Introduction

Current methods for the examination of indented writing:

• ESDA
• Oblique lighting
• Silicon rubber casting
Limitations of current methods

- ESDA: limited range of substrates
- Oblique lighting: limited sensitivity
- Casting: limited sensitivity, slow

The solution: Gelatine lifting

- Black slab of gelatine with a rubber or polyester backing
- Surface is flexible and slightly tacky
- Used to lift (powdered) fingerprints from smooth surfaces
Mechanism

- Pressure and friction from writing breaks up the paper surface in the indentations
- Dust from broken up paper filler resides in indentation grooves
- Dust particles are lifted by the tacky gelatine foil

SEM photographs

Paper surface outside writing groove

Paper surface inside writing groove
SEM photographs

Surface Gelatine lifter outside writing groove

Surface Gelatine lifter inside writing groove

Experimental set-up

• examine 35 paper types (9 classes) with:
  – ESDA
  – oblique lighting
  – gelatine lifters

• other variables examined:
  – order of methods
  – sensitivity of GL method
Method for gelatine lifting

- lay paper on a flat surface
- peal off protective layer from slab
- apply gelatine slab

Method for gelatine lifting

- apply slight pressure with a roller
- peal off gelatine slab
- photograph slab
Imaging set-up

Image from gelatine lift
## Comparison of methods

<table>
<thead>
<tr>
<th>Class</th>
<th>Basis weight</th>
<th>ESDA</th>
<th>GL front</th>
<th>GL back</th>
<th>Obl. light</th>
</tr>
</thead>
<tbody>
<tr>
<td>laser copier paper</td>
<td>80-90</td>
<td>++</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Coated inkjet paper</td>
<td>90-100</td>
<td>++</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Inkjet photo paper</td>
<td>130-220</td>
<td>-</td>
<td>- *</td>
<td>++</td>
<td>+++</td>
</tr>
<tr>
<td>A4 Writing pad paper</td>
<td>80</td>
<td>+++</td>
<td>++</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Cover sheet writing pad</td>
<td>180-200</td>
<td>+</td>
<td>+++</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Glossy paper</td>
<td>90-100</td>
<td>+</td>
<td>+++</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Cheap print</td>
<td>60-100</td>
<td>+</td>
<td>+++</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>Glossy quality print</td>
<td>140-250</td>
<td>+</td>
<td>++</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>Airmail paper</td>
<td>22</td>
<td>+++</td>
<td>+++</td>
<td>++</td>
<td>+</td>
</tr>
</tbody>
</table>

* The adhesive force of the gelatine foil destroyed the paper coating.

---

## Example I (ESDA>GL>OL)

![Example image](image.png)

ESDA: Gelatine lift

Oblique light
Example II (GL>ESDA>OL)

ESDA

Gelatine lift

Oblique light

Example III (GL>ESDA>OL)

ESDA

Gelatine lift

Oblique light
Example IV (OL>GL>ESDA)

Sensitivity of Gelatine lifting

2nd underlying page 3rd underlying page
Order of ESDA and GL

- ESDA followed by gelatine lifting
  - no deterioration of image quality identified
- Gelatine lifting followed by ESDA
  - most often deterioration in image quality

Example I

ESDA before GL  ESDA after GL
Example II

Conclusion

• Gelatine lifting is an all-round method for the examination of indented impressions

• Gelatine lifting outperforms the ESDA on coated and printed paper and paper of high basis weight

• Gelatine lifting should be performed after electrostatic lifting
Precaution

- Gelatine lifting is partially detrimental to the examination of latent prints, depending on the paper surface and the method for latent print examination applied.

Future research

- The effects of document storage conditions on gelatine lifting
Acknowledgements

• Rolf Hofer, Zurich Canton Police
• Henk van den Heuvel, NFI (retired)