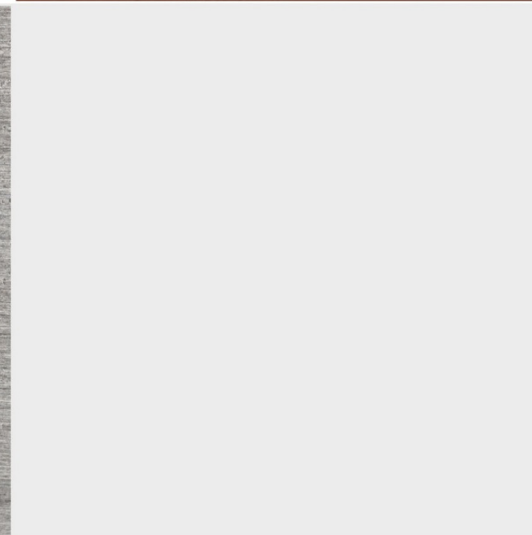


PRYOR
MARKING TECHNOLOGY



A Guide to Effective Dot Peen and Scribe Marking

Available to download at: www.pryormarking.com

Tel: +44(0)114 2766044

Sales: info@pryormarking.com

Technical support: support@pryormarking.com

Guide to Effective Marking

Pryor marking machines can mark a very wide range of work pieces using a variety of different character styles, sizes and depths. This guide outlines how to get the best out of your equipment. It covers Dot Peen and Scribe marking methods, Laser marking, Chemical Etching, Stamping and other marking technologies available from Pryor are dealt with in separate documents.

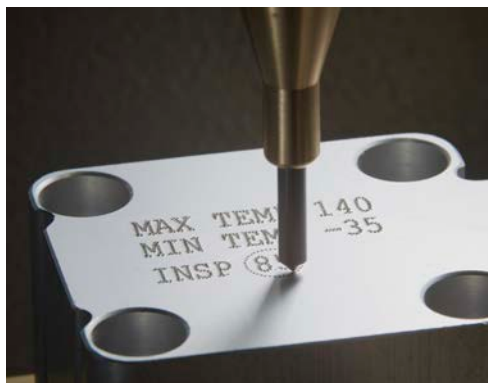
Dot Peen

[Dot Peen marking](#) is also known as dot marking, stylus pin marking and micro percussion marking. This method uses a stylus that rapidly actuates to indent a series of dots on to the surface of a material. The stylus is programmed to move around the surface in x and y directions, resulting in a succession of dots that create digits, text, logos and 2D Data Matrix codes.

Pryor's standard machines use an electrically driven solenoid to actuate the stylus, but pneumatic actuation is also available for [deep marking](#) or fast marking.

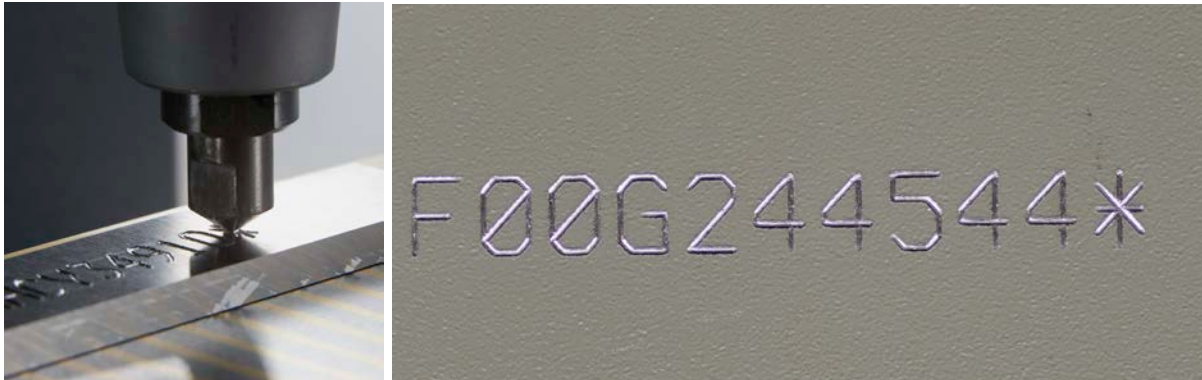
Dot peen marking provides fast, accurate, low-stress marking and can mark through coatings or film on the material surface.

It is the ideal method for permanently marking a Data Matrix code onto a metal component. A Data Matrix is a 2D barcode which can store a large amount of data.



Scribe Marking

Scribe marking uses a pneumatically driven pin which is driven into the metal surface to be marked. It is then moved through the metal, engraving the required inscription. It therefore gives a continuous engraved line.



Fixturing

IMPORTANT - Unless the work piece is held firmly then there is little hope of obtaining a good quality mark. Scribe machines in particular require very firm fixturing as the lateral forces involved are very high during the marking process.

If you have a wide variety of work pieces to mark then you may have to make several interchangeable fixtures. Use a magnetic chuck, or similar, to allow these fixtures to be changed over quickly and accurately.

Work piece material

The machines may mark a very wide range of materials but some materials are easier to mark than others.

The harder the material, the shallower the depth of mark will be. The type of material will also influence the life of the stylus, the stylus tip will wear or chip quickly the harder the material. The angle of the stylus tip may be changed to reduce the chance of chipping. Changing the angle may also increase the readability of the mark.

Surface finish

Smooth, well finished work pieces are easier to mark than rough, scaled work pieces. The worse the finish, the deeper the mark will have to be to remain readable.

Painted work pieces may be marked but the paint may chip, try changing the stylus tip angle to reduce the chipping.

Work piece flatness

The machine can mark on surfaces which are not completely flat but the depth of the mark will vary across the surface. For dot marking, as the gap between the stylus tip and the surface of the work piece increases, the depth of the mark will increase. If the difference in gap is only 1 to 2 mm (0.040" to 0.080") then the mark produced may be acceptable.

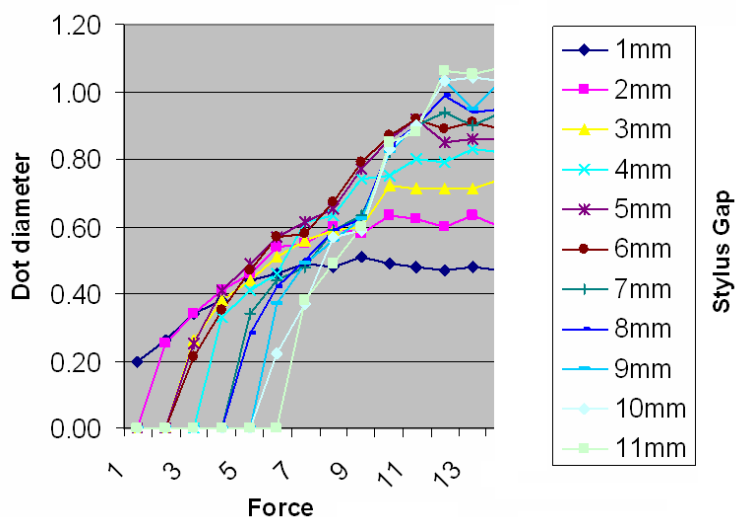
If you have to mark a heavily contoured surface (a cylindrical work piece, for example) then there are several things that should be considered:

- Try to use as large a gap as possible. If you have an initial gap of 5 mm (0.200") then a change of 1 mm (0.040") will have less effect than the same change would have had with an initial gap of 2 mm (0.080"), for example.
- Mark a line of text by splitting it into several sections and then marking each with a different force to compensate for the change in gap. If using this approach the Split Line software function will assist if marking variable data.
- Reduce the character size or width so that the whole mark is shorter.

Depth of mark (Dot Marking)

The depth of mark depends on the following factors

- marking force (programmed on the controller)
- marking gap (distance between stylus tip and workpiece)
- material hardness of the work piece
- stylus tip angle.



(90° Stylus – Note marking depths vary depending on material hardness and stylus tip angle)

The effect of marking force versus marking gap is illustrated in the above chart.

Marking gap (Dot Marking)

The marking gap is the distance between the stylus tip and the surface of the work piece. Changing the marking gap changes the depth of mark. The larger the gap, the deeper the mark.

If the marking gap is too big then the stylus will start to stick and drag the work piece. To overcome this, use a larger force or a smaller gap.

Stylus tip angle (Dot Marking)

The stylus tip angle (normally 90° included) may be varied to increase stylus life, increase the depth of the mark or increase the readability of the mark (though not all of these at once!)

A small included angle (perhaps 60°) will give a deep mark but stylus life will be reduced. The deeper mark obtained may even be less readable because the diameter of individual dots will be less.

A large included angle (perhaps 120°) will result in a longer stylus life. A less deep mark will be obtained but the mark may be more readable, this is because individual dots will be wider. Marking Data Matrix codes with a stylus angle of 120° often produces the best results and leads to the most readable codes.

A minitress stylus (radius tip) will help to eliminate any stress on the work piece but will result in a shallower mark.

Character size (Dot Marking)

The machines can mark characters from 0.15 to 49.95 mm (0.006" to 1.967") high. Avoid using very large or very small characters, if possible. We class small characters as being up to 1.00 mm (0.040"), medium characters as being 1.00 mm to 4.00 mm (0.040" to 0.160"), and large characters as being larger than 4.00 mm (0.160").

Large characters take longer to mark than medium size characters, they also need to be marked more deeply to remain readable. If you need to mark large characters then consider using the 7x9 or Varidot style instead of the normal 5x7 style (the more dots there are, the more readable the mark).

Marking gap (Scribe Marking)

Although the machine will mark with the tip anywhere between 0.5mm and 7mm from the work piece, the recommended distance of the stylus tip from the work piece is between 3mm and 4mm.

Depth of mark (Scribe Marking)

Light marks are easy to produce on most materials. Deeper marks are the more challenging marks. Large characters can be produced to a greater depth than small ones.

The four factors which most influence the depth of a mark are:

- 1) Material being marked
- 2) Marking force (Air Pressure Setting)
- 3) Stylus Tip Radius
- 4) Stylus Tip angle

Having decided on the tip radius and tip angle to suit the material being marked, the depth of the mark is most easily adjusted by varying the marking force.

Marking force (Scribe Marking)

The marking force is controlled by adjusting the air pressure. Increasing the air pressure, increases the marking force.

As a starting point, the air pressure should be set to 45 psi.

Warning : Do not turn the air pressure up too high. If the stylus is driven too hard into the material it can stick in the material and cause the motors to stall producing a bad mark. If the machine is stalling try reducing the air pressure or reducing the marking speed.

Stylus tip Radius (Scribe Marking)

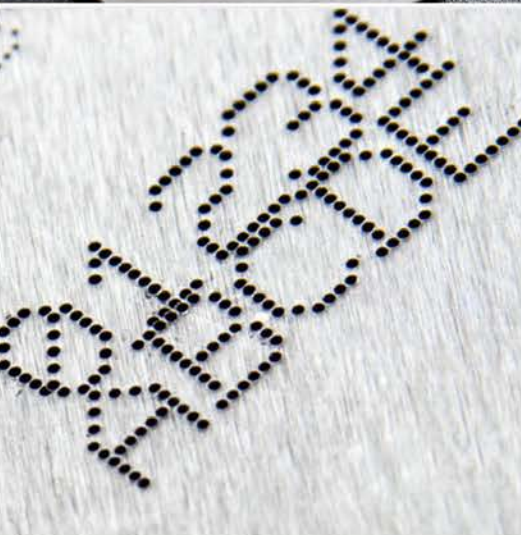
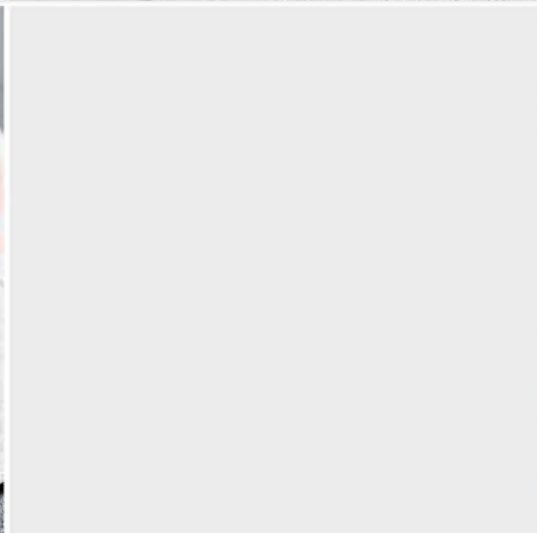
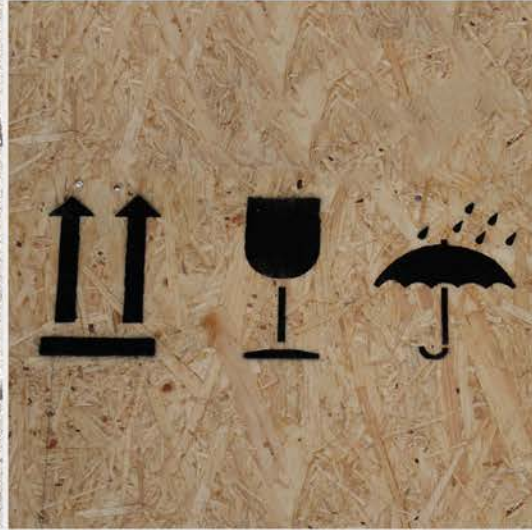
This is normally determined by trials on the material prior to delivery of the machine. Typical radii are between 0.5mm and 1mm.

Generally, the smaller the radius, the deeper the mark, but small radii can lead to tearing of the material instead of forming it.

Larger tip radii give wider marks.

Stylus tip angle (Scribe Marking)

The standard tip angle for the carbide tip is 110 degrees included. This can be modified for special applications if required.



Edward Pryor and Son Ltd.
Egerton Street, Sheffield, South Yorkshire, S1 4JX, UK
+44 (0)114 276 6044
info@pryormarking.com
Company number: 313230

www.pryormarking.com