

NAFE Saturday Schedule (January 2023)

Mark Svare, PE

Forensic Electrical Engineer and Master Electrician,
Svare Engineering Group (dba MSD Engineering)

Niamh Nic Daeid, PhD

Professor, University of Dundee (Scotland)

Neal Hanke, PE

Materials Evaluation and Engineering, Inc.

Time: 8 to 9 AM

Title: Forensic Examination of Post Fire Damaged Electrical Conductors by Quantitative Measurement to Increase Reliability of Electrical Fault Evaluations

Abstract: Forensic electrical (power) engineers and electricians during their course of work may apply electrical engineering principles to forensic investigations by performing electrical surveys and electrical fault evaluations. A fire investigation practitioner during the course of a fire investigation may implement a similar electrical investigation methodology called an arc survey. The correct application of either of these methodologies is dependent, in part, on the forensic investigation practitioner's ability to distinguish features observed on damaged electrical wiring and equipment. Experiments were conducted to generate post-fire damaged electrical artifacts for this engineering analysis. Generated artifacts of arc melting, fire melting, and mechanical damage features were examined, measured, and quantified by metallurgical engineering techniques, such as visual examination, light microscopy, SEM/EDS and/or metallographic examination. The results produced a novel method of quantifying and reliably identifying electrical conductor features that will lead to more reliable forensic electrical fault evaluations and arc survey investigations.



Svare is a licensed master electrician and professional electrical engineer who has been involved in forensic engineering since 1990. He is a PhD student at the University of Dundee, Leverhulme Centre for Forensic Science, Nethergate, Dundee, Scotland, UK. He is a veteran of the United States Navy, where he served as an electronic warfare specialist onboard the U.S.S. Briscoe DD977. While in the Navy, he served in regions such as South America, Europe, and Mediterranean countries. Svare has been involved with the evaluation and analysis of electrical distribution, controls, and equipment failure events that include, in part, fire, explosions, personal injury, and equipment damage.

Professor Niamh Nic Daeid is director of the Leverhulme Research Centre for Forensic Science (LRCFS) whose 10-year mission is to provide a robust underpinning for the scientific evidence presented in court. She is a chartered chemist and an authorized forensic chemist with specialties including fire investigation, clandestine drug chemistry, and explosives. She is a fellow of the Royal Society of Edinburgh and holds fellowships with the Royal Society of Chemistry, the Institute of Chemistry of Ireland, the Royal Statistical Society, the UK Association of Fire Investigators, and the Chartered Society of Forensic Science.



Hanke graduated from Iowa State University with a B.S. in materials engineering. He is a licensed professional materials engineer in several states throughout the Midwest and has been conducting materials investigations and testing with Materials Evaluation and Engineering, Inc. in Plymouth, MN since 2011. His experience with materials characterization and failure analysis covers a wide range of industries, but he has become increasingly involved in research and materials characterization related to structural and automotive fires and explosions.

Jason McPherson, PE

Forensic Electrical Engineer and Master Electrician, MSD Engineering

Time: 9 to 10 AM

Title: Forensic Engineering Investigation of a Machine-Related Injury

Abstract: Industry regulations, such as OSHA and industry-accepted machine guarding standards, are intended to be used in conjunction to help prevent worker-related injuries. Despite the aforementioned intentions, an injury occurred to an employee while operating a hydraulic rotary bending machine. The machine had been retrofitted with a two-hand control device that was intended to act as a machine guard and prevent unexpected machine cycles starts. A forensic engineering analysis of the electromechanical design and programmable logic code (combined with a performance requirement analysis) ultimately revealed flaws in the design of the electromechanical system/software design and a lack of adherence to the applicable industry-accepted practices for machine guarding. These factors led to the injury.



McPherson is a licensed professional electrical engineer. He has been active in the field of electrical engineering since 1997. He graduated from Western Michigan University with a bachelor of science degree in electrical engineering and obtained a master of science in electrical engineering degree from the University of Arkansas. While working in private industry, he designed control systems for assembly machinery, material handling equipment, boilers, and other electrical processes. McPherson has taught electrical investigation classes for U.S. federal, state, local, and private organizations. Involved in forensic investigations since 2006, his investigations have included fire, explosions, personal injury, and equipment damage. He has testified as an electrical expert in both depositions and trials.

Jahan Rasty, PhD, PE
Texas Tech University,
Department of Mechanical Engineering

Time: 10 to 11 AM

Mathew Mills, PE
Real-World Forensic Engineering

Olin Parker
Texas Tech University

Title: FE Investigation of Design and Quality Control Issues of Metal-On-Metal Hip Implant Failures

Abstract: High levels of cobalt and chromium ions were detected in the bodies of multiple users, necessitating the revision of their modular cobalt chrome molybdenum metal-on-metal hip implants. A forensic engineering investigation of provided discovery documents regarding the design, manufacturing, and clinical testing of these modular hip implants was performed. It was discovered that the modular interfaces of the implant allowed for micromotion to induce mechanically assisted crevice corrosion at these surfaces. The corrosion debris resulted in the release of poisonous metal ions into the bodies of the users, forming pseudotumors and compromising the users' health and wellbeing. The effect of this corrosion was enhanced by the galvanic couple that existed between the modular components of the implant. In addition, scanning electron microscopy and electron dispersive spectroscopy analysis revealed areas of high molybdenum concentration that were more susceptible to wear. Analysis also discovered silicon carbide particles left behind from polishing that were embedded in the ball and taper. These particles accelerated the wear of the hip and further exasperated the release of metal ions. Future hip implants should take care in preventing the occurrence of the above stated factors.



Dr. Rasty holds BS, MS, and PhD degrees in mechanical engineering and an MBA. Since 1988, he has served as a tenured professor at Texas Tech University where he is currently the founding director of the Materials Performance and Failure Analysis Laboratory as well as the graduate-level Applied Forensic Engineering Certificate program. Dr. Rasty is the founding president and CEO of Real-World Forensic Engineering, LLC (RWFE) where he has investigated 1,300+ cases resulting in 300+ deposition testimonies and dozens of court appearances as an expert witness in the areas of design, metallurgy, materials science, safety engineering, and warnings.

Mills, who holds an MS in mechanical engineering, is a licensed professional engineer with a specialization in engineering design. He also holds a graduate certificate in applied forensic engineering from Texas Tech University. He is currently working toward his doctor of engineering in multidisciplinary engineering. He has 4+ years of experience assisting with analysis of hundreds of forensic engineering investigations and conducting site inspections.



Parker is a teaching assistant at Texas Tech University working on doctor of philosophy in mechanical engineering. He has 2+ years of experience assisting with the analysis of a large number of forensic engineering investigations.

Richard Ziernicki, PhD, PE

Senior Consultant, Knott Laboratory, LLC

Ricky Nguyen, PE

Senior Engineer, Knott Laboratory, LLC

Time: 11 AM to 12 PM

Taylor Spiegelberg

Forensic Animator, Knott Laboratory, LLC

Title: Application of Matchmoving for Forensic Video Analysis of a Pedestrian/Train Collision and Verification with Recorded Event Data

Abstract: A fatal collision involving a pedestrian that was struck by a public rail train at a rail station located in a major U.S. metropolitan city was investigated. The train was equipped with an event data recorder that recorded valuable empirical data related to the collision, such as the train speed, braking, and acceleration inputs. However, due to circumstances, the original digital version of the data was lost and not available to analyze — only an analog graph of the data was available. The subject train was equipped with multiple video cameras from various vantage points that recorded video footage of the collision. Using the process of “matchmoving” — and with the assistance of three-dimensional LiDAR scanning of the station and the train — the video footage was analyzed to spatially determine the location of the train in three-dimensional space and to analyze the train’s kinematics and dynamics (such as its speed and deceleration rates) leading up to the collision. The accuracy of the “matchmoving” analysis was then verified with the available event data.



Dr. Ziernicki is a registered professional engineer in the states of California, Colorado, Florida, and Texas. Certified by the National Council of Examiners for Engineering and Surveying, he is a board certified diplomate in forensic engineering by the National Academy of Forensic Engineers. Dr. Ziernicki has evaluated several thousand industrial and vehicular accidents. He has presented papers and lectured at more than 100 technical conferences in the United States, Europe, and South America. He is also the author of more than 79 publications, primarily in the fields of mechanical engineering, safety, and vehicle accident reconstruction.

Nguyen has performed investigations and reconstructions of high- and low-speed motor vehicle accidents involving passenger cars, motorcycles, pedestrians, bicycles, and commercial vehicles. He frequently utilizes the latest technologies available in accident reconstruction throughout all analysis stages — from gathering evidence through accident reconstruction and accident simulation.



Nguyen has been involved in extensive investigation and analysis of the safety of mechanical products, including consumer products and material handling equipment, such as stand-up and sit-down forklifts and cranes.

Spiegelberg has a bachelor of fine arts degree from the University of Colorado Denver. Before joining Knott Laboratory, he was a freelance animator assisting in creating industrial visualizations.



Jahan Rasty, PhD, PE

Texas Tech University,
Department of Mechanical Engineering

Mathew Mills, PE

Real-World Forensic Engineering

Olin Parker

Texas Tech University

Time: 1 to 2 PM

Title: Forensic Engineering Investigation of Maintenance and Operational Factors Contributing to the Collapse of a Crane Boom

Abstract: During coating of a natural gas pipeline, all 14 bolts securing the pedestal of a crane boom to a truck bed failed, causing the boom to fall and strike a worker in the head. The bolts exhibited excessive corrosion indicative of exposure to a harsh corrosive environment prior to the failure. Investigation of provided documents revealed that the crane was kept in an uncovered yard for two years prior to attachment to use. Afterward, it was rented out and used in heavy oil and gas industrial environments. The fracture surfaces of the bolts revealed signs of excessive fatigue that were determined to be caused by excessive loading the previous renters of the crane subjected it to. The fatiguing of the bolts drastically reduced their strength and allowed the bolts to fail well below the recommended load capacity of the crane. Maintenance records indicated that the lessor failed to perform adequate inspection of the crane, allowing the corrosion and fatigue to go unnoticed. Had proper inspections and maintenance been performed, the incident would not have occurred.



Dr. Rasty holds BS, MS, and PhD degrees in mechanical engineering and an MBA. Since 1988, he has served as a tenured professor at Texas Tech University where he is currently the founding director of the Materials Performance and Failure Analysis Laboratory as well as the graduate-level Applied Forensic Engineering Certificate program. Dr. Rasty is the founding president and CEO of Real-World Forensic Engineering, LLC (RWFE) where he has investigated 1,300+ cases resulting in 300+ deposition testimonies and dozens of court

appearances as an expert witness in the areas of design, metallurgy, materials science, safety engineering, and warnings.

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Gerald Zadikoff, PE

Principal Engineer, G.M. Selby

Time: 2 to 3 PM

Title: South Florida Condominium Seawall Rotation and Subsequent Parking Structure Failure with Redesign

Abstract: Due to a sudden external event (when the system sustained water in excess of the design parameters), concrete and cast-iron pipes were displaced or broken. As such, excess water was forced through and under the ex-filtration assembly. Together with damaged pipes, the force was adequate to cause failure and full rotation of a section of the adjacent seawall. A large section of the seawall rotated into the canal as a result of the excess forces applied due to the failure of the drainage system during a major rain event. Two forensic engineering reports were prepared as to the causation of the seawall rotation and the structural damage to the two-story parking garage. A comprehensive repair protocol was identified, and documentation (including construction drawings) was prepared to mitigate all drainage and associated damage. This presentation will describe the causation of the failure in detail and the post deposition settlement with all parties. The paper/presentation explains the steps made to alleviate the stress on the drainage system together with the required repairs to the seawall and associated structures.



Zadikoff has more than 30 years of professional engineering and management experience and is presently the principal engineer of G. M. Selby. His role since the formation of this scientific and engineering consulting firm has been to oversee the day-to-day operations and skills development of the corporation. He and the firm have been called upon to consult with various regulatory and policy-making agencies as well as numerous private-sector clients on projects of varying complexity. He is a member of the Industry Leaders Council — an elite body of professionals through the ASCE brought together to determine the future direction of infrastructure design and construction by year 2025. His expertise has been sought on subjects ranging from shoreline erosion control and stabilization to structural design for marine infrastructure projects, port/marina design for sensitive environments

to environmental and socio-economic impacts of large-scale projects, both in developed and emerging markets. As such, Zadikoff is currently on the Board of the Miami-Dade International Trade Consortium and served three years as a board member of the Sub-Saharan Advisory Committee for Ex-Im Bank, as mandated by the U.S. Congress. Zadikoff is a member of the National Academy of Forensic Engineers and has been involved in numerous high-profile structural damage assessments and forensic investigations, including seawalls, foundations, marine resource, and high-rise buildings. He has been involved in the design of multiple structural projects, including foundations, buildings' envelopes, and lateral and vertical support load support systems. He has been a coastal/environmental and civil/structural engineering consultant and design engineer for multiple governmental entities. He has provided his expertise for design, permitting and project management on marina/port and coastal projects as well as civil/structural projects. In addition, he has performed numerous underwater inspections and subsequent design for marine infrastructure improvement projects for both the private and public sectors.

Michael Stichter, PhD, PE
Senior Engineer, ARCCA

Wade Lanning, PhD
Senior Engineer, ARCCA

Time: 3 to 4 PM

Zachary Ball, PhD, PE
Senior Mechanical Engineer, ARCCA

Title: Nondestructive Forensic Investigation of a Scissor Lift Fatality

Abstract: A worker was found pinned between the top rail of his scissor lift and an overhead beam, and rescue attempts were frustrated by unresponsive lift controls. In the investigation of this fatal accident, the lift behaved normally in most functional testing, but occasionally the controls responded erratically. The intermittent nature of the malfunction indicated that the evidence was sensitive and likely to be disturbed if the device was disassembled using typical destructive techniques; therefore, nondestructive techniques were required. This study discusses how X-ray imaging, computed tomography (CT), electrical testing, and engineering analysis of the lift/control system were used to investigate the causes and contributing factors of this fatal accident without disturbing sensitive evidence.

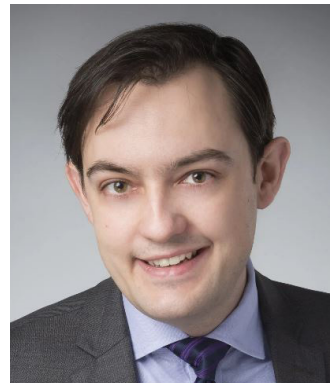


Dr. Stichter is a mechanical engineer with extensive experience in automotive, recreational, transportation, agricultural, commercial and industrial equipment and systems. He specializes in failure analysis of automobile components and systems, piping and manufacturing equipment, and mechanical devices, including industrial equipment such as forklifts and scissor lifts. He also investigates transportation-related fires, and the failure modes of lithium-ion batteries in consumer devices, including e-cigarettes and hoverboards.

Dr. Lanning is a senior engineer at ARCCA, specializing in the forensic analysis of mechanical failures and material degradation, such as fracture surface analysis, metal corrosion, polymer oxidation and degradation, weld and fastener failures, and plumbing system material failures. He also investigates consumer product failures (design or manufacturing defects, operator error) and accidents involving industrial equipment as well as performs laboratory analyses of material composition, structure, and properties.



Dr. Ball is a senior mechanical engineer at ARCCA, specializing in mechanical failures and accident investigation. He investigates failed consumer and industrial products/equipment and machinery design/failure. He is certified as a BOSCH Crash Data Retrieval (CDR) technician. He has an extensive background in product design, supporting, and teaching multiple undergraduate courses specifically pertaining to the fundamentals of engineering practice.



Greg Boso, PE

President, Boso Forensics

Time: 4 to 5 PM

Title: When the Forensic Engineer is Faced with Notifying Occupants to Vacate

Abstract: Holding the obligation to protect life, safety, and welfare paramount required the forensic engineer to notify the homeowner to vacate her new dream home constructed in an active landslide. The forensic engineering evaluation of a four-year-old home revealed extensive damages caused by active soil mass flow in glacial lake deposit soils and a natural spring that imposed excessive hydrostatic pressure on the front foundation wall. The homeowner remained in the home for more than a year prior to the investigation while insurers and their engineers argued about over coverage. This treatise propounds the structural analysis that revealed the probability of collapse threatening the safety and welfare of occupants and the compelling necessity/ethical obligation to notify the homeowner of grave peril to the occupants and their need to vacate and abandon the premises.



Boso is a native West Virginian and a 1980 graduate of the West Virginia Institute of Technology in the field of civil engineering. He has more than 36 years of experience as a registered professional engineer. He recently struck out on his own as the president and principal engineer of Boso Forensics PLLC. A licensed engineer in 33 states and the District of Columbia, he has served in blasting or vibration damage claims in Kentucky, West Virginia, Tennessee, Virginia, Ohio, Indiana, and Minnesota. He has provided forensic engineering services for more than 20 years, serving in more than 200 cases — ranging from claims of damage by blasting or vibration, construction defects, landslides, flooding and storm water to claims regarding premises liability, employer's liability, design professional negligence, and fire damage liability. His clients have included individuals and property owners, insurers and attorneys, businesses, and municipal governments. Boso grew up with a background in construction, and, for a time, he operated the family's general construction business in Summersville, W.V. as a

4th generation building contractor. He serves in his church as a deacon and his community as a firefighter and chaplain of the volunteer fire department — now in his 43rd year. He is a leader in all aspects and is thankful to have served his state as a West Virginia Senator elected from the 11th District.

NAFE Sunday Schedule (January 2023)

Jeffrey Zinder

Partner, McCoy Leavitt Laskey

Sean Walton

Partner, McCoy Leavitt Laskey

Alyssa Wickern

Partner, McCoy Leavitt Laskey

Time: 8 AM to 12 PM

Title: Putting Daubert Theory into Practice



Zinder is an AV rated trial lawyer, whose 40 plus years have provided him with a vast array of experiences, including arguing successfully at the California Supreme Court and a published Appellate Decision in *Dominguez v Financial Indemnity Company*, (2010) 183 Cal App 4th 388. His focus has always been on trial work — a great part of that dealing with complex medical causation and products liability. Although more than 95% of his matters favorably settle (many during trial), he has secured verdicts in cases involving wrongful death, severe traumatic brain injuries, quadriplegia, severe burns, and drug-induced allergic reactions. He has maintained a continued interest in the medical aspects of injuries, including psychological complications. Zinder is the managing partner of the firm's California office.

Walton is a national fire and explosion attorney with an emphasis in products liability, defense, and subrogation. He has been practicing law in these areas since 2011, and also has experience representing insurers in coverage matters as well as defending and prosecuting personal injury/wrongful death cases. He has successfully litigated a wide variety of complex cases, including catastrophic fires and explosions, subrogation, products liability, insurance defense, insurance coverage and bad faith, construction, wrongful death, and personal injury cases — from pre-suit investigation all the way through trial.



Wickern attended the University of Florida where she obtained her undergraduate degree followed by earning her law degree from St. Mary's University School of Law in San Antonio. Prior to joining McCoy Leavitt Laskey, she practiced at another South Texas insurance defense firm where she gained valuable experience handling first- and third-party civil litigation disputes. As a litigation attorney, Alyssa has participated in trials involving personal injury disputes, contract disputes, motor vehicle accidents, and public transportation accidents. Her practice includes representing clients in cases involving personal injury, products and premises liability, construction defect, wrongful death, motor vehicle and transportation litigation.

Martin Gordon, PE

Professor and Director for External Academic Relations
Rochester Institute of Technology

Steve Knapp, PE

Senior Consulting Engineer
Critical Guidance Engineering

Time: 1 PM to 3 PM

Title: The HIT – the Story Behind the Tony Stewart Incident and How the Experts Stayed in Their “Lanes”

Abstract: This 1 hour and 23-minute documentary looks at what happened the night Tony Stewart hit Kevin Ward at a local dirt track. Several NAFE members were involved in the Stewart v. Ward case, including Marty Gordon, Steve Knapp, and Richard Ziernicki, all of whom are featured in this documentary. The forensic engineering-based documentary will be shown in its entirety, and then a 30-minute technical program will follow with a question and answer portion. Learning assessment questions will wrap up this session.



Gordon is a tenured full professor at the Rochester Institute of Technology where he has taught since 1995. He has been recognized for both his teaching and engineering excellence, and has served as faculty advisor for RIT's award-winning Baja SAE team for the past 28 years. He is a Past-President and Fellow of the National Academy of Forensic Engineers, and was just recognized as a Fellow by NSPE. Marty serves as the Chair of the Engineering Technology Council and sits on the board of directors for the American Society of Engineering Educators (ASEE). His forensic engineering specialties include crash reconstruction and mechanical product design. Professor Gordon has taught courses in both traditional engineering and engineering technology programs.

Knapp is a senior member of NAFE and has more than 22 years of experience evaluating and reconstructing motor vehicle accidents. As an Accredited Traffic Accident Reconstructionist (ACTAR), he has performed hundreds of evaluations of vehicle collisions, analyzing the physics of collision incidents for both passenger and commercial vehicles. His experience includes the evaluation and analysis of crush damage, occupant dynamics, and vehicle crashworthiness in addition to cases involving product liability. As a mechanical engineer with an automotive background in drag racing, motorcycle riding, and engine/drivetrain building, Knapp has a unique understanding of vehicle mechanics and the failure modes that lead to accidents. With specialized training in photogrammetry, he has mapped and reconstructed accidents with evidence obtained from witness photographs and videos.



Mark Svare, PE

Forensic Electrical Engineer and Master Electrician,
Svare Engineering Group (dba MSD Engineering)

Time: 3 PM to 5 PM

Title: Forensic Engineering Analysis, Ethics, and Other Lessons Learned from a Commercial Property Loss

Abstract: Firefighters were alerted and responded to a fire at a local bar/restaurant. First responders at the scene observed a fully involved commercial structure fire. Firefighters were able to extinguish the fire with no loss of life or injuries; however, the property sustained substantial fire damage. Public and private fire investigators and engineers had determined that the cause of the fire was incendiary in nature. The property owner was subsequently criminally charged, convicted, and incarcerated for involvement in the fire. Years after the fire, electrical artifacts and evidence recovered from the fire scene were forensically examined and reconstructed to determine what role, if any, the electrical distribution system may have had in the fire. Application of electrical engineering principles and methods resulted in the identification of artifacts that had not been previously identified and reported to the trier of fact. This led to new court proceedings, new evidence, allegations, litigation, and outcome.



Svare is a licensed master electrician and professional electrical engineer who has been involved in forensic engineering since 1990. He has a bachelor of electrical engineering degree from the University of Minnesota. He is also a veteran of the United States Navy, where he served as an electronic warfare specialist on board the U.S.S. Briscoe DD977. While in the Navy, Svare served in regions such as South America, Europe, and Mediterranean Countries. He has taught numerous electrical courses for international, U.S. federal, state, local, and private organizations, including the Bureau of Alcohol, Tobacco and Firearms Advanced Fire Investigation program located at the Federal Law Enforcement Training Center – Brunswick, Georgia. He has also been involved with the evaluation and analysis of electrical distribution, controls, and equipment failure events that include, in part, fire, explosions, personal injury, and equipment damage. Svare's practical experience and

hands-on approach to investigations has qualified him as an electrical expert in both U.S. federal and state courts.