Duffner Engineering

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Dirk H. Duffner, P.E., Mechanical Engineer
Failure Analysis / Materials Science / Metallurgy

Experience

Mr. Duffner specializes in the practice of failure analysis. He has a background in mechanical engineering, materials science, and metallurgy. He focuses on determining the root cause of failures in a wide variety of products, including machinery, vehicles, pressure vessels, medical devices, consumer products, building materials, and communications equipment. He conducts construction defect investigations of plumbing and heating, ventilating, and air conditioning installations. His specific areas of interest are fatigue, fracture and corrosion of various materials, including metals, plastics, and fiber composites.

Mr. Duffner conducts failure analysis investigations and accident reconstructions. He determines product failure modes, whether related to design, manufacturing, or service. He performs environmental, structural, and/or mechanical tests in conjunction with computer-based analyses, such as finite element modeling, to determine the cause of failure. Much of Mr. Duffner's experience is with the design and development of customized experiments involving experimental stress analysis and modal (vibration) analysis.

Prior to forming Duffner Engineering, Mr. Duffner was a founder and owner of Principia Engineering Services, Managing Engineer at Exponent, Inc. (formerly Failure Analysis Associates), and a cooperative education student at the Space Systems Division of the Lockheed Missiles and Space Company, now Lockheed Martin Company.

Education and Credentials

M.S., Mechanical Engineering, Stanford University, 1998
B.S., Mechanical Engineering, University of California, Los Angeles, 1985

Registered Professional Mechanical Engineer, California #M27229

Awards

The Rental Equipment Register Innovative Product Award Material Handling Category Winner 2008, Super Jawz Grabbing Tool

The James F. Lincoln Arc Welding Foundation Merit Award for the Advancement of Arc Welded Design, Engineering, and Fabrication, 1999

Chancellor's Scholarship, University of California, Los Angeles, 1980

Operating Engineers' Scholarship, 1980

Memberships and Affiliations

American Society of Mechanical Engineers
Society of Automotive Engineers
American Society for Composites
Society for the Advancement of Material and Process Engineering
ASM International
American Society for Testing and Materials - Committee C27 on Precast Concrete Products
National Fire Protection Association
Institute of Electrical and Electronics Engineers
Society for Experimental Mechanics

Continuing Education

"How to Perform Elevator Inspections Using ASME A17.2, Guide for Inspection of Elevators, Escalators, and Moving Walks," ASME Continuing Education Institute, 2007, 2.25 CEU, 24 hours.

Publications

"Lake Mead Low Lift Pump Riser Failure Analysis," Proceedings of the IMAC-XXVIII Conference on Structural Dynamics, Society for Experimental Mechanics, February 1-4 2010, Jacksonville, Florida.

"Ball Mill Maintenance," International Cement Review, Tradeship Publications Ltd., Surrey, United Kingdom, May 2008 (with D. Grewal)

"Torsion Fatigue Failure of Bus Drive Shafts," Journal of Failure Analysis and Prevention, ASM International, Materials Park, Ohio, December 2006.

"Evaporator Tube Results in Ammonia Leak," The Air Conditioning, Heating, and Refrigeration News, Business News Publishing Company, Troy, Michigan, January 23, 2006.

"Remediation of High Vibration Levels in a Large-Scale Induced Draft Fan Installation," Concrete Monthly, Vol. 3, No. 7, Publications and Communications, Inc., Austin, Texas, July 2005 (with S. Hopkins and A. Strong).

"Air Conditioner Failure Investigation – Intergranular Cracking in a Pure Copper Condenser Tube," Journal of Failure Analysis and Prevention, ASM International, Materials Park, Ohio, February 2005.

"Digester Dome Collapse at the Spokane Advanced Wastewater Treatment Plant," www.spokanecity.org/services/documents, Spokane, Washington, December 2004 (with P. Moncarz et al.).

"Case Study: When a Firefighter's Filament-Wound SCBA Explodes," Composites Fabrication, Composites Fabricators Association, Arlington, Virginia, September 2003 (with R. Frankle).

"Case Study: Tests Tell Story of Fan's Vibrations," Facilities Engineering Journal, Association for Facilities Engineering, Cincinnati, Ohio, July/August 2003 (with S. Hopkins)

"Strength Reduction in Screw Fasteners Resulting From Outdoor Exposure," Practical Failure Analysis, ASM International, Materials Park, Ohio, June 2003 (with B. Pound et al.).

"A Heat Pump Failure Investigation," The Air Conditioning, Heating, and Refrigeration News, Business News Publishing Company, Troy, Michigan, May 19, 2003.

"Component Damage From Printed Circuit Board Loading," Proceedings, IPC Printed Circuits Expo 2002, IPC, Long Beach, California, March, 2002 (with A. Wagner et al.).

"Long-Term Strain-Corrosion Behavior in RPM Sewer Pipes," 14th Symposium on Composite Materials: Testing and Design, American Society for Testing and Materials (ASTM), ASTM STP 1436, Pittsburgh, Pennsylvania, March, 2002 (with S. Hopkins).

"Composite Pressure Vessel Design Optimization," Advancing Affordable Materials Technology, International Society for the Advancement of Material and Process Engineering (SAMPE) Technical Conference Series, Volume 33, November 2001 (with B. McGoran).

"The Case of the Recurring Condenser Leak," The Air Conditioning, Heating, and Refrigeration News, Business News Publishing Company, Troy, Michigan, January 29, 2001.

"Mechanical Properties of Aged RPM Piping," Proceedings, Advanced Composites '93, International Conference on Advanced Composite Materials, The Minerals, Metals and Materials Society, Wollongong, Australia, February 1993 (with S. Hopkins et al.).

"Strain Corrosion Cracking in RPM Sewer Piping," Proceedings Advanced Composites '93, International Conference on Advanced Composite Materials, The Minerals, Metals and Materials Society, Wollongong, Australia, February 1993 (with S. Hopkins et al.).

Presentations

"Residual Stress in Weld Clad Pipe," 2004 Society for Experimental Mechanics, SEM X International Congress and Exposition on Experimental and Applied Mechanics, Costa Mesa, California, June 7–10, 2004 (with Y. Potdar).

"Implementing the Maintenance Excellence Program—Failure Analysis Investigations," Vezer's Precision Industrial Constructors of California, Inc. 9th Annual Summer Conference, Training Seminar, Claremont, California, August, 2002 (with S. Hopkins).

"Personal Medical Instruments," Stanford Design Experience, Mechanical Engineering Department, Stanford University, Stanford, California, June, 1998 (with R. Lathrop et al.).

Invited Lectures

"Design Objectives of Orthopedic Prostheses; Fatigue," Orthopedic Biomechanics, ME C176, BIOE C119, University of California, Berkeley Departments of Mechanical Engineering and Bioengineering, November 2, 2006