

**Michael R. Mitchell, PhD**

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**EMPLOYMENT SUMMARY**

*Northern Arizona University  
Flagstaff, AZ*

*Adjunct Prof. in Mechanical Engineering Dept., 2005 – present. Courses in Machine Design and Material Science, junior/senior project advisor.*

*Mechanics & Materials Consulting  
Flagstaff, AZ*

*Consultant, 2005 – present. President of LLC consulting firm specializing in fatigue and fracture of materials, fatigue lifetime predictive techniques, materials compatibility/selection, design optimization, cast materials, failure analysis, etc. Major client NDC, Inc. (Nitinol Devices and Components) fatigue and fracture research involving constitutive modeling and fatigue life predictive techniques for Nitinol shape memory alloy.*

*W. L. Gore & Associates,  
Flagstaff, AZ*

*Sr. Research Associate, 2002-2005. Basic research on microstructure/property relationships in nitinol, process development for magnetic levitation manufacturing of ultrapure nitinol, fatigue analysis and development of SkyFlex™ gasket materials for aircraft fuel containment in AirBus A380, failure analyses of self-expanding nitinol stents, implementation of fluidized bed heat treatment facilities, production related problem solving and alternative weld processes for production equipment.*

*Rockwell International Science Center  
Thousand Oaks, CA*

*Sr. Research Scientist, 1977 to 2002. Performed basic and applied research for a variety of programs with funding from Corporate, Intra-company and Government sources. Worked closely with Rocketdyne Div. (presently P&W) and Automotive Div. (presently Arvin-Meritor) as program manager and principle investigator for such programs as: strain-based cumulative damage techniques for advanced propulsion systems, developed test methodologies for cryogenic (LHe and LN<sub>2</sub>) and high temperature (~3000°C) research of advanced material systems, anticlastic behavior of Al-Li alloys, shear strain-based damage analyses for titanium alloys, permeability of graphite epoxy composite and CMC's to gaseous hydrogen at high pressures (25MPa), high frequency (300 Hz) fatigue of Al-Li, gamma TiAl and P&W 1484, narrow-band spectrum fatigue of vertical axis wind turbine blades, ion implantations for improved bearing corrosion/fatigue resistance, fatigue enhancement of gears for heavy vehicles using high carbon induction hardened bainitic microstructures, direct metal fabrication/rapid prototyping of engineering structures, developed test methodology/design program for fatigue/corrosion of steel cables in window regulators, modification of case microstructures with ultrasonic agitation, failure analysis of C-17 landing gear, failure analysis of "Rocketcar" at Disneyland, failure analysis of C-130 ammunition storage/handling system, failure analysis of hydrogen vent LVDT for Space Shuttle Discovery, litigation team member – NYCTA (New York City Transit Authority) lawsuit on subway truck failures – after 25 years there's much more, but space is limited.*

*Manager, Physical Metallurgy Department, 5 years. Manager of 14 professional staff members with diverse backgrounds in alloy development, process*

## **EMPLOYMENT SUMMARY, cont.**

metallurgy, diffusion bonding, superplasticity, mechanics of materials, explosive consolidation, friction stir welding, hydrogen diffusion and permeability, etc.

Organized and managed several Corporate Short Courses on Fatigue of Materials and part-time evening instructor at Moorpark Community College, Moorpark, CA from 1988-2001. Courses in Statics & Mechanics of Materials, and Material Science.

*University of Illinois  
Champaign-Urbana, IL*

*Assistant Professor in Theoretical and Applied Mechanics Department. 1976-1977. Worked closely with Prof. R. Mehrabian (present CEO Teledyne) in Metallurgy Department on rheocasting of materials/design of powder metal RSR equipment.*

*Graduate Student/Research Assistant, 1971-1976. While pursuing PhD employed as teaching assistant and research assistant (thesis advisor; Prof. JoDean Morrow) on Fracture Control Program (consortium of 10 Industrial Sponsors). Teaching duties: Statics, Dynamics, Mechanics of Materials and Material Science. Received both TAM Departmental (J.O. Smith, '74) and first Campus-wide teaching award ('75). Research duties: Fatigue behavior of cast and wrought ferrous-based metals. Received Sigma Phi Award for Best Thesis Presentation ('76) and Arch T. Colwell Award ('74) – Society of Automotive Engineers (SAE) for cast metals research. Performed failure analysis on consulting basis for John Deere & Co., contract research for Owens-Corning on urethane filled hex-celled, Kraft paper LNG vessel insulation at cryogenic temperatures.*

*Ford Motor Company, Dearborn, MI*

*Staff Engineer, 1965-1971. Scientific Research Staff: Metallurgy Department: responsible for development of fatigue/fracture laboratory and experiments in basic research of fatigue of materials and influence of stacking fault energies, dislocation structure, alloy composition, microstructures. TEM, SEM, X-ray diffraction, mechanical testing with open-loop and first closed-loop machines (MTS) at facility. Later Staff Research Engineer: basic/applied research on microstructure/property relationships of gray cast iron (5 years).*

*Staff Engineer, 1963-1965. Engine & Foundry: production and racing components for 256 CID DOHC Indy Engine.*

## **EDUCATION**

PhD, Theoretical/Applied Mechanics	1976, University of Illinois, Champaign-Urbana, IL (Prof. JoDean Morrow, thesis advisor)
M.S., Metallurgical Engineering	1969, Wayne State University, Detroit, MI, (Prof. C. Nagler, Thesis Advisor)
B.S., Mechanical Engineering	1963, Lawrence Institute of Technology (with honors), Southfield, MI

## **PROFESSIONAL ORGANIZATIONS**

### **ASTM**

Editor-in-Chief, Journal of Testing and Evaluation, ASTM International, 2005-present  
Chairman, ASTM International Committee E08 Fatigue and Fracture, 2000-2006;

Recipient ASTM Fatigue Achievement Award, 2004; Chairman, Long Range Planning, ASTM E08.93, 1996-2000; Vice Chairman, ASTM E08 Fatigue, 1996-2000; Fellow ASTM, 1998; Chairman ASTM E8.05 Cyclic Deformation and Crack Initiation, 1992-96; Chairman, ASTM E9.08 Fatigue of Materials and Chairman of E9.03 Fatigue of Advanced Materials, 1989-92.

<b>ISO</b>	Secretary ISO TC164 SC5 on Fatigue, 1994-Present.
<b>SAE/United States</b>	Chairman, SAE, Fatigue Design and Evaluation Committee, 1983-89. Chairman, Society of Automotive Engineers, Materials Properties and Processing Analysis, 1979-1983.
<b>SAE/Sao Paulo, Brasil</b>	Organizer for Invited short courses in Fatigue of Materials with Prof's. J. Newman, N.E. Dowling, and A. Conle (2004), with Prof's. T.H. Topper, D.F. Socie, and R.W. Landgraf (2002), with Prof's. T.H Topper and A.J. McEvily (2000).
<b>SMST</b>	President, SMST, (Shape Memory and Superelastic Technologies, Inc.), 2008-present  Vice President, SMST, 2006-2008.  Member, Board of Directors, SMST (Shape Memory and Superelastic Technologies, Inc.), 2005- present

#### **AWARDS:**

- American Society of Metals, Alpha Sigma Mu Award, Outstanding Metallurgy Student, Wayne State University, 1968
- Arch T. Colwell Award, Society of Automotive Engineers, Paper of Outstanding Technical or Professional Merit, 1973
- J.O. Smith Award, Department of Theoretical and Applied Mechanics, University of Illinois, Outstanding Instructor of Undergraduate Courses, 1974
- Campus-Wide Award for Excellence in Undergraduate Teaching, University of Illinois at Champaign-Urbana, 1975
- Sigma Xi Award for Outstanding Graduate Thesis Presentation, University of Illinois, 1976
- Vanadium Award, British Institute of Metallurgy, Materials and Mining, Most Outstanding Paper in the Metallurgy of Vanadium, 1985
- Fellow of ASTM International, 1998
- Award of Appreciation for ISO TC164/SC5 for development of ISO Standard 12106 "Metallic Materials – Fatigue Testing, Axial Strain Controlled Method", 2000
- ASTM International Fatigue Achievement Award, For Outstanding and Sustained Contributions to the Field of Fatigue of Materials, 2004
- ASTM Award of Appreciation for Outstanding Service as Chairman of ASTM Committee E08 on Fatigue and Fracture, 2005
- Alumni of the Year 2008, University of Illinois at Urbana-Champaign, Mechanical Science and Engineering Department.
- Alumni Board Member, University of Illinois at Urbana-Champaign, Mechanical Science and Engineering (MechSE) Department, 2008-present

- **PATENTS:**

#5,945,594 - Method and Apparatus for the Electrochemical Inspection of Galvanized Cable and Method and Apparatus for Predicting the Corrosion Life of Galvanized Cable Undergoing Mechanical Fatigue, with Kendig, M.A. and McKie, A., August 31, 1999

#6,517,773 B1 – Direct Metal Fabrication of Parts with Facial Features Only, with Schroeder, S.A., Feb. 11, 2003.

European Patent Office, Patent Applied for, “Shape Memory Alloy Articles with Improved Fatigue Performance and Methods Therefore”, Filed 29.04.04

**CLEARANCE** Secret (DOD) through 2002.

**PERSONAL REFERENCES:**

(1) Dr. Ravinder Chona, ,  
Senior Scientist, US Air Force Research Laboratory and  
Director, Structural Sciences Center  
Air Vehicles Directorate-AFRL/VASM  
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Known for 25 years, Colleague

(2) Prof. (Emeritus) Ronald W. Landgraf  
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Known for 40+ years, Colleague

(3) Dr. Alan Pelton  
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Known for 6 years, Colleague