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The Identification of Cut Multistranded Wires

The theft of electrical equipment often involves the cutting of attached wires to expedite removal of the equipment. This situation presents the investigator with the problem of determining that wire segments attached to stolen articles were at one time joined to wire segments at the site of the theft. The usual approach taken by the forensic scientist is to effect an identification by demonstrating a physical match between the cut ends of the wire segments. Other methods utilized to compare cut wire segments include quantitative comparison of trace elements by neutron activation analysis [*1,2*] and by emission spectrography [*3*].

In those instances where the wires are cut with a comparatively dull tool, such as side-cutting pliers, the wire and insulation sustain extensive deformation which effectively precludes a physical match for identification purposes. An alternative method has, therefore, been developed by the authors for the identification of cut multistranded wires where the wires are insulated with plastic material.

Method

A 1 or 2-cm length of the plastic insulation is stripped from each cut end of the wire segments (Fig. 1). A cast of the interior of each insulation segment is prepared by injecting Jelcone®[3] Dental Impression material with the aid of a disposable hypodermic syringe with the needle removed. The casts are allowed to set and then removed from the insulation segments. Each cast represents an exact replica of the pattern produced in the insulation by the stranded wires in the insulating process. The casts are mounted in modeling clay and oriented in opposite directions under a low power comparison microscope. Where the wire segments have been joined, the impressions of the individual wire strands can be seen to run together around the entire circumference of the casts (Fig. 2), as though the viewer were looking at the original wire strands with the insulation removed.

Discussion

This method relies upon the variations noted in the pattern produced in the insulation by the outer wire strands in the multistranded wires. The stranding machines are designed to produce a uniform pattern [*4*], but inspection of the insulation casts

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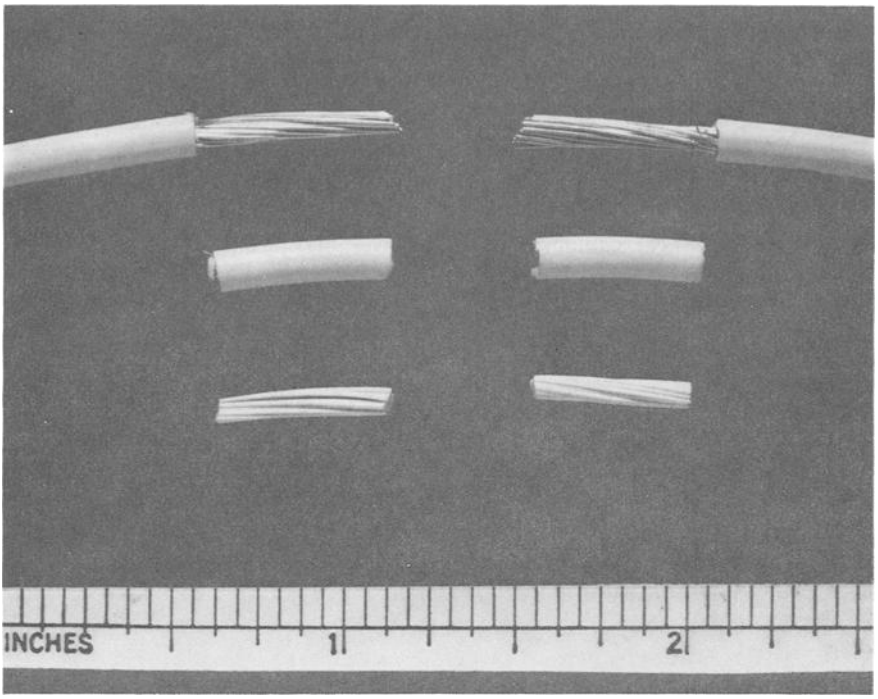

FIG. 1—*Preparation of insulation interior casts:* (top) *wires with insulation segments removed,* (center) *segments of stripped wire insulation, and* (bottom) *Jelcone® casts of insulation segments.*

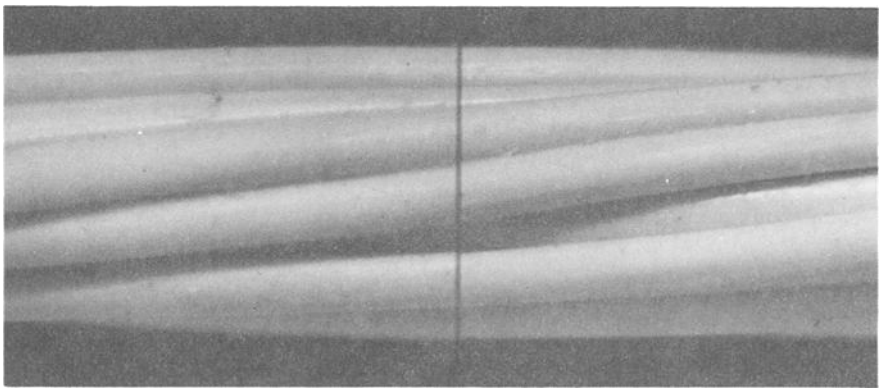

FIG. 2—*Comparison of insulation casts on bullet comparison microscope.*

indicates that a somewhat random variation in the pattern is produced. Some species of multistranded wires are produced with an exact uniformity in the twist [5], and this method is expected to by of less value with this type of wire. Moreover, the possibility of a repetition of the pattern at some other locus in randomly patterned wire cannot entirely be discounted, and the method is not considered an absolute identification. Other parameters, such as insulation color, exterior extrusion marks, and color stripes, often can be utilized to aid in the identification.

Summary

A method for the comparison of cut multistranded wires is described. The method involves preparation of silicone rubber casts of the plastic insulation interior adjacent to the cut area, and subsequent comparison of the casts utilizing the low power comparison microscope.

References

[1] Caldwell, R. J., "Comparison of PVC Coated Samples of Copper Cable by Neutron Activation Analysis," *Journal of the Forensic Science Society*, Vol. 10, 1970, pp. 69-72.
[2] Chan, R. K. H., "Identification of Single-Stranded Copper Wires by Nondestructive Neutron Activation Analysis," *Journal of Forensic Sciences*, JFSCA, Vol. 17, No. 1. 1972, pp. 93-96.
[3] Chan, R. K. H. and Li, A. H., "Comparison of Single-Stranded Copper Wires by Spectrochemical Analysis Using Copper Flouride as a Carrier," *Journal of Forensic Sciences*, JFSCA, Vol. 18, No. 3, 1973, pp. 271-274.
[4] Kerwin, E. R., General Electric Wire and Cable Products Department, personal communication, 4 Aug. 1972.
[5] Fennell, T. F., International Telephone and Telegraph, personal communication, 27 July 1972.

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