

# 2D Matrix Symbologies

With symbology specified in the ATA SPEC 2000 document and standardized by AIM, the 2D matrix is leading the way in industry

How can I make absolutely sure the current revision of label, carton, container and insert are being used on this drug packaging line? How can I permanently mark this integrated circuit with my manufacturer ID, item part number, and lot and date traceability code when the marking area is only slightly larger than the head of a pin? How can I identify this printed circuit board when the total surface area is taken up with components? How can I ... well you get the picture. These applications are beyond the scope of automatic identification as we've known it. The answer to these questions is Two Dimensional matrix symbology.

Two Dimensional (2D) bar codes are finally leaving the "marketing hype" stage and are now being implemented and relied on as an integral part of manufacturing processes. The integra-

tion of new technologies into established processes is not something that happens overnight, and 2D is no exception. Many companies have been working on that integration for several years, and are relying on the benefits of 2D to solve critical identification requirements that are strategic to their future business opportunities.

We here at Rofin-Baasel support a wide array of Error Correction code formats up to ECC 200 with square and rectangle Data Matrix codes, including the automotive code ECC200 (data matrix with up to 2335 alphanumeric characters in a field of an inch<sup>2</sup> in a matrix



of 144 x 144). This allows our customers to incorporate a greater amount of data into a smaller footprint than was possible with bar code technologies.

While standard bar codes were made prominent by their use in retail applications, the 2D symbologies find their use in the manufacturing sector. Primarily the electronic, automotive, aerospace and

These codes are ECC200 (automotive code with up to 2335 alphanumeric characters in a field of an inch<sup>2</sup> in a matrix of 144 x 144) and BC39. Each code includes the text string of "WELCOME TO THE WONDERFUL WORLD OF LASERS". As you can easily see,



the ID Matrix codes take up a much smaller footprint than the bar code font. It is also important to note that, because the ID Matrix codes have a built-in redundancy, they are less prone to error if any portion of the code is destroyed. If the bar code loses any characters, however, those characters are lost forever.





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pharmaceutical industries have the greatest needs. Because of its small size and increased information capacity the 2D matrix symbology is leading the way in these industries.

### A 2D Overview

Data Matrix is a two-dimensional matrix symbology containing dark and light square data modules. It has a finder pattern of two solid lines and two al-

ternating dark and light lines on the perimeter of the symbol. A two-dimensional imaging device such as a CCD camera is necessary to scan the symbology. Data Matrix is designed with a fixed level of error correction capability. It supports industry-standard escape sequences to define international code pages and specialized encodation schemes. Data Matrix is used for small-item marking applications using a wide variety of printing and marking technologies. Two dimensional codes fall in two basic categories. The **stacked bar code** is simply made up of thin slices of normal bar codes stacked on top of each other. The **matrix code**, unlike regular bar codes or stacked bar codes, is made up of individual elements or cells of equal size. These cells form a matrix similar to a checker board. Most often

this matrix is symmetrical, meaning that it is as wide as it is high. The information is stored in the matrix by the selective placement of the black and white cells. Because this matrix can be made very dense, a large amount of information can be held in a very small area.

Each of these two dimensional formats have their own special applications. The stacked bar code can be read by raster scanning laser technology. Laser technology has been refined over many years and is readily available at very economical prices. While the density of the stacked bar code is not as great as the matrix code, the amount of information that can be encoded is the same.

Many applications which require a mixed environment of one dimensional and two dimensional symbologies will benefit from the use of the stacked bar code because of the compatible scanning technology. Matrix codes on the other hand can only be scanned using an area CCD imager.

Our Applications Specialists have a wealth of experience with all code types. We'd be happy to help you choose the best symbology for your needs.



18x18 Data Matrix Symbology Research Center



Bar Code Label



Data Matrix Label



StarMark® UW-150 Laser Marking System for applying text, graphics, ID Marks to virtually any material

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