

Exponent®
Engineering & Scientific Consulting

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Professional Profile

Lawrence Eiselstein, Ph.D., P.E., is a principal engineer in Exponent's Metallurgical & Corrosion Engineering practice with more than 35 years of experience in failure analysis, corrosion science, materials science, and fracture mechanics. He advises law firms, manufacturers, insurers, and energy companies on materials failures, product liability, and infrastructure integrity, with depth in corrosion-driven failure mechanisms across industrial, medical, and civil systems.

Dr. Eiselstein investigates accidents, failures, and releases — including industrial explosions, pipeline ruptures, chemical releases, and product failures — to determine root cause. He also assists manufacturers and developers in selecting materials, designing accelerated life tests, conducting failure modes and effects analyses (FMEAs), and qualifying products for regulatory submission, including FDA 510(k) and PMA pathways for medical devices. His work includes corrosion testing and materials qualification for implantable medical devices, fitness-for-service assessments for aging infrastructure, and risk analysis for chemical processing and energy systems. This dual capability —failure analysis and product development support — makes Dr. Eiselstein a resource for clients at every stage of a product's or structure's lifecycle.

Metallurgy, Corrosion & Failure Analysis

Dr. Eiselstein applies the full toolkit of materials science — metallurgy, corrosion science, fracture mechanics, fractography, and mechanical testing — to determine why components fail and what can be done to prevent recurrence. Dr. Eiselstein has conducted a large number of failure analysis investigations across diverse industries and applications involving metals, polymers, ceramics, composites, and glass. By evaluating failures, he has helped clients identify root causes, helped prevent future failures, and enhanced the reliability and safety of products, structures, and processes.

Dr. Eiselstein evaluates stress corrosion cracking (SCC), hydrogen embrittlement, corrosion fatigue, environmentally assisted cracking (EAC), pitting, galvanic corrosion, microbiologically influenced corrosion (MIC), and tribocorrosion (fretting, erosion-corrosion, and wear), applying both destructive and nondestructive examination methods. His analytical methods include scanning electron microscopy (SEM), energy-dispersive spectroscopy (EDS), X-ray photoelectron spectroscopy (XPS), Auger electron spectroscopy, X-ray diffraction (XRD), electrochemical impedance spectroscopy (EIS), cyclic potentiodynamic polarization (ASTM F2129), and finite element analysis (FEA). He applies relevant industry standards — including ASTM, ASME, API, NACE, and AWS — to assess whether materials, designs, and fabrication practices meet applicable requirements.

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Energy, Infrastructure & Construction

Dr. Eiselstein has investigated failures in oil and gas pipelines, refineries, power plants, and large civil structures throughout his career. His pipeline work includes natural gas transmission lines, crude oil lines, liquid petroleum pipelines, and process piping in petrochemical facilities, addressing failure mechanisms such as internal and external corrosion, SCC, hydrogen-induced cracking, sulfidation, and weld defects. He applies standards including ASME B31.3, ASME B31.8, API 579, API 1104, and NACE MR0175 to assess integrity and fitness for service.

In the energy sector, Dr. Eiselstein has investigated failures in steam turbines, gas turbines, boilers, pressure vessels, and rotating machinery. In the built environment, he has evaluated structural steel, reinforcing bars, post-tensioning systems, suspension-bridge cables, and welded connections in buildings and bridges. He advises utilities, energy companies, construction firms, and their legal counsel on the technical causes of failures and aspects of inspection, maintenance, and design practices.

Medical Device Materials

Dr. Eiselstein provides both litigation support and design consulting for medical device manufacturers, regulatory bodies, and legal counsel. His medical device work encompasses corrosion resistance evaluation, metal ion release (nickel leaching from nitinol and stainless steel), fretting and wear analysis, fatigue life assessment, and hermetic sealing integrity for implantable devices. He has evaluated stents, stent grafts, orthopedic implants, pacemaker leads, heart valves, annuloplasty rings, IVC filters, catheters, guidewires, cochlear implants, needles and numerous other devices manufactured from nitinol, cobalt-chromium alloys, stainless steel, titanium alloys, and MP35N. He has also evaluated metal-injection-molded (MIM) parts manufactured from PH17-4 stainless steel for surgical tooling.

Dr. Eiselstein applies ASTM F2129, ASTM F3306, ASTM F3044, and ASTM F2004 to characterize corrosion susceptibility, ion release, and transformation temperatures for implantable materials. He supports FDA submissions — including 510(k) and PMA applications — and has designed accelerated life testing (ALT) programs and FMEAs for active implantable medical devices (AIMDs). When called upon, he serves as an expert witness in medical device litigation and proceedings involving implant failures, corrosion, and materials performance.

Expert Witness & Testimony

Dr. Eiselstein has served as an expert witness in U.S. state and federal courts and in international arbitration proceedings, including matters before the International Centre for Dispute Resolution (ICDR) and the American Arbitration Association (AAA). He has provided deposition and trial testimony in product liability, personal injury, construction litigation, intellectual property, environmental, and contract dispute matters involving materials failures, corrosion, welding, pipelines, medical devices, consumer products, and industrial equipment. His testimony experience spans both plaintiff and defense engagements across a broad range of industries and jurisdictions.

Academic Credentials & Professional Honors

Ph.D., Materials Science, Stanford University, 1983

M.S., Materials Science, Stanford University, 1976

B.S., Metallurgical Engineering, Virginia Polytechnic Institute and State Univ, 1974

International Nickel Company Scholarship, Virginia Tech

Townsend Fellowship, Stanford University

Wire Foundation Competition Prize

A.O. Smith-Inland Company 4th Annual Ferrous Powder Metallurgy Competition prize winner

Licenses and Certifications

Professional Engineer Corrosion, California, #1067

Professional Affiliations

Surface Mount Technology Association—SMTA

American Water Works Association (member)

American Society for Testing and Materials, Committee on Medical and Surgical Materials and Devices (member)

American Society for Metals (member)

American Institute of Mining and Metallurgical Engineers (member)

National Association of Corrosion Engineers (member)

Publications

Spece H, Underwood RJ, Baykal D, Eiselstein LE, Torelli DA, Klein GR, Lee GC, and Kurtz SM. "Is there material loss at the conical junctions of modular components for total knee arthroplasty?," The Journal of Arthroplasty, 2019. DOI: 10.1016/j.arth.2019.05.030

Spece H, Underwood RJ, Baykal D, Eiselstein LE, Torelli DA, Klein GR, Lee GC, and Kurtz SM. Is there material loss at the conical junctions of modular components for total knee arthroplasty? The Journal of Arthroplasty, 2019.

Huet R, Eiselstein LE. Lessons learned from explosion in ammonium nitrate neutralizer. Symposium on Chemistry, Process Design, and Safety in the Nitration Industry, Spring ACS Meeting, San Diego, CA, March 25-29, 2012.

Caligiuri RD, Eiselstein LE, Eastep LN. Proper design, and fabrication of socket welds for use in sour service. Materials Science Forum/Advanced Materials Research, 2010; 638-642: 3649-3654.

Eiselstein LE, Caligiuri RD. Metal Ion leaching from implantable medical devices. Materials Science Forum/Advanced Materials Research, 2010; 638-642: 754-759.

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.

Eiselstein LE, et al. Acceptance criteria for corrosion resistance of medical devices: statistical analysis of nitinol pitting in in vivo environments. J Mater Eng Perform, 2009; 18(5-6):768-780.

Guyer EP, Eiselstein LE, Verghese P. Accelerated testing of active implantable medical devices. Paper No. 09464, Corrosion 2009, NACE International, 2009.

Sjong A, Eiselstein LE. Marine atmospheric SCC of unsensitized stainless-steel rock-climbing protection. J Failure Analy Prev, 2008; 8(5).

Caligiuri RD, Eiselstein LE, Schmidt CG, Giovanola JH. Stable deformation at very high strain rates in UHCS. Int J Microstructure Mat Properties, 2008; 3(5).

Eiselstein LE, Steffey D, Nissan A, Corlett N. Toward an acceptance criterion for the corrosion resistance of medical devices: a statistical study of the pitting susceptibility of nitinol. Proceedings, SMST-2007 the International Conference on Shape Memory and Superelastic Technologies, ASM International, Tsukuba City, Japan, December 2-4, 2007.

Nissan A, Corlett N, Eiselstein LE, Steffey D. Effect of long-term immersion on the pitting corrosion resistance of nitinol. Proceedings, SMST-2007 ASM International Conference on Shape Memory and Superelastic Technologies, Tsukuba City, Japan, December 2-4, 2007.

Eiselstein LE, Proctor DM, Flowers TC. Trivalent and hexavalent chromium issues in medical implants. Materials Science Forum 2007; 539-543:698-703.

Eiselstein LE, James BA. Medical device failures. 2nd International Conference on Engineering Failure Analysis, Toronto, Canada, September 12-15, 2006.

Beaudet RA, Berkowitz JB, Doherty RM, Eiselstein LE, Gekler WC, Gollin M. Review and assessment of the proposals for design and operation of designated chemical agent destruction pilot plants (DCAPP-Blue Grass II). National Research Council of the National Academies, July 2006.

Caligiuri RD, Eiselstein LE, Schmidt CG, Giovanola JH. Stable deformation at very high strain rates in UHCS. THERMEC'2006, International Conference on Processing and Manufacturing of Advanced Materials, Chandra T (ed), Trans Tech Publications, July 2006.

Eiselstein LE, Proctor DM, Flowers TC. Trivalent and hexavalent chromium issues in medical implants. THERMEC'2006, International Conference on Processing and Manufacturing of Advanced Materials, Chandra T (ed), Trans Tech Publications, July 2006.

James B, Wood L, Murray S, Eiselstein LE, Foulds J. Compressive damage-induced cracking in nitinol. Proceedings, International Conference on Shape Memory and Superelastic Technologies, Baden-Baden, Germany, October 3-7, 2004; ASM International, pp. 117-124, 2006.

Eiselstein LE, Sire RA, James BA. Review of fatigue and fracture behavior in NiTi. Proceedings, Materials and Processes for Medical Devices Conference, Boston, MA, November 14-16, 2005; ASM International, pp. 135-147, 2006.

James BA, Foulds J, Eiselstein LE. Failure analysis of NiTi wires used in medical applications. Journal of Failure Analysis and Prevention 2005; 82-87.

Beaudet RA, Barton C, Berkowitz JB, Doherty RM, Eiselstein LE, Forsen HK, Gekler WC, Gill CF, Roy CM, Smith KA, Stenstrom MK, Webler T. Interim design assessment for the blue grass chemical agent destruction pilot plant. Committee to Assess Designs for Pueblo and Blue Grass Chemical Agent Destruction Pilot Plants, Board of Army Science and Technology, National Research Council of the National Academies, The National Academies Press, Washington, DC, 2005.

James BA, Foulds J, Eiselstein LE. Failure analysis of NiTi wires used in medical applications. Proceedings from the Materials & Processes for Medical Devices Conference, St. Paul, MN, August 25-27, 2004; ASM International, pp. 44-49, 2005.

Beaudet RA, Barton C, Berkowitz JB, Cooper AT, Doherty RM, Eiselstein LE, Forsen HK, Gekler WC, Gill CF, Jenkins-Smith HC, Merson JA, Roy CM, Smith KA, Stenstrom MK, Webler T. Interim design

assessment for the Pueblo chemical agent destruction pilot plant. R.A. Beaudet, Chair, Committee to Assess Designs for Pueblo and Blue Grass Chemical Agent Destruction Pilot Plants, Board of Army Science and Technology, National Research Council of the National Academies, The National Academies Press, Washington, DC, 2005.

Eiselstein LE, James BA. Medical device failures — Can we learn from our mistakes? Keynote paper and address, Proceedings from the Materials and Processes for Medical Devices Conference, St. Paul, MN, August 25-27, 2004; ASM International, pp. 3-11, 2005.

Eiselstein LE, Caligiuri RD. Particulate composite of white cast iron. Materials Science Forum, Trans Tech Publications, Switzerland, Vol. 426-432, pp. 895-900, 2003.

Caligiuri RD, Eiselstein LE. Superplastic densification of ultrahigh carbon steel powder compacts. Materials Science Forum, Trans Tech Publications, Switzerland, Vol. 426-432, pp. 877-882, 2003.

Andrew SP, Caligiuri RD, Eiselstein LE, Parnell TK. Evaluation of a failure in a chlorine production facility. Proceedings IMECE2001, ASME International Mechanical Engineering Congress and Exposition, New York, NY, November 2001.

Moncarz PD, Eiselstein LE, Saraf V. Prestressing wire failures in prestressed concrete pipeline. Proceedings, Awarie Budowlane, 20th Engineering Conference on Construction Failures, Szczecin-Miedzyzdroje, Poland, May 2001. (In Polish).

Caligiuri RD, Eiselstein LE. Superplasticity at ultrahigh strain rates — Can it occur? Deformation, Processing and Properties of Structural Materials, Taleff EM, Syn CK, and Lesuer DR (eds), The Minerals, Metal and Materials Society, Warrendale, PA, March 2000.

Moncarz PD, Eiselstein LE. Loss of composite system reliability due to long term environmental alteration. Proceedings, International Federation for Information Processing (IFIP), 9th Working Conference on Reliability and Optimization of Structural Systems, pp. 167-174, Ann Arbor, MI, September 2000.

Eiselstein LE, Harris DO, Scoonover TM, Rau CA. Probabilistic fracture mechanics evaluation of local brittle zones in HSLA-80 steel weldments. Fracture Mechanics, 23rd Symposium, ASTM STP 1189, Chona R (ed), American Society for Testing Materials, pp. 808-825, Philadelphia, PA, 1993.

Rau CA, Eiselstein LE, Rau SA, Harris DO, Sire R, Dedhia D, McMinn A. Probabilistic assessment of crack initiation and growth in shrunk-on disks. Proceedings, Life Prediction of Corrodible Structures International Conference, National Association of Corrosion Engineers International, p. 51/1, Cambridge, UK, September 1991.

Andrew SP, Caligiuri RD, Eiselstein LE. A review of penetration mechanisms and dynamic properties of tungsten and depleted uranium penetrators. Proceedings, Tungsten and Tungsten Alloys - Recent Advances Symposium, The Metallurgical Society, Chen E (ed), 1991.

Rau CA, Eiselstein LE, Harris DO, Sire R, Dedhia D, McMinn A. Probabilistic assessment of crack initiation and growth in shrunk-on disks. Proceedings, Fossil Steam Turbine Disc Cracking Workshop, Charlotte, NC, October 10-11, 1990; EPRI GS-7250, pp. 9-2 to 9 7, April 1991.

Caligiuri RD, Eiselstein LE. Powder metallurgy near net shape processing of heavy metal chemical energy warhead liners. Proceedings, 11th International Symposium on Ballistics, Brussels, Belgium, May 1989.

Eiselstein LE, Caligiuri RD. Application of laminated metallic armors to heavy hybrid armor systems. Proceedings, 4th TACOM Armor Coordinating Conference for Light Combat Vehicles, Monterey, CA, March 1988.

Eiselstein LE, Caligiuri RD. Atmosphere corrosion of the suspension cables on the Williamsburg Bridge. Degradation of Metals in the Atmosphere, ASTM STP 965, American Society for Testing and Materials, pp. 78-95, Philadelphia, PA, 1988.

Eiselstein LE, Caligiuri. Development of advanced, all-metallic laminated armor systems for lightweight applications (U). Proceedings, 3rd TACOM Armor Coordinating Conference, Naval Post-Graduate School, Monterey, CA, February 1987; Metals and Ceramics Information Center, Battelle, Columbus, OH, 1987 (SECRET).

Caligiuri RD, Eiselstein LE, Sherby OD. Properties and applications of ultrahigh carbon steel laminates. Proceedings, 34th Sagamore Army Materials Technology Conference: Innovations in Ultrahigh Strength Steel Technology, pp. 499-525, Lake George, NY, September 1987.

Schmidt CG, Caligiuri RD, Eiselstein LE, Wing S, Cubicciotti. Low temperature sensitization of Type 304 stainless steel pipe weld heat affected zone. Metallurgical Transactions A 1987; 18A:1483-1493.

Eiselstein LE, Caligiuri RD, Schmidt CG. Stress corrosion cracking of steam turbine disc alloys in dilute environments. Proceedings, 2nd International Symposium on Environmental Degradation of Materials in Nuclear Power Systems — Light Water Reactors, Monterey, CA, September 1985; American Nuclear Society, pp. 311-318, La Grange Park, IL, 1986.

Caligiuri RD, Eiselstein LE, Schmidt CG. Development of advanced all-metallic laminated armor systems for lightweight applications (U). Proceedings, Symposium on Composite Materials in Armament Applications, U.S. Army Armament Research and Development Center, Picatinny Arsenal, Dover, NJ, August 1985 (SECRET).

Schmidt CG, Caligiuri RD, Eiselstein LE. Stress corrosion cracking susceptibility of alternative alloys for BWR piping. Paper 99, presented at Corrosion/85, Annual Meeting of the National Association of Corrosion Engineers, pp. 99/1-99/11, Boston, MA, March 1985.

Caligiuri RD, Eiselstein LE, Schmidt CG. Use of constant extension rate tests to characterize low temperature sensitization in Type-304 stainless steel weld-heat-affected zone. Proceedings, 2nd Seminar on Countermeasures for Pipe Cracking in BWRs, Palo Alto, CA, November 1983; EPRI NP-3684-SR, Electric Power Research Institute, p. 10-1, Palo Alto, CA, September 1984.

Schmidt CG, Caligiuri RD, Eiselstein LE. Intergranular stress corrosion cracking of low temperature sensitized Type 304 stainless steel pipe welds. Proceedings, International Symposium on Environmental Degradation of Materials in Nuclear Power Systems — Light Water Reactors, Myrtle Beach, SC, August 1983; National Association of Corrosion Engineers, pp. 423-437, Houston, TX, 1984.

Caligiuri RD, Eiselstein LE, Curran DR. Microkinetics of stress corrosion cracking in steam turbine disk alloys. Proceedings, International Symposium on Environmental Degradation of Materials in Nuclear Power Systems — Light Water Reactors, Myrtle Beach, SC, August 1983; National Association of Corrosion Engineers, pp. 824-836, Houston, TX, 1983.

Caligiuri RD, Eiselstein LE, Fox MJ. Low temperature sensitization of Type 304 stainless steel pipe weld heat affected zones. Proceedings, Specialists Meeting on Subcritical Crack Growth, Freiburg, West Germany, May 1981; NUREG/CP-0044, US Nuclear Regulatory Commission, pp. 199-228, May 1983.

Eiselstein LE, Syrett BC, Wing SS, Caligiuri RD. The accelerated corrosion of Cu-Ni alloys in sulphide-polluted seawater: Mechanism No. 2. Corrosion Science 1983; 23(3):223-239.

Eiselstein LE, Ruano OA, Sherby OD. Room temperature strength and ductility of rapidly solidified white cast irons. Powder Metallurgy 1983; 26(3):155-159.

Eiselstein LE, Ruano OA, Sherby OD. Structural characterization of rapidly solidified white cast iron

powders. Journal of Materials Science 1983; 483-492.

Eiselstein LE, Ruano OA, Sherby OD, Wadsworth J. Microstructural and mechanical properties of rapidly solidified white cast iron powders. Proceedings, 3rd Conference on Rapid Solidification Processing, National Bureau of Standards, Mehrabian R (ed), Gaithersburg, MD, pp. 246-251, December 1983.

Eiselstein LE, Syrett BC, Wing SS, Caligiuri RD. The accelerated corrosion of copper-nickel alloys in sulfide polluted seawater. Paper No. 59, Corrosion/82, Annual Meeting of the National Association of Corrosion Engineers, Houston, TX, March 1982.

Ruano OA, Eiselstein LE, Sherby OD. Superplasticity in rapidly solidified white cast iron. Metallurgical Transactions 1982; 13A:1785-1792.

Wadsworth J, Eiselstein LE, Sherby OD. The development of ultrafine superplastic structures in white cast irons. Materials Engineering Application 1979; 1(3):143-153.

Sherby OD, Wadsworth J, Caligiuri RD, Eiselstein LE, Snyder BC, Whalen RT. Superplastic bonding of ferrous laminates. Scripta Metallurgica 1979; 13:941-946.

Book Chapters

Eiselstein LE, Huet R. Chapter 1: Corrosion Failure Analysis with Case Histories. In: Uhlig's Corrosion Handbook, Third Edition, Editor: R. Winston Revie, The Electrochemical Society, Inc., John Wiley & Sons, Inc., 2011.

Eiselstein LE. Chapter 38: Corrosion of Shape Memory Alloys. In: Uhlig's Corrosion Handbook, Third Edition, Editor: R. Winston Revie, The Electrochemical Society, Inc., John Wiley & Sons, Inc., 2011.

Corlett N, Eiselstein LE, Budiansky N. Chapter 29. Types of Corrosion in Liquids: Crevice Corrosion in Shreir's Corrosion. Vol. 2, Editor: T. Richardson, Elsevier, 2010, pp. 753-771.

Presentations

Lemberg J, Guyer E, Eiselstein L. Possible microbiologically induced corrosion (MIC) of stainless-steel weld used in domestic water risers. MS&T 2014, Pittsburgh, PA, October 12-16, 2014.

Lemberg J, Gibbs J, Birringer R, James B, Eiselstein L. Fire cracking of leaded and lead-free brasses for use in water, oil, and gas applications. MS&T 2014, Pittsburgh, PA, October 12-16, 2014.

Huet R, Eiselstein LE. Lessons learned from explosion in ammonium nitrate neutralizer. Symposium on Chemistry, Process Design, and Safety in the Nitration Industry, Spring ACS Meeting, San Diego, CA, March 25-29, 2012.

FDA, Cardiovascular metallic implants: Corrosion, surface characterization, and nickel leaching, March 8, Erica Takai: Moderator, CDRH, FDA: FDA White Oak Conference Center, Silver Spring, Maryland, 2012.

Guyer E, Eiselstein LE. Getting it right the first time: Accelerated testing of active implantable medical devices. Exponent Webinar, October 16, 2008.

Eiselstein LE, Steffey D, Nissan A, Corlett N, Dugnani R, Kus E, Stewart S. Acceptance criterion for the corrosion resistance of medical devices: A statistical study of the pitting susceptibility of Nitinol, accounting for the in-vivo environment. International Conference on Shape Memory and Superelastic Technologies, Stresa, Italy, 2008.

Corlett N, Eiselstein LE, Steffey D, Nissan A, Dugnani R, Kus E, Stewart S. Effect of long-term immersion on the localized corrosion resistance of Nitinol wire under aerated conditions. ASM International Conference on Shape Memory and Superelastic Technologies. International Conference on Shape Memory and Superelastic Technologies, Stresa, Italy, 2008.

Eiselstein LE. Material degradation issues in the implantable medical industry. Meeting of the San Francisco Bay Area Section of the Electrochemical Society, Menlo Park, CA, February 25, 2008.

Eiselstein LE, Steffey D, Nissan A, Corlett N. Toward an acceptance criterion for the corrosion resistance of medical devices: A statistical study of the pitting susceptibility of Nitinol. Proceedings, ASM International Conference on Shape Memory and Superelastic Technologies, Tsukuba City, Japan, 2007.

Nissan A, Corlett N, Eiselstein LE, Steffey D. Effect of long-term immersion on the pitting corrosion resistance of Nitinol. Proceedings, ASM International Conference on Shape Memory and Superelastic Technologies. Tsukuba City, Japan, 2007.

Eiselstein LE, James B. Medical device failure analysis. Keynote Session VI - Failure Analysis (Fracture, Fatigue, Corrosion, and Materials Degradation), Materials, Medicine, and Nanotechnology Summit, ASM International, Cleveland, OH, October 20-25, 2006.

Eiselstein, LE, James B. Keynote lecture - medical device failures. 2nd International Congress on Engineering Failure Analysis, Toronto, Canada, September 12-15, 2006.

Eiselstein, LE. Medical device failures. Medical Device Seminar: Leaders and Visionaries, Stanford University, Stanford, CA, October 25, 1999.

Eiselstein, LE. Material considerations for biomedical devices. Golden Gate Materials and Welding Technologies Conference, San Francisco, CA, February 26-28, 1997.

Caligiuri RD, Eiselstein LE. Development of metallic laminate composites for heavy armor. Defense Advanced Research Projects Agency/Army/Marine Corps Armor/Anti-Armor Joint Program Office Information Exchange, Los Alamos National Laboratory, Los Alamos, NM, March 1990.

Caligiuri RD, Andrew SP, Eiselstein LE. A review of high strain rate properties and penetration mechanisms of depleted uranium and tungsten alloys. Army Research Development and Engineering Command/Army Research Office Workshop on Metallurgical Aspects of Deformation/Failure Mechanisms in "The Terminal Ballistics of Heavy Metal Kinetic Energy Penetrators," Picatinny Arsenal, Dover, NJ, April 1990.

Reports

Eiselstein LE. Declaration of Lawrence Eiselstein in Support of Motion for Summary Judgment. Fireman's Fund Insurance Company, Plaintiff, v Columbia Mechanical Contractors, Inc., Defendants, Exponent Report to William B. Waterman, October 2005 (Rule 26B Report).

Eiselstein L, Belanger J, Buehler C, Reza A, Ogle R, Adan M. Investigation of the explosion at Ultem Monomer production plant. Exponent Failure Analysis Associates, December 2003.

Eiselstein LE. Support of Plaintiff Microlife Intellectual Property GmbH's Opposition to Defendant Actherm, Inc.'s Motion for Summary Judgment of Non-Infringement of U.S. Patent No. 6,419,388, Microlife Intellectual Property GmbH Plaintiff and Counter defendant, v Actherm Inc. Defendant and Counterclaimant. Civil Action No. C 03-1117 (SBA) in U.S. District Court for Northern District of California, Oakland Division, September 2003 (Rule 26B Report).

Eiselstein LE. Supplemental Declaration of Lawrence E. Eiselstein, Marchon Eyewear, Inc. and Rothandberg, Inc., Plaintiffs, v Global Optical Resources, Inc., Defendant, Exponent Report to Frommer

Lawrence & Haug LLP, June 2003 (Rule 26B Report).

Eiselstein LE. Stern tube corrosion and cathodic protection. Exponent Report to United States Coast Guard, Lockport, LA, May 2003.

Eiselstein LE. "Declaration of Lawrence E. Eiselstein, Marchon Eyewear, Inc. and Rothandberg, Inc., Plaintiffs, v Global Optical Resources, Inc., Defendant, Exponent Report to Frommer Lawrence & Haug LLP, January 2003 (Rule 26B Report).

Eiselstein LE. Stern tube corrosion on 87-foot cutters. Exponent Report to United States Coast Guard, Alameda, CA, October 2002.

Eiselstein LE, Giddings V, Kennedy R, Mahnovski S, Medhekar S. Zelickson Patent Valuation. Enteric Medical Technologies and Boston Scientific, Exponent Report, August 2002.

Eiselstein LE. Valley Transit Authority (VTA) Rail Fracture. Exponent Report, June 2002.

Eiselstein LE. Equilon/Texaco Pipe Release. Expert Report to McCutchen, Doyle, Brown & Enerson, March 2002 (Rule 26B Report).

Eiselstein LE. Declaration of Lawrence E. Eiselstein, regarding underground corrosion of ARCO station piping, Report to O'Melveny & Myers LLP, September 2001 (Rule 26B Report).

Eiselstein LE. FSI International v Particle Measuring Systems, Exponent Report to Robins, Kaplan, Miller & Ciresi, August 2001 (Rule 26B Report).

Eiselstein LE. Rebuttal Expert Report, Varian Associates, Inc. v General Electric. Exponent Report to Farella Brawn & Martel, March 2001 (Rule 26B Report).

Eiselstein LE. Trident Weld Consumables Rebuttal Report. Exponent Report to Castro and Worthge, LLP, March 2001 (Rule 26B Report).

Eiselstein LE. Stress Corrosion Cracking of CAP Wire. Exponent Report to Rogers, Joseph, O'Donnell & Quinn, July 2000.

Eiselstein LE. Support of COM/Energy's Memorandum of Law on Harvard's Purported Damages in President and Fellows of Harvard College, Plaintiff v COM/Energy Steam Company. Report to Riemer & Braunstein, April 2000 (Rule 26B Report).

Eiselstein LE and Moncarz P. Hayden-Rhodes Aqueduct Siphon Rebuttal Report. Exponent Report to Rogers, Joseph, O'Donnell & Quinn, March 2000.

Paduano D and Eiselstein LE. CS Integrated v. Vilter Manufacturing Exponent report to McCutchen, Doyle, Brown & Enersen, May 2000 (Rule 26B Report).

Eiselstein LE. Rebuttal Report (Subject to Protective Order). Cordis Corporation, Plaintiff v Advanced Cardiovascular Systems, Inc., Medtronic AVE, Inc., Boston Scientific Corporation, and Scimed Life Systems, Inc. Defendants and Medtronic AVE, Inc. Plaintiff, v Cordis Corporation, Johnson & Johnson, and Expandable Grafts Partnership, Defendants. United States District Court for the District of Delaware, February 2000 (Rule 26B Report).

Eiselstein LE. Report (Subject to Protective Order). Cordis Corporation, Plaintiff v Advanced Cardiovascular Systems, Inc., Medtronic AVE, Inc., Boston Scientific Corporation, and Scimed Life Systems, Inc. Defendants and Medtronic AVE, Inc. Plaintiff, v Cordis Corporation, Johnson & Johnson, and Expandable Grafts Partnership, Defendants, U.S. District Court of Delaware, January 2000 (Rule 26B Report).

Moncarz P and Eiselstein LE. Summary of Hayden-Rhodes Siphon Distress Study by Exponent Failure Analysis Associates. Volume I, Exponent Report to Rogers, Joseph, O'Donnell & Quinn, January 2000.

Eiselstein LE and Moncarz P. Summary of Hayden-Rhodes Siphon Distress Study by Exponent Failure Analysis Associates. Volume II, Exponent Report to Rogers, Joseph, O'Donnell & Quinn, January 2000.

Eiselstein LE and Haussmann G. Investigation of the October 23, 1995, Chemical Release at Gaylord Chemical, Bogalusa, Louisiana. Exponent Report, September 1998.

Reza A, Eiselstein LE, Huet R, Belanger J. Investigation of the April 1994 Halliburton perforation gun explosion in Kenai, Alaska. Failure Analysis Associates Report to DeLisio Moran Geraghty & Zobel and Lane Powell Spears Lubersky, January 1998.

Eiselstein LE, Wachob HF, Mimmack GF. Failure Analysis Report of Limit Switch. Failure Analysis Associates Report to Puget Sound Naval Shipyard, Bremerton WA, November 1997.

Caligiuri RD, Parnell TK, Eiselstein LE, Wu M, Huet R. Analysis of Drill Pipe Joint Failures and Recommendations for Service. Exponent Failure Analysis Associates Report, November 1997.

Eiselstein LE and Wachob HF. Report for Failure Modes and Effects Analysis of the NiCl800 Needle Disposal System. Failure Analysis Associates Report for NIC Limited and Wilson Sonsini Goodrich & Rosati, July 1997.

Eiselstein LE and Wachob HF. Test Report for Efficacy and Use Life Validation for the NiCl800 Needle Disposal System Using Clinically Destroyed Needles. Failure Analysis Associates Report for NIC Limited and Wilson Sonsini Goodrich & Rosati, August 1997.

James B and Eiselstein LE. Investigation of Sensitization and Cracking of an Incoloy 800H Silane-Production Reactor Vessel. Failure Analysis Associates Report to Bullivant, Houser, Bailey, April 1997.

Ross B, Haussmann G, Eiselstein LE, Huet R, James B. Evaluation of Fan Failure and Boiler Explosion, Unit #3, Dave Johnson Power Plant, Glenrock WY. Failure Analysis Associates Report, March 1996.

Eiselstein LE, Huet R, and Nell J. Materials Evaluation of the Broken Porcelain Bus Bar Spacer-Insulator at Diablo Canyon. Failure Analysis Associates Report, September 1994.

Eiselstein LE and Kokarakis J. Analysis of the Broken Blowdown Valve Bolts on the USNS San Diego. Failure Analysis Associates Report to Military Sealift Command, August 1994.

Petersen JF and Eiselstein LE. The Role of Copper Azides in Detonator Explosion Phillip E. Beckner v. Owen Tools, Inc., et al. Failure Analysis Associates Report, July 1994.

Eiselstein LE and Caligiuri RD. Examination and Corrosion Testing of Leaking Celulosa Del Pacifico Recovery Boiler Superheater Heater Tubes. Failure Analysis Associates Report, April 1994.

Rao VB, Rao GL, Eiselstein LE, Caligiuri RD. Report on Failure Modes and Effects Analysis for Carbon-Dioxide Powered Syringe. Failure Analysis Associates Report, May 1994.

Eiselstein LE, Wagner A, Reza A, Rao GL, Caligiuri RD. Experiments on the Effect of Suction-Side Leaks on Refrigerator Performance. Failure Analysis Associates Report, April 1994.

Eiselstein LE, Rao GL, Caligiuri RD, Wagner A. Experiments on Gas Dispersion from Sealed System Leaks. Failure Analysis Associates Report, April 1994.

Eiselstein LE, Rao GL, Caligiuri RD. Internal Isobutane-Air Ignition Experiments. Failure Analysis

Associates Report, April 1994.

Eiselstein LE, Analysis of the Hull Perforation on U.S. Coast Guard Cutter. Failure Analysis Associates Report, March 1994.

Appiarius JC, Boukarim GE, Owen EL, Mayer CB, Murdoch A, Taylor TM, Eiselstein LE, Foulds JR, Harris DO. Bus Transfer Criteria for Plant Electric Auxiliary Systems. Electric Power Research Institute, Final Report, Project 2626-01, EPRI TR-103185, October 1993.

Eiselstein LE. Failure Analysis of Powerheads Used to Install Morgrip Bolts. Final Report to LaQue Center for Corrosion Technology, Inc., May 1993.

Eiselstein LE, Andrew SP, Caligiuri RD. Recommended Practices for Materials Compatibility. Failure Analysis Associates Report, November 1992.

Andrew SP, Caligiuri RD, Parnell TK, Eiselstein LE. Computational Modeling of Dynamic Failure in Armor/Anti-Armor Materials. Failure Analysis Associates Final Report to U.S. Army Research Office, Contract DAA-L03-88-C-0029, May 1992.

Eiselstein LE, Wachob HF, Caligiuri RD. Improved Corrosion Resistance of Magnesium Alloys through Mechanical Alloying. Failure Analysis Associates Final SBIR Phase I Report to Wright-Patterson Air Force Base, 1989.

Eiselstein LE, Harris DO, Rau CA, Dedhia DD, Sire RA. Probabilistic Fracture Mechanics Evaluation of Local Brittle Zones in HSLA-80 Steel Weldments. Failure Analysis Associates Report to Department of Navy, Contract N6153389-M1103, Report No. DTRC/SME-CR-05-90, David Taylor Research Center, Annapolis, MD, December 1989.

Rau CA, Eiselstein LE, Harris, Sire RA, DO, Dedhia DD, McMinn A. Probabilistic Risk Assessment of Low-Pressure Disks on Oak Creek Unit No. 1. Failure Analysis Associates Report, 1988.

Shockey DA, Caligiuri RD, Eiselstein LE, Marchand AH, Klopp RW, Florence AL. Technical Support for the Honeywell Blue Team Heavy Armor Program. SRI Final Report to Honeywell Underseas Systems Division, SRI Project PYD-3345, December 1988.

Eiselstein LE, Caligiuri RD. Rapid Solidification Processing of Wire for Tire Reinforcement. SRI International Report, SRI Project PYC 3497, January 1988.

Eiselstein LE, Caligiuri RD. Explosive Compaction of Rapidly Solidified Nd-Fe-B Ferromagnetic Powders. SRI International Final Report, December 1987.

Eiselstein LE and Caligiuri RD. Development of Advanced, All-Metallic Laminate Armor Systems for Lightweight Applications (U). SRI International Final Report to the DARPA and the Army Research Office, Contract DAAG-29-84-K-0206, July 1987 (SECRET).

Eiselstein LE and Caligiuri RD. Stress Corrosion Cracking of A-471 Steam Turbine Disk Alloys. SRI International Final Report to Electric Power Research Institute, EPRI NP-5182, Contract 1398-12, June 1987.

Eiselstein LE, Caligiuri RD, Werner AT. Corrosion Behavior of Materials Used in Sour-Gas-Rich Oil Fields. SRI International Report, May 1987.

Schmidt CG, Caligiuri RD, Eiselstein LE. Stress Corrosion Cracking Susceptibility of Type 316 Nuclear-Grade Stainless Steel and XM 19 Alloy in Simulated BWR Water. SRI International Final Report to Electric Power Research Institute, EPRINP-05177-LD, Project T305-2, April 1987.

Eiselstein LE, McKubre MCH, Caligiuri RD. Prediction of Crack Growth in Aqueous Environments. SRI International Final Report to the Office of Naval Research, Contract N00014-82-K-0343, July 1986.

Eiselstein LE, McKubre MCH. The Suitability of Stainless Steel as a Replacement for Zinc Plated Mild Steel as a Structural Frame Material for Computer Applications. SRI International Report, May 1986.

Eiselstein LE, Peppers NA, Schaefer LF, Schmidt CG, Young JR. Automated Printed-Circuit-Board Inspection. SRI Report to SRI Multi-Client Project on Automated Printed-Circuit-Board Inspection, SRI Project 6869, March 1986.

Eiselstein LE, Caligiuri RD. Corrosion Damage to the Williamsburg Bridge Main Suspension Cables. SRI International Report, May 1985.

Eiselstein LE, McKubre MCH, Caligiuri RD. Prediction of Crack Growth in Aqueous Environments. SRI International Second Annual Report to the Office of Naval Research, Contract N0014-82-K-0343, March 1984.

Eiselstein LE and Caligiuri RD. Microkinetics of Stress Corrosion Cracking in Steam Turbine Disk Alloys. SRI International Final Report to Electric Power Research Institute, Contract RP1398-12, November 1984.

Schmidt CG, Caligiuri RD, Eiselstein LE. Low-Temperature Sensitization of Type-304 Stainless Steel Weld-Heat-Affected-Zone. SRI International Final Report to Electric Power Research Institute, EPRI NP-3368, Contract T110 1, November.

McKubre MCH, Leach SC, Eiselstein LE. Crevice Corrosion of Lattice-Support Alloys in Secondary Environments of Nuclear Steam Generators. SRI International Final Report to Electric Power Research Institute, EPRI NP-3045, Contract RPS204-1, July 1983.

Caligiuri RD, Eiselstein LE, Curran DR, Shockey DA. Microkinetics of Stress Corrosion Cracking in Steam Turbine Disk Alloys. SRI International Interim Report to Electric Power Research Institute, Contract RP 1929-8, April 1983.

Caligiuri RD, Eiselstein LE. Investigation of Water-Based Corrosion in Radiant Heating Systems. SRI International Report, January 1983.

Eiselstein LE. Friction Measurements of Steel on Refractory Bricks. SRI International Final Report to Electric Power Research Institute, EPRI NP 1987, Contract 1704-17, August 1981.

Eiselstein LE and Lamoreaux RH. Assessment of Mechanical Property Degradation of Steels Exposed to PLBR Liquid Sodium. SRI International Final Report to Electric Power Research Institute, EPRI NP-1985, Contract 1704-15, August 1981.

Eiselstein LE, Caligiuri RD, Wing S, Syrett BC. Mechanisms of Corrosion of Copper-Nickel Alloys in Sulphide-Polluted Seawater. SRI International Final Report to the Office of Naval Research, Contract 00014-177-C-0046, WR036-116, December 1980.

Eiselstein LE, Fatigue Testing of Betalloy Couplings. SRI International Report, July 1980.

Wadsworth J, Eiselstein LE, Sherby OD. The Development of Ultrafine, Superplastic Structures in White Cast Irons. Stanford University Department of Materials Science and Engineering Technical Report to the Office of Naval Research, Contract N-00014-75-C-0662, November 1978.

Project Experience

Metallurgy, Corrosion & Failure Analysis

Dr. Eiselstein has conducted hundreds of failure analysis investigations spanning power generation, transportation, industrial equipment, consumer products, and civil infrastructure. The following examples illustrate the breadth and depth of this work.

- Telecommunications cables: evaluated effects of environmental exposure on metal-clad cables.
- Hyperscale data center coolant corrosion related consulting.
- Investigated a steam explosion at a fossil-fueled power plant that killed four personnel, applying fractography, fracture mechanics, metallurgical analysis, and materials testing to trace the failure to a weld crack in a primary air draft fan; presented findings to plant personnel responsible for safety remediation.
- Investigated atmospheric corrosion damage to the main suspension cables of the New York City Williamsburg Bridge — composed of 7,696 high-carbon patented steel wires — evaluating mechanical property degradation over an 80-year service life and using accelerated corrosion testing to estimate current corrosion rates.
- Investigated copper-coated stainless steel architectural roofing and siding materials experiencing corrosion-induced failures, identifying acidic condensation from chimneys as the mechanism stripping electroplated copper and causing pitting penetration of the underlying stainless-steel substrate.
- Investigated the failure of a geothermal power plant's surface equipment — including air-cooled condensers, switchgear, transformers, turbines, and pumps — following a volcanic eruption in a marine environment, evaluating atmospheric corrosion damage from volcanic gases and marine exposure through site inspections, vendor reports, and maintenance records.
- Investigated the failure of an LM2500 gas turbine in which Inconel 718 bolting plated with silver for anti-galling failed at full power, evaluating turbine operating temperature, creep-fatigue, and hot corrosion from sulfur and chloride as contributing mechanisms.
- Investigated the warpage of HP/IP steam turbine rotors manufactured from Ni-Cr-Mo-V steel, evaluating turning gear failure, creep deformation, thermal gradient-induced stresses, and residual stress effects, along with the effectiveness of proposed straightening methods.
- Investigated the failure of forged Inconel 718 (Alloy 718) turboshaft jet engine disks during testing, determining that the root cause was failure to apply the specified age-hardening heat treatment, which destroyed the test stand and delayed the development program.
- Investigated massive explosions at a Port Neal, Iowa, ammonium nitrate plant that killed four workers and caused hundreds of millions of dollars in damage, conducting analytical modeling, experimental testing, and metallurgical analysis of artifacts to determine that operator-induced contamination and acidification of the neutralizer vessel triggered a runaway chemical reaction.
- Investigated cracking of Inconel 718 fuel spray nozzles on Rolls Royce engines installed on Airbus and Boeing aircraft, leading to the worldwide replacement of thousands of nozzles on hundreds of aircraft; evaluated forging procedures, ingot size, forgeability limits, and inspection techniques.
- Investigated the cause of a freight train derailment by determining that a combination of corrosion, fatigue, and inadequate nondestructive examination (NDE) and repair caused the rail car axle failure.
- Investigated corrosion of galvanized structural steel beams exhibiting liquid metal assisted cracking (LMAC), a form of liquid metal embrittlement (LME), and evaluated modified magnetic

particle, ultrasonic testing (UT), and eddy-current testing (ECT) techniques for detecting zinc-filled cracks.

- Investigated the failure of a shaving cream can product line, determining that the high pH of one shaving cream formulation caused corrosion penetration of uncoated aluminum can interiors, resulting in a product recall.
- Investigated the failure of a large industrial coil when steel strapping failed, causing rapid uncoiling that resulted in a fatality, conducting metallurgical analysis of the strapping failure mechanism.
- Investigated excessive field failures in a new refrigerator compressor design, conducting wear rate modeling, metallurgical analysis of M2 high-speed tool steel and cast-iron components, and statistical analysis of field failure data to identify the factors driving premature failure.
- Investigated the corrosion damage to an enameled steel heat exchanger in a condensing home furnace using X-ray photoelectron spectroscopy (XPS/ESCA) to characterize pitting damage mechanisms.
- Testified in a product liability matter involving automotive components, providing expert analysis on corrosion and fatigue mechanisms in recalled axles and stabilization bars in salt belt states.
- Provided deposition testimony in motorcycle braking systems involving corrosion of the brake fluid and generation of hydrogen gas.
- Investigated the failure of a natural gas fitting on a mobile clinic, determining through fractographic analysis that the copper fitting failed by fatigue rather than stress corrosion cracking, resolving the cause of the gas explosion.
- Investigated the cause of a series of explosions that destroyed a solid rocket oxidizer (ammonium perchlorate) plant in Henderson, Nevada — with the largest explosion equivalent to 1.5 million pounds of TNT — assessing the role of ERW weld defects in a 16-inch high-pressure natural gas pipeline that traversed the plant.
- Investigated the failure of a silane-producing chemical reactor vessel after 13 years of service, determining through metallographic, corrosion, and mechanical property testing that sensitization-induced intergranular stress corrosion cracking (SCC) caused cracking in both the weld and heat-affected zones of the Incoloy 800H vessel.
- Investigated the cause of a nitrogen tetroxide rail car rupture, conducting laboratory corrosion experiments to demonstrate that nitric acid corrosion of the carbon steel shell caused rapid wall thinning and catastrophic pressure buildup, releasing a large red-brown toxic cloud.
- Investigated the cause of a chlorine release at a liquid chlorine production facility in Henderson, Nevada, using computational fluid dynamics to model chlorine flow and conducting corrosion experiments in brine-contaminated chlorine to determine the erosion-corrosion mechanism responsible for the release.
- Investigated the cause of a hydrogen sulfide release at an upstream oil and gas processing facility, assessing sulfide-induced stress corrosion cracking in small-bore process piping welds.
- Evaluated various pressure vessel components used in supercritical conditions for water and carbon dioxide for various applications such as destruction of chemical weapons (nerve and mustard gas), cleaning semiconductors, and destruction of per- and polyfluoroalkyl (PFAS) and perfluorooctanoic acid (PFOA).
- Provided deposition testimony in an intellectual property matter involving nitinol superelasticity and shape memory patents, testing exemplar materials to determine their shape memory and superelastic properties.

Energy, Infrastructure & Construction

Dr. Eiselstein has investigated failures in pipelines, refineries, power plants, bridges, and large civil structures across North America and internationally, advising utilities, energy companies, construction firms, and their legal counsel.

- Investigated the cause of a 36-inch natural gas transmission pipeline rupture in Carlsbad, New Mexico, evaluating internal corrosion mechanisms and assessing the extent to which water ingress from third-party producers and pipeline configuration contributed to the observed corrosion.
- Investigated the potential for low-temperature sensitization of stainless steel pipe welds in boiling water reactors (BWRs).
- Investigated issues regarding primary water stress corrosion cracking (PWSCC) and steam generator denting in tube sheet crevices in nuclear steam generators in pressurized nuclear reactors.
- Investigated the cause of a refinery pipe rupture and fire, determining through metallurgical evaluation that sulfidation corrosion (sulfidic corrosion) caused wall thinning and rupture of an elevated-temperature steel pipe in crude oil distillation service, reviewing McConomy and modified McConomy corrosion rate curves.
- Investigated the failure of oil country tubular goods (P110 steel casing and connectors) used in hydraulic fracturing operations in Texas, evaluating allegations of improper design, substandard steel, improper heat treatment, excessive torque, improper coating leading to hydrogen charging, and exposure to sour environments causing sulfide stress cracking.
- Investigated the cause of cracking in six-inch-diameter Inconel 625 seamless pipes and fittings supplied for a Middle East sour crude oil extraction facility, determining through mechanical testing, metallography, and ultrasonic NDE that the piping did not comply with ASTM B444 technical specifications.
- Investigated the failure of an oil well perforation gun explosion at a Halliburton Industries assembly plant in Kenai, Alaska, that killed one employee and seriously injured five others, using forensic fragment mapping to determine the sequence of events leading to accidental ignition of the shaped charges.
- Investigated drill string failures involving complete separation at threaded couplings, using testing and finite element analysis to evaluate whether stress corrosion cracking (SCC) or fatigue from stresses in the coupling shoulder was responsible.
- Investigated the failure of prestressing wires in the Central Arizona Project (CAP) prestressed concrete pressure pipe (PCCP), determining that chloride concentration buildup in the wet/dry transition zone of the siphons caused SCC of the high-strength patented steel wire without significant carbonation of the mortar.
- Investigated the failure of post-tensioning strands on a bridge tendon, determining through SEM, metallographic examination, microhardness, and chemical analysis that environmentally assisted cracking (EAC) caused by water ingress and lack of protective wax coating was responsible.
- Investigated the failure of steel moment frame welds following the Northridge earthquake in Los Angeles, conducting metallurgical examinations of failed welds removed from buildings, chemical analysis of weld material, and analysis of the potential for hydrogen-induced weldment cracking.
- Investigated the failure of an aluminum gantry crane that injured personnel, analyzing welding records, welding practice, and design considerations to determine that the failure path ran through the weld metal joining the top plate to the tube leg and through a gusset plate weld.

- Investigated the failure of a cast iron water main, testifying the reasons for failure due to graphitic corrosion and lack of cathodic protection (CP).
- Investigated the failure of a water transmission pipeline constructed using horizontal directional drilling (HDD), evaluating pipe coating condition, weld defects in spiral welds, corrosion rates, and pipe bend radius-induced strains at the welds.
- Provided testimony in cost overrun allegations in the large municipal potable water steel tank rehabilitation project in Canada. Issues involved mill scale, abrasive blasting, and repainting.
- Investigated the performance of vapor-permeating membrane cartridges for fuel-grade ethanol dehydration, developing a mathematical model of cartridge operating parameters to deduce membrane permeability and evaluate process efficiency relative to conventional distillation methods.
- Provided deposition testimony in an environmental matter involving the adequacy of corrosion protection — coating and cathodic protection — on a 20-inch crude oil pipeline that leaked due to anaerobic microbiologically influenced corrosion (MIC).Provided deposition testimony in a construction litigation matter involving post-tensioning strand failures on a bridge tendon in Tampa, Florida, determining that environmentally assisted cracking (EAC) caused by water ingress and lack of protective wax coating was responsible for the fractures.
- Testified in an international arbitration matter before the ICDR in Houston involving metallurgical defects and improper heat treatment in large-scale gearing on offshore drilling platform jack-up rigs, supported by finite element analysis (FEA) and fracture mechanics.
- Provided international arbitration testimony in a contract dispute involving the cause of a transformer explosion at a coal-fired power plant complex, evaluating corrosion design and maintenance issues that allowed moisture ingress into high-voltage bushings in a hot tropical marine environment.

Medical Device Materials

Dr. Eiselstein has conducted corrosion evaluations, fatigue analyses, and failure investigations for medical device manufacturers, regulatory bodies, and legal counsel across a wide range of implantable and active devices.

- Evaluated corrosion resistance and metal ion release for a broad range of implantable medical devices — including nitinol stents, cobalt-chromium orthopedic implants, pacemaker leads, IVC filters, and annuloplasty rings — applying ASTM F2129, ASTM F3306, ASTM F3044, and ASTM F2004 to characterize pitting susceptibility, nickel ion leaching, galvanic corrosion potential, and nitinol transformation temperatures.
- Investigated tribocorrosion and wear debris generation in metal-on-metal (MoM) hip implants and modular tapered junctions used in total hip arthroplasty (THA), evaluating sliding wear, fretting fatigue, and the release of metallic wear particles as contributors to adverse tissue reactions.
- Investigated the failure of a tracheobronchial stent manufactured from cobalt-chromium-nickel-molybdenum wire, reviewing accelerated life testing adequacy, FDA submission records, and product quality management documents, and determining through micro-hardness measurements and fractographic analysis that the stent failed by fatigue without material or manufacturing defects.
- Investigated the failure of pacemaker leads, evaluating corrosion-fatigue, fretting, polymer material performance, manufacturing changes, residual stress effects, and in vivo loading as contributors to lead fracture.

- Investigated the failure of a Harrington spinal rod used in the correction of Scheuermann kyphosis, determining through fractographic analysis that fatigue caused by transconnector migration to the end of the rod was responsible for the fracture.
- Investigated the failure of periarticular tibial screws, determining through SEM fractographic analysis that low-cycle fatigue crack initiation and growth driven by cyclic in vivo loads exceeding design parameters caused the fractures.
- Investigated the failure of an endovascular prosthesis with broken attachment hooks at both superior and inferior ends, using SEM to determine that fatigue originating at tool marks — rather than material defects — caused the fractures.
- Investigated the failure of an implantable spinal fusion bone growth stimulator, setting up an in vitro system to evaluate hydrogen embrittlement (HE) and hydrogen-induced cracking (HIC) in Ti-6Al-4V and cobalt-chromium hardware, measuring hydrogen levels and observing cracking instances.
- Designed accelerated life testing (ALT) programs and failure modes and effects analyses (FMEAs) for active implantable medical devices (AIMDs), identifying potential failure modes and establishing acceleration factors for mechanical, electrical, and chemical test protocols.
- Investigated the failure of an intra-aortic balloon pump balloon that developed a leak after days of use, evaluating fatigue, abrasion, and instructions for use as contributing factors.
- Investigated the failure of a flexible reaming system during an open reduction internal fixation (ORIF) procedure, determining through examination of the reaming rod and head that no design or manufacturing defect was present and that the root cause was the surgeon's failure to use the flexible reaming rod during the final reaming step.
- Provided trial testimony in a laparoscopically assisted vaginal hysterectomy (LAVH) involving a safety trocar injury in state court.
- Testified in a personal injury matter involving a pedicle screw and locking nut system, addressing thread profile design and alleged improper testing following a surgical revision.
- Provided deposition testimony in an intellectual property matter involving stent patent infringement, addressing both manufacturing methods and design issues.
- Provided trial testimony in multiple cases involving hip implants.
- Provided trial testimony in permanent implanted contraception device in Australia.

Editorships & Editorial Review Boards

Editorial Advisory Board for Engineering Failure Analysis

Deposition & Trial Testimony

Dr. Eiselstein has provided expert testimony at trial, in arbitration, and by deposition in U.S. federal and state courts and international forums. These matters involve materials failures, corrosion, medical devices, energy infrastructure, and construction.