

Fingerprint and Footwear Forensics Newsletter

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PROGRAMME UPDATE

Final IRIS Build at HOSDB

Following a decision to cease manufacture of HOSDB's Integrated Rapid Imaging System (IRIS) in our workshops, the final system was delivered in March 2007. The Fingerprint and Footwear Forensics Group would like to pay tribute to the efforts of all the staff in the workshops who have contributed to the manufacture and delivery of twenty-five IRIS systems since 2001.



Ian Castle and Freddie Lubin putting the finishing touches to IRIS 025.

A full update on the current position regarding IRIS supply and support can be found later in this newsletter.

Footwear R&D Group

Dick Johnson, SSM of Bedfordshire Police has been appointed Chair of the National Footwear Board Research and Development Group. The first meeting of the Group was held at HOSDB on 22 February 2007.

Following a review by a number of forces, the group was able to give direction to a variety of projects which will be managed by Helen Bandey.

Newsletter publications can be downloaded from:
<http://scienceandresearch.homeoffice.gov.uk/hosdb/publications/fingerprint-publications/>

For further information contact: hosdb@homeoffice.gsi.gov.uk
ISBN 978-1-84726-298-1

Scene Clean-up Workshop

During the 2006 National Scientific Support Laboratories Conference, HOSDB was asked to give clearer guidance on the cleaning up of scenes where chemical treatments have been used. A workshop was held at HOSDB in November 2006 to review current advice and identify any major issues. Only a limited attendance could be accommodated at the workshop: it is hoped that the following notes, extracted from the workshop output, will prove of value and that the topic will be discussed further at the 2007 conference.

A number of general issues were identified regarding the best practice for fingerprint recovery from scenes. Kim Warner, Greater Manchester Police, had carried out a forces survey of the use of Ninhydrin at scenes prior to the workshop. Although the force experiences varied widely according to her report, there appears to be a trend towards the following principles:

1. If possible, remove articles to the laboratory, where chemical treatments can be carried out under safe, controlled conditions for optimum results.
2. Limit the use of chemical treatments at scenes where possible — if only small, targeted areas have been treated, they may be most efficiently cleaned up by the staff applying the treatment or marked up for contractors to clean.
3. Avoid the use of inherently hazardous treatments (eg Superglue) unless there are no suitable alternatives.
4. Ensure that a full risk assessment is carried out for the whole process — treatment and clean-up — and with clear responsibilities agreed for all concerned before any action is taken.
5. Leave a record at the scene of the exact treatment carried out, the chemicals used and any requirements for clean-up.

HOSDB has a responsibility to only recommend treatments for fingerprint development which are both safe and effective. It was agreed at the workshop that there may be occasions, such as the development of fingerprints with Ninhydrin, where the results may be unsightly but not unsafe. In this case sealing the treated surface before redecoration should be adequate. This and other recommendations were recorded during the workshop and are shown below. Please contact Val Bowman if you wish to have a copy of the complete workshop output.

Ninhydrin

- Ensure good ventilation post-application and during clean-up (the solvent used during application will displace air).
- Remove and destroy treated areas where possible, eg wallpaper and floor coverings.
- Seal the area post clean-up, eg with primer, lining paper, application of diluted PVA, prior to redecoration.

Superglue

(Refer to HOSDB Publication 30/03)

- Use only as a last resort — or use where deemed necessary.
- Consider whether other processes, eg powders or powder suspensions may be suitable.
- At the scene — reduce risk by securing the scene, ventilating, steam cleaning, leaving unoccupied for a time, exposure monitoring.
- If used on vehicles, we advise that they should be crushed — safety cannot be guaranteed for subsequent use.

Solvent Black 3

- Only use for small areas.
- Consider cleaning up immediately after treatment.
- Remove and legally dispose of all fixtures and fittings.
- Seal with appropriate primer before redecorating.

Powder Suspensions

- Work on a small area at a time.
- Wash area with soapy water.
- (N.B. Can stain uPVC and porous or semi-porous surfaces permanently.)

Protein Stains

- May be possible to use soaked cloths for application.
- Dyes stain very effectively and perception of clean may be difficult to achieve.

Iodine

- Alternative methods should be used for safety and greater effectiveness

N.B. HOSDB does not recommend the use of Iodine at scenes. It is toxic, toxic for the environment, suspected to be toxic for reproduction and corrosive. Dichloromethane is carcinogenic. The process requires careful application for maximum effectiveness, full PPE and the solution must not be sprayed.

During the workshop, the FFF group was asked to do further work to evaluate the migration of chemicals into typical scene surfaces. This work has not been sanctioned by the FFF User Group, but Rentokil R&D department have offered to undertake a small study to establish whether they can identify a suitable treatment for Ninhydrin clean-up.

Whether HOSDB-recommended or alternative techniques are used at scenes, the Chemical Agents at Work Directive (CAD - 1998) imposes minimum requirements on the employer, workers and suppliers to ensure adequate health and safety protection in the workplace. Concerns were raised during the workshop about the suitability and robustness of scene risk analyses, roles and responsibilities at the scene and measures to be taken in the event of the application of non-HOSDB methods. These concerns have already been discussed at the National Scientific Support Laboratories Conference, will be raised at the next meeting of the Crime Scene Investigation Board and if necessary escalated to the Forensic Science Committee.

SUMMARY REPORTS OF RECENT STUDIES

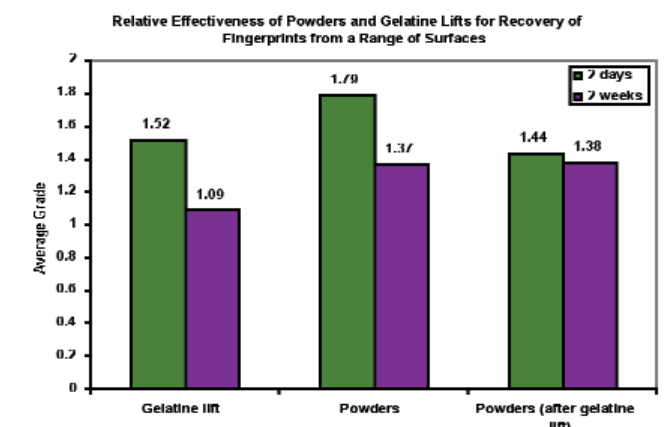
Use of Gelatine Lifts for the Recovery of Fingerprints

We have conducted a short study to determine the relative effectiveness of powders used to develop latent marks and BVDA gelatine lifts for lifting latent marks.

A range of surfaces commonly found at scenes of crime were used in the study including smooth surfaces (glass, u-PVC and painted metal) and surfaces with varying degrees of texture (melamine kitchen worktops, laminate furniture and semi-porous painted walls). When comparing processes that are likely to target different components of the fingerprint, it is important to use a large range of donors that represent a typical population. The use of only a few donors or even a standard fingerprint may favour one process over another and so may produce misleading data. For this reason 70 donors were used in this trial. Donors were asked to deposit three fingerprints only across all six surfaces. The fingerprints were aged for either 2 days or 2 weeks. Each one was then treated with one of the following:

1. Gelatine lift of the latent mark and subsequent imaging on GLScan.
2. Fingerprint powder as recommended in the Powders Guidelines Leaflet.
3. Fingerprint powder as 2, but on the surface previously covered with the gelatine lift in 1.

The graph below shows the relative effectiveness of the various recovery methods across all surfaces.



In summary, the following information can be drawn from the results:

- For both gelatine lifting and powdering used alone there is a large drop in the average grade of the marks developed from 2 days to 2 weeks. This is consistent with previous results from the powders project.
- For both ages of fingerprints, the average grade for powdered marks is higher than that for gelatine lifted marks.
- For 2 day old marks, the average grade of powdered marks is reduced by 20% if the gelatine lift is applied prior to powdering. Gelatine lifting will transfer some of the mark to the lift hence reducing the amount of material available for powders to adhere to.
- For 2 week old marks, there is little difference in the average grade given for powdered marks whether the gel lift has been applied previously or not. As marks age they harden, resulting in little material being transferred to the gelatine lift. Marks on the gelatine lift may be caused by an impression of the mark or material transfer.

From this we are able to conclude the following:

- Fingerprint powders should continue to be used on non-porous surfaces as described in the Manual of Fingerprint Development Techniques (MoFDT) and Powders Guidelines Leaflet.
- Gelatine lifts should not be used prior to powders as this may reduce the quality and quantity of marks found with powders alone.
- Gelatine lifts may offer an alternative solution for surfaces that can not be treated with powders (e.g. contaminated surfaces or items that must not be damaged or destroyed, such as some electrical items), although the MoFDT should also be consulted for alternative processes.

Ninhydrin Marks on Thermal Receipts

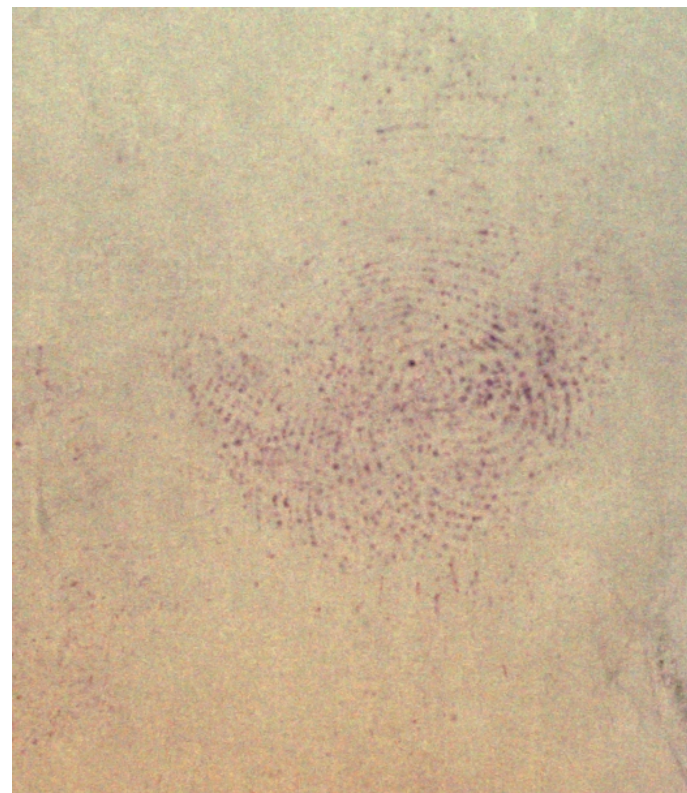
Following the article on treatments for thermal paper published in the October 2006 Newsletter, HOSDB is aware that some forces have started to use the ethanol pre-dip to prevent darkening of thermal receipts. West Mercia Constabulary has drawn our attention to the fact that some faint marks developed using ninhydrin can be significantly improved by viewing them on a light box. Whilst this may not be appropriate for ninhydrin marks on standard paper articles, the fine fibre size in thermal papers makes it

easy to distinguish the marks in transmitted light. An example of marks improved in this way is shown below.

a)



b)



Thermal receipt after ethanol pre-dip, marks developed using ninhydrin. a) mark viewed in reflected light, b) mark viewed in transmitted light on lightbox

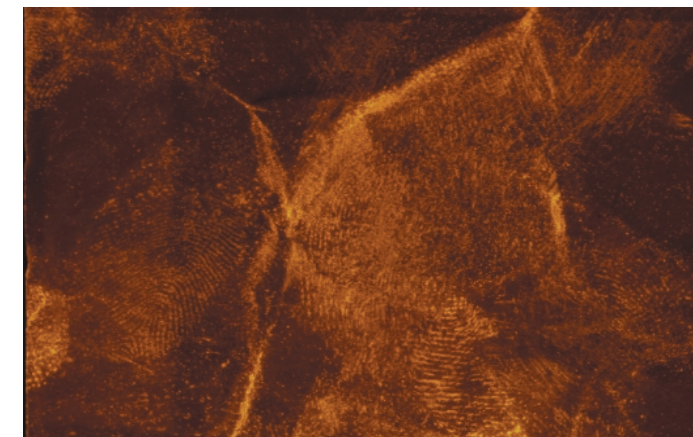
Use of White Powder Suspensions for Cowlings

It has been reported to us that a police force has had a threefold increase in the number of fingerprints developed since changing from using superglue/BY40 to white powder suspension on car cowlings. We have not conducted any work at HOSDB to confirm this, but pass this news on for information.

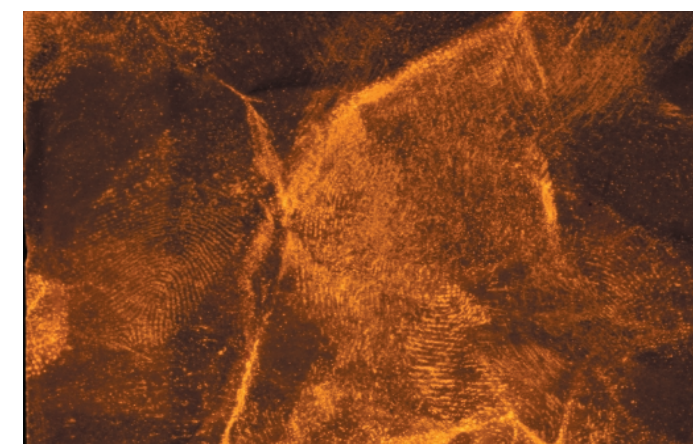
EQUIPMENT UPDATE

Schott Glass Filter Upgrades

It has been noticed that recent batches of Schott glass fluoresce. It is understood that this is because the Schott glass is now made in a different way. This has a detrimental effect on the numbers, quality and contrast of the fingerprints visualized by fluorescence.

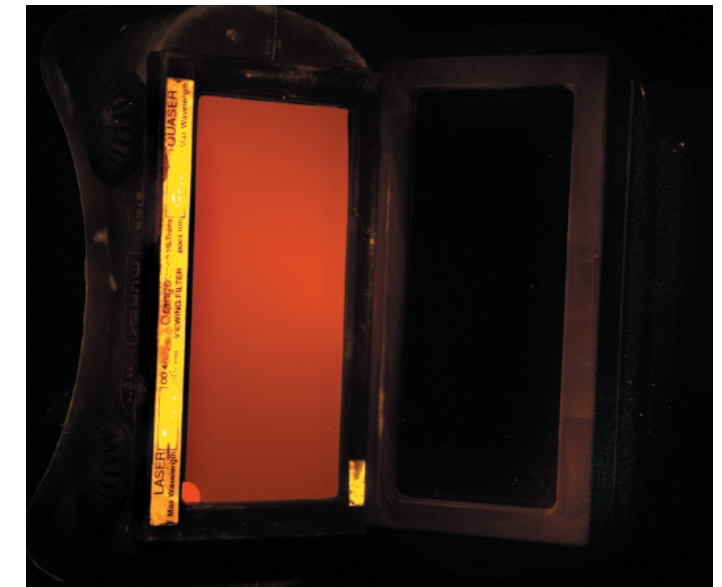


DFO fingerprint photographed using the fluorescing filter.



DFO fingerprint photographed using the upgraded filter.

If you notice that your Schott glass filters fluoresce they can be upgraded by the addition of a second filter.



An example of fluorescing Schott glass on the left and the new upgraded filter on the right.

Foster & Freeman will, at a cost, be able to upgrade your filters to correct the problem. Please contact Foster & Freeman for more information.

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IRIS Update

As indicated in the May 2006 Newsletter, HOSDB has now put in place a framework agreement with Perceptive Solutions for the ongoing support of IRIS workstations currently in service. Perceptive Solutions are experienced in the support of machine vision systems based on the scientific grade cameras used for IRIS. They will also call on the expertise of the developer of the IRIS Imager software. Support of the twenty-three systems

delivered prior to April 2006 will be transferred from HOSDB on 1 April 2007. Forces with IRIS have been informed of this change already.

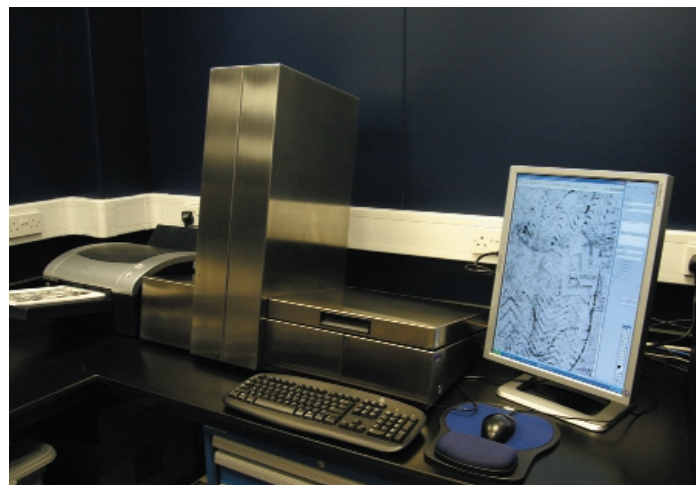
Two further IRIS workstations have been manufactured this year. Both of these systems have now been delivered, with the final system being supplied to Wiltshire Constabulary on 5 March 2007, making a total of twenty-five IRIS workstations produced in the HOSDB workshops.

We are now planning to identify whether there are commercial organisations who would be interested in taking on the manufacture of further workstations, subject to demand.

HOSDB will continue to have involvement in the development of the IRIS Imager software. It is used in the HOSDB laboratories to run specialist cameras including a UV imaging facility. Revisions to the software are currently underway to permit the import of a larger number of RAW file types and to allow perspective correction of fingerprint and footwear marks not taken at perpendicular angles to the mark.

Evaluation of GLScan

HOSDB recently purchased the GLScan system produced by BVDA for the scanning of gelatine lifts. We have been evaluating its capabilities for the imaging of fingerprints, footwear marks and indented writing. The GLScan system consists of a linescan camera combined with two high intensity, high angle light sources housed in a light-tight enclosure. The gelatine lift to be imaged is placed on a vacuum stage and traversed beneath the linescan camera, resulting in a high resolution (>1000ppi) image.



GLScan in the HOSDB laboratory

The lighting conditions have been optimised for black gel lifts, but lower intensity light sources are also available for the scanning of white gels.

Tests to date have demonstrated that the system is highly effective in the imaging of latent footwear marks lifted using black gel lifts, with good quality images being obtained from marks barely visible to the eye.

The technique has also been used to image latent fingerprints lifted from surfaces where it is suspected that contamination is present and powdering may not be effective. Operational results obtained from latent marks lifted in this way resulted in the HOSDB system being loaned to Gwent Police for operational work less than one week after delivery.

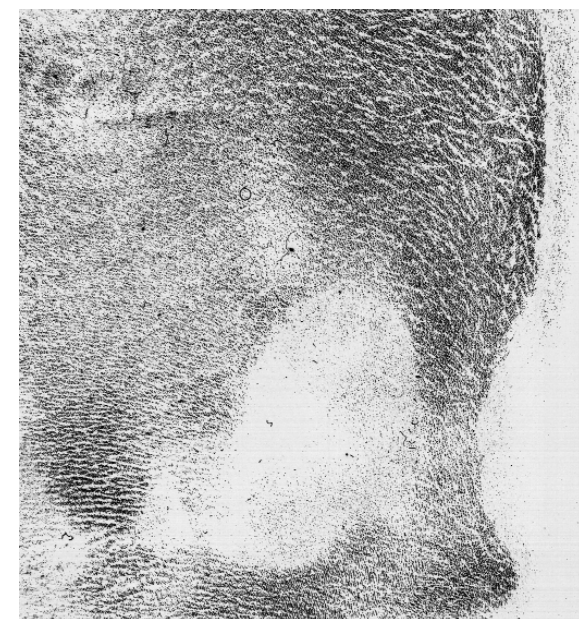
An assessment of the relative effectiveness of powdering and gel lifting of latent marks is reported elsewhere in this Newsletter.



GLScan image of a latent footwear mark, showing fainter marks from other shoes not previously visible to the eye.

Although the GLScan system has been optimised for the imaging of black gel lifts, attention is drawn to the fact that laboratory and imaging staff should also consider the use of alternative light sources for examination of gel lifts. In cases where there is more than one type of contaminant present on the gel, different lighting conditions may reveal additional information. An example is given below. Imaging of a dust mark lifted from skin using the GLScan reveals skin texture (a), whilst imaging using a digital SLR camera and low level oblique lighting (b) reveals the mark in dust.

a)



b)



Footwear mark in dust deposited on skin, a) imaged using GLScan, and b) imaged using digital SLR camera and low angle oblique light.

The intention is to use the GLScan system at HOSDB in a range of projects, including the assessment of different types of gelatine lifter. Forces requiring more information should contact one of the Fingerprint and Footwear Forensic Group for further details.

RECENT PUBLICATIONS

Powders Newsletters

Following completion of the powders project by Helen Bandey, a final publication has been sent to all forces. The Fingerprint Powders Guidelines (HOSDB Publication 09/07) is primarily for the attention of Scene of Crime personnel. The publication contains a summary of the recommendations contained in the three special edition newsletters (HOSDB Publications 54/04, 08/06 and 67/06) about the use of powders and is intended to provide the information in an easily accessible way.



Image of Tom Ciuksza from the Fingerprints Powders Guidelines publication.

The information included in the publications represents contributions from a number of HOSDB and other staff, to whom we are very grateful.