

More Data in Less Space: **The Basics of 2-D Bar Coding**

by Steven Krechmer

*When you need to encode more information
than fits on a linear bar code, consider going 2-D*

What is a 2-D bar code symbol?

Compared to a 1-D, or “regular” bar code, a 2-D symbol allows more information to be represented in a given space. One of the 2-D symbols, called Data Matrix, consists of black and white cells arranged in either a square or a rectangular pattern. A square pattern is the most typical. As many as 50 characters can be represented in a 2mm square.



What are the challenges unique to 2-D marking?

Many things can go wrong when creating or scanning a 2-D mark. Various substrates and various methods of marking (both direct part marking and labeling) can cause a variety of challenges for the scanning devices. For these reasons and more, standards such as the ISO/IEC 15415 (Department of Defense Unique Identification standard) exist to govern the verification and print/mark quality of the symbols. This standard addresses the Data Matrix code and deals with concerns such as distortion, non-uniformity, pattern damage, low contrast and resolution.

How does scanning a 2-D bar code differ from scanning a regular bar code?

You will need an imager (camera-like scanner) to detect and decode a true Data Matrix symbol. Laser scanners generally can read only linear (1-D) symbols and some stacked codes. The handheld scanning marketplace continues to change rapidly to meet the demands of accurate 2-D bar code scanning.

To locate the mark or label, the imager illuminates the target area in which the symbol exists. The illumination process is far more critical with direct part marking, low contrast applications than it is with a standard label. It is best to test your direct part marking scanning application to ensure a successful project.

Another unique aspect of scanning and decoding Data Matrix symbols is the implementation of error-correcting codes (ECCs). ECCs allow for the decode algorithms to correct – within limits – for poorly imaged marks or damaged labels. Once a scanner finds the Data Matrix symbol, it can decode the data using the benefit of error correcting. An ECC cannot be used to find the code itself, but is used to help decode all the data once the scanner locates the code.

Which scanning device do I need?

Our industry vendors have numerous scanning devices now available with Data Matrix and other 2-D decoding capabilities. Many will auto discriminate between 2-D and linear bar codes, so our hardware market is just a bit more sophisticated than it used to be when it comes to bar code scanning devices. We can help you choose the 2-D scanning and verification equipment that is best for your application. Call our scanning hotline at 1 888-400-SCAN or [email us](#) for help with your 2-D project.

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