

The Growing Requirements for 2D Imaging Technology

Introduction

Productivity is a key performance indicator for any industry and it is becoming widely accepted that bar code data collection technology is one of the best productivity investments a company can make. This has resulted in the world of data capture becoming more complex in recent years. Today, companies not only need the right data capture technology to meet the requirements of their applications, they must first decide on what the optimum technology is for their business from the different symbologies that have been developed, each with a specific set of characteristics.

The Case for 2D Symbologies

There are two main factors to be considered when choosing a symbology.

First, a business must consider whether they need to adopt a particular symbology to comply with an existing industry or organizational standard. The second factor is the type and amount of data that must be encoded.

The increasing amount of data encoded in both traditional and emerging market applications is driving the acceptance and requirements for two-dimensional (2D) symbologies. 2D symbologies encode data in both the height and width of the symbol. The amount of data that can be contained in a single code is significantly greater than that stored in a one-dimensional bar code.

The introduction of 2D symbologies in 1989 with the Data Matrix code represents

one of the most important advances in the Auto ID Data Capture (AIDC) market in the last twenty years. With advances in technology and smaller, faster micro-processors, 2D readers can significantly increase the cost/benefit ratio in any application.

Initially, 2D symbologies were developed for applications where only a small amount of space was available for a code. The first application was for individual unit-dose packages in the healthcare industry. These packages were very small and had little room for a bar code. The electronics industry also showed an early interest in very high density bar codes and 2D symbologies, as there was limited space available for marking electronics assemblies. More recently, the ability to encode a portable database has made 2D symbologies attractive in other applications where

space is limited.

Another benefit of 2D symbologies is their added reliability and durability. With conventional 1D symbologies, the addition of one bar at the start or finish of a code, a line crossing the code, or a line parallel to the stripes all make the bar code unreadable. Additional protection can be built into a 2D symbol making it remarkably secure and robust, even if accidentally damaged.

Emerging Applications

2D imagers and readers are now becoming widely used in applications traditionally based on linear bar codes, adding the advantage of omnidirectional scanning. Independent market research (VDC) forecasts that in addition to the strong growth expected for 2D readers in the industrial sectors, new emerging retail applications traditionally using linear symbologies are moving towards 2D symbologies.

Below are some examples of emerging 2D target markets:

Document Handling - Tax Returns

Tax returns must be filed in every nation around the world. To simplify the filing process, taxpayers could use tax software that allows them to enter the relevant data, perform the required calculations and print the form out with a 2D code when complete.

The following benefits will result: when the form arrives at the tax center, the data can be captured by scanning the 2D code, taking only seconds to scan. The data is not only captured quickly, it is captured with 100% accuracy - no errors are introduced by the scanning process. Not only is the direct cost of manual data entry eliminated, but the indirect costs of the errors introduced by manual key entry are eliminated. This saves money for both the taxpayers and the government. Studies show that even professional manual entry can result in up to 1 error for every 300 key strokes.

This solution also has other potential applications. Whenever data is provided in a paper format, there are benefits to this

solution including company excise/sales tax returns, submission of employment information, and collection of business economic statistics.

When a 2D code is added to a form, this creates an 'intelligent document' that can be read by human beings but can also be automatically and accurately entered into a computer database.

Document Handling - Driver Licenses/Insurances/Lotteries

Personal information such as the driver's name, address, license number, expiration date and driving restriction codes can be encoded in a 2D symbol that is printed on the license. Police officers, car rental agencies and hotels can easily scan the code, entering information about the license holder without manual keystroke errors. The same concept can apply to any application which requires fast and secure automatic data entry, such as insurance forms, banking applications and lottery tickets.

Transportation and Logistics - Packing List

By encoding shipping information in a 2D bar code and attaching it to shipped goods, order data, such as the PO number, shipping date, product codes and quantities can be quickly and automatically scanned into a computer at the receiving area.

Healthcare - Patient Record

On every hospital patient's chart record there is a 2D bar code, which encodes their name, healthcare record number, doctor's name, date of admission and allergies.

When a nurse or other healthcare provider checks the patient or provides treatment, the treatment is recorded by scanning the code matching the treatment.

When administering prescription medication, the provider scans a bar code, virtually eliminating the possibility of giving a patient the wrong medication or treatment.

Most Common 2D Symbologies

2D Stacked

PDF417

(Portable Data File) is a high-capacity 2D bar code. A



PDF417 code can contain approximately 2000 characters of information, whereas traditional linear bar codes contain a maximum of 30 characters. The key characteristic of PDF417 code is its large information capacity.

PDF417 is designed with sufficient capacity to contain an entire data file. Traditional linear codes contain only a key to access another database. With PDF417, no external database access is required because the PDF417 codes can hold an entire data file. PDF417 is used today in a wide variety of applications, including Logistics and Transportation, Retail, Healthcare, Government, Identification and Manufacturing.

2D Matrix Codes

Data Matrix

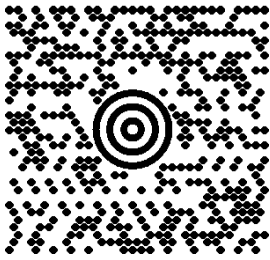
is a 2D code of black and white modules that can store up to 2,335 alphanumeric characters or 2KB.



The symbol is square or rectangular and can range from 0.0004 inch per side up to 14 inches per side (8 x 8 to 144 x 144 modules). The most popular application for Data Matrix codes is marking extremely small items, such as electronic components. The data encoded can include the manufacturer ID, a part number and a unique serial number on metal plates. They are also used to mark surgical instruments and to identify lenses, circuit boards and other small items during the manufacturing process.

MaxiCode is a fixed-size code that holds up to 93 data characters.

The symbol is composed of a central bulls-eye locator and offset rows of hexagonal elements. Created by United Parcel Service (UPS), the MaxiCode symbol was designed for rapid automated scanning of packages on high-speed conveyor lines (special cameras can read a MaxiCode on a carton travelling at up to 500 feet per minute).



The **QR Code** (Quick Response Code) is a matrix code which can encode up to 2509 numeric or 1520 alphanumeric

characters and offers three levels of error detection. The smallest QR Code measures 21 x 21 cells (each cell encodes one bit) and can grow in increments of 4 cells to a maximum size of 105 x 105 cells. The squares in the bottom left, top left and top right corners are locator patterns. This symbology is commonly used for tracking parts during vehicle manufacturing and is now used in convenience-oriented applications aimed at mobile phone users (known as mobile tagging).



Aztec Code symbols are built on a nominally square grid around a square bulls eye pattern. The central bull's eye shape and position

of the finder pattern can accommodate a wide range of viewing angles and its' easily recognizable pattern means that no quiet zone is required. These features make Aztec Code ideal for mobile tagging and other space constrained applications.



Datalogic's Commitment to 2D Technology

Datalogic is the only company in the AIDC industry offering a complete range of 2D products dedicated to both retail and industrial applications.

Gryphon™ 2D Plus handheld readers provide outstanding snappiness and omnidirectional reading on a wide range of symbologies,

from the most common 1D and 2D codes to PDF417 and Postal Codes, improving productivity and efficiency in a wide range of applications. The Gryphon reader's capability, combined with the ergonomic and reduced time-to-read of linear, PDF417 codes and all existing 2D symbologies, creates the ideal reader for environments requiring high throughput such as retail and light industrial applications. Datalogic's patented Green Spot feature provides 'good read' feedback directly on the bar code, a unique and distinctive key feature useful in noisy environments.



Magellan™ 1100i

scanners are ideal for use in retail and office applications. It offers standard support for the most popular linear and GS1 DataBar™ codes as well as optional 2D label decoding in a single device, simplifying the point of service environment and reducing the total system cost.



Magellan™ 1400i scanners, like its sister product, the Magellan 1000i scanners, are a presentation scanner featuring a unique approach to imaging technology by using digital scan patterns for omnidirectional reading. The 1400i elevates performance even higher by providing standard support for PDF417 and Data Matrix label decoding along



with image capture support, a larger scan volume and a longer depth-of-field.

PowerScan™ PD8500 / PM8500 readers

are industrial handheld 2D mega-pixel imagers capable of outstanding performance in all conditions. Datalogic Scanning's PowerScan readers are the top rated industrial handheld data collection products on the market. Long known for outstanding durability and performance, the PowerScan brand of products continues to offer the ultimate solution for demanding industrial applications. The PowerScan PD8500 and PM8500 readers offer the richest feature set of Datalogic Scanning's industrial handheld products for the omnidirectional reading of 1D and 2D bar codes as well as the capability of multiple code reading in a single read.



PowerScan™ 7000 2D

readers are Datalogic Scanning's value line of rugged industrial handheld data collection products. The PowerScan 7000 2D linear corded imager is ideal for commercial and industrial applications that need to read mixed symbologies under tough environmental conditions.



The 7000 2D reader supports decoding for standard 1D bar codes, stacked 2D labels such as PDF417, MicroPDF and composites, and matrix 2D labels such as Data Matrix, MaxiCode and QR code, as well as postal codes and OCR fonts. It is also able to capture signatures or images of objects such as shipping damage documentation.



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