

Exponent®
Engineering & Scientific Consulting

Joe Lemberg, Ph.D., P.E.

Principal Engineer | Metallurgical and Corrosion Engineering
Atlanta
+1-678-412-4807 | jlemberg@exponent.com

Professional Profile

Joe Lemberg, Ph.D., P.E., is a principal engineer in Exponent's Metallurgical & Corrosion Engineering practice with more than 15 years of experience in failure analysis, fracture mechanics, metallurgy, and corrosion engineering. He advises law firms, insurers, and industrial clients on materials failures across oil and gas, industrial equipment, consumer products, glass and ceramics, and medical devices, with particular depth in litigation and arbitration support.

Throughout his career, Dr. Lemberg has applied his knowledge of relevant consensus standards and regulations, including API, ASME, ASTM, ISO, AAR Interchange Rules, and others, as part of his failure analysis consulting practice. The complex, multidisciplinary issues Dr. Lemberg typically encounters allow him to leverage the wide variety of expertise available at Exponent to address issues that require additional expertise.

Oil & Gas Disputes

Dr. Lemberg supports attorneys, insurers, and operators in oil and gas disputes in the upstream (production), midstream (crude oil transportation and storage), and downstream (refining and refined product distribution) sectors involving pipeline failures, pressure vessel ruptures, storage tank cracking, compressor failures, and downhole equipment degradation, among other metallurgical issues. His investigations address failure mechanisms including fatigue, corrosion-induced wall loss, weld-related defects, stress corrosion cracking (SCC), and embrittlement mechanisms, such as hydrogen embrittlement, in systems subject to industry standards such as API 571, API 577, API 579, ASME B31.3, and ASME BPVC standards.

Dr. Lemberg has evaluated oil country tubular goods (OCTG), frac tank coatings, flexible hoses used in hydraulic fracturing, and large-scale compressors at liquefied natural gas (LNG) processing facilities. He applies both destructive and nondestructive examination methods — including metallography, fractography, scanning electron microscopy (SEM), and mechanical testing — to deliver technically rigorous, defensible conclusions, and he has served as an expert witness in oil and gas failure disputes and related proceedings, generally in the southeastern U.S. and Gulf Coast Region. Dr. Lemberg is a Certified Corrosion and Materials Professional (API 571) and holds a Welding and Metallurgy certification (API 577) through the American Petroleum Institute.

Industrial Equipment and Piping Failures

Dr. Lemberg investigates the root causes of failures in heavy industrial equipment and piping, including railroad rolling stock, rotating machinery, pressure vessels, storage tanks, industrial piping, and fabricated structural assemblies. His work spans ferrous and non-ferrous alloy systems and addresses failure modes such as fatigue fracture, overload, SCC, and manufacturing or design deficiencies. He has

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evaluated DOT 105 and DOT 111 tank cars, large-scale forge presses, compressors, trunnion axles on multi-axle trailers, air, water, gas, and chemical piping, expansion joints, and screw coolers, among other industrial components. Dr. Lemberg's consulting integrates fracture mechanics analysis, mechanical testing, corrosion data, and applicable industry standards to help clients — including manufacturers, insurers, and legal counsel — understand the cause and origin of equipment failures and assess liability in disputes and arbitration proceedings.

Consumer Product Liability and Recall Evaluations

Dr. Lemberg assists product manufacturers, retailers, insurers, and attorneys in consumer product liability investigations and recall evaluations involving fracture, corrosion, and materials degradation. His experience includes failure analyses of brass plumbing components and potable water fittings, fire sprinklers (including fusible link and glass bulb types), flexible stainless steel water hoses, fall-prevention devices, garage door torsion springs, flatware and other kitchen gadgets, and a broad range of household and commercial products. He applies industry standard root-cause analysis frameworks and techniques — including fractography, metallography, and materials characterization — to determine whether failures resulted from design deficiencies, manufacturing issues, improper installation, or in-service misuse. Dr. Lemberg has provided deposition testimony in consumer product liability matters and has been retained as an expert in personal injury and premises liability proceedings.

Glass & Ceramic Failures

Dr. Lemberg performs failure and fracture analyses of glass and ceramic components for clients in litigation, insurance, and product development contexts. His work encompasses architectural glazing systems, glass cookware and drinkware, fire sprinkler glass bulbs, and ceramic and glass components used in industrial and consumer applications. He identifies fracture origins, characterizes crack propagation patterns, and evaluates the role of manufacturing defects, thermal gradients, impact loading, and environmental factors in glass and ceramic failures. He has applied advanced analytical techniques including fractography and optical and electron microscopy to support product liability and insurance disputes, and he has provided deposition testimony regarding windowpane fracture.

Medical Device Failure Analysis

Dr. Lemberg advises medical device manufacturers, hospitals, and legal counsel on fracture and corrosion failures in implantable and surgical devices. His investigations have addressed orthopedic implants, surgical instruments, stents, and other devices fabricated from stainless steel, titanium, cobalt-chromium, and Nitinol alloys. He evaluates the interplay between patient factors, surgical technique, device design, and material properties to determine the root cause of in vivo and ex vivo failures. Dr. Lemberg leverages scanning electron microscopy (SEM), energy-dispersive X-ray spectroscopy (EDS), metallography, and mechanical testing, and his work supports both premarket design evaluation and postmarket failure investigation in regulatory and litigation contexts. He has been retained as an expert in medical device product liability matters.

Geographic Coverage

Based in Atlanta, Dr. Lemberg consults on matters in the southeastern U.S. and Gulf Coast region but also provides expertise nationwide and internationally. He is licensed as a professional engineer in Alabama, California, Georgia, Louisiana, Michigan, North Carolina, New York, and Texas.

Academic Credentials & Professional Honors

Ph.D., Materials Science and Engineering, University of California, Berkeley, 2011

M.S., Materials Science and Engineering, University of California, Berkeley, 2009

B.S., Materials Science and Engineering, Cornell University, 2005

National Defense Science and Engineering Graduate Fellow, 2006-2009

Licenses and Certifications

Professional Engineer, Alabama, #34215

Professional Engineer Metallurgical, California, #1974

Professional Engineer, Georgia, #PE039760

Professional Engineer, Louisiana, #47019

Professional Engineer, Michigan, #6201315805

Professional Engineer, New York, #98605

Professional Engineer, North Carolina, #41149

Professional Engineer Metallurgical, Texas, #122823

Transportation Safety Institute, Transit Rail Incident Investigation Certificate

Transportation Workers Identification Card (TWIC)

Certified Corrosion and Materials Professional (API 571)

API 577 Welding Inspection and Metallurgy

Prior Experience

Before joining Exponent, Dr. Lemberg was a graduate research assistant at the University of California, Berkeley, where he studied the fracture behavior of Mo-Si-B alloys at ambient and ultra-high temperatures (1300°C), the fracture behavior of carbon-nanotube-impregnated, Nb-toughened nanocrystalline alumina, and the fracture behavior of alumina/silicon nitride functionally graded joints at elevated temperatures. Dr. Lemberg also has experience studying the fatigue properties of tree-resistant cross-linked polyethylene insulation of underground power distribution cables.

Professional Affiliations

ASM

Failure Analysis Society – Secretary (2023 – 2025)

Failure Analysis Society Board Member (2025 -)

Tau Beta Pi

Publications

Lemberg JA, Budiansky N, Colella F, Caligiuri R. Corrosion of newly commissioned stainless steel beer fermentation and aging vessels. J Fail. Anal. and Preven. 2026; 1–17.

Lemberg J, Guyer E, Seidel S, Garry M, Tsuji J, Valenty S. Utilizing a combination of TGA and GC-MS to estimate health-based risks from off-gassed volatile compounds. Journal of Failure Analysis and Prevention 2018; 18(2):246-249.

Lemberg JA, Ellis BD, Guyer EP. Failure of a trunnion axle on a hard suspension multi-axle trailer. Journal of Failure Analysis and Prevention 2017; 17(2):189-194.

Ames N, Lemberg J, Caligiuri R. Fatigue failure of a 2500-ton forge press. Journal of Failure Analysis and Prevention 2017; 17(1):15-22.

Guyer E, Lemberg J. Things break… the hard part is figuring out why! The NCADA Resource, 2015.

Lemberg JA, Ritchie RO. Mo-Si-B alloys for ultrahigh-temperature structural applications. Advanced Materials 2012; 24(26):3445-3480.

Wang Z, Marcolongo P, Lemberg JA, Panganiban B, Evans JW, Ritchie RO, Wright PK. Mechanical fatigue as a mechanism of water tree propagation in TR-XLPE. IEEE Transactions on Dielectrics and Electrical Insulation 2012; 19(1):321-330.

Lemberg JA, Middlemas MR, Weingärtner T, Gludovatz B, Cochran JK, Ritchie RO. On the fracture toughness of fine-grained Mo-3Si-1B (wt.%) alloys at ambient to elevated (1300 °C) temperatures. Intermetallics 2012; 20(1):141-154.

Lee CS, Lemberg JA, Cho DG, Roh JY, Ritchie RO. Mechanical properties of Si3N4-Al2O3 FGM joints with 15 layers for high-temperature applications. Journal of the European Ceramic Society 2010; 30:1743-1749.

Thomson KE, Jiang D, Lemberg JA, Koester KJ, Ritchie, RO Mukherjee AK. In-situ bend testing of niobium-reinforced alumina nanocomposites with and without single-walled nanotubes. Materials Science and Engineering A 2008; 493:256-260.

Presentations

Lemberg J, Brooke P. Slab impulse response testing as a method of determining the cause of SCC in a newly installed false tank bottom: a technical case study. Failure Analysis Society Summit on Failure Analysis & Prevention: Fatigue and Fracture, Oceanside, CA, 2026.

Semenikhin N, Brooke P, Bennett-Kennett R, Lemberg J. A comparative analysis of corrosion product removal methods for ferrous fracture surfaces. IMAT 2025, Detroit, MI, 2025.

Semenikhin N, Brooke P, Bennett-Kennett R, Lemberg J, Dodaran M, Molnar J. Abnormal failures of table knives during operation. IMAT 2025, Detroit, MI, 2025.

Semenikhin N, Lemberg J, Dodaran MS. Failure analysis and fractography of two failed garage door torsion springs. IMAT 2024, Cleveland, OH, 2024.

Dodaran MS, Lemberg J, Ellis B, Briant P, Guyer E. Multimode failure of a screw cooler. IMAT 2024, Cleveland, OH, 2024.

Lemberg J, Budiansky N, Colella F, Caligiuri R. Corrosion of newly commissioned stainless steel beer fermentation and aging vessels. IMAT 2023, Detroit, MI, 2023.

Stewart J, Lemberg J, Semenikhin N. Failure analysis and fractography of a failed repair weld on a trailer axle. IMAT 2023, Detroit, MI, 2023.

Porter T, Lemberg J, Guyer E. Fall-prevention device shoulder bolt failure. IMAT 2023, Detroit, MI, 2023.

Moyer L, Flury M, Keeble M, Lemberg J, Lucas G, Akyuz B, Dennies D. (moderator). Panel Session: Metallographic Techniques in Failure Analysis, IMAT 2023, Detroit, MI, 2023.

Issahaq MN, Strayer AR, Brooke PD, Lemberg JA, Guyer EP. Muzzleloader failure analysis. 15th International Conference on Fracture, Atlanta, Georgia, 2023.

Brooke P, Lemberg J, Fecke M, Guyer E. Metallurgical case studies of early-in-life failures in three watertube boilers, IMAT 2022, New Orleans, LA, 2022.

Lemberg J, Schwartz J, MacLean S. Failure of underground ABS dry compressed air piping, MS&T 2019, Portland, OR, 2019.

Lemberg J, Guyer E, Seidel S, Garry M, Tsuji J, Valenty S. Utilizing a combination of TGA and GC-MS to estimate health-based risks from off-gassed volatile compounds. MS&T 2018, Columbus, OH, 2018.

Lemberg JA, Guyer EP. Failure of a trunnion axle on a hard suspension multi-axle trailer. MS&T 2016. Salt Lake City, UT, 2016.

Lemberg JA, Ames N, Caligiuri R. Fatigue failure of a 2500-ton forge press. MS&T 2015, Columbus, OH, 2015.

Lemberg JA, Gibbs J, Birringer R, James B, Eiselstein L. Fire cracking of lead-free brasses for use in water, oil and gas applications. MS&T 2014, Pittsburgh, PA, 2014.

Lemberg JA, Guyer EP, Eiselstein LE. Possible microbiologically-induced corrosion (MIC) of stainless steel weld used in domestic water risers. MS&T 2014, Pittsburgh, PA, 2014.

Lemberg JA, Middlemas MR, Cochran JK, Ritchie RO. Fracture behavior of Mo-Si-B alloys at elevated temperatures in air and inert atmospheres. TMS 2011 140th Annual Meeting and Exposition, San Diego, CA, 2011.

Lemberg JA, Ritchie RO. Fracture toughness of Mo-Si-B alloys at ambient and elevated temperatures. 12th International Conference on Fracture, Ottawa, Canada, 2009.

Project Experience

Oil & Gas

Dr. Lemberg has conducted failure analyses across upstream, midstream, and downstream oil and gas systems, including pressure vessels, storage tanks, compressors, downhole tubulars, and hydraulic fracturing equipment. Representative engagements include:

- Investigated the cause of pressure vessel and storage tank ruptures that occurred during operation at industrial facilities throughout the southeastern U.S. and Gulf Coast region, applying metallurgical examination, fractography, and applicable API and ASME standards to determine root cause for litigation and insurance proceedings.

- Evaluated cracking at shell-to-floor welds in a large chemical storage tank in Georgia and aided in the development of a technique for assessing foundation and false floor support integrity that has been implemented in subsequent tank analyses.
- Evaluated the cause of failure of large-scale compressors at a liquefied natural gas (LNG) processing facility, applying materials characterization, finite element analysis, and fracture mechanics analysis in a multidisciplinary effort to support dispute resolution.
- Conducted failure analyses of downhole casing, oil country tubular goods (OCTG), tank coatings, and flexible hoses used in hydraulic fracturing and other chemical service applications, addressing corrosion, fatigue, and materials degradation mechanisms.

Industrial Equipment and Piping Failures

Dr. Lemberg has investigated failures in a wide range of industrial equipment and piping, from heavy rotating machinery and large structural assemblies to gas, water, air, and chemical piping systems. Representative engagements include:

- Investigated the fatigue failure of a 2,500-ton forge press, performing metallurgical analysis and fracture mechanics evaluation to determine the cause of the catastrophic failure.
- Investigated ruptures of DOT 105 and DOT 111 rail tank cars; evaluated repair records, federal regulations, and Association of American Railroads (AAR) standards, specifications, and requirements; used fractographic and metallurgical methods to determine the cause of rupture as well as laboratory methods to determine the extent of damage to nearby structures and equipment.
- Analyzed the fracture of a trunnion axle on a hard-suspension multi-axle trailer, applying fractographic and metallurgical methods to determine the failure mode and contributing factors.
- Assessed the cause of a large explosion at an industrial facility in Texas using metallurgical methods, mechanical testing, and fractographic analysis to determine the source of the gas leak that led to the explosion.
- Assessed the cause of corrosion in newly commissioned stainless steel beer fermentation and aging vessels, identifying the corrosion mechanism and contributing factors, aiding a client in resolving a dispute.
- Assessed the cause of a line break in a large-diameter water piping system at a hospital that resulted in significant water damage as part of a multidisciplinary team; used on-site inspection as well as metallurgical laboratory techniques to determine that excessive pipe movement, as opposed to the fracture of a coupling, led to the pipe separation.
- Evaluated a multimode failure of a screw cooler, applying metallurgical and mechanical analysis to characterize the failure sequence.

Consumer Product Liability and Recall Evaluations

Dr. Lemberg has supported product liability and recall investigations across a broad range of consumer and commercial products, providing failure analysis and expert support for litigation, arbitration, and insurance matters. Representative engagements include:

- Investigated the fracture of hand tools, performing fractography, re-creation testing and metallurgical evaluations to determine the cause of fracture and whether material selection, manufacturing methods, or design contributed to the observed fractures.

- Evaluated the fracture of golf clubs, using metallography, fractography, chemical analysis, and microscopy to determine the cause of fracture and support product liability analysis.
- Investigated the failure of a muzzleloader firearm, performing fracture analysis and metallurgical examination to determine the cause of the failure.
- Evaluated the cause and likelihood of failure for seating and bunkbeds, employing laboratory re-creation testing and metallurgical inspections to aid manufacturers decisions regarding whether to recall products and how to bound recall populations.
- Evaluated reports of home fires attributed to household appliances including refrigerators and stoves; provided materials evaluation to support decision making regarding dispute resolution and a potential large-scale recall of appliance hardware in Europe.
- Evaluated the cause of failure of a fall-prevention device shoulder bolt in a consumer safety context, applying materials characterization and fracture mechanics to support product liability analysis.
- Analyzed abnormal failures of table knives during operation, applying fractographic and metallurgical methods to characterize the failure mode and assess design and materials factors.

Glass & Ceramic Failures

Dr. Lemberg has performed fracture and failure analyses of glass and ceramic components for product liability, insurance, and design evaluation purposes. Representative engagements include:

- Investigated fracture failures in glass cookware and drinkware, applying fractographic analysis to identify fracture origins and characterize the role of manufacturing defects, thermal gradients, and in-service loading in the failures, which were confirmed via bespoke re-creation testing methods developed with input from biomechanical and human factors colleagues.
- Evaluated the fracture of wine bottles using fractographic analysis to help determine whether the manufacturing processes led to the development of features that caused bottle breakage and personal injury, assisting in resolution of a legal dispute.
- Evaluated failures of fire sprinkler glass bulbs, analyzing the cause of fracture and time-to-failure to support product liability and premises liability proceedings.
- Evaluated the propensity for fracture of glass in diving masks, evaluating compliance with regulations and industry standards to aid a retailer in determining whether to recall the product.
- Evaluated the cause of localized failure of refractory material that contributed to metal dusting at a chemical facility.
- Assessed fracture and failure mechanisms in architectural glazing systems, applying optical and electron microscopy to determine the origin and cause of fracture.

Medical Device Failure Analysis

Dr. Lemberg has investigated fracture and corrosion failures in medical devices for manufacturers, insurers, and legal counsel, supporting both premarket design evaluation and postmarket litigation. Representative engagements include:

- Investigated fracture and corrosion failures in orthopedic implants and surgical instruments, applying scanning electron microscopy (SEM), metallography, and mechanical testing to determine root cause and assess the interplay between patient factors, surgical technique, and device design.

- Evaluated corrosion and fracture failures in neurovascular devices and stents fabricated from Nitinol, stainless steel, and cobalt-chromium alloys, applying materials characterization methods to support product liability and regulatory proceedings.
- Assessed fracture failures in medical device components for manufacturers seeking to understand postmarket failure modes and inform design improvements.

Deposition & Trial Testimony

Dr. Lemberg has served as a technical expert witness in federal, state, and county courts in the U.S. and a provincial court in Canada. His cases have involved oil and gas production technology and equipment, chemical production facilities, railroad equipment, large industrial equipment, utility piping and poles, product liability, medical devices, and construction disputes, among other industries.