficiency by connecting each worker to enterprise systems.
- Increase productivity with faster processing power and applications that save seconds off every scan by capturing multiple barcodes, text, images or signatures in a single scan.
- Achieve real-time visibility by giving front-line workers a "system of reality" to work from that provides actionable insights for real-time decision making.
- Ensure security threats don't make your business vulnerable to unexpected downtime with modern enterprise mobile devices that have extended support for operating systems.
- Get timely transactional data capture by empowering front-line workers to help manage warehouse activities and track goods and assets right from the warehouse aisles, receiving and shipping docks.



Step 2 Improve staff communication and management

Seamless collaboration is essential to modern warehouse operations. This requires fast and efficient task management powered by real-time voice and data communications between supervisors and employees everywhere in the facility. Managers can proactively direct work orders and assign tasks that are not currently driven by the WMS, as well as monitor the efficiency and progress of work as it is being performed. In addition, better communication and real-time information beyond the four walls enhances collaboration with partners and vendors, which improves the warehouse's omnichannel fulfillment capabilities.

Implications of ineffective staff communications

Slow problem-solving

Without the option of mobile connectivity, warehouse managers may be "chained" to their desktop computers, preventing them from spotting and resolving issues on the warehouse floor in real time.

Slower operations

Without high-speed mobile voice and data access, procedures such as receiving, put-away, cross-docking and task interleaving are difficult to execute due to the amount of coordination that needs to transpire.

Inefficient workflows

Using an inefficient pager system for manager-to-employee-to-shipper communications can create delays in interactions, creating a barrier to work efficiency.

Delayed reactions

Too often, workers cannot communicate effectively with each other, supervisors, or managers in real time, making immediate issue resolution and higher productivity all but impossible.

Missed deadlines

Quickly finding workers in a large facility for an urgent task can be time consuming, inefficient and could lead to congestion in your workflows and missed customer service opportunities.

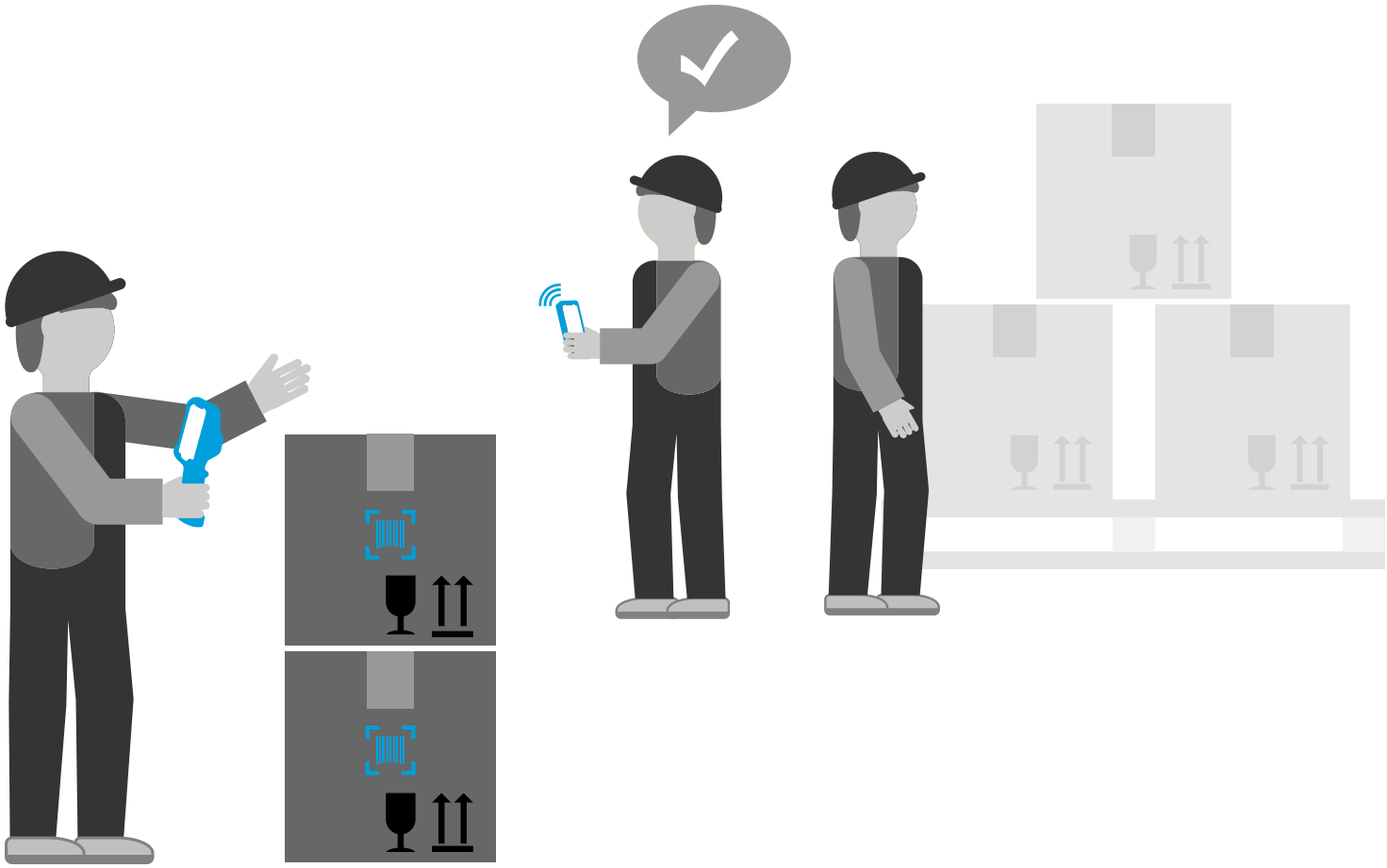
High employee turnover

When warehouse managers are inaccessible to workers on the floor to offer support and resolve issues, job satisfaction drops and employee turnover rates increase.

Mobile communications solutions

Benefits of mobile voice and data communications solutions

- Empower managers to get out of the office and onto the floor, maximizing on-the-job efficiency and effectiveness.
- Give managers access to business systems and workers with a single enterprise device.
- Eliminate lost time walking to a phone station with each employee able to communicate right from their own device on the warehouse floor.
- Eliminate distracting, nearly unintelligible overhead pages.
- Take advantage of embedded technology with mobile devices, like Bluetooth® Low Energy (BLE) beacons to locate the presence of people in targeted areas to optimize time and assign tasks.



Step 3 Upgrade inbound handling operations

Issues in inbound operations can lead to complications throughout the warehouse. Operational leaders believe the best way to avoid these problems is to bypass complete automation and implement processes that empower employees with devices, or via partial automation.[1] Facilities that take this approach will gain the benefits of:

- Accessing advance electronic shipping notices to track what was actually delivered.
- Managing vendor expectations through the use of global data sharing standards.
- Utilizing RFID readers or Bluetooth devices in portal areas to help workers manage by exception.
- Giving workers mobile workstations with scanning and printing capabilities.
- Equipping lift truck drivers with vehicle-mount computers and extended-range scanners.

[1] Warehousing Vision Study, Zebra Technologies, 2019

Implications of using outdated technology for inbound processes

Paper-driven inefficiency

Using paper-based systems or fragmented manual technology results in lost time, reduced order accuracy, decreased productivity and a lower return on investment.

Slow dock-to-stock

Delays caused by paper-based processes and fragmented technological solutions reduce inventory control and lead to false out-of-stocks and lost sales.

Poor visibility

Slow and inaccurate receiving and put-away are barriers to timely inventory visibility and control, as well as to effective cross-docking, task interleaving, traceability and tracking processes.

Clogged aisles

Slow, inaccurate manual processes and the limited throughput of older technology can cause congestion in your aisles, wasting time and decreasing productivity.

Inventory on idle

Product sitting on a dock or misplaced in inventory is more than simply idle, it's also unavailable, which can mean lost sales and dissatisfied customers.

Equipment misuse

Poor visibility and inefficient management of material handling equipment (MHE) like forklifts and crawlers reduces MHE availability and productivity, and increases maintenance costs.

Many unhappy returns

Inefficient reverse logistics processes result in slow return of product to inventory, delayed customer credit processing and decreased customer satisfaction. Increasing returns volume in the e-commerce age intensifies these process problems.

False out-of-stocks

Put-away errors and delays can create inventory inaccuracies, which can result in erroneous out-of-stock situations, unnecessary product replacement costs and lost sales.

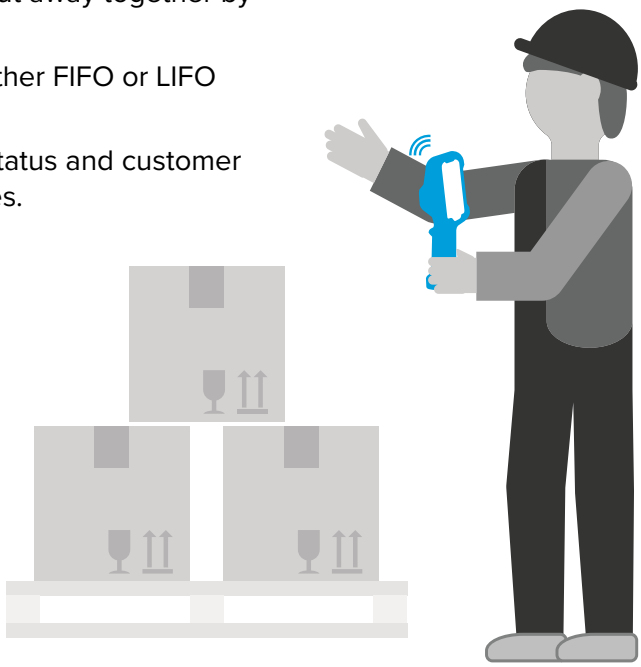
Inbound receiving solutions

Benefits of mobility at the receiving dock

- Process more inbound shipments with increased accuracy and productivity.
- Identify incoming shipments in real time by reading emitted data from an RFID tag or with a simple barcode scan of a shipping label or return merchandise authorization (RMA label).
- Quickly validate and update returns and issue customer credit automatically.
- Identify shipment errors by electronically receiving goods against advance shipment notices (ASN).
- Prioritize put-away of low-stock or out-of-stock items with more timely inventory visibility.
- Reduce handling time and costs of cross-docking operations with improved efficiency of forklift driver assignments.
- Ensure efficient put-away and picking by replacing missing or damaged barcode labels with mobile printing on the receiving dock.

Benefits of real-time WMS access

- Verify location matches WMS with a barcode scan of item and shelf tag.
- Ensure all cartons and pallets are accounted for and put away together by accessing WMS for exact location of all inventory.
- Reduce waste by ensuring proper stock rotation for either FIFO or LIFO inventory management.
- Quickly respond to changes in inventory, production status and customer requests with automated lean replenishment processes.



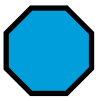
Step 4 Track inventory from beginning to end

In the modern warehouse, inventory accuracy is a requirement. Traditionally, cycle counts conducted manually or with older or fragmented technology have been fraught with errors and are time-consuming. However, cycle counting is a valuable operation in the warehouse. It allows operators to catch any inventory errors as quickly as possible to reduce out-of-stocks. The key is to be able to do it in a timely manner and often to ensure location-level inventory accuracy in each rack or bin location. In a recent Zebra warehousing survey, the overall average location-level inventory accuracy is about 86.5%.[1] This equates to approximately 15 out of 100 locations missing stock or inaccurate quantities compared to the WMS. Accurate barcode or RFID data capture makes location-level inventory accuracy possible—it's a question of choosing the right technology for the workflow, such as a mobile computer with a built-in, state-of-the-art barcode scanner or RFID solution. It's interesting to note that, in another Zebra® survey on fulfillment, 91% of respondents said they plan to implement RFID-based inventory management systems by 2028.[2] Enterprise-wide adoption of such advanced tools provides front-line workers with inventory visibility throughout the supply chain.

Implications of keeping manual or low-tech cycle counting

Inventory inaccuracies

Manual cycle counting is costly, time-consuming and error-prone—and it's a major reason for a lack of accurate, timely inventory availability and control.



Elevated regulatory risk

To meet increasingly stringent regulations, companies must keep accurate inventories. No company wants the major disruption of a shutdown to do a complete physical inventory.

Out-of-date reconciliation

Manual or low-tech cycle counts may take days or weeks, during which thousands of picks or putaways may occur, creating more inaccuracies.

Out-of-balance sheets

A lack of real-time visibility into inventory and storage affects inventory valuation, adversely impacting your company's balance sheet.

[1] Warehousing Vision Study Research, Zebra Technologies, 2019
[2] Zebra Future of Fulfillment Vision Study, 2017

Cycle-counting and asset-tracking solutions

Benefits of timely inventory data capture and analysis

- Reduce full inventory and cycle counting time from weeks to days and dramatically improve efficiency and accuracy.
- Schedule more regular and routine cycle counts to ensure accuracy.
- Improve ordering processes with accurate, more frequent trend data.
- Reduce out-of-stock conditions with reliable WMS data.
- Decrease capital expenditures for over-stocked inventory.
- Utilize warehouse space more efficiently with right-sized inventory.

Benefits of automated asset tracking using RFID

- Reduce downtime by knowing the exact location of assets in the warehouse.
- Optimize processes and improve planning and efficiencies by utilizing analytics from real-time and historical asset usage.
- Improve return on investment (ROI) and reduce the total cost of ownership (TCO) by extending the life of your assets.

Step 5 Streamline order-picking processes

Updating picking processes has become a major concern for many warehouses. In many operations picking could represent up to fifty percent of warehouse labor, could have as much as thirty percent turnover annually, is highly seasonal with four times average throughput and is physically taxing for the associates doing the work. Keeping these labor considerations in mind, warehouse decision makers have legitimate concerns as 86% of operators anticipate the volume of items shipped to increase and 83% believe the number of stock-keeping units (SKUs) to increase by 2024.[1] A modern warehouse operation is likely to use wearable mobile computers, ring scanning and enterprise head-mounted displays to dramatically increase the efficiency of the specialized workflows within this process.

Implications of out-of-date picking processes

Inefficient product locating

With legacy pick-and-fill processes, workers can spend up to 70% of their time walking to locate the right product, wasting time and reducing productivity.

One-at-a-time order processing

The linear nature of manual order picking means workers must process one item at a time, resulting in costly, ineffective and inaccurate inventory visibility and higher carrying costs.

Unknown errors

With manual processes and fragmented solutions, products cannot be automatically verified when picked, leading to unrecognized errors and inaccurate staging, packing and shipping.

Costly disappointments

Inefficient picking and filling operations cause inventory inaccuracies that all too often lead to costly out-of-stocks, lost orders, disappointed customers and lost revenues.

Inefficient labor utilization

The rising volume of orders flowing through the warehouse, especially orders of smaller size and lesser value, causes the relative labor expense for filling each order to rise, reducing already thin margins.

[1] Warehousing Vision Study, Zebra Technologies, 2019

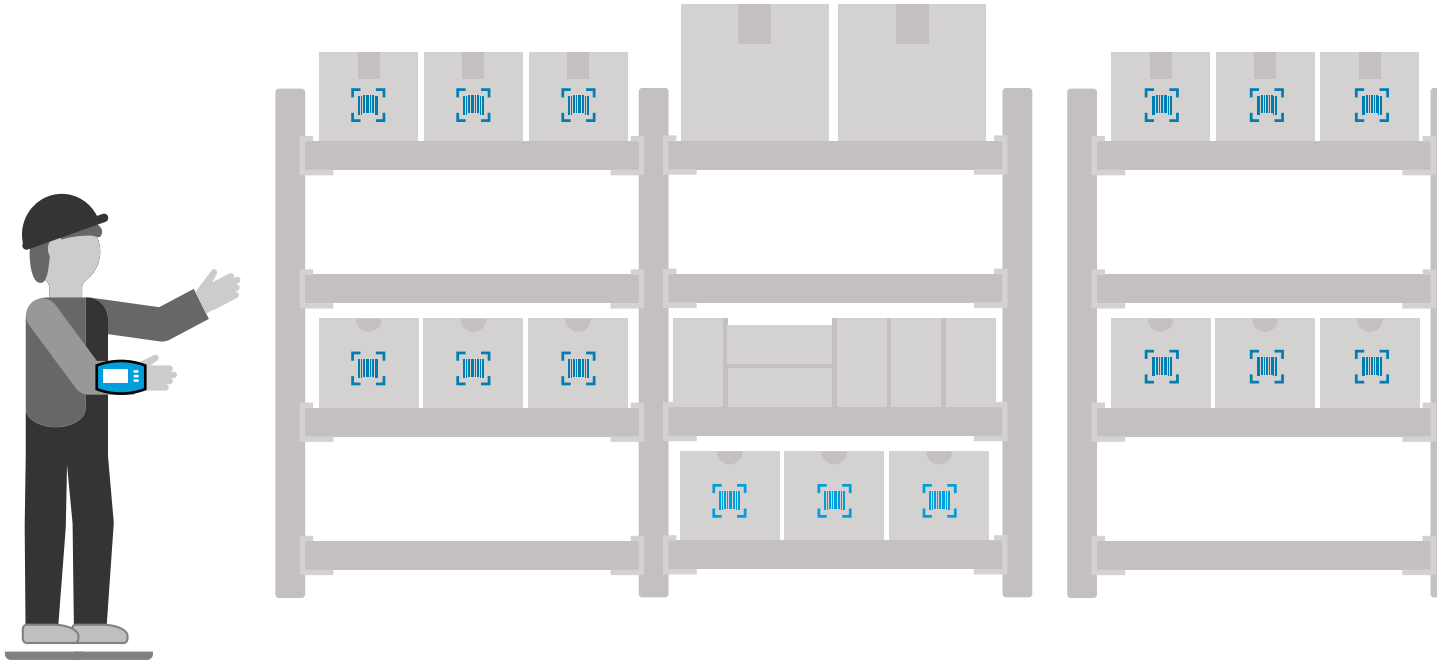
Pick-and-fill solutions

Benefits of mobility for picking operations

- Increase number of orders processed and reduce errors to lower cost per order.
- Eliminate lost time navigating to empty or wrong rack or bin locations with real-time on-hand inventory quantity and exact location.
- Get faster pick times and safer workflows with hands-free, multi-modal picking solutions.
- Help downstream operations verify orders by ensuring damaged or missing barcodes are replaced at the point of picking with mobile printing solutions.

Benefits of visibility for dynamic picking and inventory control

- Conserve time with consolidated pick lists for multiple orders grouped by zone.
- Enhance existing pick schemes such as pick-to-tote, pick-to-light and carousels.
- Receive instant verification that the right item has been picked.
- Eliminate out-of-stocks by instantly deducting items from inventory as they are picked.
- Ensure first-in/first-out (FIFO) inventory control practices with deeper visibility into item-level information.
- Instantly store serialized product information with customer orders to allow fast location of recalled products.



Step 6 Turn around outbound performance

Efficient packing, staging, loading and shipping lead to faster, smoother deliveries. To serve today's more demanding marketplace effectively, the modern warehouse empowers front-line workers by providing them with reliable item-tracking technologies such as barcode or sensor-driven technologies such as RFID, real-time location systems (RTLS) and intelligent automation to complete these processes in a timely manner. These important functions are critical to setting the stage for order verification, real-time visibility and dependable tracking while goods are in transit to the customer—resulting in streamlined delivery, enhanced competitive advantage and increased customer satisfaction and loyalty.

Implications of manual outbound processes for packing, staging, loading and shipping

Sluggish turnaround

Manual order verification in the final stages of fulfillment can lengthen turnaround times, causing significant shipping delays and carrier detention charges.

Loading inefficiency

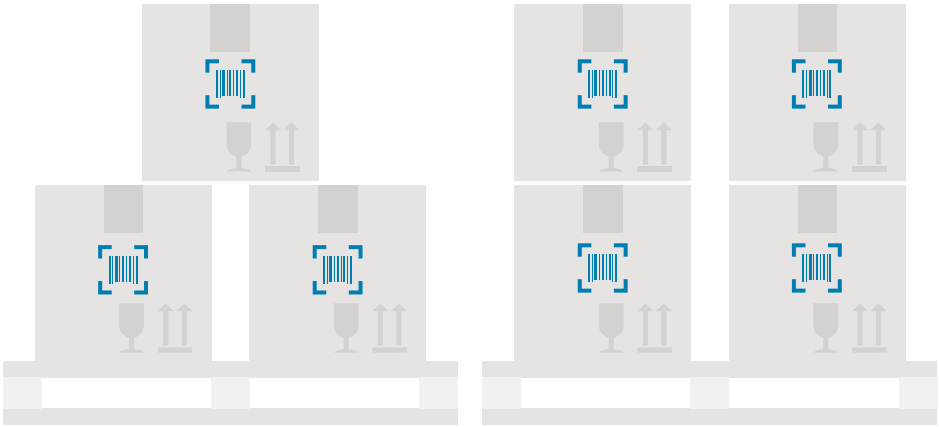
Lack of verification upon loading leaves one more opportunity for cartons or pallets to be loaded onto the wrong trailer.

Customer dissatisfaction

Manual processing and paperwork can cause delays and errors in manifest creation and shipping labels that ultimately can lead to customer dissatisfaction.

Change resistance

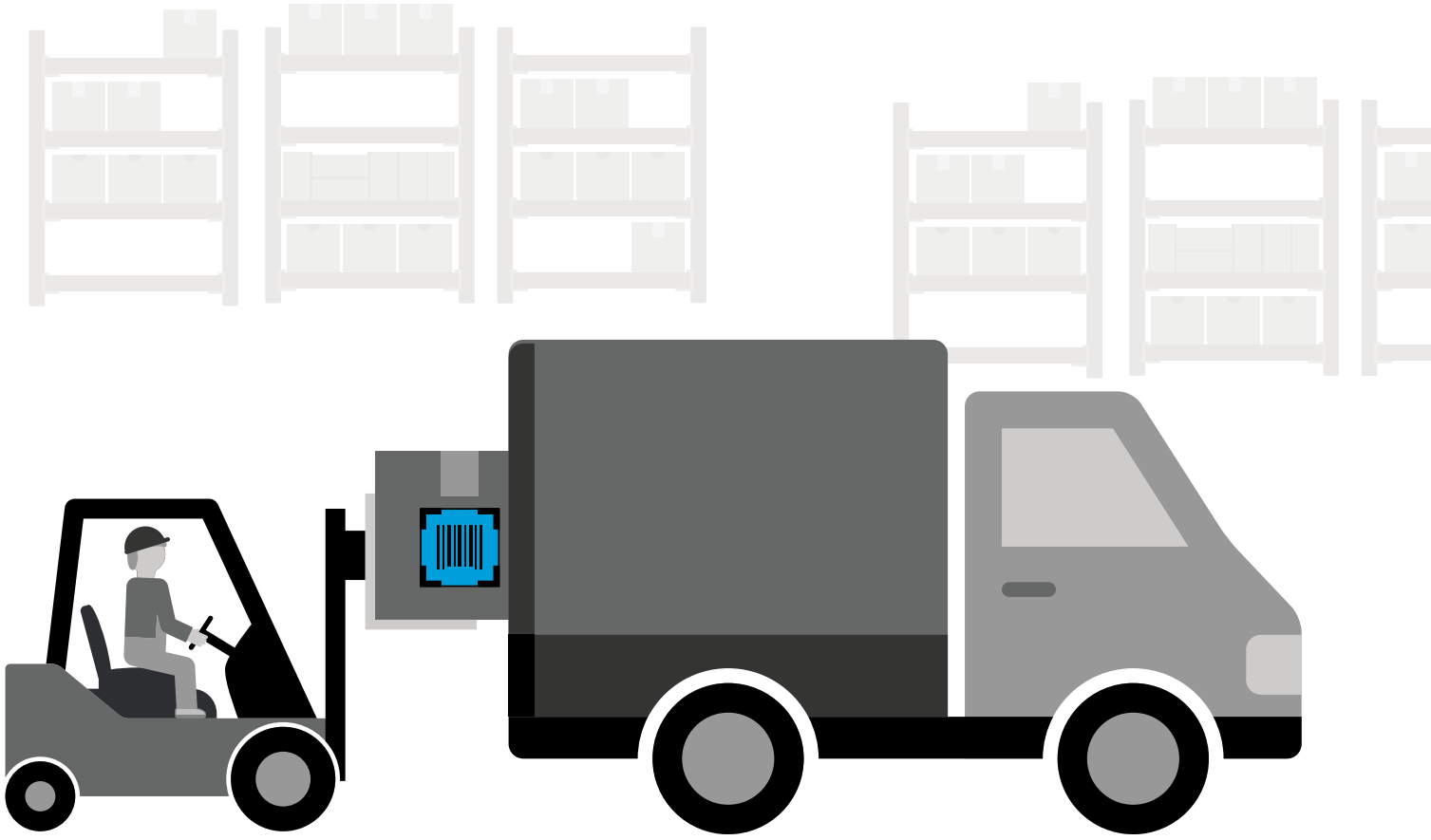
Often, manual processes can't accommodate last-minute order modifications and urgent orders.



Packing, staging, loading and shipping solutions

Benefits of increasing visibility in outbound operations

- Ensure greater order accuracy with a final barcode scan to verify contents and on-the-spot printing of necessary labels or paperwork.
- Avoid disruption and chargebacks with pack validations in retail or wholesale distribution centers. As all the goods in a carton pass by fixed RFID reader, a final record of the UPCs are generated for irrefutable proof of delivery.
- Control packing material costs by accessing item's dimensional data with mobile computers to select the right size carton.
- Reduce mis-ships by scanning items while loading to verify the right carton or pallet is on the right truck.
- Reduce driver dwell time with real-time visibility of staged goods for fast and accurate loading.
- Maximize customer satisfaction and retention with on-time and accurate orders.



Zebra® warehouse technology at-a-glance

On the table below, view the technologies that enable the warehouse to operate at a future-ready level.

	Staff communications	Inventory & materials management	Order picking	Receiving	Put-away	Returns management	Cross-docking	Packing	Staging	Loading
Handheld mobile computers	●	●	●	●	●	●	●	●	●	●
Wearable mobile computers and scanners		●	●	●		●	●	●	●	●
RFID handheld readers	●	●	●	●	●	●	●		●	●
Vehicle-mounted computers	●	●	●	●	●		●		●	●
Enterprise tablets	●	●	●	●	●	●	●	●	●	●
Zebra DNA: software, applications and utilities	●	●	●	●	●	●	●	●	●	●
Rugged or ultra-rugged scanners		●	●	●	●	●	●	●	●	●
Fixed RFID readers and antennas		●		●	●	●	●	●	●	●
Location solutions	●	●		●	●	●	●		●	●
Mobile printers		●	●	●	●	●	●		●	
Desktop printers		●		●		●	●	●		
Industrial printers		●		●		●	●	●		
RFID printers		●		●		●	●	●		
Zebra MotionWorks® Warehouse	●			●	●		●		●	●
Zebra MotionWorks® Yard									●	●
Zebra FulfillmentEdge™			●		●			●	●	
SmartPack™ Trailer and Container										●

About Zebra

Zebra empowers the front line of business to achieve a performance edge. We deliver industry-tailored, end-to-end solutions that intelligently connect people, assets and data to help our customers make business-critical decisions.

For more information on how to modernize your warehouse operations, **visit www.barcoding.com**

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