ENGINEER: MECHANICAL, METALLURGICAL

TIM A. JUR, Ph.D., P.E.
Engineering Design & Testing Corp.
Post Office Box 8027
Columbia, South Carolina 29202
tajur@edtengineers.com

EDUCATION

1973	Ph.D. (Mechanical Engineering), The University of Michigan, Ann Arbor, Michigan.
1968	M.S.E. (Mechanical), The University of Michigan-Dearborn, Dearborn, Michigan.
1966 to 1968	Participant, Chrysler Institute of Engineering Program in Automotive Engineering, Chrysler Corporation, Highland Park, Michigan.
1970	M.B.A., University of Detroit, Detroit, Michigan.
1966	B.S.M.E., Indiana Institute of Technology, Fort Wayne, Indiana.

EXPERIENCE: ENGINEERING INSTRUCTION

From 1968 through 1981 worked as a part of the engineering faculty for various universities. Responsible for course material projects and laboratory management in the areas of Mechanical Design, Materials, Metallurgy, Manufacturing, Mechanics and Lubrication at one or more of the following institutions:

1968 to 1972	**The University of Michigan-Dearborn, Dearborn, Michigan, Teaching Fellow**.
1972 to 1973	**Ohio University, Athens, Ohio, Assistant Professor**.
1974 to 1978	**The University of South Carolina, Columbia, South Carolina**, **Assistant Professor**.
1978 to 1981	**The University of South Carolina, Columbia, South Carolina**, **Associate Professor**.
1982 to 1983	On academic leave from the University of South Carolina.

1983 to 1984	**University of South Carolina, Columbia, South Carolina**, **Adjunct Professor.**
1983 to 1986	**Benedict College, Columbia, South Carolina** Consultant to MISIP grant at the College funded through the U.S. Department of Education.

EXPERIENCE: ENGINEERING PRACTICE

1966 to 1968	**Chrysler Corporation, Central Engineering, Highland Park Michigan**. Participant in program known as Chrysler Institute of Engineering.
1972	**Massey-Ferguson Advanced Product Engineering, Livonia, Michigan**. Detailing and design of prototype tractor parts.
Summer, 1974	**Square-D Corporation, Columbia, South Carolina**. Design of cooling and packaging for product line of solid-state motor controls.
Summer, 1975	**Savannah River Laboratory, Aiken, South Carolina**. Research activity pertaining to fracture of structural steel.
	Engineering Design & Testing Corp., Cayce, South Carolina. Founder. Specialized consulting in the areas of Machine Design, Failure Analysis, Metallurgy, Materials Selection, Materials and Component Testing. Supervision of materials testing and metallurgical laboratory facility. Clients include industrial design and manufacturing facilities, attorneys, insurance companies and adjustors.
1979 thru 2013	President and Chief Engineer
2014 thru March 2018	President and Chief Engineer Emeritus Manager – Southeast Region Engineer – Columbia, South Carolina District Office
March 2018 to Present	President and Chief Engineer Emeritus Engineer – Columbia, South Carolina District Office

PROFESSIONAL AND HONORARY SOCIETIES AND SOCIETAL ACTIVITIES

Tau Beta Pi
Pi Tau Sigma
Omicron Delta Kappa
American Society of Mechanical Engineers
ASM International
    Editorial Review Board 2008-2018
Journal of Failure Analysis and Prevention
Failure Analysis Society
    Board Member 2017-2018
National Safety Council
Association for Iron & Steel Technology
South Carolina Academy of Science
    Council Member 2009-2011

INDUSTRIAL CONSULTING ACTIVITY

Since 1975 have consulted with numerous industrial clients on various matters including design, materials selections manufacturing, failure analysis, scope of damage, and repairs. A representative list of client industries is as follows:

Heavy Equipment
Textile Machinery
Fabricated Metal Products
Mining Equipment
Utilities – Steam Generation and Steam and Gas Turbines
Paper-Making Machinery
Automotive Products
Fibers Manufacturing
Lift Equipment/Rigging
Steel Mills
Ore and Metals Processing
Chemical Processing
Wood Products Manufacturing

REGISTRATIONS/CERTIFICATIONS

Registered Professional Engineer in South Carolina, Kentucky, California, and New York

The National Council of Engineering Examiners, Certificate Number: 8161
The National Council of Engineering Examiners, International Registry, Certificate No.: IR156
South Carolina Notary Public

INDUSTRIAL CONTRACTS

The following industrial activity was conducted through the University of South Carolina, Center for Industrial Research:

"Investigation of Cross-Tie Plugging Materials," Canron Railgroup, Columbia, South Carolina, 1977, co-investigator.

"Investigation of V-Groove Tool Failures," B. F. Goodrich Company, Columbia, South Carolina, 1979, principal investigator.

"Technical Investigation Relative to Fiber Production," Carolina Eastman Company, Columbia, South Carolina, 1981, co-principal investigator.

THESIS SUPERVISION

"Application of the J-Integral as a Fracture Criterion for the Precipitation Hardenable A-286 Alloy," James G. Angelos, M. S. Thesis, University of South Carolina, College of Engineering, 1975.

"Prediction of Fatigue Life of Notched Members with Biaxial States of Stress," Hwa Lu, M.S. Thesis, University of South Carolina, College of Engineering, 1980.

"Investigation of Strain-Based Fatigue Characteristics of 4340 Steel as a Function of Temper Condition," Rae Woong Chang, M. S. Thesis, University of South Carolina, College of Engineering, 1982.

"Strain Amplitude Approach to the Fatigue Failure Prediction of Beams," David Traxler, M. S. Thesis, University of South Carolina, College of Engineering, 1983.

STUDENT PROJECT SUPERVISION

"Workstation for the Visually Impaired," Ali Lahlou, Amanda Linen and Barry Masters, Senior Design Project, University of South Carolina, College of Engineering, 1997.

GOVERNMENT GRANTS & CONTRACTS

"Study of Advanced Professional Educational Requirements Relative to Nuclear Fuel Cycle Engineering in Industry and Government," U.S. Dept. of Energy, 1977, principal investigator, University of South Carolina.

"Design Activity in Support of Investigations into an Underwater Non-Destructive Testing Method for Diver Application," Dept. of the Navy Coastal Systems Center, 1979, co-principal investigator, University of South Carolina.

RECENT INVITED LECTURES, TUTORIALS AND PRESENTATIONS

"A Critical Review of Materials Selected for High Integrity Containers," presented at the Waste Management Conference in Tucson, Arizona, with W. M. Poplin, February 1986.

"A Hybrid High Integrity Container for Disposal of Low-Level Radioactive Wastes," presented at the Waste Management Conference in Tucson, Arizona, March 1987, with S. B. McCoy and W. M. Poplin.

"A Study of Metal Deformation and How the Wreckage of Container Cranes Following a Hurricane Was Reconstructed," with R. L. Windham; presented at the Materials Science & Technology Conference in Houston, Texas, October 2010.

"A Study of a Separation of a Bolted Drive Shaft Coupling," with R. L. Windham; presented at the Materials Science & Technology Conference in Columbus, Ohio, October 2011.

"Wöhler Fatigue Analysis of Railcar Axels," with B. Barrett; presented at the Materials Science & Technology Conference in Pittsburg, Pennsylvania, October 2014.

"Fracture of a Surgical Instrument and the Resulting Crisis during a Spinal Operation," presented at the Materials Science & Technology Conference in Pittsburg, Pennsylvania, October 2014.

"Analysis of Tube Plugging and Wastage in a Cupola Off-Gas Recuperator," with T. D. Traubert; presented at the Materials Science & Technology Conference in Pittsburgh, Pennsylvania, October 2014.

"An Analysis of a Fractured Exercise Machine Handlebar Assembly," presented at the Materials Science & Technology Conference in Columbus, Ohio, October 2015.

"Fracture at a Welded Connection on Pressure Vessel," presented at the Materials Science & Technology Conference in Columbus, Ohio, October 2015.

"Fracture of an Office Desk Chair and Effective Design Alternatives," presented at the Materials Science & Technology Conference in Columbus, Ohio, October 2015.

"Corrosion Assisted Cracking," presented at the Materials Science & Technology Conference in Columbus, Ohio, October 2015.

"Analysis of a Rear Axle Assembly on an Open Class Dragster," presented at the Materials Science & Technology Conference in Salt Lake City, Utah, October 2016.

"Graphitic Corrosion and the Spectre of Disintegrating Aged Water Pipe Systems," presented at the Materials Science & Technology Conference in Salt Lake City, Utah, October 2016.

"Working with Experts and Technology in Litigation," with J. I. Middleton, Jr.; tutorial conducted at the invitation of the South Carolina Bar Association in Columbia, South Carolina, November 2016.

"Analysis of Corrosion Damage to a Zinc Die-Cast Plumbing Fitting," with R. T. Edwards and R. L. Windham; presented at the Materials Science & Technology Conference in Pittsburg, Pennsylvania, October 2017.

"A Procedure for Analysis of Combustion Products," with Burak Akyuz; presented at the Materials Science & Technology Conference in Columbus, Ohio, October 2018.

"Weld Related Residual Stress in the Extreme," presented at the Materials Science & Technology Conference in Columbus, Ohio, October 2018.

PATENTS

United States Patent 4,295,259, "Method of Filling Spike Holes in Railway Ties," October 20, 1981, with C. A. Rhodes and D. A. Keating.

PUBLICATIONS

"Flow Stress of Copper and Copper-Zinc Alloys at Intermediate Temperatures," Ph.D. Thesis, The University of Michigan, 1973.

"Diameter Gauge for Use at Elevated Temperatures and Intermediate Tensile Strain Rates," ASME Trans. - Journal of Engineering Materials and Technology, Vol. 96H, 1974, pg. 195 (Paper No. 74-Mat-R).

"Using the Contour Line Method of Representing Failure Criteria as a Design Aid," ASME Paper No. 76-DET-75, Design Engineering Technical Conference, Montreal, 1976.

"Course Correlated Laboratory Program," with L. M. Connor, Event No. 1651, ASEE Annual Conference in Grand Forks, North Dakota, 1977.

"Microscopic Techniques in the Analysis of Mechanical Failures," Journal of Products Liability, Vol. 1, 1977, pg. 265.

"A Visual Aid for Instruction in Orthographic Projection," Engineering Design Graphics Journal, Vol. 42, Winter, 1978, pg. 9.

"Investigation of Cross-Tie Plugging Materials," University of South Carolina Center for Industrial Research, with C. A. Rhodes and D. A. Keating, CIR-78-1, 1978 (for Tamper Corporation).

"Study of Advanced Professional Education Requirements Relative to Nuclear Fuel Cycle Engineering in Industry and Government," with others, Final report under DOE contract EY-76-5-09-0947, 1978.

"An Approach to Using Case Studies in the Instructional Mode," Proceedings, National Conference on Case Studies, College of Engineering, University of South Carolina, 1979, edited with J. M. Biedenbach and L. P. Grayson.
"International Team Teaching," Proceedings, 1979 ASEE Annual Conference, with G. Kardos, pg. 245.

"Design Engineering Education, A Special Kind of Job with Special Kinds of Problems," Proceedings, 1979 ASEE Annual Conference, pg. 294.

"Advanced Professional Education Requirements of Engineers in the Nuclear Industry," Proceedings, Ninth Annual Frontiers in Education Conference, 1979, pg. 309.

"Innovation, Technological Leadership and the Advanced Professional Education of Engineers," ASME Paper No. 79-WA/Mgt-10, with D. A. Keating, J. M. Biedenbach and J. D. Waugh, 1979.

"Investigation of the Failure of a Large Gearset," ASME Paper No. 80-WA/DE-15, 1980 ASME Winter Annual Meeting, with W. B. Dobbins.

"Engineering, the Law and Design Education," Engineering Education, Vol. 71, 1981, pg. 379, with L. C. Peters, T. F. Talbot, A. S. Weinstein and R. M. Wolosewicz.

"A Variation in Project-Based Engineering Design Education - Exchanging Student Reports Between Schools," Proceedings, Eleventh Annual Frontiers in Education Conference, 1981.

"Analytical Model for Clamping Load," University of South Carolina Center for Industrial Research, CIR-81-15C, 1981 (for Carolina Eastman Company).

"Failure Analysis of a Rotating Stub Shaft," ASME Paper No. 81-WA/DE-8, 1981 ASME Winter Annual Meeting, with B. Busch.

"Study of Static Sealing," University of South Carolina Center for Industrial Research, CIR-82-1, 1982 (for Carolina Eastman Company).

"Corrosion Assisted Cracking — Another Type of Time Dependent Failure Mechanism," ASME Paper No. 83-WA/DE-21, 1983 ASME Winter Annual Meeting.

"Analysis of a Failed Gear Tooth on a Cast Iron Gear," ASME Paper No. 84- WA/DE-23, 1984 ASME Winter Annual Meeting.

"How to Design Manufacture and Install an Unsafe Blower System," engineering case study submitted and published by the ASEE Case Committee, prepared under sponsorship of the National Institute for Occupational Safety and Health, with R. K. Taylor, January 1986.

"Case Studies in Corrosion Assisted Cracking," ASME Trans. - Journal of Vibration, Acoustics, Stress, and Reliability in Design, Vol. 108, 1986, pg. 469.

"Failure Analysis of a Plastic Boat Seat," ASME Paper No. 87-DE-8, presented at the National Design Engineering Conference in Chicago, Illinois, March 1987, with F. Furno, K. M. Suggs and W. M. Poplin.

"Methods of Analysis of Fractured Plastic Parts," SME Paper No. EM91-239, presented at the Society of Manufacturing Engineers Conference on Practical Plastic Product Design in Detroit, Michigan, February 1991, with W. M. Poplin.

"Fracture of Drum Shaft Due to Fretting Fatigue," ASME Paper No. 93-WA/DE-9, 1993 ASME Winter Annual Meeting, with B. R. Durig.

"Failure Analysis of a Large Dryer Shaft," ASME Paper No. 93-WA/DE-12, 1993 ASME Winter Annual Meeting, with R. D. Harris.

"Analysis of Cracking in the Journal-to-Hub Connection of a Large Hollow Roll," ASME Paper No. 96-WA/DE-10, 1996 ASME International Mechanical Engineering Congress & Exhibition, with J. A. Rylatt.

"Cracking and Subsequent Leak in Brass Plumbing Fitting by a Mechanism of Dezincification," ASME Paper No. 98-WA/DE-12, 1998 ASME International Mechanical Engineering Congress & Exhibition.

"A Fracture of a Material from the Past," ASME Paper No. 2000-IMECE/DE-17, 2000 ASME International Mechanical Engineering Congress & Exhibition, with D. L. Hanks and R. L. Windham.

"Biologically Induced Corrosion and Consequent Fracture of a Pump Shaft Coupling," published in August 2003 Issue of Practical Failure Analysis, Volume 3.

"Consumer Products Fires ─ Root Cause Verification as a Means for Recovery," published in Winter 2005 Issue of Subrogator Magazine, with R. L. Young, Jr.

"Failure Fracture of an Inertia Welded Drill Pipe," with R. P. Allwin; presented at the Materials Science & Technology Conference in Detroit, Michigan, September 2007.

"An Inadequate Weld Repair and Consequent Rupture of a Pressure Vessel," published in October 2007 Issue of Journal of Failure Analysis and Prevention, Volume 7, with K. T. Minden; presented at the Materials Science & Technology Conference in Detroit, Michigan, September 2007.

"Use of Metallurgical Analysis to Pinpoint a Brake Problem and the Cause of a Bus Fire," published in February 2008 Issue of Journal of Failure Analysis and Prevention, Volume 8, with R. A. Hargis; presented at the Materials Science & Technology Conference in Detroit, Michigan, September 2007.

"Classical Fatigue Design Techniques as a Failure Analysis Tool," published in February 2009 Issue of Journal of Failure Analysis and Prevention, Volume 9, with R. D. Harris; presented at the Materials Science & Technology Conference in Pittsburgh, Pennsylvania, October 2008. *This paper was presented the Journal of Failure Analysis and Prevention, 2009 Best Paper Award.*

"Stress Analysis and the Cause of the Fracture of a Clevis at the End of a Hydraulic Piston Rod," published in December 2009 Issue of Journal of Failure Analysis and Prevention, Volume 9, with R. L. Windham; presented at the Materials Science & Technology Conference in Pittsburgh, Pennsylvania, October 2009.

"Knowledge and Use of Heat Treating Procedures to Analyze the Cause of a Pair of Aluminum Piston Fractures," published in February 2010 Issue of Journal of Failure Analysis and Prevention, Volume 10; with T. D. Traubert; presented at the Materials Science & Technology Conference in Pittsburgh, Pennsylvania, October 2009.

"Metallurgical Analysis to Evaluate Cracking in a 316L Grade Stainless Steel Spiral Heat Exchanger," published in April 2012 Issue of Journal of Failure Analysis and Prevention, Volume 12, with T. D. Traubert; presented at the Materials Science & Technology Conference in Columbus, Ohio, October 2011.

"Use of Mechanical and Metallurgical Analysis to Evaluate Cause of Fractures in a Cast 310 Stainless Steel Pintle Chain," with T. D. Traubert, Journal of Failure Analysis & Prevention, Volume 12, Issue 3, June 2012; presented at the Materials Science & Technology Conference in Columbus, Ohio, October 2011.

"Failure Analysis of a Large Spincaster (and Why a Fracture is not an Explosion)," published in the Journal of Failure Analysis & Prevention, Volume 13, Issue 1, February 2013.

"Fracture of a Paper Manufacturing Machine Felt Guide Roll," with R. D. Harris, Journal of Failure Analysis & Prevention, Volume 14, Issue 4, August 2014.

"Engineering Analysis of Failure: A Determination of Cause Method," with M. D. Russell, Journal of Failure Analysis & Prevention, Volume 17, Issue 1, February 2017; presented at the Materials Science & Technology Conference in Pittsburg, Pennsylvania, October 2017.

"Case Studies in Graphitic Corrosion of Cast Iron Pipe," Journal of Failure Analysis & Prevention, Volume 21, Number 2, pp. 376-386, with James I. Middleton, Jr., Anthony A. Yurko III, Ronald L. Windham, James R. Grey, Jr., January 2021.

Selected as 2021 Journal of Failure Analysis & Prevention "Editor's Choice Article."