



WARREN

THE WARREN GROUP, INC. FORENSIC ENGINEERS & CONSULTANTS
7805 ST. ANDREWS ROAD | PO BOX 1608 | IRMO, SOUTH CAROLINA 29063
TEL 803.732.6600 FAX 803.732.7576 ↓↓ WARRENF0RENSICS.COM

John Holecek, M.S.M.E, P.E., CSE, CFEI

Mechanical & Control Systems Engineer

Electrical and Mechanical Control System Analysis

Failure Analysis

Fires and Explosions Analysis: Origin and Cause

Gas Fired Equipment and Appliances

ICC, NFPA, OSHA Codes and Standards Analysis

Machine Design

Machine Safeguarding

Machinery and Equipment Damage Assessment

Products Liability

EDUCATION

- | | |
|-------------|--|
| 1984 | Bachelor of Science, Mechanical Engineering
University of South Carolina, Columbia, South Carolina |
| 1989 | Master of Science, Mechanical Engineering
University of South Carolina, Columbia, South Carolina |
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EXPERIENCE

**April 2007 to
Present**

The Warren Group, Inc., Irmo, South Carolina. Senior Consulting Engineer performing specialized consulting related to property loss analysis and unintentional injuries involving mechanical and control system engineering, machine design and safety.

Fire & Explosion Analysis

Determine origin and cause of fires and explosions, cause of the injury or property damage, and establish involvement of parties.

Fire and Life Safety Standards and Codes Compliance

Building, fire protection and life safety codes and standards analysis and compliance evaluation. National Fire Protection Association (NFPA) Codes, International Building Codes, Fire Prevention, Mechanical, Plumbing and Gas Codes, Uniform Building and Fire Codes, materials and product codes and standards.

Control System Analysis

Electrical and mechanical control systems including relay, PLC and PC based systems and Distributed Control Systems (DCS) including Supervisory Control and Data Acquisition (SCADA) systems. AC and DC motor control and industrial process controls including Flame Supervision systems. Building Automation systems. Pneumatic and hydraulic systems.

Property Loss Analysis

Determine the cause of the loss, establish scope of damage, estimate cost to repair, evaluate replacement cost, establish actual cash value, estimate salvage value, estimate time required to complete repair.

Safety Design Analysis (both personal injury and property damage)

Industrial accident reconstruction, machine controls, machine safeguarding, warnings, OSHA compliance, standards and codes compliance, maintenance, fire and explosion analysis, products liability, product failures, failure analysis, consumer products.

EXPERIENCE (Continued)

- 2001 to 2007** Thermal Engineering Corporation, Columbia, South Carolina.
President of Industrial Products Division, Vice President of Engineering.
Responsible for all Operations of Industrial Products Division,
Manage Engineering Department providing engineering functions and
manufacturing support for all divisions of the company.
- 1994 to 2001** Thermal Engineering Corporation, Columbia, South Carolina
Vice President of Engineering and Manufacturing. Assumed the responsibility
of all manufacturing functions for the company while maintaining
responsibility for all engineering functions. Provided overall direction to a
workforce of up to 250 engineering and manufacturing employees. Guided
engineering and manufacturing departments through an increase in sales from
\$12,000,000 to \$22,000,000 per year.
- 1990 to 1994** Thermal Engineering Corporation, Columbia, South Carolina
Vice President of Engineering. Managed Engineering Department of 10-12
engineers, designers and field service technicians. Designed consumer and
commercial gas fired cooking appliances. Includes design certification by
CSA and NSF to any of several ANSI or UL standards. Guided the
Engineering Department during the transition to a company with two
divisions, Consumer and Commercial Products Division and the Industrial
Products Division. Supervised all engineering functions for both divisions of
the company.
- 1984 to 1990** Thermal Engineering Corporation, Columbia, South Carolina
Project Engineer/Manager. Responsible for engineering and managing
projects that involve the manufacture of industrial process equipment.
Managed outside contractors in the installation of industrial process
equipment.

SUMMARY OF SELECT DESIGN EXPERIENCE

Museum of Science and Industry, Chicago, Illinois

Design and fabrication of a custom built, motorized, round char broiler. The unit was installed in an open kitchen where patrons can view the cooking process. The unit included four gas burners and a variable speed motorized turntable that slowly moved the cooking food across the top of the burners. The unit was designed to the applicable portions of the ANSI Z83.11b and ANSI/NSF 4 standards.

Thermal Engineering Corporation, Columbia, South Carolina

Detail engineering and listing of several products for commercial cooking operations. The products included griddles and broilers designed and listed to the ANSI Z83.11b and ANSI/NSF 4 standards.

Thermal Engineering Corporation, Columbia, South Carolina

Detail engineering and listing of several products for residential cooking operations. The products included BBQ grills designed and listed to the ANSI Z21.58 or ANSI Z21.89 standards.

Honda Cars of America, Marysville, Ohio

Fabrication and installation of three large industrial ovens used to cure coatings on Honda cars. Two of the ovens included thermal oxidizers to incinerate the solvents liberated during the paint curing process.

ASC Incorporated, Formerly American Sunroof Corporation, Bowling Green, Kentucky

Design, fabrication and installation of a paint system used to paint hard top roofs for Corvettes. The system included paint booths with air supply units, prep booths and curing ovens.

Diamondstar Motors, Normal, Illinois

Fabrication and installation of three large industrial ovens used to cure coatings on Mitsubishi cars. Two of the ovens included thermal oxidizers to incinerate the solvents liberated during the paint curing process.

Westinghouse, Juarez, Mexico

Design and fabrication of a system to paint electrical transformers. The system included the following:

- Gas heated multi-stage parts washer
- Two down draft water wash paint spray booths with automated paint sludge removal systems
- Gas fired air supply units
- Dry off oven
- Paint bake oven
- Material handling system

SUMMARY OF SELECT DESIGN EXPERIENCE

Navistar, Springfield, Ohio

Design, fabrication and installation of several systems used in the manufacture of large trucks.

The systems included the following:

- Eight large industrial ovens each over 150 feet long. The ovens were elevated; gas fired and multi-zoned. Total heating capacity of the ovens was over 50,000,000 BTUH.
- Three large booths used to prepare truck cabs for painting. The booths were ventilated and equipped with fire protection systems.
- Plant ventilation and air conditioning systems including air make up totaling 200,000 cfm.

Delta Faucet Company, Chickasha, Oklahoma

Design, fabrication and installation of two natural gas fired industrial ovens. One oven was used to dry parts after processing through a chemical pretreatment system. The second oven was used to cure power coatings applied to faucet assemblies.

3M Corporation, Detroit, Michigan

Design and fabrication of an experimental vapor phase curing machine. The machine created a saturated environment of 3M Florinert to rapidly heat parts using condensation heat transfer.

The machine was installed in a General Motors laboratory in Detroit, Michigan.

Paccar Company, Kenworth Truck Division, Renton, Washington

Design, fabrication and installation of several systems for the Renton, Washington truck assembly plant including the following:

- Small part powder coating system which included gas heated multi-stage parts washer, powder coating booth, dry off and bake ovens, and material handling systems.
- Five large air supply units that provided gas heated and humidified air to painting processes.
- One large combination paint spray booth and oven used to paint large off road specialty vehicles. This system included pneumatic man lifts which allowed painters to safely access the vehicles.

Anchor Continental, Columbia, South Carolina

Design and fabrication of two gas fired infrared paper driers used to dry coatings applied to paper tapes. The units were installed on tape manufacturing lines that processed tape at 1000 fpm.

Freightliner Corporation, Mount Holly, North Carolina

Design, fabrication and installation of two gas fired ovens used to cure paint on large truck assemblies. Systems included two coolers to cool the trucks after exiting the ovens.

Freightliner Corporation, Cleveland, North Carolina

Design, fabrication and installation of two truck painting systems. The systems included:

- Spray and prep booths
- Air supply units with gas burners and steam humidification
- Gas fired multi-zone paint baking ovens
- Conveyors with interlocked motorized enclosure doors

SUMMARY OF SELECT DESIGN EXPERIENCE

Volvo Truck Corporation, Dublin, Virginia

Design, fabrication and installation of two truck painting systems. The systems included:

- Down draft water wash spray booths with automated sludge removal systems
- Air supply units with gas burners
- Gas fired multi-zone paint baking ovens
- Material handling systems

Plastech Corporation, Formerly Standard Products Company, Winnsboro, South Carolina

Design, fabrication and installation of a large paint system for automotive plastic door trim.

The system was designed to achieve ultra low levels of air pollutants while maintaining high production rates. The equipment was completely automated requiring operator intervention only to load and unload parts from the system. The system included the following:

- Gas heated multi-stage parts washer with deionized water
- Waste water treatment system
- Indirectly fired gas heated dry off oven
- Indirectly fired gas heated bake oven
- Six re-circulated, down draft water wash spray booths with robotic paint application and automated sludge removal capacity
- Air supply house with chilled water dehumidification of water wash booth exhaust air
- Thermal oxidizer with integral heat recovery
- Paint storage and automatic feed systems for the robotic paint application
- Automated material handling system consisting of eleven separate conveyors
- Integrated PLC and PC based control systems including data acquisition

Eaton Corporation, North Carolina, Tennessee, Iowa

Design, fabrication and installation of three systems to paint truck transmission assemblies.

The systems included gas heated parts washers, paint spray booths, ovens and material handling systems.

Haden Corporation, Detroit, Michigan

Design and fabrication of oven components used in the manufacture of large automotive industrial ovens. The components included specialized fan assemblies and indirect fired radiant duct assemblies. These components were part of a patented oven design. The components were installed by the Haden Corporation in many automotive assembly plants including those of Daimler / Chrysler, General Motors, Ford, Saturn, and Toyota. Almost 5 miles of the radiant duct assemblies were made and installed in the various plants.

SUMMARY OF SELECT DESIGN EXPERIENCE

Central Manufacturing Corporation/Central Light Alloy, Paris, Kentucky

Design, manufacturing and installation of a large paint system for coating automotive wheels.

The systems included the following:

- Gas heated multi-stage parts washer with deionized water
- Waste water treatment system
- Gas heated dry off oven
- Indirectly fired gas heated bake oven
- Powder coating booths with automated powder paint application
- Air conditioned environmental room enclosure around the powder paint application
- Liquid paint spray booths with automated paint application equipment
- Automated material handling system including specially designed machines to transfer wheels between machines.
- Integrated PLC and PC based electrical control systems including data acquisition

Paccar Company, Kenworth Truck Division, Mexicali, Mexico

Design, fabrication and installation of a system to paint large truck cabs. The system included a down draft water wash spray booth, prep booths, gas fired air supply units, paint bake oven and automated sludge removal equipment.

Masonite Corporation, Laurel, Mississippi

Design and fabrication of a large system to cure coatings on door skin assemblies. The system included seven gas fired ovens of both high velocity hot air and infrared design. Several coolers were also supplied.

Bristol Compressors, Sparta, North Carolina and Bristol, Tennessee

Design, fabrication and installation of two large paint systems for electro-coating air conditioner compressor assemblies. The systems included the following:

- Gas heated multi-stage parts washers with deionized water
- Electro-coating system with power supplies, ultra-filtration, and automated paint supply provision
- Gas heated bake ovens
- Automated material handling system

American Axle & Manufacturing, Buffalo, New York

Design, fabrication and installation of a large paint system for automotive axle assemblies.

The system included the following:

- Gas heated multi-stage parts washer
- Gas heated dry off oven
- Gas heated bake oven
- Down draft dry filter spray booth with robotic paint application
- Air supply house with gas heat and evaporative humidifier
- Paint storage and automatic feed systems for the robotic paint application
- Integrated PLC and PC based control systems including data acquisition

SUMMARY OF SELECT DESIGN EXPERIENCE

Masonite Corporation, Carrick-on-Shannon, Ireland

Design and fabrication of a large system to apply coatings to door skin assemblies. The system included:

- Four gas fired infrared ovens
- Three high velocity hot air ovens
- Three paint booths which incorporated paint recovery and high-pressure spray application
- Four humidifiers
- Integrated PLC based control system

Goodyear Tire and Rubber, Napanee, Ontario, Canada

Design, Fabrication and installation of a system to preheat large bales of rubber prior to their use in tire manufacturing. The system was a large gas heated enclosure built around a material storage rack system. The oven had many doors that were individually operated by the material transport system.

Fibramold SA, Division of Teranova SA, now owned by Masonite, Cabrero, Chile

Design and fabrication of a large system to apply coatings to door skin assemblies. The system included:

- A large wicket type humidifier. This unit processed approximately 16,000 pounds per hour of hardboard panels in an environment of 120F and 95+% relative humidity.
- Four gas fired infrared ovens
- Three high velocity hot air ovens heated with thermal oil
- Three paint booths which incorporated paint recovery and high-pressure spray application
- Three humidifiers
- Material handling system to transport panels through the painting and humidification processes.
- Integrated PLC based control system

General Motors, Massena, New York

Design and fabrication of 16 large polystyrene foam aging ovens. The ovens were used to heat treat polystyrene patterns prior to their use in a lost foam casting process. Parts were processed on racks that were preloaded away from the ovens. Racks were presented to the entrance of the oven where the automatic material handling system received the rack for processing through the oven. The ovens were of two levels and included elevators to lift and lower the part racks. The ovens were electrically heated and included a PLC based control system.

SUMMARY OF SELECT DESIGN EXPERIENCE

Tranter, Inc., Edgefield, South Carolina

Design, fabrication and installation of a system to powder paint heat exchangers used on large electrical transformers. The system included the following:

- Hot water boiler heated multi-stage parts washer with deionized water
- Programmable hoist system used to convey parts through the parts washer
- Gas heated dry off oven
- Gas heated bake oven
- Powder coating booth with automated powder paint application
- Air conditioned environmental room enclosure around the powder paint application
- Automated material handling system
- Integrated PLC based electrical control system

American Transportation, Division of Navistar, Tulsa, Oklahoma

Design, fabrication and installation of several large paint systems for bus components and body assemblies. Equipment supplied included:

- Bus body paint system over 600 feet in length. The body paint system included:
 - Body prep booth
 - Gas heated dry off oven
 - Three gas heated bake ovens
 - Down draft dry filter spray booth with robotic or automatic paint application.
 - Two spray booths were re-circulated to reduce exhaust rates and conserve energy
 - Two air supply units with gas heat
 - Two recirculation air units with direct expansion cooling provisions.
 - Paint storage and automatic feed systems (plural component) for the robotic and manual paint application
 - Integrated PLC based control system
- Bus hood and cowl paint system. The hood and cowl paint system included:
 - Prep booth
 - Down draft dry filter spray booth with robotic paint application.
 - Spray booth was recirculated to reduce exhaust rates and conserve energy
 - Recirculation air units with direct expansion cooling provisions.
 - Paint storage and automatic feed systems (plural component) for the robotic paint application.
 - Integrated PLC based control system
- Bus seat powder paint system
 - Gas heated multi-stage parts washer
 - Gas heated dry off oven
 - Gas heated bake oven
 - Powder coating booth with automated powder paint application
 - Air conditioned environmental room enclosure around the powder paint application
 - Material handling system

SUMMARY OF SELECT DESIGN EXPERIENCE

Boise Cascade, Elma, Washington

Design and fabrication of several systems used in the manufacture of a new type of lap siding. The siding is a composite material made of recycled polyethylene plastic and wood chips.

Equipment supplied included:

- Wood / plastic composite melting machine over 135 feet in length. The machine operated at 400F and included:
 - Three zones heated with circulated thermal oil. Total heating capacity in excess of 20,000,000 BTUH.
 - Ten high pressure circulation fans totaling over 1300 horsepower
 - Custom designed water mist fire suppression system with multi-zone spark detection
 - Interleaved conveyors using a stainless steel flat wire belt type carrier belt with a perforated Teflon / fiberglass overlaid release belt.
 - Integrated PLC based control system
- Caul plate heating system consisting of:
 - Four large ovens that heated caul plates used in the manufacturing process
 - The pre-heated plates received the melted composite material from the melting machine and delivered them to a large press where they were simultaneously pressed and cooled
 - Custom designed water mist fire suppression system with multi-zone spark detection
 - High temperature material handling equipment
 - Integrated PLC based control system
- Edge painting system used to paint the edges of the siding material. This system included:
 - Two flame treating machines that promote the adhesion of water based paints to plastic substrates.
 - Two spray grafting machines that promote the adhesion of paint to the substrate by applying a chemical grafting solution
 - Four gas fired high velocity hot air ovens
 - Four custom designed edge coating machines
 - Material handling system
 - CO2 based fire suppression system
 - Integrated PLC based control system
- Panel painting system used to paint large sheets of the composite material
 - Gas fired infrared preheat oven
 - Two gas fired high velocity hot air ovens
 - Two custom designed pneumatic coating machines which incorporated paint recovery
 - Seven modular coolers
 - Integrated PLC based control system

SUMMARY OF SELECT DESIGN EXPERIENCE

BMW Manufacturing, Spartanburg, South Carolina

Design and manufacturing of a hot water heated oven used to warm wiring harnesses prior to installation in cars. The system included a PLC controlled material handling system that supplied harnesses in the order needed for production.

Paccar Company, Kenworth Truck Division, Mexicali, Mexico

Design, fabrication and installation of truck chassis painting system. The system included:

- Prep booth
- Down draft water wash spray booth with automated sludge removal system
- Air supply units with chilled water cooling, gas burners and evaporative humidification

Duratex SA, Botucatu, Brazil

Design and fabrication of a large industrial oven and material handling system used to heat temper MDF panels at 320F. The system included the following features:

- Ten zone steam heating system using 200 psi steam. Total heating capacity in excess of 10,000,000 BTUH
- Recirculating air systems totaling 1250 horsepower
- Large seal welded stainless steel enclosure with built in thermal expansion provisions. The enclosure was 130 feet long, 37 feet wide and 28 feet tall.
- Wicket type conveyor with indexing drive rated at 1,000,000 inch pounds of torque. The conveyor was designed to handle 250,000 pounds of product and wickets
- Custom designed water mist fire suppression system with multi-zone spark detection

Vought Aircraft Industries, Dallas, Texas

Design, fabrication and installation of a system to paint Blackhawk helicopters. The system included a combination dry filter paint booth and oven, air supply system with chilled water cooling and humidification, and PLC based control system.

Global Aeronautica (Boeing), North Charleston South Carolina

Design, fabrication and installation of a system to paint fuselage sections of Boeing's new 787 Dreamliner commercial aircraft. The system included a very large combination dry filter paint booth and oven, air supply system with chilled water cooling and humidification, and PLC based control system. The systems are very large and handle over 1,000,000 cubic feet per minute (CFM) of conditioned air.

CERTIFICATIONS

Certified Fire and Explosion Investigator (#12474-6262)

Licensed Control System Engineer

PROFESSIONAL ORGANIZATIONS

National Association of Fire Investigators (#120116)
 International Association of Arson Investigators (#12474)
 National Fire Protection Association (#2544036)
 International Society of Automation (#33241083)

REGISTRATIONS

Professional Engineer in South Carolina (#13246)
 Professional Engineer in North Carolina (#033482)
 Professional Engineer in Florida (#67111)
 Professional Engineer in Alabama (#29030-E)
 Professional Engineer in Virginia (#0402 044801)
 Professional Engineer in Georgia (#033723)
 Professional Engineer in Ohio (#74075)
 Professional Engineer in Texas (#115097)
 The National Council of Examiners for Engineering and Surveying (NCEES) (#31492)

CONTINUING EDUCATION

September 24 - 26, 2018

International Symposium on Fire Investigation Science & Technology, ISFI 2018, Itasca, Illinois

- Experts Beware: Ignoring the Scientific Method Can Be Hazardous to Your Testimony-An Update on the Law
- Could This Gas Leak Have Caused the Explosion? Case Study Showing Why Air Infiltration Needed to be Considered to Explain Flammable Gas Accumulation
- Investigation Findings and Lessons Learned in the 2014 Georgia Pacific Corrigan Facility Fire and Explosion
- Measuring Leak Flow Rates in Fire and Explosion Investigations
- Poor Electrical Connections; Features, material Characterization, and Newly Identified Characteristic Traits, Before and After Fire Exposure
- Guidelines for Conducting a Technical Review for Fire Investigation
- Plasma Etching to Help Identify Acoustic Agglomerations Soot Patterns on Smoke Detector Piezo Disks
- Techniques for Analysis of Fire Alarm and Signaling Systems and Components
- CFD Modeling of Flammable Gas Concentration Levels and Empirical Validation
- Propane Safety: Investigation Finding and Lessons Learned in the 2014 Philadelphia Food Truck Explosion
- Space Heater Fires and Fire Investigation

CONTINUING EDUCATION, Continued

June 15, 2018

“SOLIDWORKS Simulation Learning Path,” an online course presented by Dassault Systems SolidWorks Corporation, Irmo, South Carolina

June 1, 2018

“ENGR2000X: A Hands-on Introduction to Engineering Simulations,” an online course in FEA and CFD offered by CornellX, an online learning initiative of Cornell University, Ithaca, NY

September 17, 2017

“HAZWOPER 40 Training,” an online course presented by the National Safety Council / Summit Training Source

September 12 - 14, 2016

International Symposium on Fire Investigation Science & Technology, ISFI 2016, Scottsdale, AZ

- ISFI 2016 Keynote Address – A Five Fatality fire and a Fire Scene Investigation Gone Very Wrong
- Fire Dynamics, Forensic Research and Patterns
- Overheating in Duplex Plug-Receptacle Connections
- Arc Mapping in the Advent of AFCL, GFCL, and GFEP Circuit Protection Devices
- Estimating Fuel Gas Concentration in an Enclosed Room
- An Initial Examination of Non-Energized Thermal Activation of Molded Case Circuit Breakers (MCCBS)
- Investigation Findings and Lessons Learned in the West Fertilizer Explosion
- The West, Texas Ammonium Nitrate Explosion: A Failure of Regulation
- Forensic Failure analysis of Lithium-Ion Batteries in Fire Investigation
- Susceptibility of CSST to Damage from Roofing Fasteners
- ARC Mapping and Appliance Investigations
- Air Conditioning Fan Coil Unit Fires: Research to Application

May 16, 2016

“SOLIDWORKS Flow Simulation,” by Christopher R. Hoyler of TPM, Charlotte, North Carolina

January 5, 2016

“(ROLPLC05) PLC Communications and Advanced Programming”, presented by ISA Training

January 1, 2016

“(ROLPLC04) PLC Troubleshooting”, presented by ISA Training

December 30, 2015

“(ROLPLC03) PLC Inputs and Outputs”, presented by ISA Training

December 30, 2015

“(ROLPLC02) PLC Programming”, presented by ISA Training

December 27, 2015

“(ROLPLC02) PLC Programming,” presented by ISA Training

CONTINUING EDUCATION, Continued

December 27, 2015

“(ROLPLC02) PLC Programming,” presented by ISA Training

December 23, 2015

“OSHA 10 General Industry,” online course presented by ClickSafety.com, Inc., an Online Course, Irmo, South Carolina

August 18, 2015

Training in “Warren’s Written Fall Protection Program & Policies,” by Steve Hunt, CPCU, ARM, Fall Protection Manager, Irmo, South Carolina

“Fall Protection - 29 CFR 1926, Subpart M (1926.500- 1926.503) Training,” Course designed by: Prosafe Solutions, Inc., conducted by Steve Hunt, CPCU, ARM, Fall Protection Manager, Irmo, South Carolina

- Part I – Guardrails & Personal Fall Arrest Systems
- Part II – Horizontal Lifelines, Safety Nets, Roofing Procedures & Training

July 13, 2015

“Fall Protection 101 Training” presented by Kent Earle of Capital Safety, Irmo, South Carolina

September 22 - 24, 2014

International Symposium on Fire Investigation Science & Technology, ISFI 2014, University of Maryland, Hyattsville, Maryland

- Analysis of Arc Erosion on Thermal Switch Contacts
- Analysis of Post-Fire Characteristics of Portable Oil Filled Room Heaters to Determine Pre-fire Orientation
- Commercial Cooking Operations Related
- Distinguishing Between Arcing and Melting Damage in Electrical Receptacle
- Electrical Characterization of Corrugated Stainless Steel Tubing Components and Systems
- Electrical Fault Damage to Corrugated Stainless Steel Tubing in a House Fire
- Fires Originating in Branch-Circuit NM Cables Due to Installation Damage
- Investigation of the Explosion at the ConAgra Slim Jim Plant
- Lightning-Caused CSST Hole Formation with Concurrent Ignition of Escaping Fuel Gas:
- Misuse of Simple Explosion Tools in Complex Explosion Investigations
- Origin Determination in Fires Involving Fuel Gas
- Plasma Ashing as a Fire Investigative Tool
- Propensity of Wood Ignition from Residential Electrical Arcing
- Quantifying the Hazards of Green Building Construction for Fire Investigation Analysis
- Scientific Method-Use, Application and Gap Analysis for Origin Determination
- Understanding Long Term Low Temperature Ignition of Wood
- The Application and Use of Digital Multimedia Evidence in Fire Investigations

CONTINUING EDUCATION, Continued

August 18, 2014

CAL-EMA Safety Assessment Program, 5-Year Damage Assessment Certification, presented by the CAL-EMA National Database in Irmo, South Carolina

December 24, 2013

“Sprinklers: Fire Service/Fire Prevention Officers,” a distance learning seminar presented by The Society of Fire Protection Engineers

December 24, 2013

“Arc Flash Hazard Analysis – The Basics,” online course presented by RedVector.com, Online Course

December 24, 2013

“Combustion Analysis,” online course presented by RedVector.com, Online Course

December 21, 2013

“Alternating Current, Motors, Generators, and Transformers,” online course presented by Mike Holt Enterprises, Inc.

December 10, 2013

“2011 Grounding vs. Bonding (Article 250),” online course presented by Mike Holt Enterprises, Inc.

February 27, 2013

“Fire Safety Design: Egress & Extinguishing Systems,” online course presented by RedVector.com

December 6, 2011

“Introduction to Piping Engineering,” online course presented by SunCam.com

November 25, 2011

“Orifice and Venturi Pipe Flow Meters,” online course presented by SunCam.com

November 20, 2011

“Introduction to Control & Instrumentation,” online course presented by SunCam.com

November 20, 2011

“Electrical Protection and Short Circuit Basic Tools,” online course presented by SunCam.com

November 11, 2011

“Three Phase Systems,” online course presented by SunCam.com

February 23, 2011

“Corrosion Control and Tactics,” online course presented by SunCam.com

CONTINUING EDUCATION, Continued

September 27 - 29, 2010

International Symposium on Fire Investigation Science and Technology, University of Maryland, Adelphi, Maryland

- Fire Damage or Equipment Breakdown?
- Forensic Failure Analysis and Fire Ignition Sequence of Fractional Horsepower, Shaded Pole Motors Used in Appliances
- How Does Air Get into a Sealed Gas System – Testing vs. Theory
- Investigation Techniques Used to Determine the Massive Vapor Cloud Explosion at the Buncefield Fuel Depot
- Physical Characteristics of Nonenergized and Energized Cables in Scaled Compartment Fires
- Fire Dynamics and Limited Ventilation Compartment Fires
- Low Voltage the Incompetent Ignition Source Dispelling the Myth
- Fuel Gas Overpressure as it Relates to Regulator Function
- Space Heaters as an Ignition Source: Possible, Plausible, or Probable
- Telltale Signs of Water Heater Gas Control Valve Over-Pressurization

June 28, 2010

“Steam System Basics & Performance Improvements,” online course presented by RedVector.com

October 4, 2009

“Arc Mapping Basics,” online course presented by CFITrainer.com, Online Course in conjunction with The International Association of Arson Investigators, Inc.

December 29, 2008

“Diagnosing and Mitigating IAQ Problems,” online course presented by RedVector.com

November 2-5, 2008

National Association of Subrogation Professionals 2008 Annual Conference, Hollywood, Florida

- The Inner Workings of the Subrogation Department: An In-Depth Symposium, Part I
- Damages 101: From Loss Adjustment to Subrogation Recovery – How to Understand Damages and Recover Top Dollar
- Surge Suppressors and Power Strips – it’s Shocking What You May Not Know
- Product Liability (Subro College®)
- The Revolution in Building Materials: Plastics – Innovation or Ignition?

November 4-7, 2007

National Association of Subrogation Professionals 2007 Annual Conference, New Orleans, Louisiana

- 3-2-1 Ignition!! Pyrolysis...Is It a Viable Recovery Theory? Part 1
- 3-2-1 Ignition!! Pyrolysis...Is It a Viable Recovery Theory? Part 2

CONTINUING EDUCATION, Continued

August 9-10, 2007

National Seminar on Fire Analysis Litigation presented by The National Association of Fire Investigators, Sarasota, Florida

August 6-8, 2007

National Fire, Arson, & Explosion Investigation Training Program presented by The National Association of Fire Investigators, Sarasota, Florida

June 28, 2007

“Introduction to Fire Dynamics and Modeling,” On-line curriculum presented by Daniel Madrzykowski for CFITrainer.net in conjunction with The International Association of Arson Investigators, Inc. (4 Hours Tested Training Program)

April 20, 2007

“Fires, Explosions and Electricity: Intensive Instruction in Irmo,” Inner Circle of Investigators, 2007 Annual Conference, Irmo, South Carolina

July 03, 2006

“Design Considerations for Hydronic Pump System Design,” online course presented by PDHonline.org, Inc., Herndon, Virginia

June 25, 2006

“Psychometric Chart Fundamentals and its application to HVAC Troubleshooting,” online course presented by PDHonline.org, Inc., Herndon, Virginia

June 25, 2006

“Fundamentals of Material Science,” online course presented by PDHonline.org, Inc., Herndon, Virginia

June 16, 2006

“Fire Protection Fundamentals,” online course presented by Decatur Professional Development, LLC, Houston, Texas

June 13, 2006

“Seismic Restraints for Mechanical Equipment,” online course presented by Decatur Professional Development, LLC, Houston, Texas

March 18, 2005

“2000 International Building Code – Structural Design,” online course presented by PDHonline.org, Inc., Herndon, Virginia

CONTINUING EDUCATION, Continued

March 9, 2005

“ISO 9000 and 10000 Quality Documents - 1994 to 2000 Development and Application,” online course presented by Decatur Professional Development, LLC, Houston, Texas

February 23, 2005

“Valve Fundamentals,” online course presented by Decatur Professional Development, LLC, Houston, Texas

February 22, 2005

“Finding the Root Cause,” online course presented by Decatur Professional Development, LLC, Houston, Texas

February 9, 2005

“Centrifugal and Positive Displacement Pump Fundamentals,” online course presented by Decatur Professional Development, LLC, Houston, Texas

February 3, 2005

“Steam System Basics,” online course presented by Decatur Professional Development, LLC, Houston, Texas

January 22, 2005

“Heat Transfer Fundamentals,” online course presented by Decatur Professional Development, LLC, Houston, Texas

January 18, 2005

“Industrial Fan Fundamentals,” online course presented by Decatur Professional Development, LLC, Houston, Texas

June 12-14, 2001

“Business Skills for General Managers,” Daniel Management Center, University of South Carolina School of Business

June 2000

“Leadership Skills for Engineers,” Daniel Management Center, University of South Carolina School of Business

June 3, 1999

“Lean Manufacturing and Kaizen: Improving Your Effectiveness and Productivity,” Industrial Extension Service, North Carolina State University

COURSES, SEMINARS AND LECTURES PRESENTED

September 25, 2018

“Applications of SolidWorks Flow Simulation Computational Fluid Dynamics Software to the Investigation of Fires” presented at 2018 ISFI Fire Science Conference, Itasca, Illinois

October 25, 2017

“Working with Experts” presented at Travelers Insurance, Charlotte, North Carolina

September 25, 2015

“Working with Expert Witnesses and Consultants” presented at the North Carolina Association of Defense Attorneys 2015 Fall Seminar for Insurance Claims Representatives and Defense Counsel, Greensboro, North Carolina

September 22, 2014

“Analysis of the Potential for Perforation of Corrugated Stainless Steel Tube (CSST) by Energized Branch Circuits in Fire Conditions” presented at the 2014 International Symposium on Fire Investigation Science and Technology, Hyattsville, Maryland

December 14, 2011

“Fuel Gas Fires & Explosions” was presented at the Investigating Fires and Explosions: How to Avoid Getting Burned by a Bad Fire Investigation Seminar, The Warren Group, Irmo, South Carolina

December 14, 2011

“Fires & Explosions in Ovens & Furnaces” was presented at the Investigating Fires and Explosions: How to Avoid Getting Burned by a Bad Fire Investigation Seminar, The Warren Group, Irmo, South Carolina

September 29, 2010

“Analysis of a Double Fatality Fire Allegedly Cause by a Portable Electric Heater: How Poor Methodology Can Lead to the Wrong Conclusion” presented at the International Symposium on Fire Investigation Science and Technology

April 6, 2010

“Losses Involving Corrugated Stainless Steel Tube” (CSST) presented at the Greenville Claims Association Meeting, Greenville, South Carolina

February 23, 2010

“Fuel Gas Fires & Explosions” presented at the Fires, Explosions & Electricity 101 Seminar, The Warren Group, Irmo, South Carolina

November 4, 2008

“Fires and Explosions in Industrial Ovens and Furnaces – Subrogation Potential,” presented at the 2008 Conference of the National Association of Subrogation Professionals, Hollywood, Florida

COURSES, SEMINARS AND LECTURES PRESENTED, Continued

November 6, 2007

“Spread Claims: Recovering from Parties Who did Not Start the Fire,” presented at the 2007 Conference of the National Association of Subrogation Professionals, New Orleans, Louisiana

September 12, 2007

“Design Issues of Workers’ Comp Injuries: How to Identify and Pursue Third Party Workers’ Comp Subrogation Claims,” presented at the Georgia Chapter of the National Association of Subrogation Professionals, Atlanta, Georgia

September 15-16, 1992

Presentation on “Convection Stabilized Radiant Heat Transfer Ovens,” SME Paint Systems Design conference, Cleveland, Ohio

February 19, 1992

Mechanical Engineering Panel Member, “Engineering the Future 1992” conference, University of South Carolina, Columbia, South Carolina

“Losses Involving Corrugated Stainless Steel Tube (CSST)” presented at the Large Loss and Complex Claims Investigations Seminar, The Warren Group, Irmo, South Carolina

- **August 27, 2009**
- **October 22, 2009**
- **March 18, 2010**
- **May 20, 2010**

Two-hour seminar, approved by the North Carolina Department of Insurance, Continuing Education Agency Services Division, entitled “Design Issues as a Cause of Workers’ Comp Injuries”

- **September 16, 2009** Key Risk, Greensboro, North Carolina
- **September 29, 2009** Key Risk, Columbia, South Carolina
- **October 7, 2009** Zurich, Charlotte, North Carolina

Three-hour seminar, approved by the North Carolina Department of Insurance, Continuing Education Agency Services Division, entitled, “Investigating Property and Liability Claims: Determining Who Else Owns This Loss?”

- **March 28, 2011** Travelers Insurance, Charlotte, North Carolina
- **October 4, 2011** Montgomery Mutual Insurance, Charlotte, North Carolina
- **June 13, 2012** EMC Insurance, Charlotte, North Carolina

PUBLICATIONS

“Determination of Transient Temperature Distributions in Auto Bodies Subjected to Radiative and Convective Heat Transfer,” M.S. Thesis, University of South Carolina, 1989

“Convection Stabilized Radiant Heat Transfer Ovens,” SME Paper No. FC92-255, 1992

“Analysis of a Double Fatality Fire Allegedly Caused by a Portable Electric Heater: Poor Methodology Can Lead to the Wrong Conclusion,” co-authored with Dr. Jeffery H. Warren, P.E., CSP and Jerry R. Tindal, P.E., C.F.E.I., proceedings of the International Symposium on Fire Investigation Science and Technology, September 2010

“Evaluating Fire Damaged Regulators: How Reliable is Post-Fire Testing?” co-authored with Jerry R. Tindal, proceedings of the International Symposium on Fire Investigation Science and Technology, University of Maryland, October 2012

“Analysis of the Potential for Perforation of Corrugated Stainless Steel Tube (CSST) by Energized Branch Circuits in Fire Conditions,” co-authored with Keith Atkinson, CFEL, proceedings of the International Symposium on Fire Investigation Science and Technology, September 2014

“Technical Requirements for Paint Spray Booth Airflow Velocities,” SME Paper No. TP14PUB85, 2014

“Applications of SOLIDWORKS Flow Simulation Computational Fluid Dynamics Software to the Investigation of Fires,” proceedings of the International Symposium on Fire Investigation Science and Technology, September 2018