Exponent®
Engineering & Scientific Consulting

Abid Kemal, Ph.D., CFEI, CVFI

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Professional Profile

Dr. Kemal specializes in analyzing thermal failures involving infrastructure, consumer and commercial products, industrial equipment and processes. His responsibilities include the analysis and investigation of fires, explosions, and detonations in industrial, commercial, residential, medical, transportation, and wildland sectors.

Dr. Kemal also provides design support for products and processes aimed at improving thermal performance for safety, efficiency and reliability. He has led numerous large-loss complex failure and product recall investigations to determine the root cause of failures and has helped develop applicable fixes and risk assessments. In performing his duties, Dr. Kemal carries out work related to combustion, thermodynamics, gas dynamics, macro- and micro-scale heat transfer, feedback control of complex dynamic plants and micromachining. He studies air-breathing propulsion systems and stationary gas turbines and has experience in applying advanced control techniques to optimize the performance of such plants. He has designed and built a CMOS-compatible micromachined sensor for the measurement of pollutant emissions in combustion exhausts. Dr. Kemal also maintains an interest in international environmental law and policy and authored the first ever draft of fire laws for the government of Pakistan.

Prior to joining Exponent, Dr. Kemal was a Research Assistant in the High Temperature Gas Dynamics Laboratory at Stanford University. As part of his graduate work, he taught numerous classes on thermodynamics, gas dynamics, and combustion, at both graduate and undergraduate levels. He performed independent peer reviews of research proposals and of publications in the Combustion Institute's journal Combustion and Flame. He also worked as an independent consultant for Alzeta Corporation and for NASA Ames. Before joining Stanford, he worked in Pakistan as a Programmer and Operator of CNC machines (Spinning Machinery Company, Lahore); as a Management Trainee (ICI Soda Ash Plant, Khewra); and as a Production Engineer (Career Telephone Industries, Islamabad, a subsidiary of Siemens AG).

Dr. Kemal holds an appointment as an Adjunct Professor / Lecturer in the School of Engineering at Stanford University where he teaches the course Techniques of Failure Analysis during the spring quarter.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, Stanford University, 1998

M.S., Mechanical Engineering, Stanford University, 1994

B.Sc., Mechanical Engineering, University of Engineering and Tech, Peshawar, 1989

The Centennial Teaching Award, Stanford University, 1995-1996

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Government of Pakistan's Scholarship for Doctoral Studies Abroad, 1992-1994

President of Pakistan's Award for Academic Excellence, 1989

Valedictorian and Gold Medal Recipient, Engineering University, Peshawar, 1989

University Divisional Scholarship, 1984-1989

Licenses and Certifications

40-Hour Hazardous Waste Operation and Emergency Response Certification (HAZWOPER)

Certified Fire and Explosion Investigator (CFEI)

Certified Vehicle Fire Investigator (CVFI)

Fire Investigation: Techniques of Fire Investigation (1B), California State Fire Marshall (CA)

Fire Investigation 1A (Cause and Origin), California Office of State Fire Marshal (CA)

Academic Appointments

Adjunct Professor / Lecturer, Department of Aeronautics and Astronautics, Stanford University

Instructor, California Conference of Arson Investigators

Instructor, Alameda County DA's Arson Task Force

Teaching Assistant, Stanford University, School of Engineering

Prior Experience

Independent Thermosciences Consultant, 1999-2002

Research Assistant, High Temperature Gas Dynamics Laboratory, Stanford University, 1993-1998

Teaching Assistant, Thermosciences Division, Stanford University, 1996-1998

Production Engineer, Career Telephone Industries, Islamabad, Pakistan (subsidiary of Siemens, AG), 1989-1991

Management Trainee, ICI Soda Ash Plant, Khewra, Pakistan, 1990

Programmer and Operator of CNC machines, Spinning Machinery Company, Lahore, Pakistan, 1988

Professional Affiliations

The Combustion Institute (member)

American Society of Mechanical Engineers (member)

Pakistan Engineering Council (member)

National Fire Protection Association (member)

Technical Committee on Motion Picture and Television Industry (member)

Languages

Punjabi

Urdu

Publications

Barrera C, Hosseini K, Kemal A. Transient reservoir conditions and leak flow rate for a choked orifice: Basic Principles, Estimation and Applications. Proceedings, 7th Global Congress on Process Safety, Chicago, IL, March 13-16, 2011. American Institute of Chemical Engineers ISBN 978-0-8169-1067-10.

Barrera C, Kemal A. Condensation induced water hammer: Principles and consequences. Proceedings, 6th Global Congress on Process Safety, San Antonio, TX March 21-25, 2010. American Institute of Chemical Engineers ISBN 978-0-8169-1064-9.

Kemal A, Mattison D, Murray S, Loose M. Degradation and ignition of polyvinyl chloride wire insulation. Proceeding, Fire and Materials, San Francisco, CA, 2007.

McGoran B, Ross B, Nunes S, Buehler C, Reza A, Kemal A, Fessler, J, Belanger J, Arnold D. Evaluation of a chemical plant explosion and lessons learned. Proceedings, Safety and Reliability, Annual Meeting of the Chinese Mechanical Engineering Society and 1st Annual Meeting of the Chinese Academy of Engineering, Mechanics and Transportation Engineering Division, pp. 252-257, 2006.

Reza A, Kemal A, Markey E. Runaway reactions in the aluminum, aluminum chloride, HCl and steam system: An Investigation of the 1998 Condea Vista Explosion in Baltimore, Maryland. AIChE Loss Prevention Symposium, New Orleans, LA, November 2001.

Kemal A. Adaptive control and its applications to combustion systems. 26th International Nathiagali Summer College, Nathiagali, 2001.

Kemal A. Active real-time control of air-breathing combustors. Ph.D. Thesis, Stanford University, July 1998.

Kemal A, Bowman CT. Real-time adaptive feedback control of combustion instability. 26th Symposium International on Combustion, The Combustion Institute, Pittsburgh, PA, August 1996.

Kemal A, Pinnillia M. Feedback control of an adaptive treadmill. Consulting Report for NASA Ames, Mountain View, CA, August 1997.

Conference Proceedings and Presentations

Owens Z, Gilman L, Dunne R, Kemal A. Evaluation of breathable enclosures for thermal management of outdoor electronics. The Intersociety Conference on Thermal and Thermomechanical Phenomenon in Electronic Systems (ITherm) 2017.

Simeoni A, Owens Z, Christiansen E, Kemal A. A study of wildland fire direction indicator reliability following two experimental fires, International Symposium on Fire Investigation Science & Technology, Scottsdale, AZ, September, 2016.

Owens Z, Gilman L, Rosen J, Kemal A. Investigation of variables affecting electrical arcing with applications in wildland fire investigations, 2015 Wildland Fire Litigation Conference, Monterey, CA, May 2015.

Barrera C, Kemal A. InP and phosphorous allotropes: Safety lessons from their processing and mishandling in semiconductor facilities. Presentation at the SESHA 36th Annual International High Technology ESH Symposium, Scottsdale, AZ, May 6-8, 2014.

Barrera C, Kemal A. Root-causes and causal-factors: Effective incident investigation closure. Proceedings, 10th Global Congress on Process Safety, New Orleans, LA, March 30-April 2, 2014.

Barrera C, Kemal A. The hidden risks of deposits, by-products, and residues on exhaust and waste streams. Poster at the 9th Global Congress on Process Safety, San Antonio, TX, April 28-May 1, 2013.

Barrera C, Kemal A. The hidden risks of deposits, by-products, and residues on exhaust and waste systems. Poster, 9th Global Congress on Process Safety, San Antonio, TX, 2013.

Kemal A, Mattison D, Murray S, Loose M. Degradation and ignition of polyvinyl chloride wire insulation. Proceedings, Fire and Materials 2007, San Francisco, CA, 2007.

Belanger B, Kemal A. Computer modeling of fires for use in litigation settings. Las Vegas, NV, February 2006.

Kemal A, MacDonald M, Hebert J, Kytömaa HK. Explosion hazards due to delayed ignition in gas turbines. Electric Power Conference, Baltimore, MD, March 2004.

Kemal A, Dorn J, Bowman CT. Control of nitrogen oxide emissions from air-breathing combustors using partial premixing of fuel and air. The Combustion Institute, Western States Section, Fall Meeting, Diamond Bar, CA, October 1997.

Kemal A, Bowman CT. Active adaptive control of combustion. The Combustion Institute, Joint Technical Meeting, San Antonio, TX, September 1995.

Kemal A, Bowman CT. Active adaptive control of combustion. 4th IEEE Conference on Control Applications, Albany, NY, April 1995.

Invited Lectures

Kemal A. Electric Vehicles – The Wave of the Future. Invited Seminar, California Conference of Arson Investigators, San Luis Obispo, February 2022.

Kemal A. Scientific investigations of accidental explosions. Invited Lecture, Department of Aeronautics and Astronautics, Stanford University, April 2009, April 2010, April 2012, April 2013, April 2014 and April 2015.

Kemal A. Fire and explosions—Analysis and investigative techniques. Invited Lecture, Department of Aeronautics and Astronautics, Stanford University, April 2005, April 2006, April 2007 and April 2008.

Peer Reviews

Combustion and Flame, IEEE Transactions on Components and Packaging