

Peter C. McKeighan, Ph.D.
Manager

Professional Profile

Dr. Peter C. McKeighan is a Manager in Exponent's Mechanical Engineering practice. He has performed numerous multidisciplinary failure analyses of complex systems and components ranging from consumer products to gasoline fuel storage and dispensing facilities. His specific expertise is in fatigue and fracture of engineering materials and mechanical behavior measurement. In addition, he performs design assessments of mechanical systems with a focus on life prediction, damage tolerance and durability, and component integrity. Dr. McKeighan has managed and coordinated numerous research programs concerning a variety of different end-product uses including USAF trainer jets, railroad tank cars, offshore structures in oil and gas, chemical reactor pressure vessels, sport utility vehicles, transport aircraft, medical devices, and space structures. Recent work has focused on the fatigue and fatigue crack growth behavior of medium strength steel welds exposed to hydrogen sulfide and seawater brine.

Prior to joining Exponent, Dr. McKeighan managed the Solid and Fracture Mechanics Laboratory at Southwest Research Institute in San Antonio, Texas. The laboratory focused on quantifying the fatigue and fracture behavior of a variety of materials in both lab air and aggressive environments. During this time, Dr. McKeighan managed and directed numerous commercial and government programs focused on fatigue and fatigue crack growth rate behavior, especially under variable amplitude, spectrum loading conditions. The laboratory specialized in unusual and unique experimental methods to evaluate component integrity and life. Prior to joining Southwest Research Institute, Dr. McKeighan was a researcher and lecturer at the University of Bristol (Bristol, England) focusing on life prediction of dynamically loaded submarine and aircraft structures.

Academic Credentials and Professional Honors

Ph.D., Mechanical Engineering, Purdue University, 1991
M.S.M.E., Mechanical Engineering, Purdue University, 1988
B.S.M.E., Mechanical Engineering, Purdue University, 1985

Fellow, ASTM International, 2008
Chairman, Automation and Apparatus (Fatigue and Fracture) Subcommittee ASTM E08.03
Best Paper Award, ASTM Committee E9, 1989
Best Student Paper Award, ASTM Committee E24, 1992
Pi Tau Sigma; Tau Beta Pi; Phi Eta Sigma

Licenses and Certifications

Engineer-in-Training, Indiana

Publications and Presentations

McKeighan C, Anderson TL. Development and validation of an inexpensive puncture test for railroad tank car steels. 4th International Symposium on Railroad Tank Cars, Materials Science and Technology Conference, Detroit, MI, September 2007.

Garcia DB, Feiger JH, McKeighan PC, Cardinal JW, Jeong DY. Fatigue crack growth behavior of TC128-B steel under variable amplitude loading. ASME Rail Transportation Division Fall Technical Conference, RTDF2007, Chicago, IL, 2007.

McKeighan PC, Garcia DB, Cardinal JW, Thomsen ML. The role of mechanical testing in the damage tolerance process. Proceedings, SF2M International Conference on Residual Fatigue Life and Life Extension of In-Service Structures, JIP 2006, 11th International Spring Meeting, pp. 71–82, Paris, France, May 30–June 1, 2006.

Hsu TM, Buitrago J, Herman A, McKeighan P. Fatigue performance of friction welded studs. Offshore Mechanics and Arctic Engineering Conference, Halkidiki, Greece, June 2005.

McKeighan PC, McMaster FJ. A framework for a standardization effort for fatigue crack growth testing under variable amplitude spectrum loading. pp. 36–52. In: Fatigue Testing and Analysis Under Variable Amplitude Loading Conditions, ASTM STP 1439. McKeighan PC, Ranganathan N (eds), ASTM International, West Conshohocken, PA, 2005.

McMaster FJ, McKeighan PC. Spectrum coupon testing of fatigue-resistant fasteners for an aging military aircraft. pp. 171–185. In: Fatigue Testing and Analysis Under Variable Amplitude Loading Conditions, ASTM STP 1439. McKeighan PC, Ranganathan N (eds), ASTM International, West Conshohocken, PA, 2005.

Thacker BH, Pepin JE, McKeighan PC. Model validation for the collapse of spherical shells. Conference and Exposition on Structural Dynamics, IMAC-XXII, Dearborn, MI, January 26–29, 2004.

McKeighan PC, McMaster FJ, Gordon JE. Fatigue performance of AAR Class B railroad wheel steel at ambient and elevated temperatures. Presented at the ASME International Mechanical Engineering Congress and Exposition, New Orleans, LA, November 17–22, 2002.

McKeighan PC, Feiger JH, Riddell WT. Fatigue crack growth rate behavior of tank car steel TC-128B. Iron & Steelmaker 2002; 29(5):73–78. Also in Proceedings, Iron & Steel Society's 43rd Mechanical Working and Steel Processing Conference Proceedings, ISS, Vol. XXXIX, pp. 873–882, 2001.

McMaster FJ, McKeighan PC, Cardinal JW. Analysis of crack length measurements utilizing in-direct DCPD and markerband techniques under a civil aircraft spectrum. Presented at the ASTM Symposium on Fatigue Testing and Analysis Under Variable Amplitude Loading Conditions, Tours, France, May 29–31, 2002.

McKeighan PC, Warke RW, Cardinal JW. End-of-life structural teardown of welded tank car stub sills. Proceedings, The Iron & Steel Society's 43rd Mechanical Working and Steel Processing Conference ISS, Vol. XXXIX, pp. 849–860, 2001.

McKeighan PC, Fess II FE, Petit M, Campbell FS. Quantifying the magnitude and effect of loading errors during fatigue crack growth testing under constant and variable amplitude loading. pp. 146–164. In: Applications of Automation Technology in Fatigue and Fracture Testing and Analysis, Fourth Volume, ASTM STP 1411. Braun AA, McKeighan PC, Nicholson AM, Lohr RD (eds), American Society for Testing and Materials, West Conshohocken, PA, 2002.

McKeighan PC, Nicholls AE, Perocchi LC, McClung RC. Sensing crack nucleation and growth in hard alpha defects embedded in Ti-6Al-4V alloy. pp. 15–35. In: Nontraditional Methods of Sensing Stress, Strain and Damage in Materials and Structures, Second Volume, ASTM STP 1323. Lucas GF, McKeighan PC, Ransom JS (eds), American Society for Testing and Materials, West Conshohocken, PA, 2001.

Dombrowski DE, Haws WJ, McKeighan PC. Comparison of elevated temperature properties of HIP'd impact ground beryllium (S-65-h) and HIP'd gas atomized (GA) Beryllium. Proceedings, 4th IEA International Workshop on Beryllium Technology for Fusion, Karlsruhe, Germany, September 15–17, 1999.

McClung RC, Leverant GR, Wu Y-T, Millwater HR, Chell GG, Kuhlman CJ, Lee Y-D, Riha DS, Johns SR, McKeighan PC. Development of a probabilistic design system for gas turbine disk integrity. Proceedings, FATIGUE '99, 7th International Fatigue Congress, pp. 2655–2660, Beijing, China, EMAS 4, May 1999.

McKeighan PC, Perocchi LC, Nicholls AE, McClung RC. Characterizing the cracking behavior of hard alpha defects in rotor grade Ti-6-4 alloy. pp. 349–356. In: Fatigue Behavior of Titanium Alloys. Boyer RR, Eylon D, Lutjering G (eds), The Minerals, Metals & Materials Society, Rosemont, IL, 1999.

Burkhardt GL, Fisher JL, Stolte JS, Buckingham JP, McKeighan PC, FitzGerald J, Burkhardt G. Reliability study of magneto-optic imaging (MOI) inspection of C-5 aircraft fuselage. Proceedings, 2nd Joint NASA/FAA/DoD Conference on Aging Aircraft, Part 1, Harris CE (ed.), Williamsburg, VA, August 31–September 3, 1998.

Smith KB, Cardinal JW, McKeighan PC. Stub-sill tank car damage tolerance analysis full-scale validation test. pp. 43–48. In: Rail Transportation 1997, RTD-Vol. 13. Stone DH (ed), The American Society of Mechanical Engineers, New York, NY, 1997.

McKeighan PC, Smith KB, Cardinal JW. Load interaction effects in coupon fatigue tests using a railroad tank car spectrum. pp. 33–42. In: Rail Transportation 1997, RTD-Vol. 13. Stone DH (ed), The American Society of Mechanical Engineers, New York, NY, 1997.

McKeighan PC, Burnside OH, Dubke JP. Measurement of the life improvement gained with cold expansion for the T-38 wing. Proceedings, 1st Joint DoD/FAA/NASA Conference on Aging Aircraft, Volume I, pp. 1691–1710, Ogden, UT, July 8–10, 1997.

McKeighan PC, Seida SB, Franke EA, Davidson DL. BISMAR: A non-contact biaxial displacement measurement system. pp. 101–122. In: Nontraditional Methods of Sensing Stress, Strain and Damage in Materials and Structures, ASTM STP 1318. Lucas GF, Stubbs DA (eds), American Society for Testing and Materials, Philadelphia, PA, 1997.

McKeighan PC, Tabrett CP, Smith DJ. The influence of crack deflection and bifurcation on DC potential drop calibration. pp. 51–66. In: Special Applications and Advanced Techniques for Crack Size Determination, ASTM STP 1251. Ruschau JJ, Donald JK (eds), American Society for Testing and Materials, Philadelphia, PA, 1995.

McKeighan PC, Zhu W-X, Smith DJ. A full field DC potential drop calibration for an asymmetrically cracked M(T) specimen. J Test Eval 1995; 102–110.

McKeighan PC, Smith DJ. Determining the potential drop calibration of a fatigue crack growth specimen subject to limited experimental observations. J Test Eval 1994; 22(4):291–301.

Zhu W-X, McKeighan PC, Smith DJ. Estimating residual stresses in hot forged steel components. 1994 European Joint Conference on Engineering Systems Design and Analysis, The American Society of Mechanical Engineers, London, July 1994.

McKeighan PC, Hillberry BM. On the uncertainties involved in quantifying the fracture toughness of Al-Li-X alloys. Journal of Testing and Evaluation, JTEVA 1994; 22(1):3–13, January.

Tabrett CP, McKeighan PC, Smith DJ. Fatigue crack growth behavior of the aluminum-lithium alloy 2090. Proceedings, 3rd International Symposium on Advanced Materials, Islamabad, Pakistan, September 1993.

McKeighan PC, Hillberry BM, Sanders TH. Intergranular delamination and the role of artificial aging conditions on the fracture of an unrecrystallized Al-Li-Zr alloy. pp. 515–535. In: Fracture Mechanics: Twenty-Third Symposium, ASTM STP 1189. Chona R (ed), ASTM, Philadelphia, 1993.

McKeighan PC, Hillberry BM. Modeling the fracture behavior of underaged Al-Li-X alloys. Proceedings, 3rd International Conference on Aluminum Alloys, ICAA3, Vol. 1, pp. 351–356, 1992.

McKeighan PC, Hillberry BM. An algorithm for determining tensile properties from digitally recorded tensile test data. *Exper Tech* 1991; 15(6):27–30.

McKeighan PC, Hillberry BM, Sanders Jr. TH. The role of grain delamination and delamination toughening in the fracture behavior of Al-Li-X alloys. Proceedings, 6th International Aluminum-Lithium Conference, Garmisch-Partenkirchen, Federal Republic of Germany, October 1991.

McKeighan PC, Hillberry BM. The effect of extrusion and processing variables on the tensile properties of an Al-Li-Zr alloy. Proceedings, 6th International Aluminum-Lithium Conference, Garmisch-Partenkirchen, Federal Republic of Germany, October 1991.

McKeighan PC, Evans RD, Hillberry BM. Fatigue and fracture testing using a multitasking minicomputer workstation. pp. 52–67. In: *Applications of Automation Technology to Fatigue and Fracture Testing*, ASTM STP 1092. American Society for Testing and Materials, Philadelphia, PA, 1990.

McKeighan PC, Henkener JA, Kistler GP, Sanders Jr. TH, Grandt Jr. AF, Hillberry BM. Mechanical properties of a peak-aged Al-2.6Li-0.09Zr alloy. Proceedings, 5th International Aluminum-Lithium Conference, pp. 849–858, 1989.

Pegram JE, Sanders Jr. TH, Hartshorn CJ, McKeighan PC, Valentine MG, Hillberry BM. Tensile properties of an Al-2.6Li-0.09Zr alloy. Proceedings, 5th International Aluminum-Lithium Conference, pp. 261–272, 1989.

Sanders Jr. TH, Grandt Jr. AF, Hillberry BM, Fragomeni JM, Henkener JA, Kistler GP, McKeighan PC, Pegram JE, Sater JM, Valentine MG. PAn extrusion program designed to relate processing parameters to microstructure and properties of an Al-2.6Li-0.09Zr Alloy. 5th International Aluminum-Lithium Conference, pp. 273–285, 1989.

Book Chapters

McKeighan PC. Testing of metallic materials. Chapter 19, pp. 519–543. In: *Handbook of Materials Selection*, Kutz M (ed), John Wiley & Sons, Inc., New York, NY, 2002.

Books Edited

Braun AA, McKeighan PC, Nicolson AM, Lohr RD (eds). *ASTM STP 1411—Applications of Automation Technology in Fatigue and Fracture Testing and Analysis, Fourth Volume*. ASTM International, West Conshohocken, PA, 2002.

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Lucas, GF, McKeighan, PC, Ransom, JS (eds). ASTM STP 1323—Nontraditional Methods of Sensing Stress, Strain, and Damage in Materials and Structures: Second Volume. ASTM, West Conshohocken, PA, 2001.

Peer Reviewer

- Fatigue and Fracture of Engineering Materials and Structure
- Journal of Strain Analysis for Engineering Design
- Experimental Mechanics
- International Journal of Fatigue

Professional Affiliations

- ASTM
 - Committee E08 on Fatigue and Fracture
- ASME
- TMS