



James F. Lane, P.E.

Director, Materials Science Practice and Laboratory Services

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Background

Mr. James Lane earned a B.S. degree in Materials Engineering and an M.S. degree in Materials Science and Engineering. He is a registered professional engineer in 27 states.

Mr. Lane consults from a materials engineering perspective, having extensive experience with failure analysis and engineering investigations. His focus is generally on metallurgy, materials of construction, property/structure relationships, and corrosion of both ferrous and non-ferrous materials. Mr. Lane also has experience evaluating polymeric and ceramic components and coatings.

Mr. Lane's characterization and failure analysis experience began with evaluating failed helicopter components while a cooperative education intern with Sikorsky Aircraft and transitioned to advanced materials research and microelectronics at the Georgia Tech Research Institute. He has now accumulated over 30 years of expertise in the determination of root cause and dispute resolution, with extensive experience designing and conducting field and laboratory testing. His background extends to the fields of materials characterization, fractography, metallography, and mechanical testing. He has supported a broad range of industries, including, but not limited to, construction, facilities, aerospace, railroad, automotive, recreational equipment, pharmaceutical, petrochemical, pulp and paper, food services, power generation, building systems, light manufacturing, insurance, and the legal community.

Mr. Lane is actively involved in ASM International, currently serving as President of the Failure Analysis Society (FAS), of which he was a founding member. He also is an active member of ASTM, serving on Committees A01, A05, E04, E08, E26, E30, E58, and G01 and various subcommittees; TMS, serving on the Professional Development Committee; and AWS. In addition to his society and committee work, Mr. Lane also peer reviews submitted articles for the Journal of Failure Analysis and Prevention.

Professional Engagements

• Energy

- Gas Transmission Line – Evaluated cause of gas leaking in an 8-inch natural gas transmission line running under a busy intersection, which caused an explosion, shutting down traffic, and cutting natural gas service to over 20,000 residences and businesses. The investigation identified that the installation crew was not confident in the mechanical coupling system, so they added an additional constraint to the system, which

prevented the mechanical coupler from seating properly, thus weakening the connection and allowing the joint to fail.

- Natural Gas Explosion – Investigated cause and origin of a natural gas transmission line suddenly exploded in the middle of a recently deforested rural area. Determined cause was damage from the teeth of a scraper that gouged the pipe surface, reducing the thickness of the pipe in the gouge and altering the microstructure of the hardened steel pipe, creating a brittle layer. Cracks developed in the brittle layer and propagated through the wall and ruptured the pipe, resulting in a catastrophic explosion.

- **Commercial/Industrial/Manufacturing**

- Pressure Vessel Corrosion – Developed test procedure to identify the cause of corrosion in stainless steel pressure vessels used to create the carbonated water mixed with the soda syrup for soda machines for a soda manufacturer and distributor. Also identified materials that would ease fabrication and improve corrosion resistance. The investigation involved collecting municipal water from various parts of the U.S. and evaluating different sections of each vessel and potential vessel material.
- Pump Weld Project – Investigated cracking in mud-driven down-hole drill heads for a major pump manufacturer. Identified weld material compatibility issues and developed a process to refine fabrication to resolve the cracking issue.

- **Railroad**

- Railroad Failure Analysis – As the group lead in a company contracted to perform all failure analyses for a Class I Railroad, I provided root-cause failure analysis for engineering components (rail, frogs, fasteners, clips, joints, welded segments, etc.) and mechanical components (wheels, bearings, axles, bolsters, side frames, cushioning units, couplers, knuckles, yokes, etc.). These analyses involved identifying the root cause and assisting the Class I Railroad with addressing these issues with their suppliers.
- AAR Qualification Testing – Managed a laboratory that performed AAR (Association of American Railroads) qualification testing for mechanical and engineering railroad components for major manufacturers. Static and dynamic testing of mechanical components, including bolsters, side frames, yokes, knuckles, and truck frames were crucial for the recertification of these components in accordance with federal regulations. Also provided American Railroad Engineering and Maintenance-of-Way Association bid qualification testing for engineering components.

- **Aviation**

- Airport Light Pole Project – Evaluated light pole anchoring systems at a major metropolitan airport after a pole fell and struck a parked car. The investigation identified corrosion and corrosion-fatigue mechanisms compromising the integrity of the individual light poles. In addition to the root-cause failure analysis, a program to survey and evaluate every light pole on the property was developed and completed.

- **Automotive**

- Cracked Pinion Gears – Conducted a root cause failure analysis of cracked powder metallurgy steel pinion gears used by an automotive Tier 1 supplier. Study determined that the pinion gears failed due to hydrogen embrittlement associated with tooling wear and improper heat treatment by the gear manufacturer.

- **Structural**

- Floor Bubbling Investigation – The floor on a warehouse space used by a clothier was experiencing bubbling and delamination. After an investigation, it was determined the moisture was being transmitted through the floor slab and the bottom layer of the high alkali water forming between the concrete surface and the coating was saponifying the coating, creating the bubbles and blisters in the coating.

Forensic Engagements

• Commercial

- Georgia – Investigated a dry barrel fire hydrant in a metropolitan area that ruptured when the base failed, flooding the basement server room in the adjacent building.
- Illinois – Investigated a claim of patent infringement associated with meat processing equipment.
- Indiana – Investigated a claim of theft of intellectual property associated with the alloying content of a proprietary grade of high-strength low-alloy steel.
- California – Investigated a helicopter crash allegedly tied to the malfunction of a lifting winch.
- Texas – Investigated the root cause of turbine blade failures associated with locomotive turbochargers.
- Mississippi – Investigated the mechanical integrity of table saw blades and the brazed carbide tips after a tip dislodged and struck the user in the eye.
- North Carolina – Investigated the frame and front forks of a high-performance mountain bike that fractured, injuring the rider.

• Industrial

- Georgia – Investigated an explosion in a sugar hammer mill in a confectioner's refining facility resulting in a localized fire.
- South Carolina – Investigated the material properties of wrought aluminum plates associated with a breach of contract dispute.
- Georgia – Investigated the erosion/corrosion damage associated with an exhaust system of a gas-powered fork truck involved in an asphyxiation matter.
- Alabama – Investigated the cause of a cupola water jacket explosion.

• Facilities

- Texas – Investigated a cracked PVC valve in a water line that resulted in a major flood of a commercial space.
- Georgia – Investigated the pressure relief valve and brass hot water heater fittings associated with a major water loss.
- Florida – Investigated formicary corrosion as it pertained to the evaporator coils in new residential construction.
- Illinois – Investigated the corrosion of metal studs used to retain the brick façade on a 20-story building.

• Amusement Park

- Kentucky – Investigated a wire rope failure on an amusement park ride that failed while in operation, injuring three young riders, including severing the feet of a young girl.

Professional Experience

• Rimkus

2018 – Present

- Director, Materials Science Practice and Laboratory Services (2020-Present)
Responsible for providing technical guidance, oversight, training, and supervision of materials-related professional engineering and scientific work performed across the various practice areas within Rimkus. Continue to provide consulting services commensurate with experience, training, and education.
- Principal Consultant – Materials Science Division (2018-2020)
Responsible for providing consulting services, from a materials engineering perspective, to determine root cause of systems and products that are either not performing to expectation or have experienced a

catastrophic event. Use engineering experience, materials characterization techniques, and analytical tools to isolate and identify primary and contributing factors associated with incidents. This work is performed in support of the legal community, insurance companies, private industry, and public entities.

- **Professional Analysis and Consulting, Inc.**

2014 – 2018

- Senior Materials Engineer

Responsible for materials engineering evaluations, failure analyses, and engineering investigations; focusing on metallurgy, stress conditions, property/structure relationships, and corrosion of both ferrous and non-ferrous components. Knowledgeable in the determination of root cause and problem resolution, including extensive experience designing and conducting field and laboratory testing. Proficient in areas of materials characterization, fractography, metallography, and mechanical testing. Supports a broad range of industries, including railroad, automotive, aviation, recreational equipment, pharmaceutical, petrochemical, pulp and paper, food services, power generation, construction, building systems, weldments, and light manufacturing.

- **CTLGroup, Inc.**

2011 – 2014

- Director/Principal Engineer

Responsible for the technical and business operations of the \$3.75M structural and mechanical testing facility. Managed projects typically consisting of static, dynamic, and pseudo-dynamic qualification and product performance testing for various manufacturing and construction industries, including railroad, intermodal, and long-haul. Additionally, responsible for engineering investigations associated with system and component failures, corrosion/environmental degradation, or materials engineering. Operations duties included personnel, schedule, facilities, safety, and quality.

- **Metals & Materials Engineers, LLC**

2007 – 2011

- Director/Principal Engineer – Failure Analysis Group

Responsible for the day-to-day operations (including financial performance). Project management and technical lead on projects included performing materials, corrosion, and materials failure analyses, including site visits. Performed analyses to characterize different materials, including mechanical, metallurgical, and chemical properties, for design and/or material selection. All duties were performed in support of private, governmental, industrial, and litigation business sectors.

- **MACTEC Engineering & Consulting, Inc.**

2005 – 2007

- Manager/Group Leader, Laboratory Services

Responsibilities included providing day-to-day operational control of Laboratory Services cost center, which included four separate laboratories. Provided technical and professional assistance to the laboratory in the form of proposal and report review, technical oversight, and materials consultation; established field and laboratory testing and inspection programs; provided supervision for field and laboratory testing; and overall responsibility for technical operations. Also responsible for laboratory quality system, including maintaining NQA-1 accreditation, and its implementation.

- Project Manager/Senior Materials Engineer

Responsibilities included performing materials, corrosion, and failure analyses, including site visits, when necessary, and characterizing different types of materials, including mechanical, metallurgical, and chemical properties, for design and/or material selection. All duties were performed in support of private, governmental, industrial, and litigation business sectors.

- **Applied Technical Services, Inc.** **1998 – 2004**
 - Senior Metallurgical Engineer
Performed materials, corrosion, and failure analyses, including site visits. All duties performed as private, governmental, industrial, and litigation support. Characterization of different types of materials, including mechanical, metallurgical, and chemical properties. Project Management, including supervising and directing junior-level personnel, generating technical proposals and reports, and reviewing and approving technical reports. Supervise the day-to-day operations of the Electron Microscopy Laboratory.
- **Law Engineering and Environmental Services, Inc.** **1993 – 1998**
 - Metallurgical Engineer
Consulting in the areas of materials engineering and failure analyses, corrosion testing and evaluations, fractography, metallography, mechanical testing, and material characterization. Responsibilities included the development and implementation of long-term test programs.
- **Georgia Tech Research Institute** **1990 – 1993**
 - Research Assistant (cooperative education assignment)
Responsible for materials characterization supporting research and private-sector clients, which included electron microscopy (scanning and transmission), x-ray diffraction, infrared spectroscopy, failure analysis, metallography, fractography, and presentation of research findings. Duties also included the characterization of advanced material.
- **United Technologies Corp./Sikorsky Aircraft** **1988 – 1990**
 - Engineering Assistant (cooperative education assignment)
Responsible for characterization of components associated with design improvement and failure analysis, including electron microscopy, fractography, metallography, composite testing, advanced material testing, acoustic and dynamic data acquisition, and hazardous waste management.

Education and Certifications

- **Materials Engineering, B.S.:** Georgia Institute of Technology (1993)
- **Materials Science and Engineering, M.S.:** Georgia Institute of Technology (1999)
- **Licensed Professional Engineer:** Alabama, California, Colorado, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Louisiana, Maryland, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New Jersey, New York, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, Washington, and Wisconsin

Continuing Education

- Annual work to maintain professional engineering licenses.

Publications

- **“Railroad Qualification Testing: Failure Prevention,”** Material Science & Technology (Presentation), Oct. 2015.
- **“Failure to Communicate: Corrosion,”** Material Science & Technology (Presentation), Oct. 2015.
- **“Gaining acceptance: Testing of stay-cable systems assures durability,”** Roads & Bridges, 2013, May:46-51.

- **“Failure Analysis of a Wire Rope from an Amusement Park Ride – Part 2 – Accident and On-Site Investigation,”** Material Science & Technology (Presentation), Oct. 7-11, 2012.
- **“When Stronger is Weaker: A Dynamic Failure of an 8-Inch Natural Gas Transmission Line Coupling System,”** American Academy of Forensic Science 57th Annual Meeting (Presentation), Feb. 21-26, 2005.
- **“Delayed Failure Mechanism in P/M Gears,”** ASM Materials Solutions Conference (Presentation), Oct. 18-21, 2004.
- **“Strain-Aging as a Failure Mechanism in Boat Trailers,”** Microscopy and Microanalysis (Presentation), Aug. 1-5, 2004.
- **“Effect of Microstructure on Die Punch Failures,”** Microscopy and Microanalysis (Presentation), Aug. 1-5, 2004.
- **“Fatigue Issues in Structural Aircraft Components,”** TMS Annual Meeting (Presentation), March 15-18, 2004.
- **“Engineering and Metallurgical Failure Analysis,”** ASM International – Atlanta Chapter (Presentation), Jan. 20, 2004.
- **“Root Cause Failure Analysis in Industrial Applications,”** Atlanta Plant Engineering and Maintenance Show and Conference (Presentation), June 21-22, 2000.
- **“Fatigue Analysis of Dump Cylinder Piston Rod,”** Georgia Institute of Technology, School of Materials Science and Engineering (Presentation), Partial Fulfillment of Graduate Industrial Internship, July 21, 1999.
- **“Characterization of Water Soluble Flux Corrosion,”** Georgia Academy of Science, 76th Annual Meeting, Engineering and Technology Division (Presentation), May 1, 1993.
- **“Characterizing Water Soluble Fluxes: Surface Insulation vs. Electrochemical Migration,”** Proceedings, IEEE, International Electronics Manufacturing Technology Symposium, Sept. 22-30, 1992 (co-author).
- **“Characterizing Solder Flux Corrosion Products,”** International Conference on Solder Fluxes and Pastes (Presentation), May 27-29, 1992.
- **“Characterizing the Corrosion Properties of Flux Residues,”** Soldering and Surface Mount Technology, No. 8, June 1991 (co-author).