

*An interactive, hands-on course on the fundamentals
of fire science and evidence analysis techniques.
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Fundamentals of Motor Vehicle Fire Investigation

October 26-28, 2009

Exponent, Inc.
Phoenix, Arizona, USA

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seminars

Fundamentals of Motor Vehicle Fire Investigation

October 26-28, 2009

The manner in which a motor vehicle fire is initiated and subsequently spreads is dependent on a number of complex, interdependent, phenomena including combustion kinetics, heat transfer and fluid dynamics. Because the damage caused by a fire is coupled to these phenomena, damage patterns can sometimes be used to understand certain characteristics about the fire. In many cases, the goal is to determine the cause and origin of the fire.

In this highly interactive, hands-on course, participants will acquire a working knowledge of fire science and be able to use this knowledge to assess possible ignition mechanisms, evaluate burn patterns, and analyze fire spread. This seminar will also explore the interpretation and limitations of the physical evidence from a fire scene. The approach to collecting and retaining important physical evidence, and laboratory techniques to examine this evidence, will also be described. As an in-class project, participants will have the opportunity to inspect several burned vehicles, predict cause and origin and compare findings to the actual cause and origin of the fire, as shown in burn test videos.

Learning Objectives

By attending this seminar, you will be able to:

- Apply fundamental combustion concepts to evaluate possible ignition mechanisms, burn patterns, and fire spread
- Recognize the value and limitations of burn patterns to determine the area of origin of a fire
- Describe the typical burning characteristics of motor vehicle fires
- Identify and retain important physical evidence during a structure or vehicle fire inspection
- Utilize laboratory techniques to evaluate physical evidence recovered from a fire scene

Who Should Attend

This seminar is designed for engineers, scientists, investigators and consultants involved in the investigation of vehicle fires.

Prerequisites

An engineering degree in any discipline would be beneficial.

IMPORTANT INFORMATION

Continuing Education Units (CEU)

SAE Professional Development has been approved as an Authorized Provider by the International Association for Continuing Education and Training (IACET), 1760 Old Meadow Road, Suite 500, McLean, Virginia 22102; (703) 506-3275



Satisfaction Guarantee

If you are not 100% satisfied, SAE will refund your registration fee in full or give you a credit to a future seminar. We make this offer because SAE seminars are taught by highly qualified industry or academic experts, and we know that this seminar will meet or EXCEED your expectations. SAE is committed to providing you with the highest quality in technical training available to engineers.



If you have a disability that may impact your participation in this seminar, please call 2 weeks prior to the start date so that we can address your needs.

Cancellations - If you cannot attend, you may send a substitute or transfer to a future offering. A full refund is issued if you notify SAE at least 14 days prior to seminar start date. If canceled less than 14 days prior, the full fee is charged. For \$50, you may process a one-time transfer to a future offering within one year of canceled seminar. Canceling may reduce group discounts. To cancel, transfer or send a substitute, call SAE Customer Service (numbers listed above). For the SAE membership registration rates, member dues must be current at the start of the event.

Note: SAE reserves the right to change instructors or cancel seminars and cannot be held responsible for costs incurred other than the registration fee. Prices subject to change.

SEMINAR CONTENT

DAY ONE

- Combustion Fundamentals
 - Global and elemental combustion reactions
 - Heat release due to combustion
 - Combustion kinetics
 - General ignition mechanism
 - Flame structure
- Combustion Properties
 - Flammability limits
 - Flash point
 - Auto ignition
 - Piloted and unpiloted ignition of solids
- Ignition Mechanisms
 - Electrical sparks and arcs
 - Mechanical sparks
 - Resistive heating
 - Hot surfaces
 - Thermal radiation
- Vehicle Systems and Associated Ignition Mechanisms
 - Electrical system
 - Fuel system
 - Lubricant systems
 - Exhaust system
 - Brake system/overheated bearings
- Structures/garages and Associated Ignition Mechanisms
 - Electrical system
 - Power tools/equipment
 - Consumer electronics/extension cords
 - Heaters/cooking appliances
 - Oily rags/spontaneous combustion
 - Smoking materials

DAY TWO

- Fire Dynamics in Structures/garages
 - Fire growth rate and flame propagation
 - Effect of fuel load and ventilation
 - Flashover
 - Temperature versus time
- Fire Dynamics in Vehicles
 - Fire growth rate and flame propagation
 - Effect of fuel load and ventilation
 - Flashover
 - Temperature versus time
 - Time to untenable conditions
 - Effect of collision damage on flame spread
- Physical Evidence Interpretation
 - Burned/consumed combustible material
 - Melted metals
 - Oxidation of steel surfaces
 - Melted/beaded copper wires
 - Arcing-through-char
- Arcing-through Char Laboratory Demonstration
- Vehicle Fire Investigation Techniques
 - Information gathering
 - Interpretation of burn patterns
 - Evidence processing and preservation
 - Origin determination
 - Cause determination

- Structure/garage Fire Investigation Techniques
 - Information gathering
 - Interpretation of burn patterns
 - Scene processing and evidence preservation
 - Origin determination
 - Cause determination
- Laboratory Examination of Evidence

DAY THREE

- Introduction to Vehicle Inspection Class Project
 - Define circumstances prior to each vehicle fire
- Group Vehicle Inspections
 - Groups determine the cause and origin of each fire
- Group Discussion about Findings
- Review Video of Vehicle Burn Tests
- Discussion about Interpretation of Burn Patterns
- Summary

Instructor: Jeff Colwell

Dr. Jeff Colwell is a Principal Engineer in Exponent's Thermal Sciences practice in Phoenix, Arizona where he specializes in the engineering analysis of thermal and combustion processes, especially the cause, origin, and propagation of fires and explosions. Dr. Colwell has particular expertise investigating fires associated with automobiles, recreation vehicles, motorcycles, and heavy trucks, where typical fire scenarios include post-collision fires, structure fires involving vehicles, and fires that occur while the vehicle is being operated. He analyzes how these fire scenarios, along with vehicle design, operation, maintenance, repair, and aftermarket equipment, are related to mechanisms of fire causation, growth rate, and spread. He has specialized expertise in designing and conducting both component and full-scale tests to evaluate these complex relationships. Prior to joining Exponent, Dr. Colwell held research positions at AlliedSignal Aerospace, the Combustion Laboratory at Arizona State University, the High Temperature Gas Dynamics Laboratory at Stanford University, and the Thermal Sciences and Propulsion Center at Purdue University. He has a B.S. in Mechanical Engineering from the University of Wyoming, a M.S. in Mechanical Engineering from Purdue University, a M.S. in Engineering from Stanford university and a Ph.D. in Mechanical Engineering from Airzona State University.

Registration Information

Fundamentals of Motor Vehicle Fire Investigation
CEUs awarded upon completion: 2.0
Fees: \$1,355; SAE Members: \$1,225
When registering, refer to I.D. #C0915

To Register

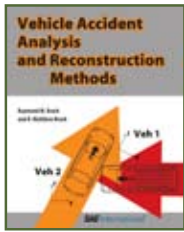
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Forensic Analysis of Medical Records in Injury Biomechanics and Accident Reconstruction Studies Seminar

With accident reconstruction becoming an increasingly interdisciplinary field, this seminar will help safety professionals in various disciplines learn how to read medical records, and gain a greater awareness of their informational value. (I.D. # C0402; \$1,115 List/\$995 Member; November 9-10, 2009; Troy, Michigan)

Vehicle Accident Reconstruction Methods Seminar

This seminar is devoted to the exposition, use and limitations of the engineering, scientific and mathematical principles and methods used to reconstruct vehicular accidents. The course covers a wide range of topics including uncertainty, impact mechanics, tire mechanics, vehicle-pedestrian impacts and vehicle dynamics. (I.D. #C0416; \$1,285 List/\$1,165 Member; December 10-11, 2009, Troy, Michigan)



Vehicle Accident Analysis and Reconstruction Methods

Raymond M. Brach and R. Matthew Brach

Intended for seasoned practitioners and those entering the field of

accident reconstruction, this book looks at the problems reconstructionists encounter from day to day, and the types of methods used. Readers are guided through practical examples that show how, when, and why many problems occur – key requirements for designing safer vehicles, handling insurance claims, and litigating court cases. (R-311; \$119.95 List/\$95.96 Member)



Forensic Biomechanics: Using Medical Records to Study Injury Mechanisms

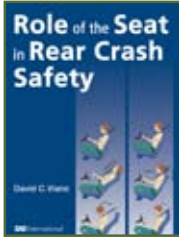
By Jeffrey A. Pike

Designed to help safety professionals in various disciplines learn how to read medical records, this

book reveals the types of information these records contain and the insight they can provide on critical issues such as restraint usage and deployment, injury mechanisms, severity and outcome, and the effects of prior medical conditions. Case studies look at real-world examples of the use of medical records in situations involving factors such as pre-existing conditions and high-speed rear impact. (R-379; 99.95 List/\$79.96 SAE Member)

New Fire Safety, 2009

Seven papers from the SAE 2009 World Congress which cover a broad range of vehicle fire issues including statistical analysis of vehicle fires, ignition mechanisms, hydrogen vehicle safety and testing, fire suppression, and vehicle fire case studies. (SP-2227; \$69.95 List/\$55.96 Member)



Role of the Seat in Rear Crash Safety

By David C. Viano

This book addresses the historic debate over seatback stiffness, energy absorbing yielding, occupant retention, and whiplash prevention, providing a scientific

foundation for the direction GM pursued in the development and validation of future seat designs. Also covered are: the need for occupant retention in severe rear crashes; the need for an adequately positioned head restraint; and changes in the compliance of the seatback to lower the risks of whiplash in low-speed crashes. (R-317; \$49.99 List/\$39.99 Member)



Crash Reconstruction Research: 20 Years of Progress (1988 - 2007)

Edited by Michael S. Varat

Over the past 20 years, ongoing research has continually enhanced crash reconstructionists' knowledge of the

application of physical laws in this field. This book features 47 papers that have presented significant steps forward, focusing on advances in fields such as: Planar Impact Mechanics; Stiffness Modeling; Crash Pulse Analysis; Pedestrian Crashes; Braking Performance; and more. (PT-138; \$119.95 List/\$95.96 Member)

Accident Reconstruction, 2009

23 papers from the SAE 2009 World Congress which detail occupant protection, accident reconstruction, and event data recorders. Several papers cover heavy truck braking and vehicle yaw analysis. (SP-2224; 119.95 List/\$95.96 Member)

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