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### **B155 Frequency of Occurrence of Original Equipment Manufacturer (OEM) Automotive Refinishes Using the Paint Data Query Database**

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The goal of this presentation is to provide a basis for determining the potential significance in observing an OEM refinish in automotive paint comparisons.

This presentation will impact the forensic science community by illustrating how awareness of the rate of occurrence of OEM refinishes will assist paint examiners in determining the strength that may be assigned to conclusions in comparative associations. The rate observed in 1,000 samples will be provided along with the number of OEM topcoats observed within each refinish, which can also affect significance.

In recent years, the Paint subgroup within the Scientific Working Group for Materials Analysis has attempted to develop language that would convey significance of association in comparative paint examinations. The strength of association in reporting a fracture match or the discrimination of paint chips with obvious differences in physical or chemical characteristics can be conveyed using relatively straightforward text. Likewise, the rationale for associating a standard four-layer OEM paint chip with a known vehicle(s) of corresponding layer construction and chemical compositions can be succinctly described as long as appropriate caveats are in place to alert the reader to the existence of other vehicles also painted in the same manner.

Within the extremes of identification and elimination and somewhat proximal to the confines of the “middle road,” there exists the circumstances of associations that may be considered stronger or weaker than the “norm.” An architectural refinish layer on an automotive paint chip would be unusual. The absence of primers in a partial layer system paint chip transfer would weaken the strength of association that could be conveyed. Within these further classifications, where would an analyst place the significance of association of an OEM refinish paint chip comparison between a known source and a questioned paint chip?

To address this circumstance, the frequency of occurrence of an OEM refinish must be considered as well as the number of layers of refinish that are present between the comparison samples. Moreover, the number of refinish layers that are permissible in an OEM repair should also be known.

To gain some knowledge of the frequency with which OEM repairs occur, the physical samples used to populate the Paint Data Query (PDQ) database were assessed for OEM refinishes. Approximately 1,000 samples representing model years 2000-2013 were microscopically examined. Samples containing refinish topcoat layers (e.g., clear/basecoat layers over a typical four-layer OEM layer system) were noted. Visual indicators of basecoat consistency included comparable appearance with respect to color, flake distribution in a metallic finish, number of layers (e.g., tri-coat finishes), relative layer thicknesses, and thickness uniformity across the layer. The clear coat layers of the first and last topcoats were then analyzed by Fourier Transform Infrared (FTIR) spectroscopy to confirm the consistency of an OEM binder formulation between these systems.

The frequency of occurrence results for this study were on par or lower than reported industry expectations or standards for OEM refinish of topcoat systems. Further, the greatest number of OEM topcoat repairs observed was one; however, up to three topcoat OEM refinishes were observed on vehicles by two different manufacturers. All manufacturers are not equally represented in PDQ and not all were represented in the population of OEM refinishes observed nor was the rate of OEM repair correlated to a particular plant or model.

This study was intended to highlight the need for interpretative statements in comparative examinations. While some comparisons of mass-produced manmade materials are straightforward, it is not uncommon to encounter samples that require further discussion to strengthen or weaken the degree to which the items may be considered to be “associated.” It is hoped this work will promote further discussion with respect to the inclusion of interpretative language in comparison reports.

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#### **OEM Refinishes, Interpretation, Paint Data Query**