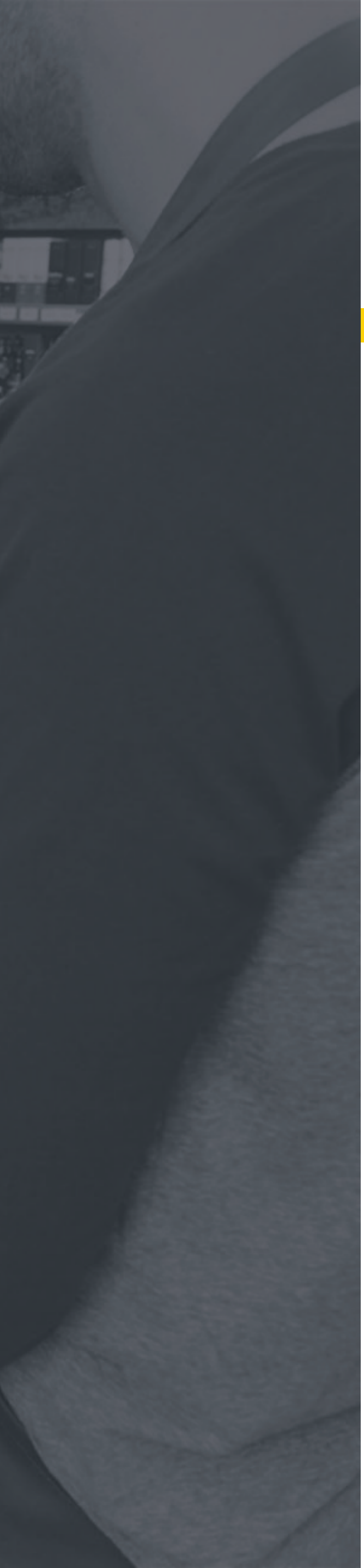
ZEBRA

SHINING LIGHT ON

2D IMAGERS



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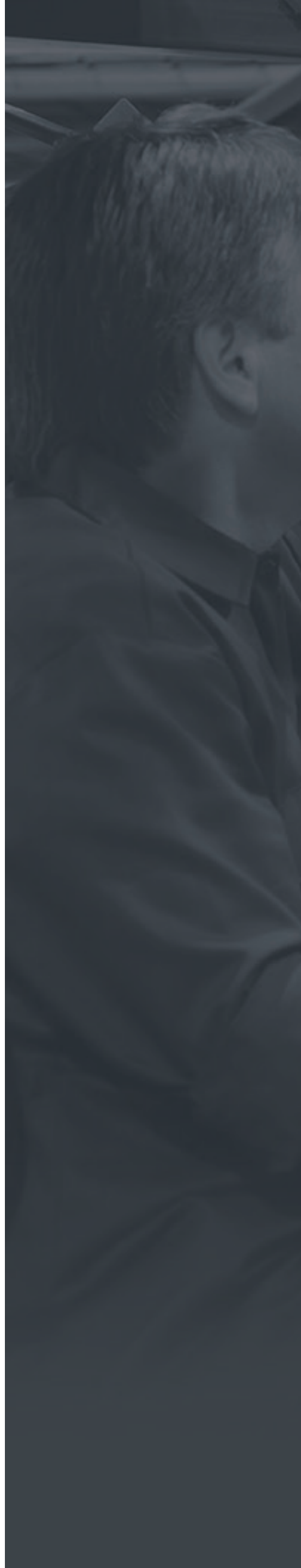
AN INTRODUCTION TO **BARCODE SCANNING**

For decades, enterprises have relied on laser scanners to efficiently capture barcode data. In recent years, however, many organizations have begun to reassess their relationship with traditional laser technology, thanks to a host of new applications that are driving the move to imaging across several markets. Before we delve into the applications and benefits of 2D imaging, it is important to understand the basic capabilities of each technology.

Laser scanners are designed solely for 1D traditional paper barcodes, commonly found on coupons, hang tags and packaging. In comparison, 2D array imagers utilize camera technology to read both 1D and 2D barcodes in print and electronic media, such as digital coupons or loyalty apps. Linear imagers also utilize camera technology, but with a linear row of pixels. This allows them to read from both paper and mobile media but only for 1D barcodes.

The majority of barcode types do not have a universal application. Thus, the flexibility of a 2D imager is very beneficial to enterprises whose environments are likely to require a device that can read multiple symbology types from different forms of media. Such flexibility is demonstrated in the following capabilities:

- **Capture Every Barcode**
  2D imagers can read 1D and 2D barcodes from both paper and electronic screens, enabling users to read virtually any barcode that may come their way.
- **Superior Performance on Poor Quality Barcodes**
  2D imagers are designed to easily read barcodes that are damaged, torn, smudged or poorly printed.
- **Omni-directional Scanning**
  A 2D imager reads barcodes omni-directionally, meaning users do not have to take the time to align the scanner with the barcode. This enhances productivity and keeps lines moving quickly.
- **Enhanced Range**
  Some 2D imagers offer enhanced range, enabling users to scan barcodes from a greater distance than traditional lasers. This is particularly helpful when scanning large or bulky items on the bottom of a shopping cart.
- **Read Multiple Barcodes in a Single Trigger Pull (Multi-Code)**
  With a 2D imager, you can read multiple barcodes in a single trigger pull. This allows workers in a warehouse environment to populate a database automatically as they scan incoming shipments, faster and with greater accuracy.
- **Go Beyond the Barcode**
  Since at their core they are essentially cameras, many 2D imagers can capture images, signatures, and documents, as well as support Optical Character Recognition (OCR) for reading characters on checks, passports, invoices and more.



SYMBOLOGIES

Barcodes are divided into two main types: one-dimensional (1D) and two-dimensional (2D). 1D barcodes, the oldest and most widely adopted of the two, are composed of vertical black bars and white spaces of varying lengths. 2D barcodes store information vertically and horizontally to support much higher amounts of data.

Barcodes can further be divided into symbologies, or barcode languages, which support different types and amounts of data.

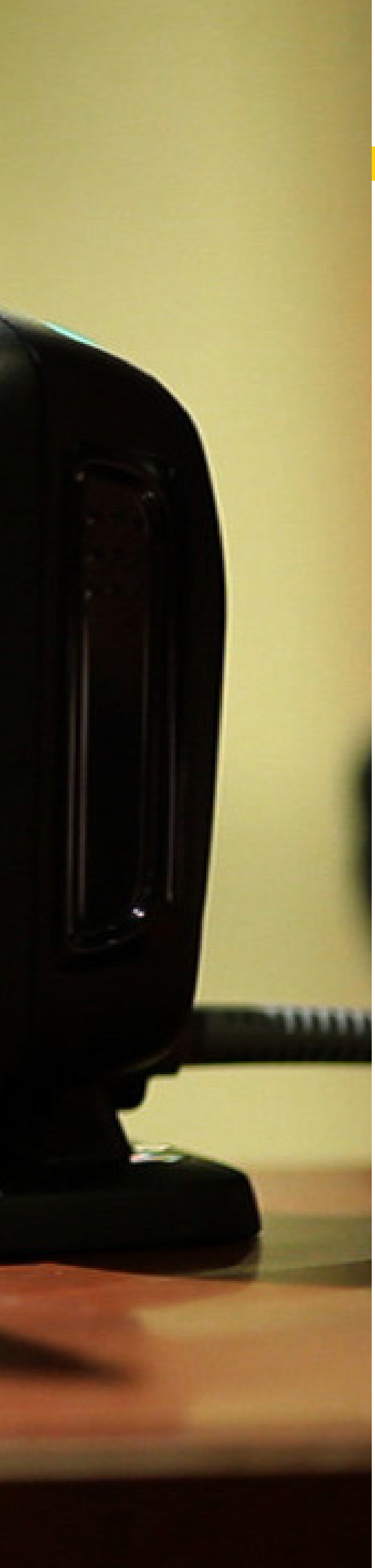
For example:

1D BARCODE SYMBOLOGIES		2D BARCODE SYMBOLOGIES	
UPC		QR Code	
GS1 Databar		Data Matrix	
Code 128		Aztec	
I 2 of 5		Maxicode	

Barcode Infographic

View this document for a quick reference guide on barcode basics.

symbol



AN INTRODUCTION TO **BARCODE SCANNING**

FEATURE	LASER	2D IMAGER
Reads 1D printed barcodes on paper	X	X
Reads 1D and 2D printed barcodes on paper		X
Reads 1D and 2D electronic barcodes from the screen of a mobile device		X
Enables true omni-directional scanning		X
Reads multiple barcodes in a single trigger pull		X
Supports Optical Character Recognition (OCR)		X
Captures and transfers images		X
Reads Direct Part Marks (DPM)		X
Excellent performance on poorly printed, damaged, or shrink-wrapped barcodes		X

IMAGERS - CONVERTING THE PHYSICAL TO DIGITAL

HOW IT WORKS

- Barcode illuminated by LED lights
- Scanner captures image of entire code
- Decoder software finds barcode in image to decode
- Symbology algorithm applied
- Verification via check digit, if supported
- Data stream sent to host

IMAGING IN **RETAIL**

From the point of sale to the warehouse, the retail environment demands expedient, accurate data capture. An upgrade to 2D imaging technology can potentially transform the customer experience, improve overall productivity and maximize supply chain efficiency. Specific benefits of adopting imaging solutions include:

Mobile Coupons

More and more, today's tech-savvy shoppers expect to find discounts online in the form of mobile coupons—mobile coupons that can only be read by an imager.

Benefits

- Reaches customers quicker
- Coupons always on hand or accessible
- Can send instant offers
- More likely to be redeemed
- Mobile coupon programs are less expensive to implement

Mobile Loyalty Applications

Stores are increasingly offering customers the ability to track purchases through a mobile application and be rewarded for their loyalty. To redeem their rewards, they must have a worker scan the barcode on their mobile device.

Benefits

- Increases customer satisfaction
- Increases customer loyalty
- Increases insight into customer buying habits and targeting opportunities

Mobile Payment

Some stores enable customers to upload their gift card on their mobile app and then use that card as a way to pay for purchases. Very often this type of mobile payment is tied to the mobile loyalty program as a complete solution.

Benefits

- Ease of use
- Encourages customers to load and reload their gift cards frequently
- Increases customer satisfaction

Multiple Barcode Capture (Multi-Code)

Some situations call for the ability to capture multiple barcodes in a single trigger pull and simultaneously populate a database with the information. For example, retailers are able to extract the UPC, manufacturing date and serial number information from an item to improve records and better serve the customer.

Benefits

- Ability to extract only the information needed from a single trigger pull
- Increases productivity and decreases processing time by eliminating the need to scan each barcode individually

IMAGING IN **RETAIL**

Images and Signatures

There are certain scenarios where a retailer can use a 2D imager to take a picture of an item, a person, a document or a signature.

Benefits

- Proof of membership (membership cards at warehouse clubs)
- No need for a separate camera
- Saves time and money
- Reduces fraud (proof of returned items)
- Reduces need for a flatbed scanner
- Picture of proof of delivery in receiving environments

Optical Character Recognition (OCR)

Businesses that have invoices with customer names and account numbers in OCR fonts, such as OCR-A and OCR-B, can use an imager to decode and populate the information into an application. Other fonts supported include Magnetic Ink Character Recognition (MICR) and U.S. Currency.

Benefits

- Reduces fraud
- Reduces human error
- Speeds processing and increases productivity

Driver's License Parsing

Many driver's licenses contain a PDF417 barcode embedded with the personal identifying information that is written on the front. With available parsing software, retailers can use this information for auto-populating forms for credit card and loyalty card applications, as well as identifying serial returners and managing the sale of restricted items such as alcohol or tobacco.

Benefits

- Keeps lines moving without the holdup of manual entry
- Ensures accuracy by preventing human error
- Discourages theft and fraud
- Ensures purchaser is of the required age
- Reduces liability for the retailer

2D BARCODE SYMBOLOGIES COMMONLY FOUND IN RETAIL

- PDF417
- QR

PORTFOLIO

MP6000

DS4308

DS9808

DS6878

CS4070

DS4801

IMAGING IN **HEALTHCARE**

In healthcare, there's no room for error. Barcode imagers can significantly facilitate a caregiver's interaction with their patients. These applications, though routine in nature to the caregiver, help prevent medical errors, improve patient safety and increase productivity. Therefore, more focus can be placed on the needs of the patient, because imaging technology automates many of the caregiver's administrative requirements. The following applications can benefit from the use of an imager:

Positive Patient ID

A 2D barcode is printed on a patients' wristband and is scanned prior to any clinical interaction.

Benefits

- Ensures right patient is getting the right treatment or procedure
- Reduces liability
- Reduces medical errors
- Improves quality of care

Specimen Collection

Clinician scans wristband and vial or specimen collection container.

Benefits

- Ensures that specimens are accurately collected at the point of care and correctly labeled with the patient and order identifiers
- Improves patient safety

Medication Administration

Clinician scans the barcode on the wristband and then the medication, prior to administering to the patient.

Benefits

- Ensures the right patient is getting the right medication, dosage and delivery method by the right clinician at the right time ("five rights")
- Reduces medication errors
- Tracks dosages and prevents deadly medication interactions

Dietary

Clinician or hospital worker scans wristband and menu.

Benefits

- Ensures that meals delivered to patients comply with patients' dietary restrictions
- Reduces occurrence of patients having eaten prior to scheduled surgery
- Reduces allergic reactions and other potential contradictory interactions

Prescription Imaging

Scan an image of the paper prescription for digital document storage.

Benefits

- Reduces need for additional flatbed scanner
- Reduces need to store paper scripts
- Reduces medical errors/liability
- Stores image of driver's license to demonstrate compliance of tracking repeat purchases of restricted items

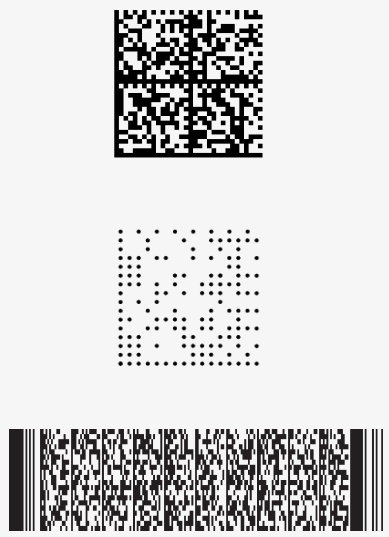
Age Verification

Scan driver's license of person picking up narcotics to ensure he or she is 18 years of age or older.

Benefits

- Reduces liability
- Adheres to state and local regulations

2D BARCODE SYMBOLOGIES COMMONLY FOUND IN HEALTHCARE



- Data Matrix
- DPM
- PDF417

PORTFOLIO

DS6878-HC

CS4070-HC

DS4308-HC

IMAGING IN **HOSPITALITY**

Thanks to the adoption of and convenience offered with mobile loyalty applications, there is a growing opportunity for barcode scanners in different types of hospitality environments, such as quick-serve restaurants, hotels, and event sites - market segments where we traditionally have not seen barcode scanners before.

Mobile Loyalty

Given the successful use of mobile loyalty programs by several large chains, restaurants and hotels are increasingly offering customers the ability to sign up for and track purchases through a mobile application and be rewarded for their loyalty. To redeem their rewards, they must have a worker scan the barcode on their mobile device.

Benefits

- Increases customer satisfaction
- Increases customer loyalty
- Allows establishments to learn more about customers' buying habits and target them with unique offers

Driver's License Parsing

Many driver's licenses contain a PDF417 barcode embedded with the personal identifying information that is written on the front. With available parsing software, restaurants, hotels, and event sites can use this information for age and identity verification for restricted events and to manage the sale of alcohol.

Benefits

- Ensures faster service without the holdup of manual entry
- Ensures accuracy by preventing human error
- Ensures purchaser is over the required age
- Reduces liability

Mobile Payment

In quick-service establishments, customers can upload a loyalty gift card onto a store app, generating a mobile barcode. Very often this type of mobile payment is tied to the mobile loyalty program as a complete solution.

Benefits

- Ease of use
- Encourages customers to load and reload their gift cards frequently
- Increases customer satisfaction

Mobile Coupon

When customers sign up for a loyalty program, a quick-service establishment can send them targeted offers based on their purchase history.

Benefits

- Ease of use
- Encourages customers to load and reload their gift cards frequently
- Increases customer satisfaction

2D BARCODE SYMBOLOGIES COMMONLY FOUND IN HOSPITALITY

- QR
- PDF417

PORTFOLIO

DS9208

DS9808

DS4308

DS457

CC5000

CS4070

IMAGING IN **MANUFACTURING AND WAREHOUSING**

Using 2D barcodes and imaging solutions designed for warehouse operations and highly specialized supply chains, businesses can keep up with and proactively respond to customer demand, inventory turnover and regulatory requirements. For manufacturers, imaging solutions speed up delivery, reduce waste, control costs, and improve customer service.

Track and Trace

A 2D barcode is placed on components throughout the manufacturing process to identify the component.

Benefits

- Easily see the details of a component including serial number, date of manufacture, lot number, manufacture location and more
- Helps to quarantine bad lots of goods quickly

Work in Process (WIP)

Barcodes are placed on partially manufactured goods to track all materials and partially finished products at various stages of the production process. WIP excludes inventory of raw materials at the start of the production cycle and finished products inventory at the end of the production cycle.

Benefits

- Enables line workers to track work progress and ensures that the right part is in the “right place”
- Allows for productivity tracking on the production line

Shipping/Receiving

Shipping labels utilize 2D barcodes that contain more information and enable better data accuracy. As an example, PDF417 can incorporate many data points such as the part number, plant location, lot number, weight, pack date, revision and quantity. Shipping labels may also use a mix of both 1D and 2D barcodes.

Benefits

- Offers the flexibility to read all barcode types
- Captures more data points in a single scan to help streamline quality records

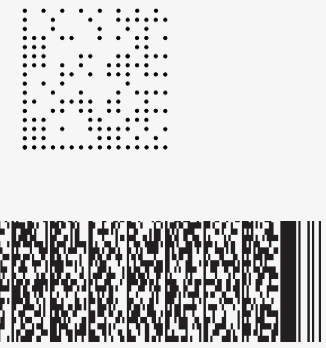
Pick and Pack

Scan the 1D and 2D barcodes on shelf labels, product labels and other barcoded labels to pick, pack and ship orders. 2D codes can offer a smaller footprint than 1D codes and may contain more information enabling better data accuracy.

Benefits

- Offers the flexibility to read all barcode types
- Captures more data points in a single scan

2D BARCODE SYMBOLOGIES COMMONLY FOUND IN MANUFACTURING AND WAREHOUSING



- DPM
- PDF417
- Data Matrix

PORTFOLIO

DS3508 Series

DS3578 Series

MT2000 Series

DS4308-HD

ZEBRA TECHNOLOGIES
A LEGACY OF FIRSTS

Why Zebra imagers?

It's no mistake that Zebra has remained at the forefront of the barcode industry for more than 35 years. As a leader in barcoding technology, Zebra has consistently shattered standards in innovation, being the first to bring to market game-changers like the:

- PDF417 Barcode
- Handheld Scanner
- Rugged Barcode Scanner
- Six-sided, Multi-Plane Imager
- OEM Scan Engine
- Wireless Scanner
- Hybrid RFID Imager

When it comes to 2D imaging, Zebra wins hands down.

Zebra Technologies also offers the right experience, the right partners and the right services. As a global leader in the manufacturing of all things scanning-related, we offer an unparalleled depth of proven innovation in the market. Through countless deployments in some of the world's largest enterprises, Zebra has demonstrated that whatever the nature or needs of your business, we have industry experts on staff who understand your challenges and how to solve them.

See our winning portfolio of imagers in action and discover why Zebra raises the bar in barcode scanning.

Learn more about Zebra's 2D imaging portfolio at:
www.Zebra.com/Imaging

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