Restoration of Stamp Marks and Development of an Etching Paste

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Introduction

Stamped identification marks may be erased or defaced by the criminal but the process of stamping deforms the underlying metal structure and this can sometimes be recovered by etching. The use of a liquid etchant is, however, not very convenient in the field or when dealing with surfaces that are not flat. An investigation was therefore carried out to see whether a suitable etching paste could be made.

The study also examined the conditions necessary to completely remove the underlying changes to the crystal structure and a tentative model is proposed to explain how deep the underlying damage is. This may help assessing the potential success of recovering marks.

Method

To understand the factors affecting recovery, a series of steel discs or bars were prepared by impressing a single letter using a die and a hydraulic press. The specimen was carefully filed to obliterate the letter and the disc thickness was measured. A pre-determined additional layer of material was removed (0.5-2.0 mm) and Fry’s reagent was applied. Periodically this was removed, the specimen observed, and etching was continued if recovery was not achieved. If no recovery was achieved after 9 hours the test was terminated.

Over-stamped samples were treated in a similar manner with 1 mm removed below the original imprint.

In order to make a paste Fry’s reagent was mixed with alumina powder in the ratio 3.5 ml to 4 g to give a suitable consistency. It was intended to try other reagents, but this combination proved very successful and often etched better than the liquid reagent.

Development of the Paste

A paste could be easier to apply in field applications, and in order to produce a paste a range of options were considered. Mixing Fry’s reagent with alumina was tried initially, and was surprisingly successful. Consequently work focussed on this paste rather than investigating alternative systems.

It was observed that the paste produced a chromatographic effect when dealing with surfaces that are not flat. An investigation was carried out to see whether a suitable etching paste could be made. The ratio of liquid and solid can be adjusted to produce a reagent that will stay in place and not flow. After etching the paste can be wiped off (subject to suitable safety precautions) and a clean metal surface is obtained. Often the paste will etch better than liquid, but as with any new or modified technique, toolmark examiners need to gain experience in order to make a judgement of when to use it.

Merits of the Paste

The ratio of liquid and solid can be adjusted to produce a reagent that will stay in place and not flow. After etching the paste can be wiped off (subject to suitable safety precautions) and a clean metal surface is obtained. Often the paste will etch better than liquid, but as with any new or modified technique, toolmark examiners need to gain experience in order to make a judgement of when to use it.

Conclusion

Further understanding has been gained of when erased marks may be recovered, and a paste has been developed that may be useful in recovering erased stamp marks.