J29 Alternative Methods for Dry Seal Analysis

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After attending this presentation, attendees will gain a better understanding of traditional and unconventional non-destructive methods to examine dry seal impressions.

This presentation will impact the forensic science community by demonstrating new and different types of methods that can be used when traditional methods of dry seal examination are unsuccessful or insufficient. The goal of this research is to determine under what circumstance each technique will demonstrate an advantage over the other.

A dry seal is a non-inked mechanical device which embosses a design on a substrate. A dry seal impression is fixed on the substrate by application of two complementary metal plates, one a positive die with the design of the seal raised on its surface, the other a negative die with the depressed design.[1] Historically, dry seal devices have been used by notaries to verify legal documents, as stationers' embossments to identify the paper manufacturer or business, on architectural or engineering construction documents, or land survey drawings, to certify the identity of the licensed professional who supervised the development.[2,3,4] Dry seals continue to play a role in the forensic science community and are used by forensic document examiners to assist in authenticating passports and other identification documents. They can be used as a security feature, associating a photograph, text, or signature to a page, by compressing or permanently affecting the paper fibers, making alteration or replacement difficult. Some forgers, rather than attempting to replicate the design of a genuine seal, use a similar seal to make a weak impression in hopes that no one will detect the deception.[1,2] The Homeland Security Investigations Forensic Laboratory (HSI-FL) is tasked with determining if a document has been altered, which may include authenticating dry seals on passports, birth certificates, and other types of identification documents.

The dry seal impressions used for this research will be obtained from a variety of sources, including laboratory casework, specimens from the forensic laboratory reference library, and self-generated specimens. This experiment will strive to incorporate impressions of varying degrees of quality and depth. The dry seal impressions will be placed into three categories based on the clarity of the impression. Impressions that have all of the details including the texts and pictographic elements distinctly visible will be placed into Category I, impressions that have some of the details visible will be placed into Category II, and Category III will include impressions with no observable details. The categorization will be reviewed by other examiners not associated with this research project. A diverse selection of methods and instrumentation, including the traditional methods using oblique lighting, the Video Spectral Comparator 6000 (VSC), microscopy and unconventional techniques using the Electrostatic Detection Apparatus (ESDA), and Reflectance Transformation Imaging (RTI) will be applied in this research. The toner bead cascade method, the toner pad, the aerosol development hood, and a dry erase marker will be used in conjunction with the ESDA equipment. Reflectance Transformation Imaging (RTI) is a new imaging technique based upon the combination of multiple digital images of an object illuminated from different angles. The object and the camera are in a fixed position which allows for the creation of a composite image from several images. The results obtained from this research will expose forensic document examiners to other techniques available for dry seal examination.

References:

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3. National Society of Professional Engineers. (2012, July). What is a PE? Available: http://www.nspe.org/Licensure/WhatisaPE/ index.html
4. Phinney, F.G. (2008, July, August, September) Rule and Regulation Change Allowing the Construction and Use of Computerized Seals. Kansas State Board of Technical Professionals Newsletter, 13 (3), 1

Dry Seals, ESDA, VSC, RTI, Microscope

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