



## Questioned Documents Section - 2013

### J22 A Crosscut Shredded Document Case Made Easier — Predicting Where the Pieces Go

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After attending this presentation, attendees will learn some of the characteristics of crosscut paper shredders and shredder “chad” (the shredded pieces), and more importantly, understand some of the techniques that can facilitate the manual re-assembly of shredded documents.

This presentation will impact the forensic science community by proposing a methodology to make the process of manually reassembling a shredded document easier.

A small bag of crosscut shredded documents was received for reassembly in the hopes of providing evidence in a case of identity theft and the filing of false tax returns. Several of the documents shredded were self-adhesive memos. Some of the notes had apparently been stuck to each other before shredding, and some had been attached to other documents. Due to the random position of the notes, they became shredded in different orientations to the shredder “mouth,” which resulted in bits and pieces of the same type of paper in various sizes and shapes.

Little could be found in the literature outlining a practical methodology for reassembling shredded documents. Some of the difficulties encountered in reassembling shredded documents are: (1) many pieces are of the same size and shape; (2) many pieces are very small, deformed and/or stuck together; (3) some pieces are likely to be missing; (4) paper chad are often very delicate and difficult to handle; and most significantly, (5) the examiner typically has no final design to work toward (this problem is akin to attempting to complete many different picture puzzles thrown together on same table).

The hypothesis presented is that it is possible to predict the precise pattern into which a document was shredded. This can be done by first making some rudimentary measurements of the shredded chad. Next, the pattern observed that is formed by the crosscuts on even a small portion of reassembled chad can be extrapolated to predict the overall pattern into which the document was shredded. Several preliminary steps for sorting the chad (based on size, shape, shred direction, border angles) eventually allow for the more rapid location of a desired piece to fit into the pattern.

A methodology for the complete (ideal) reassembly of a shredded document is proposed. This includes, in part, the following steps: (1) sorting chad by color and type of paper, and by markings present; (2) making measurements or comparisons of the chad width, chad length, and the angles formed by the machine-cut edges and the shredded edges; (3) orienting the chad in the shredder direction, (4) creating a template for assembly and a grid for aligning the chad; and, (5) creating a grid of the pattern of the shred over the entire document.

Through the use of the methodology described, at least nineteen documents in the case were able to be either totally or partially re-assembled.

Also presented will be some results of a related research project of examining the chad produced by shredders of several makes and models.

**Paper Shredder, Shredded Documents, Document Reconstruction**