

# Taking the Hallmark into the 21st Century

The changing face of the jewellery industry means that technological developments in assaying and marking are both necessary and inevitable. But how does a 700-year old company that is steeped in tradition and characterised by unique knowledge and expertise meet the demands of modern-day production and a new generation of

customers? By **DR ROBERT ORGAN**, deputy warden at The Goldsmiths' Company Assay Office



Aligning a punch to the silver supported by tool

Introduced in the 1300s as the King's mark of authentication, the Leopard's Head we use today is remarkably similar in design to the early marks, with the most pronounced change being in definition and detail. It is a development one might expect, given that the first punches would have been made entirely by hand.

Punch-making is still a highly-skilled craft, which is carried out using a combination of machining of a blank, engraving with a pantograph or laser and finishing by hand. We began using lasers to create the detail on a punch in 2011. The fine beam width makes them ideal for engraving smaller marks as a light beam is finer than the radius of a pantograph cutting tool, which is also prone to wear that can impact engraving quality. The laser 'rasters' across the surface of the punch blank like a TV image and a smooth, 3D topography

is built up as the beam cuts in thousands of ultra-thin layers. Although the laser is less labour intensive and as many as 24 punches can be etched automatically without the need for an operator; the more traditional technique of engraving using a pantograph is still used for the larger punches as it is more efficient for the removal of large quantities of material.

Once the panels are engraved, each punch is finished by hand, hardened, cleaned and polished and then checked under a microscope. If a punch isn't perfectly made, the hallmark will never be perfect and all of our punches and support tools are made and maintained in-house - a necessity these days due to a reduction in the number of UK workers possessing the required skills - with our team constantly testing the technology to improve overall efficiency.

**How a Punch is Made:**  
**Early punches were made by engraving directly onto a punch blank or by 'hobbing', the stamping of an impression on the punch blank with another punch. More consistency between batches was introduced by pantograph engraving.**

A pantograph engraving machine comprises two arms which are mechanically linked. One arm comprises a fine stylus which traces the surface of a stencil - usually an enlarged 'master copy' of the mark to be applied. The other arm is

connected to a rotating cutting blade, which engraves a miniature but otherwise perfect copy of the master on the surface of the punch. Different sizes can be produced by changing the geometries of the arms in the pantograph. The tracing process requires considerable skill by the operator to ensure that all the detail is captured.

Once the engraving is complete, the 'shoulders' of the punch are filed by hand up to the edge of the shields around the mark. With shield sizes ranging from 0.3mm to 6mm, this is another highly skilled operation.

The material used in the punches is 'W1 steel'. The engraving and hand-finishing processes are carried out in a softened state. The punch is then tempered and water-quenched to harden the surface.

Laser hallmarking was introduced in the late 1990s and since that time, its popularity has grown to the extent that it now accounts for around 50% of all items hallmarked. The main reason for its success is that there is none of the metal displacement associated with struck marks, making it ideal for fragile, hollow, stone-set and mixed-metal pieces.

Historically, unfinished items were sent in by skilled silversmiths for hand marking and an integral part of the making process was the manual 'setting back' and polishing of the marked item. Nowadays, with around 90% of all items submitted to the Assay Office being imported, reflecting the growth in recent years in companies



Engineer working on a pantograph

manufacturing or sourcing jewellery in the Far East, India and Thailand, articles often arrive in a finished condition making laser marking the perfect option, as no setting back is necessary.

The oldest laser machines used in hallmarking production were really only suitable for large display marks - the beam is powerful and, has a high tolerance on curves, but it is too wide for small marks. The increasing requirement to mark imported jewellery, where marks needed to be smaller, led to the purchase of machines with finer beam qualities. However, even these machines were only capable of producing marks in 2D. A 3D effect can be created by extending the 2D mark into a third dimension to create a 2D+ mark or 'deep laser mark' as it is termed, but the inability to create a full '3D' mark has led many customers to consider a laser mark as inferior to a struck mark.

Laser beams engrave by plotting straight lines from fixed points (nodes) and the fine beam on our newest laser machines



Hand marking close up

- purchased in 2015 - means that nodes can be plotted closer together, which creates finer detail and the impression of a smoother curve. These machines have a much finer beam and can create a more detailed image, thereby improving the quality of smaller marks and ensuring it is no longer the customer's second choice. More importantly, the artwork derived from a 3D scan produces node-to-node contour patterns that enable the lasers to engrave in relief, without compromising on detail. It is this capability that has fueled our latest work into the creation of a premium laser display mark with the quality and clarity of a struck mark, regardless of its size.


Although laser marking is likely to increase in popularity as the technology develops, there will always be a requirement for the unique, skilled craft of hand-marking. Having said that, there is no doubt that contemporary and cutting-edge designers will favour the advantages that modern laser technology has to offer, not least of which is the ability to personalise their work and use the elements of the hallmark to enhance their designs.

In fact, developments in laser technology look set to have a lasting effect on the entire hallmarking process - from the common artwork that is used in the creation of punches and laser marks, to the wholesale improvement to the quality of every mark (whether struck or lasered) and the inception of a premium laser display mark that more closely resembles the struck mark. There is no doubt that advances in technology will continue to blur the lines between the two techniques, giving customers a greater choice and better overall quality, and ensuring that hallmarking endures for another 700 years.



Laser at work - marking silverware

#### About Dr. Robert Organ

Dr Robert Organ has been the deputy warden of the Goldsmiths' Company Assay Office since 2006. The deputy warden is an ancient title for the position of assay master or managing director. The Goldsmiths' Company Assay Office also has responsibility for testing the coins of the realm as part of the Trial of the Pyx and is the Secretariat of the International Association of Assay Offices. Organ joined the Assay Office in 2000 as the superintendent assayer (general manager). Prior to this he was a project leader and principal scientist at Crown Cork & Seal Company Inc. and a Section Leader in the Department of Process and Quality Development at Horsell Graphic Industries. Robert read Materials Science and Metallurgy at Cambridge University where he also completed a PhD. He also holds an MBA from Reading University, is a Member of the Institute of Metal Finishing and a Fellow and Chartered Engineer with the Institute of Materials, Minerals and Mining. 

#### Applications Now Open for the Make Your Mark Awards

Students, apprentices and recent graduates (past five years) are invited to stretch their imagination by designing and/or making a precious metal piece where the hallmark is an intrinsic part of the design.

Deadline for entries is Friday 21 October at 5pm and shortlisted entrants will be invited to attend a VIP Evening Reception at Goldsmiths' Hall in London.

With prizes donated by Stephen Webster, Just Castings, Stewart Hersey, Cooksongold, Allied Gold and HS Walsh; and a panel of judges that includes Eddie Davis from Graff, Elizabeth Hunt from Allied Gold and Grant MacDonald, the Make Your Mark Awards offer newcomers an exciting opportunity to make their mark on the industry.