Applied Laser Engineering Ltd
Unit 7 Ember Centre
Lyon Road
Walton-On-Thames, Surrey
KT12 3PU, UK

t +44(0)208 941 1101
f +44(0)208 783 1348
e sales@appliedlaser.co.uk
w www.appliedlaser.co.uk

APPLIED LASER ENGINEERING

19/10/2022

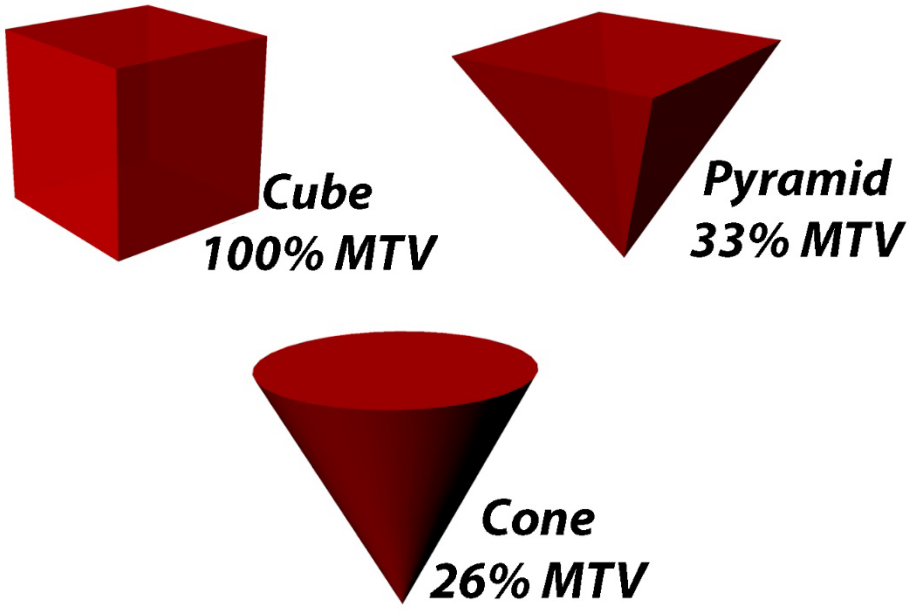
Laser Engraved Ceramic Rollers - New Applications
The Shape of Things to Come

For around forty years laser engraved ceramic Anilox rollers have been used by the flexographic printing industry. The transition from mechanically engraved Anilox rollers to laser engraved Anilox rollers was slow at first, but now the use of laser engraved ceramic Anilox rollers is ubiquitous. However, the use of laser engraved ceramics as coating and applicator rolls has been a much slower affair. To date, the main problem with high volume ceramic applicator engravings is that the ceramic flows and therefore makes a messy engraving. Now because of the introduction of new laser engraving technology, the shape of things to come is quite different!

Shapes and Volumes

Sorry to remind you of your school days, but most of us had to learn the volume of some shapes. The one shape I would like to refer to, that I am sure you will be familiar with, is a cube. For example, a box with a height (H), width (W), and depth (D) of one metre would have a volume of one cubic metre. I like to think of this as a reference volume or the maximum Theoretical Volume (MTV = H x W x D), for that space. A cube has 100% the MTV. A pyramid has about 33% of the MTV and a cone will have about 26%. The point I am making is that the shape of a cell matters. In particular, the flatter the bottom of a cell the more volume it will have. Another way to think of this is to know the depth necessary for all shapes to have the same volume. The cube is reference, so depth is 100%, the pyramid must be 3 times deeper and the cone about 4 times deeper.

Do not get me wrong, I am not suggesting it is practical to engrave cubic cells. However, I am suggesting the flatter the bottom of a cell, the more closely its volume will approach the MTV. This also means the cell has less depth for the same volume. The lesser depth will also help the cell release liquid more readily. This, I would argue, is a virtuous circle.



What Part of a Cell Has the Greatest Volume?

This, at first, sounds a very strange question. However, if a cell were like a test tube, the same cross section all the way to a deep bottom, the answer would have to be the top of the cell must have more realisable volume than the bottom. If liquid cannot be released from the bottom of a cell, the volume of the bottom of the cell is wasted. In the case of a mechanical engraved pyramid or quad cell, there is much more effective volume at the top of a cell than at the bottom. Traditional laser engraved cells are the same, the nearer to the top of the cell, the greater effective volume there is.

Applied Laser Engineering Ltd
Unit 7 Ember Centre
Lyon Road
Walton-On-Thames, Surrey
KT12 3PU, UK

t +44(0)208 941 1101
f +44(0)208 783 1348
e sales@appliedlaser.co.uk
w www.appliedlaser.co.uk

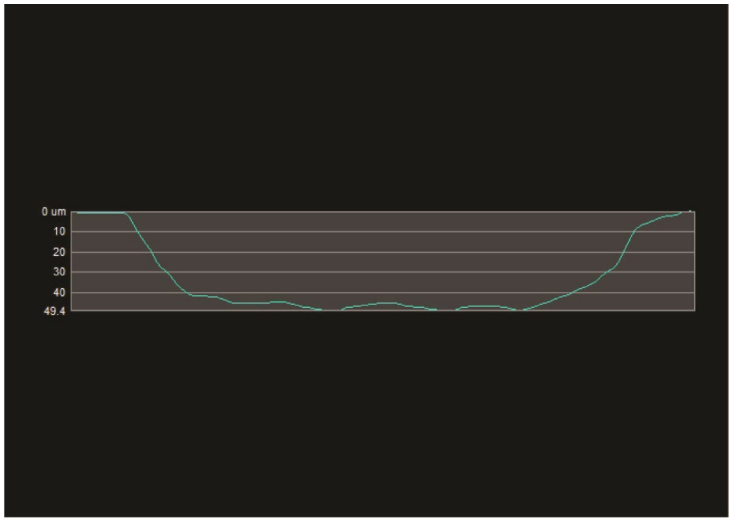
APPLIED LASER ENGINEERING

Mechanical Engraving Uses a Pointed Tool

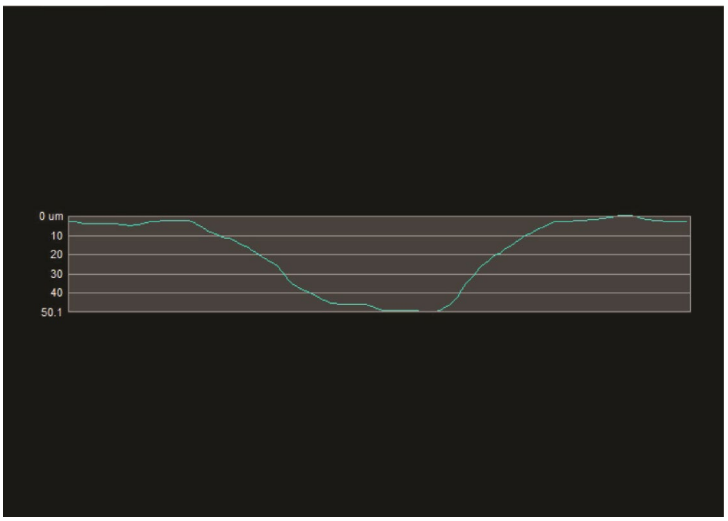
Mechanical engraving tools need a point to push their way into metal. It is true to say that a degree of flatness can be incorporated in a tool, this flatness contributes a small amount to the cell volume but might well improve the release characteristics of the cell.

New laser engraving technology sets asides the historic link between the shape of a laser beam and the shape of a cell. This new approach, particularly applicable to mid and low screen counts, dynamically shapes the beam's impact on the ceramic being engraved. Historically, with laser engraving, there has been a single-track approach of changing the size of a focused laser beam until it matched the size and volume of the required cell. The new Twin Track approach dynamically changes the laser power and laser beam position throughout a cell in order to change the cell shape or profile. This facilitates the engraving of flatter and wider bottomed cells, offering higher volume and good release characteristics.

*100lpi/40lcm - Quad Engraving **with** Twin Track (TT)*



*100lpi/40lcm - Quad Engraving **without** Twin Track (TT)*



Applied Laser Engineering Ltd
Unit 7 Ember Centre
Lyon Road
Walton-On-Thames, Surrey
KT12 3PU, UK

t +44(0)208 941 1101
f +44(0)208 783 1348
e sales@appliedlaser.co.uk
w www.appliedlaser.co.uk

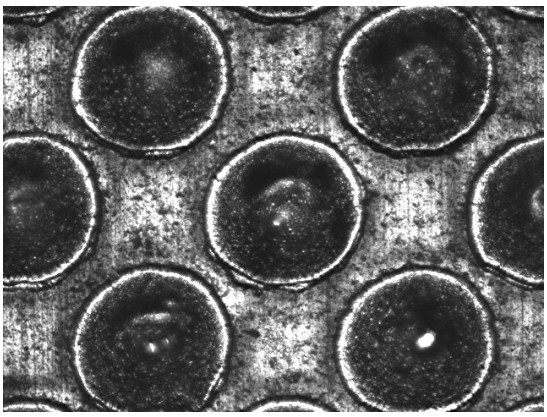
APPLIED LASER ENGINEERING

Why Does a Round Laser Beam Make a Hexagonal Cell?

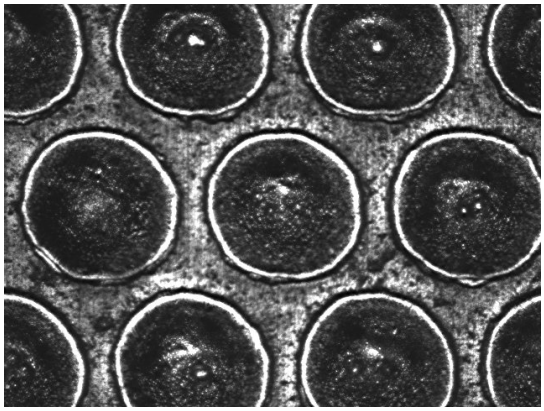
The conventional hexagonal and diamond form of a laser engraved ceramic cell is created by the melting and solidification of the ceramic. However, the hole in the ceramic roller is the shape of the laser beam.... round!

Please see the examples below:

Conventional method 45-degree Quad engraving - 100lpi

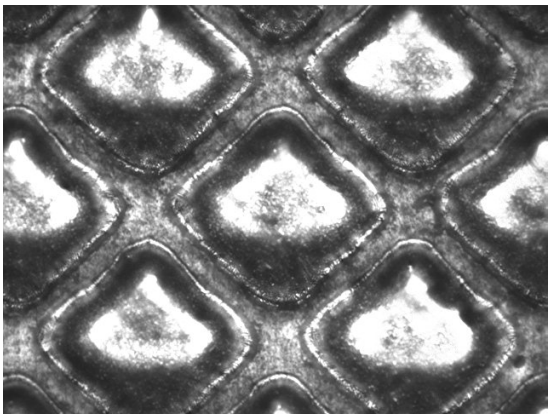


Conventional method 60-degree Hex engraving - 100lpi

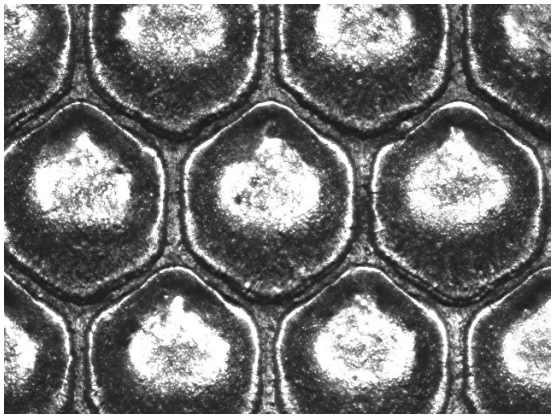


In contrast, the new technology Twin Track (TT) approach makes the shape of the cell into the ceramic roller. So, quad cells make diamond shaped holes into the roller and hex cells make hexagonal holes into the roller. This is part of the explanation as to why TT cells have such high volume to depth ratios.

Twin Track (TT) method 45-degree Quad engraving - 100lpi



Twin Track (TT) method 60-degree Hex engraving - 100lpi



The big advantage of a high volume to depth ratio is that the shallower a cell is for a given volume, the easier it is for a cell to release. In the case of TT cells more volume lives within the ceramic of the roller and therefore less volume lives within the recast ceramic. As a consequence of this phenomena, it is likely that that TT cells will lose less volume over time, as compared to a conventional cell. From a simplistic point of view, flatter bottom cells are easier to clean and are less prone to plug as compared to pointy conical cells.

By Brendan Pollard
Managing Director
Applied Laser Engineering Ltd

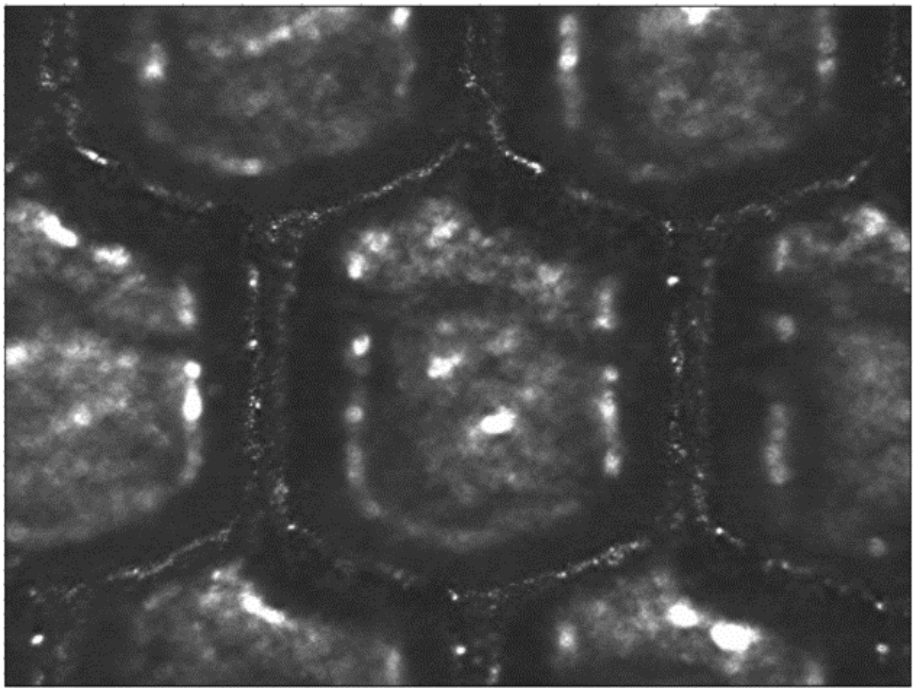
Applied Laser Engineering Ltd
Unit 7 Ember Centre
Lyon Road
Walton-On-Thames, Surrey
KT12 3PU, UK

t +44(0)208 941 1101
f +44(0)208 783 1348
e sales@appliedlaser.co.uk
w www.appliedlaser.co.uk

APPLIED LASER ENGINEERING

Further Twin Track (TT) Ceramic Engravings

35lpi - Hex 60 degree (TT)



50lpi – Long Hex 76 degree (TT)