



**Hallman** ENGINEERING LLC

14040 96th Avenue North  
Maple Grove, MN 55369  
612.437.4412  
David@HallmanEngineering.com  
www.HallmanEngineering.com

**David M. Hallman, M.S., P.E.**  
***Consulting Mechanical / Materials Engineer***  
***ASE Certified Master Automotive Technician***  
***CFEI, CVFI***

**Summary**

I am a Licensed Professional Engineer in nine states with over thirty years combined experience in materials research, mechanical engineering and design, crash testing research and crash investigation and reconstruction, vehicle fire research and investigation, automotive mechanics and forensic mechanical and materials investigation. I hold degrees in mechanical engineering (BS) and materials science and engineering (MS).

I work on a wide variety of forensic mechanical metallurgical investigations. These investigations have included but are not limited to an elevator failure involving materials and design issues, a personal injury involving a paper shredder, multiple cases involving farm equipment and personal injuries and / or fatalities, machine guarding cases, chair collapse cases, bolted joint failures, patient lifter failures, vehicle hand control issues, and tipped telehandler and boom crane cases.

My automotive background coupled with my two degrees, extensive testing and research and continuing studies qualifies me for many aspects of vehicle mechanical failure investigation, crash investigation and reconstruction and vehicle fire investigation. Some of the cases investigated include a vehicle tie rod failure that triggered a cross over crash, multiple unintended vehicle acceleration cases and cases involving heavy truck brake failure. Since 2011, I have been involved with several different crash teams around the country and have been deeply involved in planning and executing low-speed and high-speed instrumented vehicle crash tests.

**Areas of Expertise**

Root cause analysis of mechanical incidents and failures  
Forensic Mechanical Engineering Investigations  
Crash Investigation / Reconstruction  
CDR (crash data retrieval, "black box", EDR) collection and analysis  
Vehicle Infotainment Data retrieval, collection, and analysis  
Chip-Off Data Collection and Analysis  
Toyota Record Data Retrieval and Analysis  
General Vehicle Repair Data retrieval, collection, and analysis  
Heavy Truck Data Retrieval, collection, and analysis  
Vehicle mechanical investigations  
Vehicle electrical investigations  
Vehicle fire origin and cause investigations  
Mechanical fire origin and cause investigations (structures)

## **Employment History**

*Consulting Engineer, Hallman Engineering, LLC*, Maple Grove, MN, 2012 – Present

*Adjunct Faculty, Minnesota State University*, Mankato, MN, Normandale Campus, 2019 – 2024

*Mechanical Engineer, MTS Systems*, Eden Prairie, MN., 2012 - 2013

*Materials/Mechanical Engineer, Crane Engineering*, Plymouth, MN., 2009-2012.

*Senior Mechanical Structural Design Engineer, BAE Systems*, Minneapolis, MN., 2008-2009.

*Mechanical Engineer, MTS Systems*, Eden Prairie, MN., 2006-2008.

*Technical Aide, 3M*, St. Paul, MN., 2003-2004.

*Automotive Technician, Various independent shops and dealerships*, Minnesota, 1991-2001.

## **Professional Licenses / Certifications**

Licensed Professional Engineer – Minnesota License 48027.

Licensed Professional Engineer – Illinois License 062.068403.

Licensed Professional Engineer – Iowa License P23448.

Licensed Professional Engineer – North Dakota License PE-10574.

Licensed Professional Engineer – Wisconsin License 44866-6.

Licensed Professional Engineer – Kansas License 26254.

Licensed Professional Engineer – Oklahoma License 30494.

Licensed Professional Engineer – Nevada License 026582.

Licensed Professional Engineer – Florida License 93872.

Automotive Service Excellence, Certified Master Auto Technician, A1-A9, 2000-2005, 2010-2030.

Crash Data Retrieval (CDR) Technician Level 2 Certification

Crash Data Retrieval (CDR) System Operator Certification – Analyst Course, 40 hours

Crash Data Retrieval (CDR) Certified Trainer Mentor Certification

National Association of Fire Investigators Certified Fire and Explosion Investigator

National Association of Fire Investigators Certified Vehicle Fire Investigator

Berla CVST - Certified Vehicle System Forensic Technician – 24 hours instruction plus test

Berla CVSE - Certified Vehicle System Forensic Examiner – 40 hours instruction plus test

Heavy Vehicle Data Analyst Training – 32 hours of instruction

Advanced Heavy Vehicle Data Training – 21 hours of instruction

Berla Chip-Off Training – Tested Hours

## **Professional Affiliations**

National Association of Fire Investigators (NAFI) – CFEI, CVFI

Society of Automotive Engineers International (SAE)

Accident Reconstruction Network

- *Member of ARC-CSI crash crew 2011 - 2017*

Midwest Association of Technical Accident Investigators (MATAI)

- *MATAI crash crew lead 2018 – 2024*
- *MATAI Board of Directors Member 6/2021 – Present*

Southwestern Association of Technical Accident Investigators, Inc. (SATAI)

- *Member of SATAI crash crew 2013 – 2023, 2025*

National Association of Professional Accident Reconstructionists (NAPARS)

International Association of Arson Investigators (IAAI) – MN Chapter

American Academy of Forensic Sciences (AAFS)

- *Associate Member*

Texas Association of Accident Reconstruction Specialists (TAARS)

- *Regular Member*

## **Patents**

U.S. Patent: M93-485 Flat Belt Roadway Simulator with Steer and/or Camber Adjustment and Method for Ascertaining Rolling Loss, 2008. (Co-inventor)

## **Education**

Master of Science in Materials Science and Engineering, University of MN, Minneapolis, MN, 2006.

Bachelor of Science in Mechanical Engineering, Minor in Mathematics, University of St. Thomas, St. Paul, MN, 2004.

Diploma in Automotive Repair, Anoka Hennepin Technical College, Anoka, MN, 1993

## **Continuing Studies**

“UPS Smith System Driver Training”, UPS, Eagan, MN May 2002, 40 hours.

EAG Working Smarter Seminar, EAG, Chanhassen, MN October 6, 2009.

"Vehicle Fire Investigation", Public Agency Training Council, National Criminal Justice, Loveland, Colo., March 15-17, 2010.

“Forensic Engineering: Engineers as Expert Witnesses”, MSPE, University of Minnesota, April 8, 2010.

“NFPA Fire and Explosion Investigations (NFPA 921)”, NFPA, Boston, MA, April 19-20, 2010.

“ARC-CSI Crash Conference”, ARC-CSI, Las Vegas, NV, May 24-27, 2010

“ARC-CSI Crash Data Retrieval User’s Summit”, ARC-CSI, Houston, TX, January 17-19, 2011

“ASM Failure Analysis Seminar”, ASM, Brooklyn Park, MN February 23, 2011

“At-Scene Traffic Crash / Traffic Homicide Investigation”, IPTM online course (80 hours).

“Advanced Traffic Crash Reconstruction”, HVE-CSI, IPTM, Jacksonville FL, April 25-29, 2011

“ARC-CSI Crash Conference”, ARC-CSI, Las Vegas, NV, May 23-26, 2011

“ARC-CSI Crash Team Boot Camp”, ARC-CSI, Las Vegas NV, May 22-26, 2011

“CSI Crash Data Retrieval (CDR) Specialist, Technician Level 2”, Las Vegas, NV, May 26, 2011

IAAI “Burn to Learn Seminar”, IAAI, Sisseton, S.D., June 28-29, 2011.

National Association of Fire Investigators, “Vehicle Fire, Arson & Explosion Investigation Science & Technology Seminar”, Lexington, Ky., September 12-15, 2011.

“ARC-CSI Crash Data Retrieval User’s Summit”, ARC-CSI, Houston, Texas, January 16-18,2012.

2011 MN IAAI Fire Conference.

“ARC-CSI Crash Conference”, ARC-CSI, Las Vegas, NV., June 4-7, 2012.

“Effective Investigation and Testimony”, IAAI on CFITrainer.Net, 10/31/2012

“Geometric Dimensioning and Tolerancing”, Dunwoody, 2/14/2013

2013 MN IAAI Fire Conference.

“ARC-CSI Crash Conference”, ARC-CSI, Las Vegas, NV., May 10-16, 2013.

“Ten Most Common Fire Scene Errors”, IAFI Online, 9/19/2013

“2013 SATAI Fall Conference”, SATAI, Phoenix, AZ, September 27-28, 2013.

“FMCSA DOT Annual Inspection Training 2013”, Truck Safety Services Online, 10/8/2013.

“Corrosion of Metals”, SAE online course, 5 hours, Completed 11/7/2013.

“The Business of Engineering”, MnSPE, 4 hours, Attended 1/16/2014

“2014 CDR Summit”, ARC-CSI, Houston, TX, January 27 – 29, 2014

“Ethical Professional Practice: Learning from Others' Mistakes”, MnSPE, Attended 2/12/2014

“2014 ARC-CSI Crash Conference”, ARC-CSI, Las Vegas, NV, May 30 – June 5, 2014.

“2014 MATAI Annual Meeting and Training Seminar”, St. Paul, MN June 11-13, 2014. Topics included: accident reconstruction, conservation of linear momentum, and Event Data Recorder (EDR) data, animations, simulations, nighttime crashes, visibility, detectability, and conspicuity, perception-reaction, and EDR update. Live staged demonstration: 42 mph 90° collision and 50 mph offset head-on collision.

“2014 SATAI Fall Conference”, SATAI, Phoenix, AZ, September 25-27, 2014. Topics included: Applied Physics & Rotational Mechanics, General Motors Ignitions and Rollover Analysis.

“The Expanding Role of Engineering Ethics”, MnSPE, Attended October 21, 2014.

“2015 CDR Summit”, ARC-CSI, Houston, TX, January 26 – 28, 2015 - Topics included: accident reconstruction, GM ignition switch failures, spoofing ACM Clearing, Nissan Consult System for Non-supported Nissan and Infiniti vehicles, over-writing prioritization in Toyota ACM's, and NASS CDR Database.

“2015 ARC-CSI Crash Conference”, ARC-CSI, Las Vegas, NV, June 1 – June 4, 2015. Topics included: accident reconstruction, trauma biomechanics, motorcycle evasive maneuvers, tire mechanics and failure, pedestrian impacts, unmanned aircraft systems, in-vehicle digital forensics, and video speed analysis.

“2015 SATAI Fall Conference”, SATAI, Phoenix AZ, September 10-12, 2015. Topics included: laser scanning, human factors and acceleration, consumer GPS data in accident reconstruction and compliance crash testing.

“2016 CDR Summit”, ARC-CSI, Houston, TX, January 25 – 27, 2016. Topics included: CDR Tool updates, Chrysler and Fiat CDR updates, Kia data analysis, damaged module analysis and data imaging, car / motorcycle crash analysis, unsupported Ford data analysis, vehicle back powering and repowering, vehicle system analysis, digital security and digital privacy law update.

“CDR Technician Train the Trainer Course”, Collision Safety Institute, Attended January 24, 2016.

“Forensic Engineering: Railroad Accident Reconstruction”, MnSPE, Thomas Johnson, Attended webinar March 16, 2016. Description: Railroad accident reconstruction forensics including inspections, locomotive video & event recorder download analysis, summary of available data, train handling review and failure analysis.

“2016 MN IAAI Fire Investigation Conference”, MN IAAI, St. Cloud, MN, March 23 – 25, 2016. Topics included: NFPA 1033, Drone Use, ASTM, Cloud Based Apps, OSHA, CFI Trainer.net, Electric Origin Fires, Codes and Standards, Explosion Dynamics, Fire Protections Systems, Vehicle Fire Investigations, Cell Phone / Bluetooth / WiFi Use in Vehicles, Wood Stove Fires, Light Bulb Fires, Photography.

“2016 ARC-CSI Crash Conference”, ARC-CSI, Las Vegas, NV, May 23-26, 2016. Topics included: Comparison of IIHS driver and passenger side small overlap crash tests, Photography for crash reconstruction, Comparative crash analysis using NHTSA NASS, Safely working around hybrids, Motorcycle reconstruction techniques, Scene and Vehicle data analysis, Evaluation of wheel impact in a rollover, Crash reconstruction case studies, Lateral acceleration through a curve, When do airbags deploy and derivation of 30.

“2016 ISFI Conference”, NAFI, ISFI, Scottsdale, AZ September 12-14, 2016. Topics included: Fire dynamics, forensic fire scene analysis, fire pattern interpretation, hot particle ignition, arc mapping, vehicle fire pattern interpretation, flammable gas fires and explosions, scientific method, fire statistics, appliance fire investigation and case studies.

“2016 SATAI Fall Conference”, SATAI, Phoenix AZ, October 6-8, 2016. Topics included: motorcycle and bicycle, reconstruction, railroad track hazards and helmet examination, nighttime accident documentation and reconstruction, and toxicology and impaired driving.

“The Global Positioning System (GPS) – A Primer to Positioning and Navigation Timing”, MnSPE, Bernard J. “Bernie” Gruber, Attended Webinar 12/7/2016. Description: The Global Positioning System (GPS) is a global navigation satellite system (GNSS) that provides location and time information in all weather conditions, anywhere on Earth and at any time. Learn more about the history of GPS, how it’s organized and governed and how it really works.

“Engineering Ethics and Lessons Learned from the Space Shuttle Challenger and Columbia Accidents”, Allen McDonald, Attended Live Site Presentation, 2/23/2017. Description: On January 28, 1986, NASA launched the Space Shuttle Challenger despite warnings against doing so including Allan McDonald, an engineer and then Director of the Space Shuttle Solid Rocket Motor Project for Morton Thiokol.

“2017 EDR Summit”, ARC-CSI, Houston, TX, March 6 - 8, 2017. Topics included: CDR Tool updates, Autonomous Vehicles, Analysis of Digital Data From Motor Vehicle Systems and Mobile Devices, Subaru and Mitsubishi EDR data, Forensic Data from Heavy Vehicles, Overview of Volvo, Mack, Caterpillar and Cummins Heavy Vehicle Data, Toyota Gen 3 Pre-Crash data, Asynchronous Data Concepts, Atypical Deployment Cases, Hyundai and Kia EDR Data Update Case Studies for GM, Toyota, BMW, Ford and Mercedes Crash Data, and a Heavy Vehicle Case Study Reconstruction with ECM EDR Data.

“26<sup>th</sup> SEAK Annual National Expert Witness Conference”, Clearwater Beach, FL, May 6 – 7, 2017. Topics included: How to Improve Expert Testimony, How to Excel at Expert Depositions, Effective Expert Testimony, How to Work with Counsel, How to Prepare for Deposition, How to Deal with

Aggressive Attorneys, Forming Defensible Opinions, Teaching in Court, How Experts Destroy Themselves, Video Testimony, Report Writing, Selection of Experts, Trick and Difficult Deposition and Trial Questions, How Experts can Assist at Trial.

“2017 MATAI Annual Conference”, Wisconsin Dells, WI, June 5 – 7, 2017. Topics included: CMV and motorcycle tires, Forensic Mapping with UAVs, Heavy Vehicle Data Logging, CMV EDR, CMV Brake Evidence, CMV inspection, Wheel Slip and Vehicle Mechanical Inspection.

“2017 MN IAAI Burn-to-Learn”, Eveleth, MN, August 11 – 12, 2017. Topics included Origin and Cause Determination and Evaluation, Live Room Test Burns, Arc-Mapping Investigation, Spontaneous Ignition, Cellulose Insulation Ignition, Lithium Ion Battery Fires, Lighter Fires, Cigarette Fires, Gasoline Fires, Aerosol Can Fires, Kitchen Fires, Charcoal Fires, Fireworks Fires, Magnifying Glass Fires, Glass Cracking, Interpretation of Burn Patterns, Ignitable Liquid Fires, Ignitable Liquid Pour Patterns, Plastic Materials Differences, Performing a Room Set for a Test Burn, and Team Investigation and Dig-Out of a Test Burned Room.

“2017 ARC-CSI Crash Conference, 16<sup>th</sup> Annual”, ARC-CSI, Las Vegas, NV, Sept 2017. Topics included: traffic accident reconstruction, event data recorders (EDR) and body worn cameras, pedestrian crash reconstruction, gap acceptance, driver expectation and nighttime recognition, pedestrian walking speeds, IIHS moderate overlap crash testing, unmanned aerial vehicles (UAV) for photography, mapping and photogrammetry, NTSB Highway Crash Investigations, disc and drum air brakes, and passenger vehicle emergency braking performance.

“Crash Data Retrieval (CDR) Analyst Certification Course”, Collision Safety Institute, November 2017 – 40-hour course. Course topics included Event Data Recorder (EDR) function, interpretation skills enabling the application of an EDR report to a situationally complete crash reconstruction, including momentum, Delta V, PDOF, as well as general considerations related to EDR data admissibility, reading, interpreting and using EDR reports and understanding, identifying and dealing with anomalous data from vehicle EDR reports.

“2018 SATAI Winter Conference”, SATAI, Glendale AZ, January 25 – 27, 2018. Topics included: Pedestrian crash reconstruction, traffic signal timing, low speed crash analysis and reconstruction.

“2018 AAFS Annual Scientific Meeting”, AAFS, Seattle, WA, February 19 – 24, 2018. Topics included: Forensic Applications of Fire Science, Etiology of Vehicle Mishaps Clarified via Forensic Analysis, Who’s Driving, Forensic Methods of Vehicle Operator Identification, Forensic Analysis of Helmets and Head Injuries, Misconduct and Ethics Violations in Forensic Investigations, The CSI Effect, The Intersection of Science, Standards and the Law in Fire Litigation.

“CDR Technician Train the Trainer Course”, Collision Safety Institute, Attended March 4, 2018.

“2018 EDR Summit”, ARC-CSI, Houston, TX, March 5 - 7, 2018. Topics included: CDR Tool updates, Infotainment Systems, On-Star Data, EDR Throttle Input, Power Loss and Reported Vehicle Speeds, Subaru EDR Evidence, Tesla EDR, EDR Case Studies, EDR Legal Challenges, EDR and Motorcycles, Bendix ABS and Bendix Data Recorder Overview.

“Ethics in Forensic Engineering”, MnSPE, St. Paul, MN, September 13, 2018. This seminar will cover forensic engineering, including the role of an expert witness, best practices for following a specific methodology and how to be mindful of ethical considerations when considering being an expert witness - an engineer is not an advocate but should be impartial even if that impartiality is at cross-purposes with the hiring client.

“CDR Technician Train the Trainer Course”, Collision Safety Institute, Attended March 3, 2019.

“2019 EDR Summit”, ARC-CSI, Houston, TX, March 4 – 6, 2019. Topics included, CDR Tool updates, EDR and U-Haul, Analyzing Steering, Autonomous Vehicles and ADAS, Video Velocity Analysis, Bosch CDR 900, Tesla EDR, Heavy Truck Collision Mitigation Systems, Infotainment Systems, EDR and Vehicle Fires, Advanced Data Collection, Speed from Audio recordings, Guardrail Analysis, Motorcycle Reconstruction and EDR and EDR Applications.

“2020 Southwestern Assoc. of Technical Accident Investigators”, SATAI, Glendale AZ, January 23 – 25, 2020. Topics included: Toyota Safety Sense and Vehicle Control History, electric scooter performance, and using video evidence in traffic investigations.

“2020 EDR Summit”, ARC-CSI, Houston, TX, March 9 – 11, 2019. Topics included: Bosch CDR, Tesla and Berla iVe updates, advanced CDR data collection techniques, autonomous emergency braking (AEB) and pedestrian AEB, locomotive EDR, railroad crossings, traffic signal timing, and traffic signals as EDRs, Nissan CDR and pre-crash steering, Subaru ADAS & EDR, Toyota Techstream data and testing, ignition cycology, and case studies.

“ET-2025: Determining Negligence in Engineering Failures”, PDH Engineer.com, Completed March 16, 2020, Ethics Requirement, 2 PDH, Description: This course is intended for engineers concerned with ethical behavior in engineering practice. This course is based on the paper, "Determining Negligence in Engineering Failures," by Mark Rossow, July, 2015.

“2021 NAFI Fire Investigation Training Program”, Orlando, FL, February 22 – 25, 2021. Topics included: Explosions Dynamics, Fire Chemistry, Fire Dynamics, Heat and Flame Vector Analysis and the Origin Matrix, Fire Scene Safety, Origin and Cause Determination, Diagramming the Fire Scene, Basic Photography for Fire Investigators, Water Based Suppression Systems, and Electricity and Fire.

“Berla Vehicle Forensic Systems Course”, Annapolis, MD, September 12 – 17, 2021. This five-day course focuses on the full spectrum of vehicle system forensics. It is structured to provide investigators with the necessary skills to identify, acquire, and analyze data from vehicle systems. The course starts with gaining a basic understanding of the iVe Ecosystem of tools and vehicle data, and then quickly moves into practical exercises in vehicle system removal, acquisition methodology, and scenario-based analysis.

Berla Certifications attained through testing:

CVST - Certified Vehicle System Forensic Technician

CVSE - Certified Vehicle System Forensic Examiner

“Heavy Vehicle Event Data Recorder Use in Traffic Crash Investigation Analyst Training”, Pleasant View, TN, October 4 – 7, 2021. This four-day training offers further training into the history, development, and function of heavy vehicle digital forensics. The investigator’s expanded interpretation

skills will assist in the completion of a situation-based crash reconstruction. Topics included are: Best practices used to access and document HVEDR data, HVEDR Data Available on Heavy Trucks, Use of OEM software/adapters, as well as the Synercon Forensic Link Adapter and TruckCRYPT software, Validation Testing Case Analysis.

“NAFE Forensic Engineering Seminar”, Tucson AZ, National Academy of Forensic Engineers, January 8 – 9, 2022. Topics included: Borax in a Rail Car, Computer Fire Modeling and the Law, Forensic Hydrology and Environmental Assessment of and Oil Field, Factors to Consider in Roofing Repair Recommendations, Self-Loosening Sediment Traps Resulting in Gas Explosions, Engineering Simulation, Who can get What From Your File, Practical Real World Ethical Challenges, Preparation for an Expert Challenge, Electric Power Steering and Fault Codes, Forensic Inspection of Braking Systems, Pneumatic Brake Force Calculations. **(INCLUDED 4 HOURS ETHICS TRAINING)**

“How to Excel at Your Expert Witness Deposition”, SEAK, Clearwater Beach FL, April 21 – 22, 2022. The course is taught using five methodologies: lecture, interactive exercises, videos of experts testifying in real cases, mock deposition demonstrations, and questions & answers. This is a hands-on course. All attendees will have the opportunity to practice their deposition skills through in class exercises and to receive feedback from the faculty.

“How to Be an Effective Expert Witness”, SEAK, Zoom Class, June 4 – 5, 2022. This is a hands-on, fast-moving interactive workshop covering deposition, direct examination, and cross-examination skills. Attendees will learn how to become markedly more effective and significantly more valuable expert witnesses. Attendees will have an opportunity to participate in demonstrations and to receive constructive feedback as to how to improve their performance.

“Advanced HVEDR Systems”, Texas Association of Accident Reconstruction Specialists (TAARS) Annual Conference, October 19 – 21, 2022. Topics included data preservation and integrity, electrical vehicle safety, damaged vehicle data analysis, Wabco brake system data, Detroit Assurance data analysis, Bendix brake data analysis, Trailer data collection, Transmission data collection, other data types available, data collection of other data types.

“2023 Southwestern Assoc. of Technical Accident Investigators”, SATAI, Glendale AZ, February 28 – March 4, 2023. Topics attended included EDR update and advanced photography techniques.

“World Reconstruction Exposition (WREX) 2023”, Orlando FL, April 17 – 21, 2023. Topics attended included the history of crash reconstruction, the future of crash reconstruction, analysis of sideswipes, the next generation of GM ACMs and EDRs, crash testing, commercial vehicle collision mitigation systems, EDR accuracy of modern vehicles, accessing Toyota camera data, injury biomechanics, autopsy of a primus biofidelic dummy, forensic data Acquisition of mobile devices, methods of establishing motorcycle impact speed, heavy vehicle side and rear underride speed calculation and crash data review.

“30th SEAK Annual National Expert Witness Conference”, Clearwater Beach, FL, May 6 – 7, 2023. Topics included: How Experts Can Improve Their Persuasiveness, How to Excel at Trial, How and Why Attorneys Depose Experts, Using Demonstratives, How to Excel During Direct Examination, How to Excel Testifying via Zoom, Benefits of Narrowing Your Area, Expert Mistakes and how to Avoid

Them, How to Excel at Deposition, Effective Expert Testimony, How Attorney's Cross Exam Experts, How to Avoid Unforced Errors, Establishing a Working Relationship with Counsel, How Attorneys Select Expert Witnesses.

“Surviving Cross Examination” via Zoom, July 25, 2023, Presented by Kathryn Nester, Esq.

“Symposium on EDR Research and Training”, Oklahoma City, OK, April 8 – 12, 2024.

Topics included: Bosch CDR tool updates, GM active safety module data, back powering and repowering of damaged vehicles, Toyota GTS and Techstream data updates, Ford CDR technology update, Berla iVE and infotainment data, motorcycle EDR systems, events, support and application, and heavy vehicle EDR systems, capabilities, challenges, research and demonstrations.

“Motorcycle Collision Reconstruction”, Four Day Zoom Course, Lightpoint Learning, Taught by Lou Peck, May 2024. Topics included Kinematics. Dynamics, MC Inspection, PRT Analysis, Braking, Using Excel, Swerving, Acceleration, Sliding Friction, Wheelbase Reduction, Rotational Mechanics, Vault, EDR, Simulation and Monte Carlo Analysis using Excel.

“2024 Midwest Assoc. of Technical Accident Investigators”, MATAI, Newton Iowa, September 16 – 18, 2024. Topics attended included Injury Biomechanics, HIC and NIC and the reconstruction of a UTV rollover crash.

“Berla Vehicle System Forensics Chip-off Course”, Annapolis, MD, October 15-17, 2024. This 3-day, 24-hour course focuses on the methodology, tools, and techniques required to remove and read memory chips from vehicle systems. It begins with hands-on instruction covering the identification of chip types, removing them from circuit boards, reading the chip data, importing and parsing binary images using iVe Software, as well as utilizing third-party software for reviewing unparsed binary images from various vehicle systems. Berla Certification Attained Through Testing

“Professional Ethics for Engineers” Pace Online Training for Florida PEs, 1 hour. Taken on 11/14/2024.

“Florida Law for Engineers” Pace Online Training for Florida PEs, 1 hour. Taken on 11/14/2024.

“2025 Southwestern Assoc. of Technical Accident Investigators”, SATAI, Glendale AZ, March 26 – 29, 2025. Topics included: Hyundai & Kia EDR Tool update, lateral displacement from precrash yaw and lateral acceleration, advanced time-distance analysis, aerial drones, photogrammetry, and trailer dynamics.

“Southwestern Assoc. of Technical Accident Investigators”, 2025 SATAI Fall Conference, Glendale AZ, October 10 – 11, 2025. Topics Attended Included: Occupant Biomechanics in Vehicle Collisions, Takata Airbag Update.

CFI Trainer.net, 4/2/2026 “Electric & Hybrid Vehicle Design Basics”, 3 hour tested training, online instruction, - 3 credit hours

CFI Trainer.net, 4/3/2026 “Electric and Hybrid Vehicle Fires”, 3 hour tested training, online instruction, - 3 credit hours

CFI Trainer.net, 4/3/2026 “Lithium-Ion Battery Fires”, 3 hour tested training, online instruction, - 3 credit hours

CFI Trainer.net, 4/7/2026 “Alternative Fuel Vehicles, Safety Concerns When Responding”, 3 hour tested training, online instruction, - 3 credit hours

“Symposium on EDR Research and Training”, Chattanooga, TN, April 14 – 16, 2026.

Topics Included: Bosch Developments, Capabilities and Future, Cummins EDR, Toyota Safety Sense, Bendix Safety Direct, Vehicle Data Testing and Validation, How to Get the Data, Hyundai and Kia Update, Limitations of Focusing on the Final Speed Value, Applied Use of Recorded Data Yaw Rate and Speed Data, Calculating Lateral Displacement Using EDR Precrash Data, Correlating EDR Data to Physical Evidence and a Panel Discussion with the Speakers.

### **Publications**

“Plasticity Responses in Ultra-Small Confined Cubes and Films”, Chemical Engineering and Materials Science Department, University of Minnesota, Minneapolis, Minn., May 2006. (Co-author)

“Thickness Effects on the Plasticity of Gold Films”, Chemical Engineering and Materials Science Department, University of Minnesota, Minneapolis, Minn., January 2007. (Co-author)

“Crash Team Boot Camp & Data Review”, Collision Magazine, The International Compendium for Crash Research, Volume 6, Issue 2, January 2012. (Co-author)

“Differentiating Potentially Causal Pre-Crash Component Damage from Crash Damage”, Collision Magazine, The International Compendium for Crash Research, Volume 8, Issue 2, December 2013. (Author)

“What Your Expert Needs for Successful Case Resolution”, NASP Subrogator Magazine, 2014 Spring / Summer Edition. (Author)

“Wheel Slip and Its Effect on Reported Vehicle Speed”, Collision Magazine, The International Compendium for Crash Research, Volume 9, Issue 2, December 2014 [PEER REVIEWED]. (Author)

“Vehicle Battery Cable Arcing vs. Melting Analysis”, 2016 ISFI Proceedings, September 15, 2016. (Lead author)

“Evaluation of the MIDE Slam Stick X as a Low-Cost Accelerometer and Data Acquisition System for Vehicle Crash Testing,” Hallman DM, Anderson RD, Grimes W, Salisbury K & DiTallo M, Collision Magazine, The International Compendium for Crash Research, Volume 11, Issue 2, 2016 [PEER REVIEWED]. (Lead Author)

“Motorcycle Center of Gravity Data Methodology and Reference,” Michael DiTallo, Eric Paul, Kelley Adamson, Thomas Green, Mike Merolli, Brent Munyon, Kevin Vosburgh, Billy Cox, Eric Moody, Robert Anderson, James Whelan & David Hallman, Collision Magazine, The International Compendium for Crash Research, Volume 12, Issue 1, 2017, [PEER REVIEWED].

“Three Different Methodologies for Determining the Drag Factor for Motorcycles Sliding on Their Sides,” Michael DiTallo, Brent Munyon, Thomas Green, Eric Paul, Kelley Adamson, Mike Merolli, Kevin Vosburgh, Billy Cox, Robert Anderson, David Hallman, Eric Moody & James Whelan, Collision Magazine, The International Compendium for Crash Research, Volume 12, Issue 1, 2017, [PEER REVIEWED].

“Evaluation of the MIDÉ Slam Stick as a Low-Cost Accelerometer and Data Acquisition System for Vehicle Skid Testing,” David Hallman, Robert Anderson, Billy Cox, Kevin Vosburgh, Kelley Adamson, Thomas Green, Mike Merolli, Brent Munyon, Eric Paul, Eric Moody, James Whelan & Michael DiTallo, Collision Magazine, The International Compendium for Crash Research, Volume 12, Issue 1, 2017, [PEER REVIEWED]. (Lead Author)

“3D Laser Scanners in Crash Testing,” Thomas Green, Michael DiTallo, Eric Paul, Kelley Adamson, Mike Merolli, Brent Munyon, Kevin Vosburgh, Billy S. Cox, Jr., Robert Anderson, David Hallman, Eric Moody & James Whelan, Collision Magazine, The International Compendium for Crash Research, Volume 12, Issue 1, 2017, [PEER REVIEWED].

“Summary of School Bus Crash Testing Conducted to Evaluate the Use of Seat Belts”, David M. Hallman, Michelle R. Hoffman, Robert D. Anderson, Billy S. Cox Jr., Collision Magazine, The International Compendium for Crash Research, Volume 13, Issue 2, 2019.

“Nissan SUV EDR Recording Characteristics”, David M. Hallman M.S., P.E., Billy S. Cox, Jr., Collision Magazine, The International Compendium for Crash Research, Volume 14, Issue 2, 2020.

“Toyota Vehicle Control History Case Studies”, David M. Hallman, M.S., P.E., Robert D. Anderson, Billy S. Cox, Jr., Collision Magazine, The International Compendium for Crash Research, July 2020, Volume 14, Issue 2, 2020.

“Nissan Automobile EDR Recording Characteristics”, David M. Hallman M.S., P.E., Billy S. Cox, Jr., Robert D. Anderson, Collision Magazine, The International Compendium for Crash Research, Volume 16, Issue 2, 2022.

“Impact Severity: A Function of Vehicle Closing Speed or Vehicle Impact Speed (Ground Speed)?” – Crashology, Michelle Hoffman, Robert Anderson, Wesley Vandiver, Billy S. Cox, Jr., David M. Hallman, Collision Magazine, The International Compendium for Crash Research, Volume 16, Issue 2, 2022.

“Crash Analysis with Berla and EDR Data, Two Case Studies” – Crashology, David M. Hallman, Robert Anderson, Wesley Vandiver, Billy S. Cox, Jr., Michelle Hoffman, Collision Magazine, The International Compendium for Crash Research, Volume 17, Issue 1, 2023.

### **Presentations**

“ARC-CSI Crash Team Boot Camp” Data Collection and Team Presentation, ARC-CSI Crash Conference, Las Vegas NV, May 22-26, 2011

“What’s New in Vehicles and Crash Investigation”, Crane Engineering Seminar, Minneapolis, MN, October 19, 2011.

“Vehicles and Crash Investigation”, MDLA Lunch and Learn Presentation, Minneapolis, MN, October 5, 2011.

“Properties of Metals including fatigue, corrosion, failure analysis, crystal structure, phase diagrams, processing and electrical, thermal and magnetic properties”, two 3-hour lectures, University of Saint Thomas, ETL5 771 Materials Engineering Class, October 2012.

“Differentiating Potentially Causal Pre-Crash Component Damage from Crash Damage”, 2013 ARC-CSI Crash Conference, Las Vegas, NV, May 15, 2013.

“Vehicle Mechanical Forensics and Tire Failure Analysis”, 2013 SATAI Fall Conference, Phoenix, AZ, September 28, 2013.

“Properties of Metals including fatigue, corrosion, failure analysis, processing and electrical, thermal and magnetic properties”, one 3-hour lecture, University of Saint Thomas, ETL5 771 Materials Engineering Class, October 31, 2013.

“Unique Features of Toyota Gen3 Data”, 2014 CDR Summit, Houston, TX, January 28, 2014

“Wheel Slip and Its Effect on Reported Vehicle Speed”, 2014 ARC-CSI Crash Conference, Las Vegas, NV, June 4, 2014.

“Properties of Metals including fatigue, corrosion, failure analysis, and mechanical properties”, one 3-hour lecture, University of Saint Thomas, ETL5 771 Materials Engineering Class, October 23, 2014.

“Crashes and Vehicle Mechanical Failure, Are You Missing Subrogation Opportunities?”, 2014 NASP Fall Conference, Orlando, FL, November 11, 2014.

“Crash Data and Vehicle Mechanical Failures: What are you missing?”, 2015 MAJ Wrongful Death Seminar, Minneapolis, MN, February 5, 2015.

“Physics of Crashes”, Spring 2015 at Osseo Junior High School for 9<sup>th</sup> Grade physics students, one day, five sections of students, April 2015.

“Vehicle Battery Cable Arcing V. Melting Analysis”, 2016 ISFI Conference, Scottsdale, AZ, September 12-14, 2016.

“Mechanical Forensic Engineering”, Half Moon Education Incorporated Seminar, Minneapolis, MN, September 22, 2016

“Force and Motion”, Spring 2017 at Osseo Middle School for 6<sup>th</sup> Grade science students, one day, three sections of students, February 14, 2017.

“Toyota GEN3 Pre-crash Brake Data – Details and Application. (Co-presented with William “Rusty” Haight)”, 2017 EDR Summit, Houston, TX, March 7, 2017

“Wheel Slip and Its Effect on Reported Vehicle Speed”, “Vehicle Mechanical Inspections”, 2017 MATAI Annual Conference, June 7, 2017.

“Steering Failure in a Triple Fatality Crash”, 2018 AAFS Annual Scientific Meeting, February 19 – 24, 2018.

“2019 MATAI Crash Data Review”. Presented crash data from MATAI school bus crashes performed at 2019 MATAI Annual Training, Cedar Rapids IA. June 5, 2019.

“Mechanical Forensic Engineering”, 2019 Materials Camp, University of Minnesota, Amundson Hall, July 9, 2019

“2019 IPTA Crash Data Review” with Billy S. Cox, Jr. 2019 IPTA Annual Conference, Des Moines IA. July 17, 2019.

“Introduction to Vehicle Fire Investigation”, Provided Three Hour Training Course to Local Public Sector Fire Investigators from Hennepin County and Monticello, Minnesota, Maple Grove Fire Station #2, Maple Grove, MN. July 24, 2019. Vehicle burn testing (detailed under research) and further instruction (three hours additional training) was conducted on September 7, 2019, in Monticello Minnesota.

“I Have a Product Failure, Do I Need an Engineer?”, Invited presentation for the North Dakota Defense Lawyers Association Annual Meeting / Fall Seminar, Bismarck ND, September 19, 2019.

“Crash Reconstruction and EDR” Invited Presentation for the 2019 Fall AVCAW/WIASIU Seminar, Milwaukee WI, October 15, 2019.

“Nissan SUV EDR Recording Characteristics and Interpretation of Pre-Crash Steering Data”, with Billy S. Cox, Jr. “2020 EDR Summit”, ARC-CSI, Houston, TX, March 9 – 11, 2019.

“2021 MATAI Crash Data Review” Presented crash data from MATAI farm equipment vs. light vehicle crashes performed at 2021 MATAI Annual Training, Des Moines, IA. June 23, 2021

“2022 CrashCon22 Crash Data Review” with Billy S. Cox, Jr. Presented crash data from crashes performed during the CrashCon22 Conference in New Orleans, LA. May 22, 2022

“2022 MATAI Crash Data Review” Presented crash data from MATAI Light Vehicles vs. Heavy Vehicles crash tests performed at 2022 MATAI Annual Training, Des Moines, IA. September 14, 2022.

“EDR Tech Edition 4: Toyota Techstream Vehicle Control History Data” Presented via Crash Data Group “EDR Tech” YouTube Channel, 2022.

“2023 MATAI Crash Data Review” Presented crash data from MATAI “Back to the Basics” crash tests performed at 2022 MATAI Annual Training, Des Moines, IA. September 20, 2023.

“Toyota Data, Berla Data, and EDR Data, and How They Can Be Used Together for Crash Reconstruction”. Case studies including a stolen vehicle claim, a red-light dispute, the impact order in multiple vehicles rear-end collisions. Presented at the 2024 MATAI Conference in Newton Iowa on 9/18/2024.

“Vehicle Fire Causes and Arson Investigation”, 4-hour presentation “Southwestern Assoc. of Technical Accident Investigators”, 10/14/2025, 2025 SATAI Fall Conference, Glendale AZ

“Vehicle Fire and Arson, Vehicle Theft Analysis” 3-hour presentation plus 2-hour hands on demonstrations, “Progressive Insurance Property Damage Summit 2025”, 10/22/2025, DeSoto IA.

## **Research**

**May 22-23, 2011** - Planned and executed an instrumented vehicle crash (with a team) between a Crown Victoria and a simulated left turning Hyundai Excel with a team. Crown Victoria was driven by an instrumented human volunteer. Results were presented at the 2011 ARC-CSI conference.

**June 28-29, 2011** – Planned and executed a vehicle fire in a garage. A Chevrolet Astro van and a Pontiac Grand Prix were placed in a garage and a fire was started under the hood of the Grand Prix. The fire was video recorded and pre-fire condition was documented. A post fire investigation was then carried out.

**March 16, 2012** – Assisted IAAI MN with a house burn in Coon Rapids, MN set up to train fire investigators. Set fire to one room using a flare at the base of a foam couch. The flare residue was not detected by the investigators.

**June 2-3, 2012** - Participated in crash tests with instrumented human volunteers. These crashes included frontal and rear-end impacts between a Jeep Grand Cherokee and a Chrysler Town & Country, and a broadside between a Ford Contour and a Ford Crown Victoria with instrumented anthropomorphic dummies. The data from these crashes was presented at the 2012 ARC-CSI crash conference.

**June 4, 2012** – Performed and participated in crash tests with instrumented human volunteers and anthropomorphic dummies including:

- Remote driven Gran Prix striking a E350 ambulance in an angled broadside.
- Chrysler Town & Country with a remote air out striking a Ford Aspire in an offset rear-end and a Toyota Corolla in a broadside.
- Ford Crown Victoria and a Saturn SL2 in a glancing high speed high angle broadside.
- Remote driven Rio and a Yaris in an angled head-on.
- Remote driven Jeep Grand Cherokee and a Fiat Bertonne in an offset head-on, over-ride and rollover.
- Ford Crown Victoria and a Kia Sephia in a sideswipe and an Escort in a broadside.
- Remote driven Volkswagen Jetta and a Chrysler Town & Country.

The data from these crashes was presented at the 2012 ARC-CSI crash conference.

**June 19, 2012** – Performed multiple box burns and three vehicle burns for flare research presented at 2012 ISFI Conference.

**May 12, 2013** – Performed and participated in low-speed crash testing and bus-car collision test with instrumented human volunteers prior to 2013 ARC-CSI crash conference. The data from these collisions was presented at the 2013 ARC-CSI Crash Conference.

**May 13, 2013** – Performed and participated in instrumented crash tests with human volunteers and anthropomorphic dummies.

- Human driven Toyota Yaris into a barrier.
- Remote driven Toyota Yaris into barrier at high speed.
- Remote driven Saturn SL2 offset into rear of a city bus.
- Human driven Crown Victoria offset head-on into stationary Chevrolet Cavalier.
- Remote driven Chevrolet Cavalier centered into the rear of a city bus.
- Remote driven Chevrolet Impala into side of city bus.
- Human driven Crown Victoria offset head-on into pushed Chevrolet Cavalier.
- Remote driven high-speed head on between two Pontiac Grand Ams.

The data from these crashes was presented at the 2013 ARC-CSI Crash Conference.

**September 27, 2013** – Performed and participated in an instrumented vault crash utilizing a remote driven vehicle at the 2013 SATAI Fall Conference.

**June 1 – 2, 2014** – Performed and participated in remote driven Explorer and Cobalt (with remote controlled ignition switch position) frontal barrier impacts, Contour to New Flyer city bus containing an instrumented anthropomorphic dummy driver and human passengers, and head-on collision between Crown Victorias, as well as human driven Prius and Cobalt to barrier impacts, rear-end and frontal impacts between a Prius and a Cobalt, multiple vehicle crash with Crown Victoria, Malibu and Saturn, broadside crashes between Crown Victorias and an Impreza and a Prius. – Results presented at ARC-CSI conference, June 2-5, 2014, Las Vegas, NV.

**June 10 – 11, 2014** – Performed and participated in two fully instrumented crash tests including a 90-degree intersection crash and a head-on crash at the 2014 MATAI annual meeting and training seminar. Results were presented at the end of the seminar.

**September 25, 2014** – Performed and participated in instrumented Camry to pedestrian dummy impacts, a remote driven BMW 740 iL to Camry to Volvo 850 chain reaction rear-end impact, and Volvo 850 to motorcycle with a pedestrian dummy rider impacts at the 2014 SATAI Fall Conference. Results were presented at the end of the conference.

**January 27 – 28, 2015** - Performed and participated in instrumented Cobalt to Camry rear-end, broadside and head-on collisions in Houston, TX. Results presented at CDR User's Summit, January 26-28, 2015, Houston, TX

**May 31, 2015** - Performed and participated in rear-end bumper-to-bumper and bumper-to-hitch impacts with instrumented human occupants with a Mazda 3 into a Yaris and a Land Rover. Results presented at 2015 ARC-CSI conference.

**June 1, 2015** - Performed and participated in instrumented broadside impacts between remote ridden Taizhou scooter, Honda cruiser and Kawasaki ZX600 motorcycles, and Grand Caravan and Crown Victorias, a remote driven head-on between a Grand Prix and Crown Victorias, human driven Land Rover into Lincoln MKZ, Malibu into Mazda 3, Grand Caravan into Elantra broadside impacts including pre-impact ramp jumps, instrumented drivers, passengers and an anthropomorphic dummy. Results presented at 2015 ARC-CSI conference.

**September 10, 2015** - Performed and participated in instrumented Ford Focus and Ram 1500 to pedestrian dummy, Ford Crown Victoria to Ford Focus sideswipe, and Ram 1500 head-on to a Honda Prelude impacts with an instrumented human and Hybrid III dummy, in Glendale, AZ. Results were presented at the 2015 SATAI Fall Conference.

**May 22, 2016** – Performed and participated in low-speed impact testing with human occupants between a Volkswagen Passat and a Toyota Prius. Performed and participated in instrumented motorcycle barrier impacts and instrumented motorcycle crashes into an instrumented vehicle. These results were presented at the 2016 ARC-CSI crash conference.

**May 23, 2016** - Performed and participated in and instrumented head-on impact between a Ford Crown Victoria, an instrumented 90 degree impact between a Crown Victoria and a Toyota Prius, an instrumented head-on barrier impact of a Volkswagen Passat, a three car inline impact including a Crown Victoria, a Passat and a Chevy Cavalier, an instrumented oblique barrier impact with a Passat, multiple instrumented motorcycle barrier impacts and multiple instrumented motorcycle impacts with both stationary and moving instrumented vehicles including a Passat, A crown Victoria and a Lexus Sedan. These results were presented at the 2016 ARC-CSI crash conference.

**June 15, 2016** – Performed stranded battery cable testing including melting, burning and arcing battery cables to observe the effects. The samples were then analyzed by Neal Hanke at Materials Engineering and Evaluation and the results of the burn testing, and the analysis were presented at the 2016 ISFI Conference in Scottsdale AZ.

**October 5, 2016** – Performed and participated in instrumented steering wheel and brake force, vehicle pitch, and bumper height change tests during hard braking using a Celica in Mesa, AZ.

**October 5, 2016** – Performed and participated in instrumented license plate-to-bumper car-to-car rear-end impacts with a human subject using Civics and a Celica in Mesa, AZ.

**October 6, 2016** – Performed and participated in instrumented remote driven Celica into an angled head-on with a Ranger, and Massive Moving Barrier to Oldsmobile 98 and Expedition with child safety seat restrained 3-year-old dummies in Glendale, AZ. These results presented at the 2016 SATAI conference, September 6-8, 2016, Glendale, AZ.

**February – March 2017** – Performed research and testing with Toyota vehicles collecting and analyzing collected record data. Examined and evaluated more than 50 Toyota crash data reports to compare to the collected data. The results of this analysis were presented with William “Rusty” Haight at the 2017 EDR Summit in Houston Texas on March 7, 2017.

**September 17, 2017** - Performed and participated in multiple instrumented vehicle-to-pedestrian dummy crashes. The results of these crashes will be combined with the results from the September 18, 2017, crashes and will be published in the future.

**September 18, 2017** - Performed and participated in instrumented vehicle-to-pedestrian dummy crashes, remote driven Dart angled head-on with an SRX, a Deville offset broadside with a Solstice, a multiple vehicle rear-end impact with an Escape into a Corolla into a 500, and an offset head-on with two Escapes. Results presented at ARC-CSI conference, September 18-21, 2017, Las Vegas, NV.

**January 24, 2018** - Performed and participated in instrumented car-to-car impact testing involving front bumper mounted license plates and human volunteers, in Mesa, AZ.

**January 25, 2018** - Performed and participated in sideswipe, angled broadside, offset rear-end impacts between a Malibu and Mustang, child pedestrian and pedestrian-cyclist dummy impacts with a Malibu and Tahoe, and Mustang and Malibu to Tahoe hitch impacts with instrumented volunteers in Glendale, AZ. Results presented at SATAI conference, January 2018, Glendale, AZ.

**June 1-2, 2018** - Performed and participated in multiple instrumented vehicle-to-pedestrian dummy impacts with a Ford E250 van. Research to be published in the future. IATAI Pedestrian Crash Testing, Lockport IL.

**June 18-19, 2018** – Planned, performed, and participated in instrumented motorcycle-to-automobile, motorcycle-to-barrier, motorcycle ramp, and automobile-to-motorcycle-to-automobile, and remote driven head-on multiple vehicle crashes, in Newton, IA. Results presented at MATAI conference, June 2018, Altoona, IA.

**January 16, 2019** – Performed and participated in rear-end impacts between an Impala and Grand Marquis with instrumented volunteers in Glendale, AZ.

**January 17 – 18, 2019** – Performed and participated in instrumented remote driven broad-side rollover collision between a Tahoe and Grand Marquis, a multiple vehicle rear-end impact with a Towncar, motorcycle and Prius, and yaw testing with a Suburban in Glendale, AZ. Results presented at SATAI conference, January 2019, Glendale, AZ.

**June 3 – 4, 2019** – Planned, performed, and participated in instrumented Blue Bird school bus idle into Camry rear-end impacts and F150 to bus side-swipe impacts with live humans, as well as remote driven GMC to bus rear-end, Deville and Malibu to bus broad-side collisions, and Thomas school bus yaw testing, in Cedar Rapids, IA. Results presented at MATAI conference, June 2019, Cedar Rapids, IA.

**July 14 – 15, 2019** - Planned, performed and participated in low-speed instrumented rear-end impacts between an International school bus and a Kia Spectra with live humans; school bus idle forward,

acceleration and skid testing; and remote driven head-on and broadside collisions between school bus, Spectra and Rendezvous with instrumented ATDs and child dummies in Des Moines, IA. Results presented at IPTA conference, July 2019, Des Moines, IA.

**September 7, 2019** – Planned, performed, and participated in four vehicle burn tests utilizing three vehicles. An engine fire in a 2004 Ford Expedition, an interior fire set with a road flare in a 2001 Toyota Camry, an engine fire in a 2001 Toyota Camry and an interior fire in a 1995 GMC Suburban. These tests were conducted in Monticello, Minnesota as part of teaching vehicle fire investigation techniques to public sector fire investigators from Hennepin County and the Monticello Fire Department.

**January 20 – 23, 2020** - Performed and participated in instrumented Pathfinder to Navigator and 528i to Genesis rear-end impacts, Pathfinder front and rear to barrier impacts, and 528i to mattress, ladder, pallet, bicycle and couch impacts with instrumented volunteers and an ATD, and instrumented Navigator to bicycle broadside, Genesis to Cobalt broadside and Pathfinder steering testing, 528i with an instrumented human driver and ATD in broadside and rear-end impacts to a manikin on an electric scooter, and an angled head-on collision between a Navigator and 528i. *Data from the Nissan Pathfinder research was presented at the 2020 ARC-CSI EDR Summit.*

**May 15 – 18, 2020** – Performed vehicle electrical fire related testing with a custom test rig to evaluate localized heating of mechanically degraded wiring with varying current levels applied. The results of this testing will be published at a later date. The testing was performed in Maple Grove, Minnesota.

**August 7 – 8, 2020** - Performed and participated in rear-end, frontal and broadside crash tests between a Crown Victoria and a Nissan Versa with an instrumented volunteer driver in White Hall, TX.

**January 26 – 28, 2021** - Performed and participated in instrumented Versa-to-barrier and Versa rear-to-Suburban front impacts, Genesis rear-to-barrier and head-on Genesis-to-Astrovan collisions, and multiple vehicle rear-end impacts between a Sonata, Sonic and Thunderbird with instrumented volunteers and ATD's as well as testing of Ford SYNC Gen 3, Version 2 Infotainment System, Ford AEB System, and Ford Active Cruise Control System, steering wheel angle versus directional change and vehicle pitch/bumper height change during hard braking in Glendale, AZ.

**June 22 – 23, 2021** - Performed and participated in instrumented Suburban to Grand Prix front into open door impacts, as well as remote driven Rendezvous oblique rear-end to the corn head of a New Holland combine, head on between a Malibu classic and the disc of a Massey Ferguson tractor, Suburban rear-end to tractor, Malibu rear-end to combine's corn trailer, and head-on to the combine's corn head in Newton, IA. Results were presented at the 2021 MATAI Annual Training Conference.

**February 17 – 18, 2022** - Performed and participated in front-to-barrier, rear-to-barrier, and rear end impacts with instrumented volunteers using a Honda Civic and Subaru Outback, remote driven Honda Civic to e-scooter impacts, and offset rear-end impact with two Honda Civics, a sideswipe between a Toyota Corolla and Honda Civic, and rear-end impacts using Chevrolet Impalas and an angled broadside between a Chevrolet Impala and Toyota Corolla with volunteers and an ATD in Glendale, AZ. Results were presented at the 2022 SATAI Annual Training Conference.

**May 20, 2022** - Performed and participated in bumper-to-bumper and bumper-to-hitch rear-end impacts between two Chevrolet Suburbans, Ford Focus-to-Suburban hitch, and Suburban-to-Focus broad-side collisions with instrumented volunteers and ATD's, and remote driven offset head-on crash with a Nissan Altima and Mazda 5 Sport, and a chain-reaction rear-end collision with Suburbans and a Ford Focus in New Orleans, LA. Results presented at CrashCon22 Conference, May 19-22, 2022, New Orleans, LA.

**September 11 - 12, 2022** - Performed and participated in transit bus testing with instrumented volunteers during hard braking, transit bus front impact to Grand Am, transit bus rear-ended by a remote driven, instrumented Nissan Sentra and broadsided by a remote driven, instrumented Chevrolet Malibu. Also participated in Nissan Sentra hard braking tests with instrumented 5th and 50th percentile HBIII dummies and a human driven StopStick demonstration. Performed and participated in a remote driven, instrumented Chevrolet Malibu broadside into a dump truck and a remote driven, instrumented Pontiac Montana rear-end into a dump truck. All crashes were performed in Newton, IA. Results presented at the MATAI Conference, September 12-14, 2022, Des Moines, IA.

**March 1 – 2, 2023** - Performed and participated in front-to-barrier, angled front to barrier, and rear-to-barrier impacts with an instrumented volunteer in a Mazda 5, rear-end impacts between a Focus and Civic with an instrumented volunteer, a HB3 ATD and a RID ATD, karate mat to windshield strikes using an Escape with an instrumented driver, a remote driven Escape with instrumented ATD to pedestrian and offset head-on with Impala, and side-to-side, side to front and side to angled front side-swipes and an open door impact between a Mazda 5 and Outback with instrumented drivers and ATDs in Glendale, AZ. Results presented at SATAI Conference, March 1-3, 2023, Glendale, AZ.

**September 17 – 18, 2023** - Performed and participated in rear bumper, trailer hitch and super bumper to barrier crashes with an instrumented volunteer, both vehicle moving side-swipe and rear-end impacts and a broadside collision between an Express and Elantra with instrumented volunteers and 5th and 50th percentile HBIII dummies, remote driven both vehicle moving head-on collision between an F-150 and Grand Cherokee, and remote driven rear-end impact between a Prizm and Mountaineer in Newton, IA. Results presented at MATAI Conference, September 18-20, 2023, Des Moines, IA.

**September 14 – 16, 2024** - Performed and participated in instrumented volunteer exposures to rear-end impacts in a Polaris Ranger UTV, instrumented volunteer and 5th percentile ATD exposures in Lincoln LS to tire and tire tread run overs and a frontal impact to an ATV, an instrumented volunteer and 50th percentile ATD exposure to frontal broadside impact between an F-150 and a UTV, remote driven Impala into ATV dropped from a moving pickup, remote driven UTV rollover, and remote driven chain reaction rear-end impact between a Torrent, UTV and Impala, and UTV and ATV performance and skid testing in Newton, IA.

Results presented at MATAI Conference, September 16-18, 2024, Newton, IA.

**March 26 – 27, 2025** - Performed and participated in multi-surface skid testing with a UTV, rear-end impacts between a passenger car and SUV with a straight hitch, a Super Bumper, a trailer and a trailer with Super Bumper hitch, with instrumented human and 50th percentile ATD, as well as remote driven SUV to UTV broadside, car to trailer rear-end and angled head-on car-to-trailer with rollover in Glendale, AZ.

Results presented at SATAI Conference, March 27-29, 2025, Glendale, AZ.