C32 Vehicle Live Burns

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After attending this presentation, attendees will understand the comparison of fire evolution in identical vehicles with fires set at different locations. Temperature measurements correlated with video of the fires will be presented for four instrumented vehicle fires.

This presentation will impact the forensic community and/or humanity by aiding fire investigators in the determination of the origin and the cause of vehicular fires.

On April 24, 2006, Advanced Engineering Associates Inc., in conjunction with Progressive Insurance Company, conducted a live vehicular burn training exercise at Adesa Impact in Tampa, Florida. Four separate and distinct vehicles were ignited and allowed to burn. Two of the vehicles were allowed to burn to completion, and the other two were burned to various degrees in order to simulate real life vehicle burns as encountered in the field. All the vehicles were fully instrumented with K-Type thermocouples and the burns were photographed and video taped. The temperatures at various locations in the vehicles were recorded. These tests were partially performed in order to dispel myths that exist about the development, evolution, and venting of the fires in vehicles.

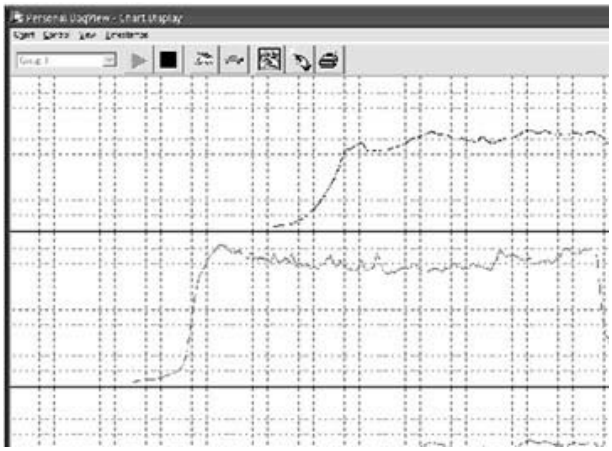
Of particular interest to the investigators was the development of fires in two identical vehicles that were started at different locations with the same fuel load and the same venting scenario. The venting scenario is governed by the ventilation factor and described by the equation:

$$H_{rr} = 750 A_o (h_o)^{1/2}$$

where

H_{rr} = Heat release rate (KW)
A_o = Ventilation opening (m^2)
h_o = height of opening (meters)

The temperature graphs of the two identical vehicles were used to correlate the fire patterns after the extinguishment of the fires. The fire patterns were then analyzed to determine the origin of the two fires. The comparison of the two identical vehicle fires reveals that fire pattern analysis, when properly interpreted, can reveal the origin of the fire in vehicles. Fire patterns in vehicles are indicative of the fire origin even though the vehicles are completely consumed.



The other two vehicle fires demonstrate different scenarios of fire development and the effect of different venting and interior volume on the progression of the fire. The effect of a large interior volume and significant venting area produce exceedingly rapid-fire development while small volume and small venting area produce a slow fire progression. The difference is quite dramatic as the fires vary in development between ten and thirty minutes. These fire tests also verify the considerable fuel load that is present in the interiors of the modern

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vehicle.

The thermographs and the scenarios of the fires for each vehicle will be made available to the participants. These scenarios include the fuel load and the method of ignition for each of the fires. This presentation should aid the fire investigator of vehicular fires in the recognition and analysis of fires they investigate. The presentation will also include video clips of the live burns and pertinent photographs. A graph of one of the fires is shown below.

Fire Evolution, Fire Patterns, Ventilation

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