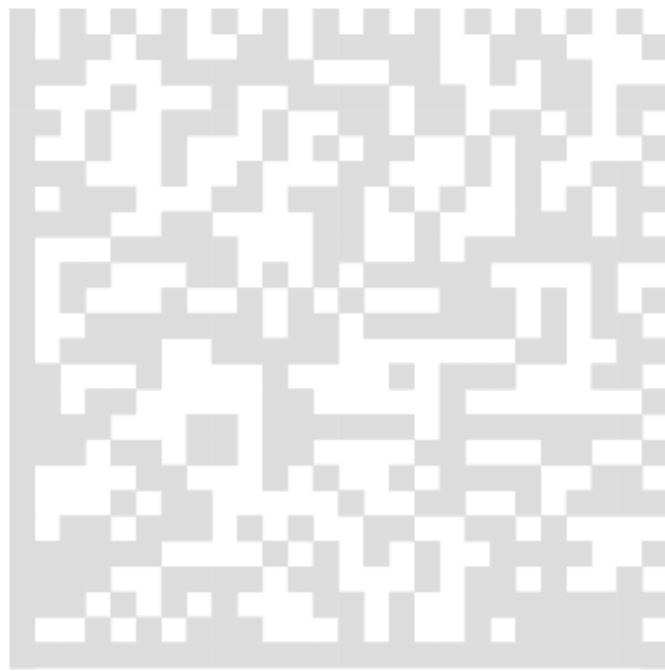


Meeting Traceability Requirements with 2D Data Matrix Codes



Why use a 2D Data Matrix code rather than a barcode?

2D Data Matrix codes offer several advantages over conventional barcodes:

- A Data Matrix offers very high information density, which means that you can place a lot of information in a very small area. Data Matrix codes can store up to 3,116 numeric or 2,335 alphanumeric characters, more than 100 times as much data as a barcode the same size.
- 2D codes can be read even where there is low contrast, so codes can be applied directly to products without requiring a label.
- Because of the high information density in Data Matrix codes, they also offer built-in error correction which allows full recovery of the message even if the mark is damaged and missing as much as 20% of the symbol.
- 2D codes are read by vision systems, as opposed to laser beams used for reading conventional barcodes, which means that they can be read in any orientation.



What about the readers? Do they work as well as barcode scanners?

The latest generation of 2D code scanners has greatly improved the readability of Data Matrix codes marked directly on products. Improvements include smaller footprints, adjustable integral lighting, improved algorithms, built-in verification, and blue tooth compatibility. 2D codes can be easily read on a variety of products, even when contrast is low or the product has an irregular surface.

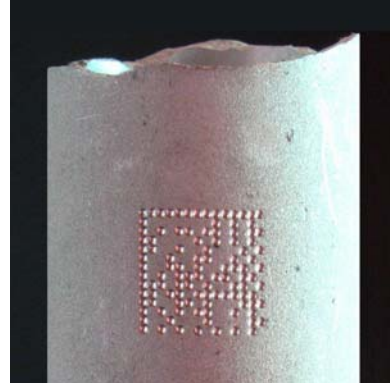
Data Matrix readers are also multi-purpose, capable of reading code 128, code 39, and interleaved 2 of 5 barcodes, QR codes, UPC codes, and more.



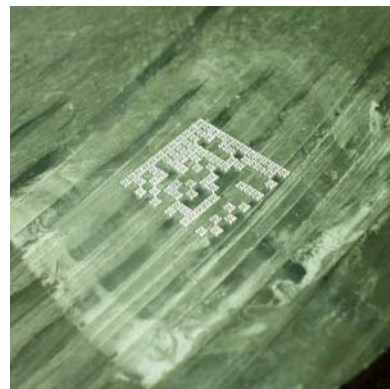
What are the major considerations when planning to mark with 2D Data Matrix codes?

Part geometry, surface condition, and part function are the major constraints in direct part marking with a Data Matrix code. These three constraints affect both the application and readability of the Data Matrix Code.

Part geometry influences how well the part can be positioned and secured for marking. The geometry of the part may also interfere with the operation of the marking machine. Typically for laser, percussion, and ink jet marking, parts must be positioned perpendicular to the marking head. With laser marking, both the marking head and part are typically stationary while the beam is directed over the marking area. The power of the laser and the focal length of the lens must be considered when setting the marking head distance from the part in order to clear obstructions. Percussion markers must be programmed to move a pointed stylus directly over the area to be marked while avoiding obstructions. The length and diameter of the stylus must be considered when programming the marking path. With ink jet, the part is either passed directly under the marking head or the marking head is passed over the part. The size of the ink jet head and distance from the part must be taken into consideration in order to avoid any obstructions near the marking area.



Surface condition influences readability of the Data Matrix code. A smooth, flat surface is best. The part surface impacts the way light is reflected from the surface and influences contrast, which is key to the readability of a Data Matrix code. Rough castings present the most challenging read. Surprisingly, Data Matrix scanning technology can also tolerate reading a Data Matrix placed on a slightly curved surface.



Part function also influences where a Data Matrix code can be applied. The Data Matrix must be placed in an area that does not come in contact with another surface or is exposed to a harsh environment. Testing should be done to evaluate the longevity of the mark in the intended environment.

What's the best way to mark 2D Data Matrix codes?

Each marking application presents unique challenges. Size, shape, throughput, and end use all play an important role in the selection of the marking method. Percussion marking works best on medium hard to hard materials. Percussion marking isn't suited for marking soft, resilient, or brittle materials. Ink jet marking works best on clean, dry, oil-free surfaces. Laser marking is very adaptable. A wide range of substrates can be marked by choosing a laser with the correct wavelength and power. In addition, there are special additives and coatings that can be mixed into or applied to parts that react with the laser light when marked.

2D Data Matrix codes can also be printed on tags or labels of any kind to attach directly to a product or to containers and pallets. The small size of Data Matrix codes allows manufacturers to reduce label costs in comparison to using barcodes, as a large amount of information can be stored in a small code.



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