



J33 An Examination of the Influence of Various Parameters on the Quality of Laser Printer Printouts

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Learning Overview: The goal of this presentation is to show attendees how variable print parameters of laser printers and various file formats can affect the print quality of laser printers.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by raising awareness that print quality of laser printers, apart from other parameters such as substrates, replacement toners, etc., are greatly influenced by the variable parameters of the printer itself as well as the file format being printed.

Forensic document examiners are often asked to determine whether two or more laser-printed documents were produced by the same laser printer. The examination of questioned documents can be performed using multiple techniques, such as microscopic examination, physical examination, and chemical examination (Fourier Transform Infrared Spectroscopy (FTIR), X-ray microanalysis, etc.). The physical analysis includes examinations of toners (type, fusion methods, etc.), possible printer identifying characteristics (roller marks, repetitive defects marks, etc.), and printout quality.

The goal of this study was to determine in which way the variable printer's parameters, such as print resolution, color or black/white printing, etc., as well as different file format (.txt, .pdf, .jpg, .png), have influence on printout quality. In the present study, more than 200 printout samples were taken from five different color laser printers. The number of printed samples on each printer depended on the number of their predefined variable parameters. Several files were used for printing on each of the printers; one file was created in MS Word® (letters and numbers in Arial and Times New Roman font), then saved in different file formats (.txt file, high-compressed .pdf file, low-compressed .pdf file); another file was a .pdf file containing letters, numbers, graphics, vectors, and images. Standard office paper (A4, 80g/m²) was used for preparing these samples. The examinations of samples were performed using non-destructive methods, such as video-spectral and stereomicroscopic analysis.

This study has shown that changing the parameters of the printer itself and changing the file format that is printed on the same printer causes significant differences in print quality. For example, there is a significant difference in letter size and the shape of the same letters and numbers between the print samples of a file saved as a high-compressed PDF file and a file saved in plain TXT format. Furthermore, changing the printer resolution and other available parameters, such as color balance, edge control, halftone options, RGB graphics, etc., also have a great effect on the printout quality.

Based on the results obtained, it is possible to conclude that the document experts should know that the differences in the printing quality of two or more of the questioned documents do not necessarily mean that they are manufactured on different laser printers and that other available test methods are needed to provide more reliable conclusions.

Laser Printers, Variable Parameters, Printout Quality