ZEBRA CAPTURE YOUR EDGE

Embracing the Next Generation of Machine Vision

How manufacturers and logistics companies are using new advancements in machine vision to transform their operations

New Realities Have Changed the Game

The manufacturing and logistics industries look quite different today than they did just a few years ago. With rising worldwide labor shortages, growing ecommerce demands and ever-increasing requirements for improving speed and quality, many organizations are embracing automation to address these market-changing trends.

Looming Labor Crisis

According to a recent study, analysts predict an imminent labor shortage that threatens to upend economies worldwide. By 2030, the trajectory suggests that the quickly shrinking labor pool will result in a global shortage of more than 85 million workers.[1] Forward-thinking leaders are fast-tracking their automation initiatives to ensure steady operations against a potentially catastrophic trend. An added benefit to automation is its ability to deliver a level of consistency and speed that humans simply cannot deliver.

Skyrocketing eCommerce Demands

Online shopping shows no signs of abating anytime soon. Prior to the COVID-19 pandemic, just 9% of global consumers regularly shopped online.[2] But by May 2020, 44% of shoppers worldwide reported purchasing goods online every week–and 23% were shopping online multiple times a week.[3] That's a big part of the reason that worldwide ecommerce sales grew so dramatically in 2020, by nearly 28%, and reached an astounding $4.280 trillion.[4]

Drive for Perfection

While ecommerce offers a myriad of benefits, one of the drawbacks is the consumer's inability to touch and inspect a product before purchasing. There is a preconceived expectation of product and service quality. If a shopper's order isn't 100% correct and free of defects, they will not hesitate to send it back. And it costs the industry dearly. According to a new report, consumers return approximately 10% of purchases annually.[5] In the U.S. alone, returns totaled more than $428 billion in 2020.[6]

Adapting to Thrive

The modern-day shopper's on-demand mindset has spurred manufacturers and logistics providers alike to improve their operational efficiency and product quality to meet shifting consumer expectations. At the same time, growing labor shortages are straining resources and leaving companies looking for new ways to automate tasks and reduce costs. Businesses throughout the supply chain are exploring machine vision technology to help them not only survive but thrive in a highly competitive world.

This paper delves into the advancements Zebra Technologies has made in machine vision technology and explores the benefits of software-defined solutions.

Revolution to Evolution and Back Again

Machine vision delivers images and intelligence that help industrial companies gain more visibility into their physical operations. The term "machine vision" encompasses a wide range of technologies, including fixed industrial scanners, 3D sensors, smart cameras, frame grabbers, vision controllers and more. Machine vision is already a more than $7 billion industry.[7]

It's been more than seven decades since the first barcode patent was filed, and nearly 50 years since the first UPC code was scanned at a supermarket. In the ensuing years, barcodes have fundamentally transformed all aspects of the global economy. A marvel of simplicity, the barcode's black and white iconic stripes are on nearly every product in every factory and every store shelf. They've simplified the process of tracking, tracing and managing inventory and made just-in-time deliveries not only possible but attractive. Barcodes have also dramatically reduced the costs of carrying the ever-expanding variety of products today's savvy shoppers demand.

From Lasers to Advanced Imagers

Early barcode scanners employed laser-based technology to read the lines and spaces that characterize barcodes. While revolutionary at the time, scanners have come a long way since they were first introduced. Modern-day fixed industrial scanners have little resemblance to their earlier predecessors and now employ sophisticated camera-based imaging technology. Instead of a laser, an image-based reader snaps a digital image of a barcode and uses advanced software and intricate algorithms to decipher the information.

Interestingly, the same imaging technology at the core of modern fixed industrial scanners also powers the data capture function of machine vision smart cameras. No longer confined to reading just barcodes, imagers are quickly evolving to alter the machine vision landscape.

From Complexity to Streamlined Convergence

Older iterations of machine vision could be complicated, requiring time, skill and financial resources to make automation solutions viable. Even today, some vendors still develop and market proprietary solutions, meaning users must purchase and support totally different products and applications to utilize and manage their machine vision projects.

It's different with Zebra—we deliver one interoperable portfolio for all your machine vision requirements. Our robust lineup of fixed industrial scanning and machine vision products deliver greater flexibility, choice, simplicity and value, preparing you for today's challenges and tomorrow's uncertainties. Streamline how you qualify, procure and deploy automation products, software and components with a single source for all your needs. This is the Zebra difference.

Delivering on the Promise of Industrial Automation

As more and more manufacturing and logistics companies seek to address increasing business challenges, technology innovators are introducing integrated software and hardware solutions that unlock the promise of automation. Focused on driving higher levels of process efficiency and productivity, these fast-emerging solutions are simpler to use, provide a broader range of capabilities and easily integrate into existing operations.

Instead of requiring separate hardware and software for each application, these advanced systems unify machine vision and scanning capabilities into a single solution. Businesses can rely on an easy-to-manage platform for various scanning, traceability and product inspection needs, from reading barcodes and basic track-and-trace operations, to complex inspection, recognition and guidance tasks.

Careful to take heed of the lessons of the past, innovative product designers are focusing on ease of use to ensure the new solutions are simpler to deploy and manage. Flexible solutions make it easier for both value-added distributors and system integrators to design and set up applications for their industrial clients. Profiles are easily added to allow for quick network configuration and easy device commissioning.

Even small and mid-sized industrial companies can now realize the many benefits of industrial automation without all the headaches involved with managing cumbersome legacy systems. And in doing so, these businesses become much less dependent on manufacturer's representatives or technical support to implement these solutions.

The Benefits of Machine Vision and Fixed Industrial Scanning

Faster Product Assembly	Fewer Manufacturing Defects
Increased Quality Control Throughout the Supply Chain	Lower Overall Costs
Faster Inbound/Outbound Order Processing	More Efficient Sorting and Shipping
Higher Customer Satisfaction	Better Product Tracking and Traceability

Delivering Easier Management, Faster Upgrades

Newly emerging solutions are intuitive and employ a software-defined approach that supports both machine vision and fixed industrial scanning in the same hardware. Now companies only need to invest in one portfolio to manage multiple operations. And that single portfolio can provide pathways for navigating and upgrading from a simple scanning capability to the most advanced machine vision process.

Why is this important? Because businesses—and the processes that support their operations—are constantly evolving. Today the need may be to capture 1D/2D barcodes at a slow speed, tomorrow may require Direct Part Marks (DPM) or Optical Character Recognition (OCR). Future requirements may ask for machine vision toolsets for inspection. The good news is that all of these capabilities are now possible using the same hardware and common software platform.

Plant managers can now enhance their scanning or vision capabilities with routine software updates in minutes instead of having to refresh or replace an entire set of products. No rip and replace or hardware upgrades are required.

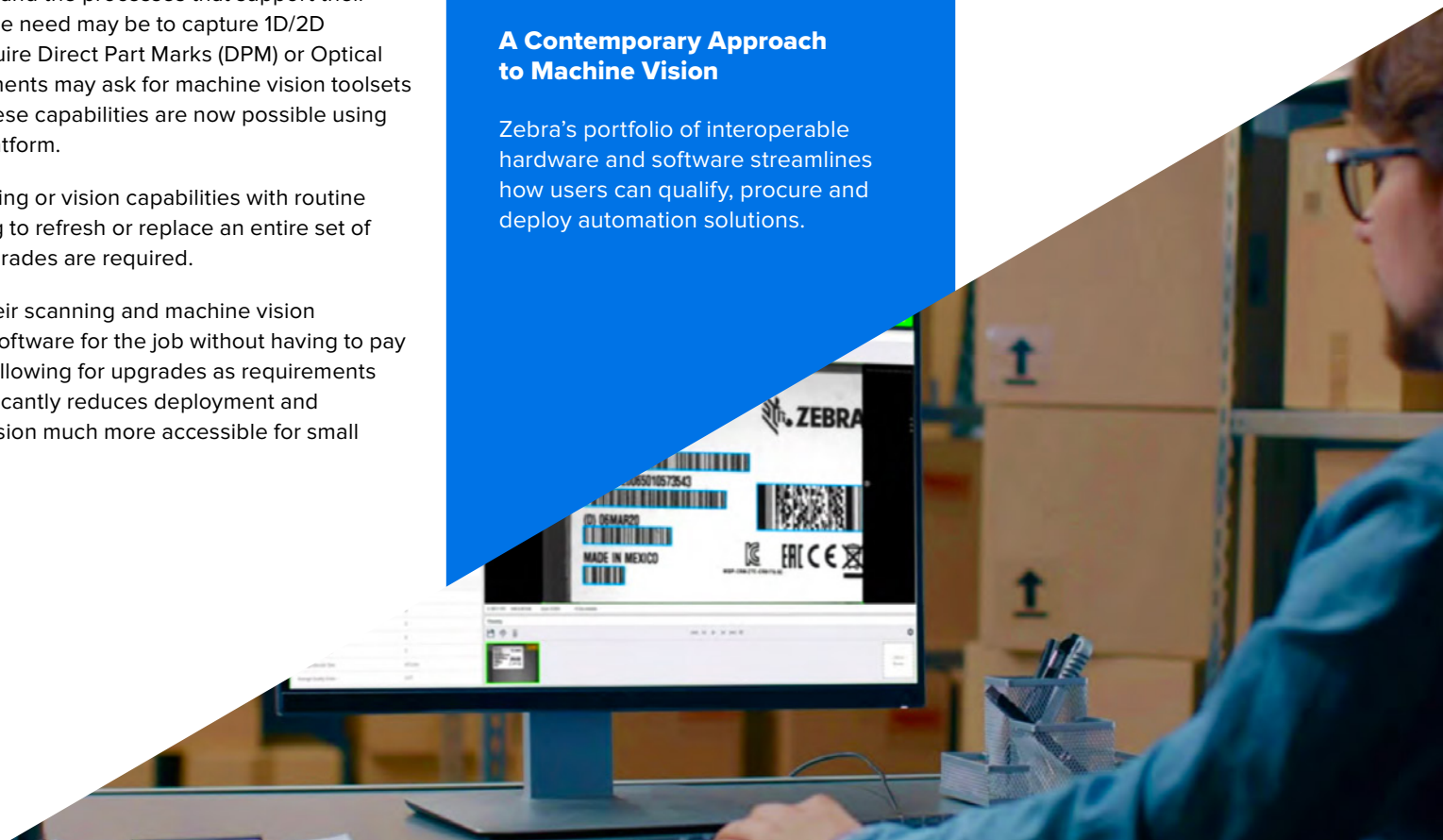
Additionally, plant managers can right-size their scanning and machine vision applications, getting the right hardware and software for the job without having to pay for extra features they don't need, while still allowing for upgrades as requirements change. This software-based approach significantly reduces deployment and integration complexity and makes machine vision much more accessible for small and mid-sized companies.

Driving Better Business Decisions

A software-based design makes it easier for machines, cameras and sensors to quickly identify problems and enables managers to address quality issues in real time. Software-defined systems also allow companies to swiftly capture data, analyze it and turn it into actionable information.

A Contemporary Approach to Machine Vision

Zebra's portfolio of interoperable hardware and software streamlines how users can qualify, procure and deploy automation solutions.



Medical and Pharma

Multiple Applications in a Unified Platform

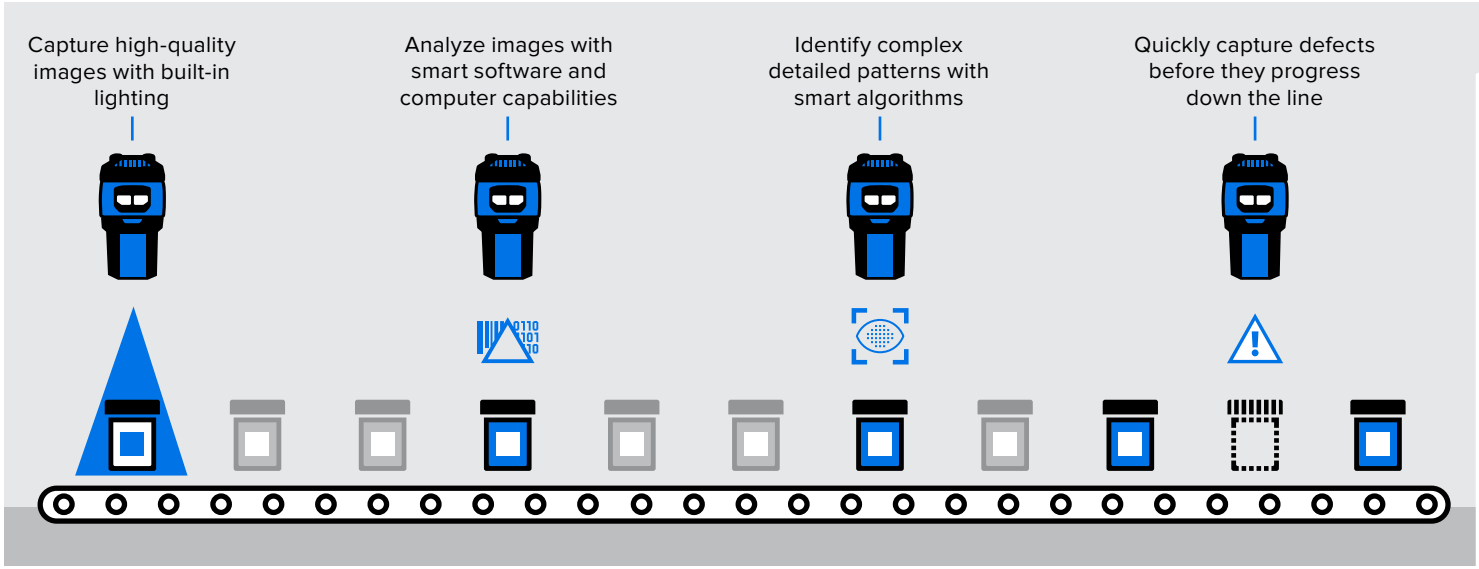
Many industry segments can benefit from the increased flexibility of a software-defined, unified fixed industrial scanning and machine vision platform. To illustrate, let's examine fixed industrial scanning applications in the medical device and pharma industries:

A fixed industrial scanning system that previously only scanned barcodes to track specimens can now also support quality checks, such as ensuring fill levels are correct and media is free of foreign materials.

Another system that formerly scanned barcodes located on pill bottles for shipment can now also inspect the date and lot printing as well as overall label quality. Cameras using the same platform can likewise check pill quality and count.

New groundbreaking solutions can support track and trace, sorting and quality control throughout the supply chain, providing flawless decoding, inspection and sorting of every part and package moving through production, storage and fulfillment. These systems don't simply reject an item that does not meet quality standards; they provide manufacturers with details on exactly why the item was rejected so that operators can take corrective actions.

Zebra's Fixed Industrial Scanning and Machine Vision Solutions



- **Easy to set up:** Get up and running, and keep moving fast, with unique diagnostic tools that help resolve issues quickly when they happen.
- **Easy to deploy:** Minimize downtime with trusted decode performance and inspection routines.
- **Easy to run:** Simplify operations with robust, user-friendly software that can handle scanning and machine vision requirements.

Manufacturing and Logistics

Improving Operations Across the Supply Chain

There is a myriad of applications for both fixed industrial scanning and machine vision in manufacturing and logistics.

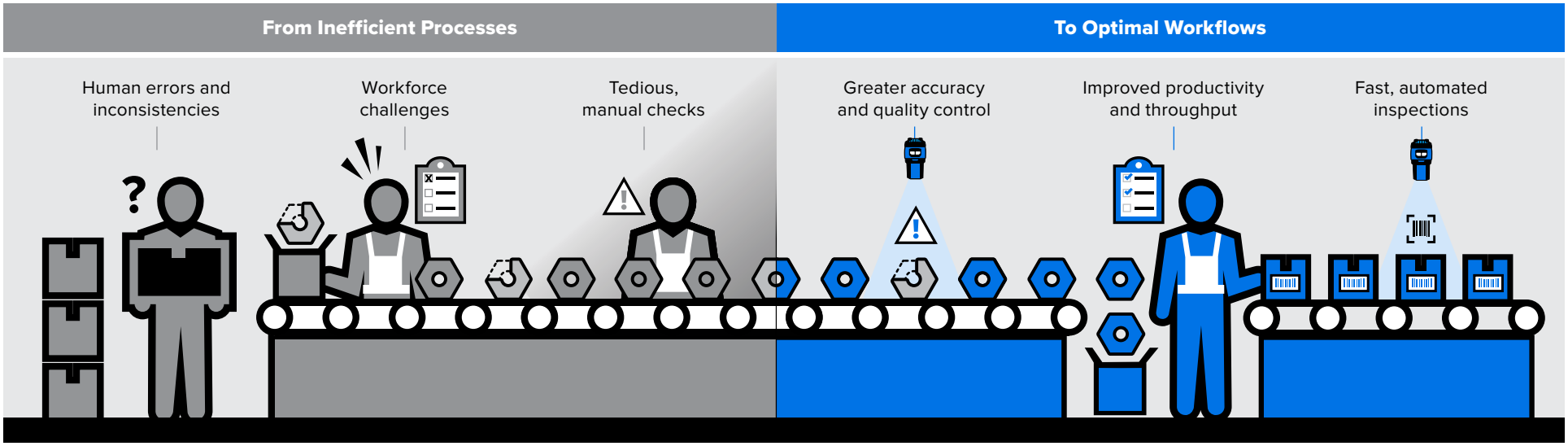
Consider this example: In the manufacturing and packaging process, a company deployed fixed industrial scanners to automate product and package sorting. With just a software upgrade, the manufacturer can upgrade the system to support both sorting and quality control applications such as:

- Scanning the product's barcode and checking its placement
- Inspecting the readability, design and placement of the product's labels
- Analyzing fill quantity
- Sorting products for packaging

After packaging, the same system can also:

- Scan all package barcodes to ensure data such as date or lot codes are present
- Inspect the packages to ensure quality
- Sort the packages based on final shipping destination
- Track products and packages once they arrive at their destination

In this example, the manufacturer can rest assured that each product was inspected and analyzed against rigorous quality control standards. Similarly, the warehouse and logistics groups can automatically track and trace every product throughout the distribution process without operator interaction. With the ability to improve productivity and automate the movement of goods, these solutions are ideal for improving efficiency in warehouse operations, from order sorting and inbound processing to trailer loading and robotics management.



Machine Vision Without Limits

With need for higher quality output and increased traceability, demand for faster production times and better overall use of resources, manufacturers and logistics companies need easy-to-use solutions that help elevate quality and drive production performance. Zebra has 50+ years of experience in industrial automation and a unique understanding of what technology is required to advance both business strategy and operational goals.

That's why Zebra designed its portfolio to make machine vision and fixed industrial scanning solutions affordable, flexible and easy-to-deploy. Zebra's acquisition of Matrox® Imaging expands our industrial automation capabilities to support from basic track-and-trace applications to complex inspection, recognition and guidance tasks.

With unique features designed for easier set up, deployment and maintenance, Zebra's fixed industrial scanning and machine visions solutions offer users a flexible, interoperable portfolio—one that helps companies keep pace with the demands of industrial manufacturing and logistics. Whether reading challenging barcodes or performing complex quality inspections, industrial companies of all sizes can rely on Zebra's inspired innovation now and into the future.

Ready to Improve Your Margins and Metrics? So Are We.

At Zebra, we lead the development of intelligent, enterprise-technology solutions that provide unrivaled visibility into what is happening in your environment and recommend the next best move or action. Our vision is to mobilize operational data from devices and applications, analyze it and drive smarter, faster workflow decisions by users anywhere, anytime.

With a range of rugged tablets, handheld mobile computers and scanners, innovative printing technology, 3D scanners, smart cameras, frame grabbers and vision controllers, Zebra has a broad, interoperable portfolio of machine vision technology to streamline operations and protect costs throughout any warehouse or manufacturing facility.

For more information on Zebra's machine vision and fixed industrial scanning solutions, visit
zebra.com/industrial-machine-vision-fixed-scanners

SOURCES: [1] Korn Ferry, Future of Work: The Global Talent Crunch, 2018. [2,3] Nielsen, "COVID-19 has Flipped the Value Proposition of Omnichannel Shopping for Constrained Consumers, October 6, 2020. [4] Cramer-Flood. "Global Ecommerce Update 2021," eMarketer, 13 January 2021. [5] The Wharton School, University of Pennsylvania, "The High Cost of Returns: Should Retailers Rethink Their Policies?" August 10, 2020. [6] National Retail Federation, "$428 Billion in Merchandise Returned in 2020," January 11, 2021. [7] Machine Vision Solutions and Stationary Industrial Scanners, Rapidly Growing Opportunities, February 2020.

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