

	TRACE-PM 3.0 Fibers Analysis	
	<i>Document #: 7350</i>	<i>Page 1 of 3</i>
	<i>Revision #: 2</i>	<i>Issued Date: 09/17/2020</i>
	<i>Document Manager: Cheryl Lozen</i>	<i>Approved By: Ryan Larrison</i>

3.0 Fibers Analysis

Also see:

- 3.1 Common Natural Fibers
- 3.2 Fabric Impressions
- 3.3 Refractive Index Fiber Analysis
- 3.4 Buttons, Fasteners, and Attaching Threads
- 3.5 Ropes and Knots
- 3.6 Fiber Sampling and Sample Collection
- 3.7 Fibers Solubility
- 3.8 Fiber Yarns to Fabrics
- 3.9 Fiber Cross-Sectioning
- 3.10 Fibers FTIR Microscope
- 3.11 Fibers Microscopic Comparison
- 3.12 Fabric Damage (example: cut vs. tear)

Fiber Analysis Introduction and Method Summary

Introduction

Forensic fiber analysis is typically a comparison of two or more fibers, usually from a questioned source and a known source for the purpose of determining if the known source can be eliminated or included as a potential donor of the questioned fiber(s).

Fiber examinations may include the identification of the fiber type or end use possibilities to provide investigative information when a known source is not provided/available for comparison.

Textile fibers are transferred either by direct (primary) transfer or indirect (secondary, tertiary) transfer. The likelihood of transfer depends on the types of fabric or surface involved in the contact and the nature and duration of the contact. Contact with a textile can result in both passive and forceful transfers. In the case of forceful contact (i.e., a motor vehicle striking a pedestrian) fibers can be transferred in an abraded or smeared form which is characteristic of forceful contact.

	TRACE-PM 3.0 Fibers Analysis	
	<i>Document #: 7350</i>	<i>Page 2 of 3</i>
	<i>Revision #: 2</i>	<i>Issued Date: 09/17/2020</i>
	<i>Document Manager: Cheryl Lozen</i>	<i>Approved By: Ryan Larrison</i>

Fibers can be divided into two categories, natural and man-made. Each category contains a wide variety of generic classes and subclasses. The forensic scientist has to be not only knowledgeable in fiber classification but also knowledgeable in fiber transfers, fiber collection, fiber and fabric manufacture information, and methods of fiber identification and comparison.

Scope

This procedure contains various fiber analysis methods intended for use by FSD forensic fiber examiners. The particular methods employed by each examiner, laboratory, or both will depend upon sample size, sample suitability, laboratory equipment, and examiner preference.

Summary of Test Method

There are several activities involved in a fiber analysis: overall case assessment, collection of fibers, preparation of the samples for analysis, analysis using appropriate methods, interpretation/significance decisions and reporting.

The examiner normally approaches the fiber comparison by setting out to show that the samples being compared are not similar. The failure to detect any significant differences, after exhausting the methodology available to the examiner, necessitates the conclusion that the fibers could have the same origin. The comparison process can be as simple as visual examination to as complex as several instrumental methods.

The various analytical methods available for fiber analysis yield different kinds of information. Although these activities are independent of each other, any one of them can have a significant effect on another. Ultimately, it is the examiner's responsibility to choose an analytical scheme that provides the greatest discrimination between samples. It is highly desirable to select a combination of methods and apply them in an order that provides the most exclusionary information first. By doing this, the examiner optimizes accuracy, precision, and production while most effectively using the laboratory's resources.

A typical analytical scheme may include visual and microscopical examination to compare physical and optical characteristics such as shape, diameter, color, texture, presence/absence of inclusions, delustrants, fluorescence etc., and instrumental analysis to examine/compare chemical composition (infrared spectroscopy) and to further compare color (microspectrophotometry).

Significance and Use

Analytical methodology has a direct impact on significant assessments. Fiber comparisons commonly consist of determining if a questioned fiber(s) exhibits the same color, chemical, microscopical, and optical properties as fiber(s) comprising part or all of a known sample. Fibers/textiles can only provide positive identification associations in the case where there is a fracture match of textiles products along damaged, torn or cut edges.

In reporting an association, a statement of lower significance may be warranted if the analytical scheme is not inclusive of the assessment of the aforementioned physical characteristics, as well as both organic and measured color properties. A statement of greater significance may be warranted if a more sensitive method with more discrimination power is used. In addition, lower or higher levels of associations may be

	TRACE-PM 3.0 Fibers Analysis	
	<i>Document #: 7350</i>	<i>Page 3 of 3</i>
	<i>Revision #: 2</i>	<i>Issued Date: 09/17/2020</i>
	<i>Document Manager: Cheryl Lozen</i>	<i>Approved By: Ryan Larrison</i>

stated based on published discrimination studies as well as product manufacturing and distribution information concerning the relevant population.

Also see [TRACE-PM 1.2 Report Conclusions](#)