



Questioned Documents Section – 2011

J14 Optimal Methods for Developing Machine- Made Indentations on Paper

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After attending this presentation, attendees will learn various optimal techniques for developing the indentations on paper documents caused by modern business machines.

This presentation will impact the forensic science community by providing a guide for developing the best results of indentations on paper caused by business machines (printers, fax machines, and/or photocopiers).

For at least 30 years, document examiners have developed indentations of various types of paper fiber disturbances using an instrument known as an electrostatic detection device (EDD). An EDD is used most often to attempt to visualize impressions from handwriting, but it can also detect erasures, as well as other impressions in the paper. It has only been in the past several years that papers have discussed that an EDD can also develop indentations caused when a document comes in contact with the working parts of business machines (e.g., printers, fax machines, and photocopiers).

Inspired by a case in which distinctive machine indentations were found on a number of questioned documents, research was started to determine what indentations could be caused by a pair of photocopiers of the same make and model. A document can receive indentations from a photocopier in one of two ways: either as (1) as an original document being copied, if it is processed by an automated feeder mechanism; or (2) as a photocopy passing from a paper tray through the machine to the print and fixing mechanisms. Exemplars were created from the subject copiers by the two means listed above. The specimens were processed with an EDD known as an ESDA2 (manufactured by Foster + Freeman, Ltd.), in accordance with recommended operating instructions, using the cascade method of development.

The research revealed that although there were parts of the subject copiers that did come into contact with the paper, the development of indentations from this contact could not be guaranteed, and the extent of the indentations visualized was not consistent from specimen to specimen, despite the use of the same type of paper.

The purpose of this current research was to improve the quality and quantity of machine-made indentations on paper by attempting to determine the optimum conditions for their development.

Specimens were created using a single type of paper and were passed through a photocopier known to create indentations. Two different EDDs were used for the processing, an ESDA and an ESDA2 machine. All possible means of image development were attempted: (1) development by the aerosol application of toner powder; (2) development by the application of toner covered cascade beads; and, (3) development by the use of a toner activation device (TAD). Different orientations of holding the corona wand were tried to vary the distribution of an electrostatic charge on the document's surface. Specimens were developed both with and without humidification, and they were processed at different times of the year, with different levels of relative humidity in the processing room.

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