E64 A Forensic Comparison of Cable Ties to Create a Database

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Learning Overview: The goal of this presentation is to show the variation in characteristics with cable ties and their potential usefulness as physical evidence.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing the foundation for a cable tie database. This database could eventually provide valuable investigative leads in forensic cases.

Cable ties are often overlooked as forensic evidence since their characterization has not been extensively studied. However, cable ties may be used in criminal events in a variety of capacities, such as binding the hands of victims, in the design of homemade explosives, and during strangulations. Cable ties are made by injecting molten nylon plastic into metal molds. Two metal plates with a certain number of molds are brought together and the molten plastic injected. Each cable tie mold on the metal plate has a series of numbers and letters. Often, the molds are in numerical order and the highest number is the maximum number of cable ties that can be formed from one batch on that machine. The molten plastic is then ejected from the mold using pins.[1] Due to the nature of the manufacturing process, class and individual characteristics are created.

Class characteristics of the cable ties include general dimensions, color, and the mold number/letter combination impressions. To document all class characteristics for future use and comparison, cable ties were purchased from various national hardware stores. To start the database, a total of 29 bags of cable ties were purchased from Lowe's®, Home Depot®, and Harbor Freight®. From each store, 8", 11", and $^{14}/_{15}$" cable ties were purchased. Ten cable ties were randomly selected from each store and size for examination. Twenty-five areas were selected to be measured or observed from different areas of the cable tie, including the clasp, body, and tail. These measurements and observations were made using a calibrated digital caliper and a stereomicroscope. The measurements were averaged over the sampled cable ties and a 95% confidence interval was calculated for each class characteristic.

Pin impressions from each manufacturing mold leave individual characteristic striation patterns on cable ties. When the plastic is ejected from the mold, striations can be imparted onto the malleable plastic. With larger quantity bags of cable ties, there are often multiple cable ties with the same mold number. Thus, cable ties with the same mold number impression can be compared to each other. To study how strongly the striation pattern matches between cable ties of the same mold and between ties of different molds, 12 bags of 100 cable ties were purchased from Nelco™ Cable Ties (Pembroke, MA). The 12 bags were from four separate lots. The first six bags were from the manufacturer Hua Wei Industrial (Taiwan) and were natural colored. The next six bags were black colored and from the manufacturer Kai Suh Enterprise (Taiwan). The majority of the bags had mold numbers in numerical order with multiple cable ties with the same mold number. The cable ties with the same mold number were compared to each other and had high amounts of matching striations whereas cable ties of different mold numbers had almost no matching striations. This indicates that matching striations are successfully transferred to cable ties with the same mold numbers.

Creating a cable tie database could be an extremely useful tool for forensic investigations. A database containing multiple measurements will yield a better chance for successful identification of brand/manufacturer. A large enough database may even provide an estimate to the likelihood of finding a particular cable tie from a random location, such as a crime scene. This study shows the potential evidentiary value of cable ties and should provide a practical reason for their collection by crime scene personnel and their subsequent examination in the laboratory.

Reference(s):

1. Gorn M., Hamer P. The forensic examination of cable ties. *J Forensic Ident.* 2006;56:744-755.

Cable Ties, Database, Class and Individual Characteristic

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