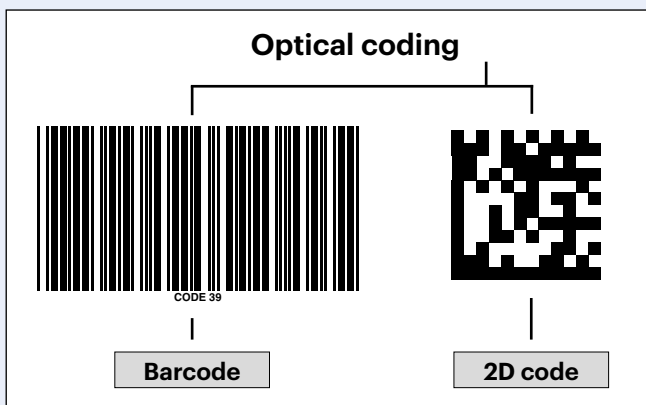


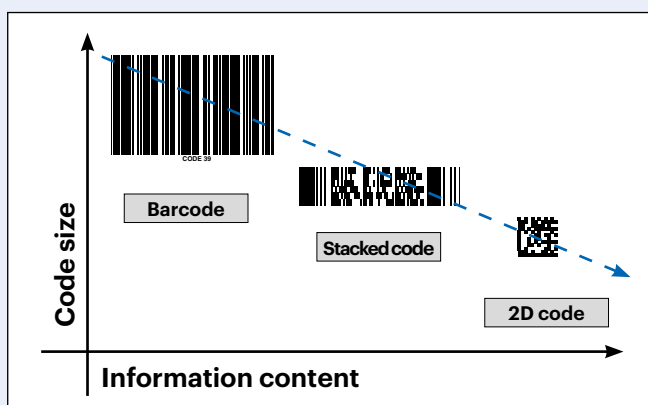
Barcode / 2D Code Technology

Basic principle and operation

A barcode is an optically readable code that allows machines to quickly scan, capture and read printed data. It consists of parallel bars of varying widths, i.e. lines and spaces. Here, the meaning of "code" does not come from "encode." Instead, it refers to the representation of data as binary symbols. Barcodes have existed since 1949, but those most common today were developed in the 1970s. They include types such as EAN/UPC, Code 39, Code 2/5 interleaved and Codabar.



Alongside these, the technical requirements for a number of other codes were developed. These are called 2D codes (two-dimensional codes) and are a further development of 1D linear barcodes. The term "2D code" derives from its two-dimensional representation of data. This differs from 1D codes, which provide data only one-dimensionally on the X-axis. There also is a distinction between stacked codes (stacked barcodes) and matrix codes. The latter's development began in the late 1980s, and the best-known matrix codes are PDF417, DataMatrix, MaxiCode, QR code and Aztec code.



The main difference between linear barcodes and 2D codes is that the barcode itself contains no information, just a reference to data such as an item number. Therefore, it only makes sense in the context of a database. On the other hand, 2D codes contain actual information.

A barcode system consists of three basic components:

- a barcode or 2D code applied to an object (product) to be identified
- a barcode scanner (reader) or a 2D code imager (2D code scanner or imager)
- the unit transmitting communication to a computer



Barcodes and 2D codes are usually applied to labels with a barcode printer. However, they can also be applied to packaging or products with an inkjet printer or printed along with the packaging. The code to be used depends on many factors. These include the quantity of data, space requirements, orientation, the product to be identified, the scanner distance and much more. Codes must therefore be evaluated for each application. Ultimately, this is dictated by the industry or the user.

Barcode scanners and 2D code imagers scan or read many types of bar or matrix codes. Scanning is always optical. Beams sent by a light source are reflected differently by the bars and surfaces. The scanner records the reflections and decodes them for evaluation. With laser scanners or CCD cameras, the code can be captured from a given distance, either while moving or standing still.

Communication transfer to a computer takes place through standardized interfaces. The data can be transferred through cables, infrared connections, WLAN (Wireless Local Area Network), GSM/GPRS and/or Bluetooth. Mobile data capture systems can communicate in both directions over wireless systems.