

Exponent®
Engineering & Scientific Consulting


# Brad James, Ph.D., P.E., FASM

Group Vice President and Principal Engineer | Metallurgical and Corrosion Engineering
Menlo Park
+1-650-688-7391 | bjames@exponent.com


## Professional Profile

Brad James, Ph.D., P.E., FASM, is a group vice president and principal engineer at Exponent with over 30 years of experience in metallurgical and corrosion engineering. He specializes in the investigation and prevention of complex failures, applying expertise in fracture mechanics, fractographic examination, and quantitative risk analysis across diverse industries. He has led multidisciplinary investigations into engineering system and component failures, addressing challenges such as material selection, design, testing, fitness for service, extent of condition, abuse, heat treatment, corrosion, and joining for global clients in transportation, utilities, oil and gas, mining, fire protection, medical device, and consumer product industries.

Dr. James has served as an adjunct professor at Stanford and Santa Clara universities, teaching several graduate-level courses that include metallurgical/materials failure analysis, fractography, fracture mechanics, mechanics of materials, and electrochemistry concepts. He is a Fellow of ASM International, the world's largest materials engineering technical society, and he has served on the editorial review board of the Journal of Failure Analysis and Prevention.

Before joining Exponent, Dr. James was a research engineer in the Materials Performance Division at the Babcock and Wilcox Research and Development Center in Alliance, Ohio. In this role he conducted fatigue, fracture, and corrosion testing and analyses of materials used in power generation and aerospace applications.

### Metallurgical Failure Analysis

Dr. James has conducted thousands of metallurgical failure analysis investigations across diverse industries and applications from large steel structures to nearly microscopic medical devices and consumer products. By diagnosing material failures in these varied areas, Dr. James helps clients identify root causes, prevent future incidents, and enhance reliability and safety throughout their operations.

### Utilities

Dr. James has extensive experience conducting failure and risk analyses for both gas and electric utility clients. This work has included consulting on PG&E's San Bruno pipe failure investigation, helping implement pipeline records review processes, and helping implement novel methodologies and engineering models to support electric utilities in quantifying fire risk due to wind-induced equipment failures. Dr. James has experience reporting the findings of his utility investigations in both regulatory and legal settings.

© 2026 Exponent, Inc. All Rights Reserved 

### Medical Devices

Dr. James has conducted medical device failure analysis investigations for over 30 years, assisting dozens of device manufacturers in testing, assessing, and validating fatigue and corrosion performance of their implants and surgical tools. He has also taught dozens of day-long failure analysis, fracture, corrosion, and materials design courses to medical device engineers for ASM International.

### Oil & Gas

Dr. James has conducted dozens of failure analysis investigations of oil and gas refinery facilities, pipelines, and associated components. He has also helped assess the fitness for service and flaw tolerance of pipelines and associated components.

### Transportation, Aviation & Aerospace

Dr. James conducts failure analysis investigations involving motor vehicles, aircraft, spacecraft, and satellites. These investigations typically involve metallurgical and mechanical analyses to determine the cause of a component failure or to assess the integrity or expected lifetime of a specific component.

### Expert Witness and Testimony Experience

Dr. James has been deposed or given expert testimony in over 70 matters involving product liability, intellectual property, and accident causation. He has testified in both state and federal courts, before grand juries, and in international arbitration.

## Academic Credentials & Professional Honors

Ph.D., Metallurgical and Materials Engineering, Colorado School of Mines, 1994

B.S., Metallurgical Engineering, University of Washington, 1988

ASM International Fellow, 2011

## Licenses and Certifications

Professional Engineer Metallurgical, California, #1867

Professional Engineer Metallurgical, Texas, #116334

## Professional Affiliations

ASM International (Fellow)

Failure Analysis Society (member)

International Organization on Shape Memory and Superelastic Technologies (member)

Independent Metallurgical Engineering Consultants of California (Past President)

## Publications

### Book Chapters

Stewart JR, Ganot GS, Slone CE, James BA, Roepke CT. Fractography of weldments. In: ASM Metals Handbook, Volume 12; ASM International 2024; 441–449.

Malito LG, Bowers ML, Briant P, Ganot GS, James B. Fractography of nitinol. In: ASM Metals Handbook, Volume 12; ASM International 2024; 430–440.

Hudgins C, Roepke B, James B, Kondori B, Whitley B. Failures of pipelines. In: ASM Metals Handbook, Volume 11A; ASM International 2021; 531–556.

Bowers M, Ganot G, Malito L, Kondori B, Ezechukwu E, Svedlund F, James B. Failures analysis of medical devices. In: ASM Metals Handbook, Volume 11A; ASM International 2021; 531–556.

James B, Hudgins A. Failure analysis of oil and gas transmission lines. In: Handbook of Materials Failure Analysis with Case Studies from the Oil and Gas Industry. Elsevier 2015.

James B. Effects of heat treatment on vintage pipeline electric resistance welds. Metall Mater Trans A 2025; 56:3670–3680.

James B. Fractography for aircraft accident investigators, General Aviation Manufacturers Association, General Aviation Air Safety Investigators 30th Annual Workshop, Sept. 2025.

Liu C, Hudgins A, James B. Failure analysis of a ruptured pipeline. Journal of Failure Analysis and Prevention 2024.

Slone C, Mostaed E, Cline C, Kaplowitz D, Ganot G, James B, Aguiar D. Copper contamination cracking in a pipeline repair weld. Journal of Failure Analysis and Prevention 2024; 24:794–804.

- **Selected as Best Paper of 2024 in Journal of Failure Analysis and Prevention**

James B. Failure analysis of a gold mill slide ring. IMECA Fall Meeting, Pacific Grove, CA, October 9, 2022.

James B, Stevenson K, Bowers M. The metallurgy of fire cause-and-origin analysis. Materials Science and Technology Conference, Columbus OH, October 18, 2018.

Nirankari V, James B, Van Der Schjiff. Grooving corrosion: differentiating weld defects from corrosion failure. Materials Science and Technology Conference, Columbus OH, October 17, 2018.

Bowers M, James B. Case studies on sterilization-induced failures in metallic medical devices. Materials Science and Technology Conference, Columbus OH, October 17, 2018.

James B. Fire-cracking of lead-free brasses for use in water, oil and gas applications. IMECA Spring Meeting, April 21, 2018.

Birringer R, Hudgins A, James B. Case study of a natural pipeline explosion caused by a combination of manufacturing defects and environmental factors. Materials Science and Technology Conference, Salt Lake City, UT, October 24, 2016.

Birringer R, Ganot G, James B. Failure analysis of internal fixation medical devices: overview and case studies. Journal of Failure Analysis and Prevention 2016; 16(5)849–857.

James B, Briant P. Fatigue design and validation for medical device: what we learned from Portico. Invited Lecture, St. Jude Medical Materials Summit, September 29, 2015.

James B, Hudgins A. Fracture mechanics and crack management for natural gas operators. American Gas Association Fall Operators Meeting, Nashville TN, September 13, 2016.

Briant P, James B, Easley S, Kennett S, Schaffer J, Kay L. The effect of crimp strain on the fatigue performance of nitinol. Shape Memory and Superelastic Transformation (SMST) Conference, May 22, 2015.

Hudgins A, James B. Fatigue of threaded fasteners. Advanced Materials & Processes, ASM International 2014; 172(8):18–22.

Guyer E, James B. Surgical tool failure analyses. Journal of Failure analysis and Prevention 2013; 13(6). DOI 10.1007/s11668-013-9763-5.

James B. Pipeline rupture failure mechanisms and prevention. IMECA, Pacific Grove, CA, October 2012.

James B. Pipeline ruptures: review of common metallurgical failure mechanisms. Materials Science and Technology Conference, Pittsburgh, PA, October 2012.

James B. Pipeline ruptures: causes and prevention. Natural Gas Claims and Litigation Association, San Diego, CA, April 2012.

James B. Fracture, fatigue, corrosion and failure analysis of medical devices. Health Canada, Ottawa, Canada, March 2012.

James B. Medical device failure modes: learning from unexpected outcomes. Plenary Speaker, Bay Area Biomedical Device Conference, San Jose State University, March 2012.

Briant P, Lieberman S, James B. Residual stress distribution in MP35N due to plastic deformation and comparison to finite element analysis. International Medical Device Conference and Expo, Chicago, IL, October 5-6, 2011.

Briant P, Siskey R, Rau C, Easley S, James B. Effect of strain rate on nitinol constitutive modeling in the clinically relevant strain range. Proceedings, ASM Materials and Processes for Medical Devices, Minneapolis, MN, August 8-10, 2011.

James, B, Lieberman S. Analysis of a brake cylinder failure. Journal of Failure Analysis and Prevention 2011; 11:193-196.

James B. Fracture surface interpretation. Invited lecture, St. Jude Medical Cardiac Rhythm Management Division, Sylmar, CA, September 2010.

James B. Medical device fatigue design. Invited lecture, Medtronic Cardiovascular Innovation Seminar (CVIS), Santa Rosa, CA, July 2010.

James B, McVeigh C, Rosenbloom S, Guyer E, Lieberman S. Ultrasonic cleaning-induced failures in medical devices. Journal of Failure Analysis and Prevention 2010; 10(3):223-227.

James B, Sire R. Fatigue-life assessment and validation techniques for metallic vascular implants. Biomaterials 2010; 31:181-186.

James B. Fatigue design and validation of implantable medical devices. Invited lecture, St. Jude Medical, Cardiovascular Division, Maple Grove, MN, January 2010.

Fasching A, Kuş E, James B, Bhargava Y, Eiselstein L. The effects of heat treatment, surface condition and strain on nickel-leaching rates and corrosion performance in nitinol wires. Materials and Processes

for Medical Devices, ASM International, Minneapolis MN, August 2009.

James B, Sire R, Caligiuri R. Determination of the failure mode and the rupture pressure in a mechanically damaged pipeline. Journal of Failure Analysis and Prevention 2008; 8(3):223-230.

James B. Medical device failure analysis — practice and pitfalls. Invited lecture, ASM International, Materials and Processes for Medical Devices Conference, Cleveland Clinic, August 2008.

James B. Nitinol fatigue and fracture — beyond the fundamentals. Invited lecture, International conference on shape memory and superelastic technologies, Monterey, CA, May 7, 2006.

Eiselstein L, Sire R, James B. Review of fatigue and fracture behavior of nitinol. ASM Symposium on Materials and Processes for Medical Devices, ASM International, pp. 135-147, Boston, MA, November 14-16, 2005.

James B. Compressive damage-induced cracking in nitinol. International Conference on Shape Memory and Superelastic Technologies, ASM International, Baden Baden, Germany, October 2004.

James B. Failure analysis of NiTi wires used in medical applications. Materials and Processes for Medical Devices, ASM International, St. Paul, MN, August 2004.

James B, Eiselstein L, Foulds J. Failure analysis of NiTi wires used in medical applications. ASM International Journal of Failure Analysis and Prevention 2005; 5(5):82-87; Materials and Processes for Medical Devices, ASM International, pp. 44-49, St. Paul, MN, August 2004.

Eiselstein L, James B. Medical device failures — can we learn from our mistakes? Proceedings, Materials & Processes for Medical Devices Conference, ASM International, pp. 3-11, August 2004.

James B, Wood L, Murray S, Eiselstein L, Foulds J. Compressive damage-induced cracking in nitinol. Proceedings, International Conference on Shape Memory and Superelastic Technologies, ASM International, pp. 117-124, Baden Baden, Germany, October 2004.

James B, Murray S, Saint S. Fracture characterization in nitinol. Proceedings, International Conference on Shape Memory and Superelastic Technologies, SMST Society, pp. 321-329, May 2003.

James B, Matlock D, Krauss G. Interactive effects of phosphorus and tin on carbide evolution and fatigue properties of 5160 Steel. 38th Mechanical Working and Steel Processing Conference, Vol. XXXIV, pp. 579-590, October 1996.

Jones D, Hoppe R, Hechmer J, James B. An experimental study on the effects of compressive stress on the fatigue crack growth of low-alloy steel. Journal of Pressure Vessel Technology 1994; 116:317-324.

James B. Interactive effects of phosphorus and tin on carbide evolution and fatigue and fracture properties in 5160 steel. Ph.D. Thesis, Colorado School of Mines, 1994.

Merlano N, James B, Matlock D, Krauss G. Effects of tempering and residual element content on mechanical properties of 5160H steel. Proceedings, Gilbert R. Speich Symposium, Iron and Steel Society, pp. 101-109, Montreal, Canada, October 1992.

James B. Low cycle fatigue crack initiation in SA-210 A1 carbon steel boiler tubing in contaminated boiler water. Pressure Vessels and Piping Conference, ASME, Nashville, TN, June 1990.

## Project Experience

### Metallurgical Failure Analysis Examples:

#### Turbines and Boilers

- Steam turbine bearing failure analyses: Evaluated the cause of fatigue and cavitation in a steam turbine bearing that failed within months of commissioning.
- Turbine shaft wear and coating analysis: Analyzed turbine shaft wear at bearings and cold-spray coating techniques.
- Boiler failure analysis: Assessed corrosion, corrosion fatigue, welding and joining, and creep-induced failures in boiler piping, heat exchangers, and waterwalls.
- Steam turbine compressor blade failure analysis: Investigated the cause of failure of steam turbine compressor blades.
- Waterwall tubing corrosion fatigue: Analyzed the cause of corrosion fatigue and rupture of waterwall tubing associated with a catastrophic steam failure event.

#### Food/Chemical Processing

- Process piping weld specifications: Helped a food-processing plant revise their weld specification, testing, and validation procedures to eliminate leaks and stress-corrosion cracking of their 316L jacketed piping.
- Process piping failures: Examined the cause of leaks, fractures, and ruptures of piping and associated processing equipment; identified causes including poor welding, vibration-induced fatigue, and stress-corrosion cracking.
- Ammonia refrigeration piping failures: Investigated the cause of failures in ammonia refrigeration units for ice cream and fruit processing plants; traced failures to insufficient supports, vibration, and poor welds.
- Chemical processing valve: Evaluated the failure of a large gate valve at a chemical processing plant; determined that a combination of insufficient bolt torque and vibration resulted in insufficient bolt clamping force, which resulted in fatigue failure.
- Piping creep: Inspected piping at a chemical processing plant and revealed local bulging of adjacent piping; attributed the failure to creep-rupture from excessive temperatures caused by deposits that restricted cooling.
- Valve bolt failures: Analyzed a large-loss incident at a chemical processing facility caused by fractured bolts; found that the bolts fractured due to stress-corrosion cracking; recommended material and environmental changes to address the core problem.

#### Fire Cause-and-Origin and Electrical Damage

- Wildfire analysis: Investigated several electrical distribution and transmission components implicated as the cause or contributors to wildfires.
- Analyzed whether re-solidified metal deposits were caused by melting and alloying caused by fire damage or by arcing that potentially initiated the blaze.
- Crude oil pipeline leak: Analyzed and confirmed that a major crude oil leak was caused by arcing associated with an adjacent electrical sub-station.
- PTCRs: Evaluated positive temperature coefficient resistors (PTCRs) as potential sources of arcing and fires in compressor motors.

- Service boxes: Analyzed whether service box damage indicated the cause and origin of fires or damage associated with fires that initiated elsewhere.

### Engineering Structures

- Steel components corrosion: Analyzed corrosion in steel construction components across diverse geographies to determine whether and how pre-existing conditions or environmental factors contributed to structural failures; presented analyses to support settlement of claims in litigation.
- Electrical transmission tower collapse: Investigation of pre-existing cracks in an electrical transmission tower collapse, including the effects of potential strain aging and hydrogen embrittlement of the tower steel.
- Olympic stadium bolt failure: Examined the cause of bolt failures that occurred during construction of the Salt Lake City Olympic stadium.
- Swing scaffolding: Analyzed several worker-supporting swing scaffolding failures, including fractography, metallography, fracture toughness, and tensile testing. Some of the failures were from progressive fatigue crack initiation and growth, while others were from overloading.
- Paint Scaffolding: A hoist connection fractured in San Francisco, resulting in significant injuries to one of the workers. Failure analysis indicated the hoist connection suffered bending-induced fatigue crack initiation and growth due to scaffold misuse.
- Bay Bridge scaffolding: Evaluated portions of aluminum scaffolding used for painting the San Francisco/Oakland Bay Bridge that fractured, resulting in a worker's death; conducted metallurgical analysis, including fractography, metallography, and mechanical property testing, in combination with weld and structural analysis to determine the cause of the failure.
- Las Vegas sign welds: Analyzed welds that fractured in a high-rise sign during a windstorm to determine whether proper welding procedures were followed.
- Cranes: Investigated several crane failures, including root-cause assessment of wire rope, axle, rail, lug, and attachment cracking and fractures.

### Fire Protection

- Fire sprinkler: Conducted numerous failure analyses of fire protection sprinklers that activated in the absence of a fire, including fusible-link solder and glass-bulb sprinkler designs.
- Sprinkler pipe weld-o-let leaks: Examined the cause of sprinkler pipe weld-o-let leaks in a large government building; assessed the leaks and the likelihood that any additional leaks could occur after hydrotesting.
- Sprinkler pipe: Analyzed multiple instances of fire-protection sprinkler piping that ruptured or leaked; determined causes of the failures ranging from pitting (and possible microbial-influenced corrosion), grooving corrosion, improper roll-grooving, improper pitch, and freezing.
- Corrugated stainless steel piping: Investigated the cause of leakage in multiple corrugated welded stainless steel pipers; fractographic and metallographic examination have indicated multiple failure modes including fatigue and stress corrosion cracking.
- Fitting fractures: Examined several fire sprinkler-system fitting fractures to determine the cause of failure.

### Sporting Goods

- Bicycle fork analyses: Examined multiple bicycle fork failures to determine root causes; worked directly with manufacturers to examine potential metallurgical issues involving bicycle forks.
- Seat-post bolts: Conducted multiple failure investigations of broken seat-post bolts.
- Bicycle weld analysis: Assisted a bicycle manufacturer with the evaluation of novel welding materials and methods with metallurgical and mechanical testing.
- In-line skate bolt fatigue analysis: Conducted fatigue testing and analysis for an in-line skate manufacturer; recommended bolt grade, size, and torque levels to client based on results.
- Skateboard trucks: Conducted analyses of several skateboard truck fractures, including metallography, fractography, and fracture mechanics.

### Electronics

- Printer sulfidation: Examined sulfidation in consumer electronics printer mechanisms, including testing to determine the effect of liquid entrainment into the printer system.
- Ultrasonic welded ignition module: Conducted a failure analysis investigation of a diesel engine ignition module that had an ultrasonically welded lead fracture that reportedly resulted in the engine stalling and an accident; although severe post-fracture damage was observed, determined the lead fracture to have been caused by thermal fatigue.
- Capacitor fatigue: Participated in an analysis to determine the cause of capacitor fractures; fractographic analysis combined with finite element modeling indicated that the capacitors fractured in reverse-bending fatigue due to harmonic oscillation during service.
- Cables and strain reliefs: Conducted several strain-relief failure analysis investigations for both electronics and medical device manufacturers; performed fatigue life analyses, including testing to assess and predict cable strain-relief fatigue performance.

### Utilities

- Supported public safety power shutoff decision making for multiple utilities, including modeling fatigue, corrosion, and creep in electrical components across generation and transmission infrastructure.
- Participated in development of models for risk assessment of electrical transmission structures to corrosion, fatigue, and wear.
- PG&E San Bruno pipe rupture investigation: Participated in the post-incident investigation of the San Bruno pipe rupture; produced findings consistent with those of the NTSB.
- Testing and quantification covered conductors and their reduced risk of fire ignition.
- Analysis of earthquake fault creep and the susceptibility increased strain on gas distribution line fracture susceptibility.
- Analysis of the effect of wear on C-hook strength.
- Analysis (and testimony) regarding inspection and cold-end hardware damage on the Caribou-Palermo and similar transmission lines.
- Dozens of natural gas transmission pipe and component failure investigations.
- Post-explosion failure analysis of home natural gas piping, meters, and appliances.
- Metallurgical analysis of electrical components to assess likelihood of arcing.

### Medical Devices

- Regulatory assessment: Performed fatigue and corrosion testing on medical devices ranging from aortic stents to surgical robots in support of regulatory approval by the U.S. Food and Drug Administration as well as international agencies.
- Cardiovascular implants: Conducted failure analysis investigations of dozens of stents, filters, and coronary/peripheral devices; directed several fatigue, corrosion, and fretting studies of cardiovascular implants for various medical device manufacturers.
- Pacemakers/ICDs: Conducted several pacemaker/ICD failure analysis investigations; helped pacemaker manufacturers with lead and can material selection, as well as fatigue and corrosion testing and validation.
- Orthopedic implants: Conducted failure analysis investigations on dozens of orthopedic implants, including hip and knee prostheses, pedicle screws, bone plates, nails, and various other prostheses; evaluated metallurgical, embrittlement, fatigue, coating, and corrosion issues to help manufacturers solve problems or validate device performance.
- Heart valves: Investigated several heart valve failures; conducted and reviewed fatigue testing programs to help validate heart valve performance.
- Catheters: Helped manufacturers design and develop catheters, validate fatigue performance, and investigate failures.
- Surgical tools: Conducted several failure analysis investigations of surgical tools that fractured or failed during service; helped manufacturers conduct surgical tool fracture, fatigue, corrosion, and embrittlement studies.
- Needles: Conducted failure analyses to determine the cause of needle breaks; examined the effects of manufacturing processes on needle sharpness.
- Neuro-implants: Conducted failure analysis investigations of neuro-vascular implants; helped manufacturers validate neuro-vascular device fatigue performance.
- Diabetes/insulin monitoring devices: Conducted failure analyses of insulin monitoring devices; assisted manufacturers with coating and electrode development.
- Obesity devices: Helped manufacturers develop and test various obesity devices.
- Ventricular-assist devices: Conducted failure analysis investigations, fatigue performance validation, and material selection of ventricular-assist devices.
- Corrosion testing: Performed potentiodynamic, open-current leaching, galvanic, and fretting testing to assess expected implant corrosion performance of a variety of medical devices.

### Oil & Gas

- Multi-leak assessment: Assessed multiple leaks for a major crude oil pipeline operator to help determine whether there may have been a common cause or related causes connected to regular operations.
- Separator failure: Led a failure analysis investigation into how and why a natural gas separator experienced a catastrophic breach.
- Sulfidation analyses: Examined sulfidation-induced breach in refinery steel piping.
- Hydrotest failure analyses: Conducted failure analysis investigations to determine the cause of gas pipelines that ruptured during hydrotesting.

- Sierra-Nevada Pipeline Leak: Analyzed a gasoline pipeline leak in the Sierra-Nevada mountains that occurred due to damage from improper installation that occurred some 50 years before the leak; found that the local damage resulted in increased stresses that initiated slow-growing “near-neutral” stress-corrosion cracking.
- LEFM-fatigue analysis: Assessed the risk of fatigue-crack growth, leakage, and rupture in pipelines with seam-weld defects of varying depths and lengths using linear-elastic fracture mechanics; provided the basis for the client to establish a methodology for seam-weld defect assessment.
- Estuary pipeline rupture: Investigated the cause of a pipeline rupture that occurred within an estuary; evaluated the cause and extent of corrosion that led to the rupture.
- High pH SCC rupture: Evaluated the cause of a gasoline pipeline rupture that occurred in a high-population area in Arizona; determined the cause of the rupture was high-pH stress-corrosion cracking (SCC); recommended hydrotesting of adjacent pipeline areas, which revealed other SCC locations that were close to rupture.
- Nevada third-party damage: Conducted a failure analysis investigation of a gasoline pipeline that leaked in the desert outside of Las Vegas; found that the pipeline had suffered a gouge from third-party digging and that a fatigue crack initiated from the gouge and eventually grew through the wall to cause the leak.
- Bellingham Washington pipeline: Helped investigate the cause of a gasoline pipeline rupture that resulted in three deaths; participated in investigations at the NTSB and Exponent laboratories; traced the cause of the rupture to severe damage from an excavator accident that occurred several years earlier.
- Seam weld defect, Sacramento: Investigated the cause of a gasoline pipeline leak that occurred along an electric-resistance weld (ERW) seam near Sacramento, California; attributed the leak to fatigue crack growth that initiated and grew from the seam weld defect.
- Seam weld defect, Texas: Investigated the cause of a gasoline pipeline rupture that occurred in Texas; metallurgical examination indicated the rupture occurred at an improperly welded ERW seam, where a fatigue crack initiated and grew in the weld seam until it reached sufficient length to cause the rupture.
- Australian Gas Pipeline SCC risk assessment: Participated in a study to assess the risk of rupture in an Australian natural gas pipeline that exhibited significant stress corrosion cracking (SCC); used the results of in-line inspection coupled with fracture mechanics to help determine the risk of rupture.
- Tee failure: Invested the rupture of a tee at an oil refinery that resulted in release of product and environmental damage; metallurgical analysis indicated that the tee failed due to a creep-rupture mechanism caused by excessive temperature.
- Ethanol storage tank weld: Examined a fracture at a weld in an ethanol storage tank that resulted in significant loss of product and damages; determined that the tank fractured from stress-corrosion cracking at the weld heat-affected zone.
- Gasoline storage tank failure analysis and integrity assessment: Analyzed the cause of a gasoline tank failure and conducted a fracture mechanics-based fitness for service analysis for floor-to-shell repair welds.

**Transportation, Aviation, and Aerospace**

- Lead investigator of a U.S. Air Force-funded study to assess long-term cracking mechanisms in titanium and aluminum-alloy fuel and storage tanks.
- Crimped aluminum microcracks: Assessed whether microcracks present in crimped aluminum rocket components would be expected to propagate or decrease functionality in rocket-body housings.
- Cut copper conductors: Helped predict the remaining life of stranded copper conductors that had been cut during the fabrication of a satellite using both stress-life and fatigue-crack growth methodologies.
- Ultrasonic weld fatigue: Conducted analysis and testing to predict the fatigue performance of ultrasonically welded components in satellite applications.
- Airplane propeller shaft: Conducted a root-cause failure investigation of a propeller shaft that fractured in service; found that the subject shaft fractured due to unidirectional torsional fatigue.
- Steering knuckle investigation: Led a metallurgical investigation into the cause of steering knuckle failures observed in specific sport utility vehicles; presented results to NHTSA on behalf of the client.
- Engine mount role in motor vehicle accident: Determined whether a broken engine mount could have contributed to a vehicle crash; analysis confirmed the mount fractured by overload and therefore broke during the crash, rather than causing it.
- Spot weld analyses: Participated in several analyses to examine fractured spot welds following vehicle accidents to assess spot weld size and failure mode.
- Steering system failure analysis: Investigated several steering system failures, including projection weld fractures and bellows cracking.
- Motorcycle gas tank ejection: Examined fasteners associated with the gas tank ejection following a motorcycle accident; conducted testing to determine the amount of thread engagement necessary to re-create the accident bolt features as well as to retain the tank in an accident.
- Chopper weld failure analysis: Conducted a failure analysis investigation of broken welds in a custom chopper to assess failure mode and any welding issues.
- Wheel-off incidents: Conducted several investigations of wheel assemblies that detached from the vehicle while driving; performed fractographic examination of the bolts, loosening studies, torque versus pre-load calculations, examination of the effect of painted hubs, and Goodman-based fatigue calculations of fatigue life as a function of bolt torque and pre-load.
- Leaf spring failure analysis: Performed thesis research investigating the embrittlement, fracture, and fatigue of leaf-spring steel; conducted several failure analysis investigations of leaf springs that fractured in service.
- Brake cylinder: Led the investigation of a fractured brake cylinder involved in a meter maid traffic accident; determined that the brake cylinder indeed fractured, resulting in the accident and that improper assembly just before the accident cracked the cylinder leaving it susceptible to failure.

## Additional Education & Training

Instrument-rated private pilot

## Editorships & Editorial Review Boards

*Journal of Failure Analysis and Prevention*

## Peer Reviews

ASM Handbook, Volume 19, Fatigue and Fracture

Journal of Failure Analysis and Prevention

Biomaterials

Materials Engineering and Performance

Acta Biomaterialia

ASM Handbook, Volume 12, Fractography