



SOLUTION GUIDE:
**Building a Smarter,
More Connected
Plant Floor with IoT**



WELCOME TO MANUFACTURING 4.0

The manufacturing industry is entering a Fourth Revolution. To manage increasing complexities and meet rising consumer expectations, manufacturers are implementing advanced technology on the plant floor, in the warehouse and in the supply chain. They are capitalizing on the Internet of Things (IoT) to achieve real-time visibility into their goods, assets, people, processes and places.

Manufacturers today are dealing with a greater number of suppliers, faster product development cycles and more demanding consumers than ever before. They are also under intense pressure to drive continuous improvements in production time, cost and safety of their operations.

To achieve these improvements, they are implementing technology solutions that help them increase visibility, reduce complexity, enhance productivity and streamline overall operations. Manufacturers are embracing IoT and the technologies that enable it – including RFID and barcode technology, mobile printers, mobile scanners and smart mobile devices – to achieve unprecedented visibility into their plant floor assets and operations.

In fact, manufacturers currently spend more than \$4.5 billion annually on plant floor technology – and that spending is expected to grow by double digits through 2020.*

Unfortunately, while 88% of manufacturers say they are capturing data from their assets and operations, only 18% believe they are fully equipped to deliver on IoT and connect that data to their business systems to improve operations.*

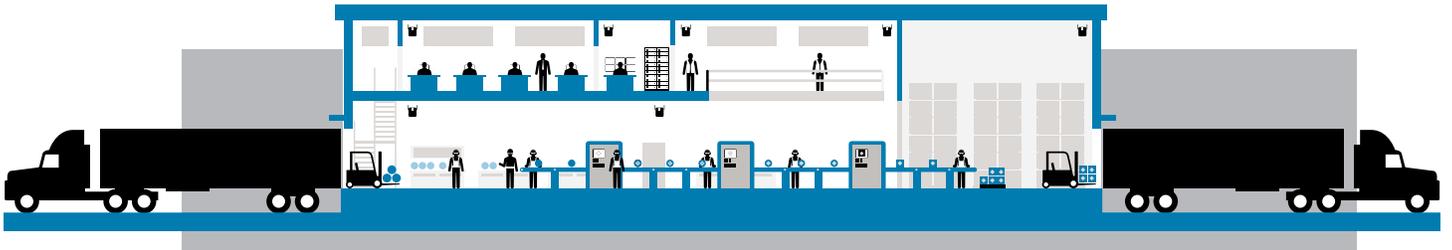
Manufacturing companies need an integrated, intelligent mobile technology solution that gives them unprecedented visibility into the plant floor – and helps them translate this visibility into business decisions that allow them to address inefficiencies, improve productivity, ensure compliance and exceed customer demands.

* *Mobile's Place in the Connected Factory*, VDC Research

The Production Process: A Plant Floor Tour

Manufacturing is generally categorized into two distinct industries: process manufacturing and discrete manufacturing. Process manufacturing typically involves producing bulk goods, such as food or chemicals, that do not need to be individually counted or marked. In contrast, discrete manufacturing involves producing finished products that are distinct items, such as automobiles or computers, that can be easily touched, counted or seen.

While discrete manufacturing tends to involve more steps and components than process manufacturing, every product – no matter whether it has 5 components or 5,000 components – travels through multiple production steps on the plant floor before it is ready for shipping.



INBOUND PROCESSING

When the components arrive at the manufacturing facility, the shipment is checked for accuracy and the components are prepared for assembly.



LINE SIDE REPLENISHMENT

Once components are booked in, they are allocated to a storage area that feeds the manufacturing line side parts zone on a call-off basis. Some may refer to this as Kanban.



ASSEMBLY/ MANUFACTURING

A sequential process where a semi-finished assembly moves from workstation to workstation to have parts or components added at each station to produce a finished product.



MAINTENANCE

A portion of the plant floor is usually dedicated to maintaining and calibrating the equipment so that the production process continues to run smoothly, with no machinery delays or breakdowns.



QUALITY CONTROL

During the assembly process and after assembly, products and processes are checked to ensure they comply with the necessary quality and regulatory standards.



PACKAGING

In the packaging area, workers ensure that finished goods are labeled correctly and comply with packaging guidelines.



OUTBOUND OPERATIONS

At the end of the operations, the finished goods are placed on the truck for delivery to the end customer.



INDUSTRIAL CONTROL SYSTEMS

This activity manages the automation on the manufacturing line and ensures the human-to-machine interfaces (HMI) are operating efficiently.

Tackling Today's Plant Floor Challenges

On the plant floor, problems can arise at any point in the manufacturing process. Even a small delay in any step can shut down or delay the production line and significantly impact a manufacturer's bottom line.

Industry analysts estimate that up to 40% of profits are lost annually due to unplanned plant floor downtime.* Manufacturers face several potentially costly production challenges.

INBOUND PROCESSING DELAYS: The moment raw materials or components arrive at the plant, shipments must be checked for accuracy, quality and adherence to service level agreements (SLAs). Manufacturers need a fast and accurate way to process these materials when they arrive at the plant or they can result in costly bottlenecks in the production process.

UNTRACEABLE ASSETS: Booking materials is only the beginning. If manufacturers cannot trace materials throughout the production process all the way to the consumer, they cannot effectively solve production problems and quality issues or comply with product recalls.

DELAYED LINE SIDE REPLENISHMENT: When components are not replenished on a timely basis, the production line can be delayed or even shut down. By automating the line side replenishment process, manufacturers can keep exactly the right amount of material on hand to ensure they never run out. This keeps the production line running smoothly and reduces inventory costs by lowering overstocks.

HIGH COMPLIANCE COSTS: Protecting regulatory compliance ratings and safety track records, while also meeting and exceeding business goals, requires manufacturers to validate processes to ensure that equipment and finished goods meet strict specifications. If manufacturers are still relying on manual processes to monitor compliance, they lack the visibility needed to uncover and resolve compliance and production issues and to prove compliance during audits.

UNPLANNED PRODUCTION DOWNTIME: When machinery or devices operate poorly, require replacement parts or have connectivity issues, downtime occurs and quality can be affected. By eliminating points of failure and deploying Industrial Internet of Things (IIoT)-enabled machinery and devices, you gain visibility of plant floor assets, reduce cost and increase quality.

LACK OF CONSISTENT QUALITY CONTROL: Human or mechanical errors during product production can lead to quality issues. Accurately tracking and tracing assembly and component data helps to certify that finished goods meet specifications, contains quality issues by identifying defects and their root cause and ensures consumer safety and brand equity in the event of a recall.

POOR PLANT FLOOR COMMUNICATIONS: Plant floor managers are oftentimes isolated in the control room, making it difficult to communicate with or manage workers across the expansive and noisy plant floor environment. This can lead to confusion on production line changes and other worker-related issues impacting production.

**\$60
Trillion**

Investment in Industrial IoT will top \$60 trillion in the next 15 years.

Source: IDC

33%

of organizations will soon have full real-time visibility of plant floor KPIs based on RFID and sensors

Source: General Electric

* The Hidden Cost of Downtime: A Strategy for Improving Return on Assets, Maintenance Technology

Optimizing Operations With Better Plant Floor Visibility

Zebra's solutions help manufacturers leverage IoT to build a connected factory that offers unparalleled visibility into the entire production ecosystem. This provides the enterprise with the required asset intelligence to make smarter manufacturing a reality, streamlining operations, meeting and exceeding production targets and cutting costs.

FASTER INBOUND PROCESSING

Armed with mobile technology, workers can quickly process inbound components and materials – and easily determine if components are on time and match the order. This allows components to be quickly moved from the yard to the manufacturing floor.

COMPLETE ASSET TRACEABILITY

Mobile scanning devices and RFID tags allow manufacturers to track the location and movement of materials and assets from the moment they land in the plant to their arrival at their final destination. Manufacturers can easily track work in progress and support just-in-time inventory management as well as quickly identify and locate product components, thus limiting the cost and scope of recalls.

BETTER QUALITY ASSURANCE

Thanks to Zebra technology, manufacturers can efficiently and accurately track and trace quality at every point in the production process. This also allows them to more easily identify defects, comply with recalls and analyze supply chain quality and fulfillment.

EASIER COMPLIANCE

Zebra technology allows manufacturers to easily monitor machine and human performance to ensure production processes comply with all safety, quality and regulatory guidelines, and to quickly access the data needed for regulatory audits.

GREATER PRODUCTIVITY AND CONNECTIVITY

For true integration of scanning and printing on the production line, Zebra provides Ethernet IP integration for print and apply processes and transmits scanned barcode data over industrial EtherNet systems by supporting the most widely used protocols for automation and process control applications.

STREAMLINED LINE SIDE REPLENISHMENT

Mobile computers help manufacturers automate inventory replenishment by tracking real-time inventory levels and the availability of materials on the plant floor. Manufacturers can ensure that the right material is where it needs to be when it is needed, eliminating bottlenecks, preventing downtime and optimizing inventory management.

IMPROVED ASSET MANAGEMENT AND MAINTENANCE

Visibility into plant floor machinery allows manufacturers to migrate from reactive to proactive maintenance. For instance, maintenance crews can be notified in real-time when an ink cartridge is about to run out or when a machine needs servicing, hence allowing maintenance to be performed without any interruption to production.

IMPROVED COMMUNICATION AND MANAGEMENT

Human-to-machine interface (HMI) allows remote interaction with machines to access production reports, monitor production parameters and get real-time alerts. Managers can see work in progress, analyze adherence to standard operating procedures and monitor machinery health from anywhere using their Zebra mobile computing devices.

THE ZEBRA PLANT FLOOR SOLUTION



Handheld computers and enterprise-class tablets



Rugged barcode scanners and imagers and RFID readers



Industrial barcode, RFID and microlabel printing equipment



Zebra Network Connect integrates scanning and printing on production line



Push-to-talk (PTT) over Wi-Fi or cellular networks



UNPARALLELED VISIBILITY. A SMARTER, MORE CONNECTED PLANT FLOOR.

At Zebra, we're bringing together real-time asset visibility with rugged mobility and cloud computing to help manufacturers shave off seconds, drive down defects and work more safely. No matter what size your operations are, Zebra is the strategic partner with the expertise to guide you through the next step on your manufacturing journey. Whether you require fundamental mobility solutions or are ready for a fully integrated Factory of the Future solution, Zebra gives you the tools you need to move into the Fourth Industrial Revolution – and confidently step into the world of Industry 4.0.

For more information on how Zebra can help you build a smarter,
more connected plant floor, visit www.zebra.com/plantfloor



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