JEFFREY C. SUHLING
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EDUCATION

- Ph.D., Engineering Mechanics, University of Wisconsin, 1985
- M.S., Engineering Mechanics, University of Wisconsin, 1981
- B.S., Applied Math and Physics, University of Wisconsin, 1980

EXPERIENCE RECORD

- 2008-Present Department Chair, Mechanical Engineering, Auburn University
- 2002-2008 Director, NSF Center for Advanced Vehicle Electronics (CAVE)
- 2001-Present Quina Distinguished Professor, Mechanical Engineering, Auburn University
- 1990-2000 Associate Professor, Mechanical Engineering, Auburn University
- 1985-1990 Assistant Professor, Mechanical Engineering, Auburn University
- 1980-1985 Graduate Assistant, Engineering Mechanics, University of Wisconsin

PROFESSIONAL INVOLVEMENT

- Member ASME, IEEE, IMAPS, SMTA, TAPPI, SEM, BSSM
- Chairman, TAPPI International Paper Physics Committee, 1999-2001
- Chairman, SEM Electronic Packaging Division, 1999-2003
- General Chairman, 4th Symposium on Experimental/Numerical Mechanics in Electronic Packaging, Orlando, FL, June 5-8, 2000
- Associate Editor, *Experimental Mechanics*, 2002-2005
- Executive Committee Member, ASME Electronic and Photonic Packaging Division, 1998-2003
- Chairman, ASME Electronic and Photonic Packaging Division, 2002-03
- Technical Track Chair: ASME InterPACK ’99 and InterPACK ’05 Conferences
- Program Chair, ASME InterPACK ‘07 Conference, Vancouver, Canada, July 8-12, 2007
- General Chair, ASME InterPACK ‘09 Conference, San Francisco, CA, July 19-23, 2009
- Associate Editor, *Journal of Electronic Packaging*, 2014-Present
- IEEE ECTC Applied Reliability Committee, Member, 2003-Present
- IEEE ECTC Professional Development Course Committee, Co-Chair, 2006-Present
- IEEE EPS Society Board of Governors, Member, 2014-Present
- IEEE EPS Society, Director of Membership Programs, 2016-2018
- IEEE EPS Society, Vice President – Education, 2019-Present
- Program Chair, IEEE ITherm Conference, San Diego, CA, 2018
- General Chair, IEEE ITherm Conference, Las Vegas, NV, 2019

HONORS AND AWARDS

- Birdsong Superior Teaching Award, College of Engineering, Auburn University, 1994
- Best Paper of Conference Award, 1999 International Conference on Multichip Modules and High Density Packaging, IMAPS, Denver, CO, April 1999
- Senior Faculty Research Award, Auburn University College of Engineering, 2001
- Best Paper of Conference Award, IMAPS 2002, Denver, CO, September 2002
- Best Paper of Conference Award, IEEE ECTC 2005, Orlando, FL, June 2005
- Best Poster of Conference Award, ASME InterPACK ’07, Vancouver, BC, September 2007
- Best Paper of Conference Award, 2008 SMTAI, Orlando, FL, August 2008.

- Best Poster of Conference Award, ASME InterPACK '09, San Francisco, CA, July 2009.
- ASME Fellow, 2009.
- ASME Excellence in Mechanics Research Award, For Outstanding Contributions in the Area of Engineering Mechanics Applications to the Field of Electronic Packaging, ASME, 2009.
- Best Paper of Conference Award, IEEE ECTC 2010, Las Vegas, NV, June 2010
- Best Paper of Conference Award, ASME InterPACK 2013, San Francisco, CA, July 2013
- Best Poster of Conference Award, ASME InterPACK 2013, San Francisco, CA, July 2013
- Best Paper of Conference Award, IEEE ECTC 2014, Orlando, FL, June 2010
- Best Poster of Conference Award, ASME InterPACK 2017 San Francisco, CA, Sept 2017
- Best Poster of Conference Award, Mechanics Area, ITherm 2018, San Diego, CA, 2018
- Best Poster of Conference Award, Mechanics Area, ITherm 2019, Las Vegas, NV, 2019

NSF CENTER DIRECTORSHIP

- Co-Founded the Interdisciplinary Center for Advanced Vehicle Electronics (CAVE) at Auburn University in 1998. The Center has been Continuously Funded by NSF and Industry for Over 20 Years Through the Industry-University Cooperative Research Centers (IUCRC) Program.
- Served as Center Director from 2002-2008, and Center Associate Director from 1998-2002. Currently Directing 2 Center Projects while Serving as Department Chair.
- Accomplishments of the Center During Term as Center Director (2002-2008) Include: (1) Expansion of the Center to Involve 6 Departments, 18 Faculty Members, and 40 Graduate Students; (2) Increase in Annual Funding from $1.5M to $3.5M; (3) Increase in Center Membership from 10 Companies to 24; (4) Addition of an Annual SMTA-CAVE Sponsored Harsh Environment Electronics Workshop at the National Level; (5) Increase in Center Publications from 10 per Year to 35 per Year; (6) Addition of an Off-Campus Environmental Testing Laboratory Facility.

MECHANICAL ENGINEERING DEPARTMENT CHAIR

- Served as Department Chair from 2008-Present. Elected to a 5-Year Term in 2008, and Re-elected for a Second 5-Year Term in 2013.
- Accomplishments of the Department During Term as Department Chair (2008-Present) Include: (1) 2.2X Increase in Undergraduate Enrollment to 1348 students (Fall 2019); (2) 1.64X Increase in Graduate Enrollment to 210 students (Fall 2019); (3) 6 Year ABET Accreditations in 2010 and 2016 for both Mechanical Engineering and Materials Engineering Programs; (4) 1.62X Increase in Annual Publication Output from 2008 to 2018; (5) 2.4X Increase in Research Funding to $15.74M in 2018-19; (6) Addition of 15 New Professorships; (7) 100% Increase in Scholarship Support for Undergraduate Students, (8) Design, Construction, and Occupation of a $50M New Mechanical Engineering Building (Wiggins Hall); (9) Development a Successful Annual Alumni Professional Conference (140 attendees); (10) Increase in External Advisory Board size from 8 to 30 Members; and (11) Development of Joint 2+2 Programs with Several Universities in India.
- The ME Department Received the Auburn University Departmental Award for Excellence in Education ("Best Department Award") During 2014.

EDUCATION INTERESTS AND SUMMARY

- WWW Based Instruction
- Courses in Mechanics of Materials, Solid Mechanics, Experimental Mechanics, Inelastic Stress Analysis, Composite Materials, Plates and Shells, and Electronic Packaging

RESEARCH INTERESTS AND SUMMARY

- Solid Mechanics: Stress and Strain Analysis, Experimental Mechanics, Advanced and Composite Materials, Finite Element Analysis and Computational Mechanics
- Electronic Packaging: Electronics Reliability, Silicon Sensors, Test Chips, Solder Material Behavior and Aging, Underfill Material Behavior, Solder Joint Reliability

RESEARCH SUMMARY

- Dr. Suhling's Primary Research Area is Electronic Packaging Reliability. He has Advised 100 Graduate Students at Auburn University, Including 39 Ph.D. Students and 61 M.S. Students. Dr. Suhling has Authored over 500 Technical Publications and Presentations Including 9 Books and Book Chapters, 75 Journal Articles, and 450 Conference Proceedings Papers; and has an H-Index of 52 on Google Scholar. He and His Co-Workers Have Attracted over $35M in Externally Funded Research Projects to Auburn University.

REPRESENTATIVE PUBLICATIONS (Selected from over 500 Papers)

- Bittle, D. A., Suhling, J. C., Beaty, R. E., Johnson, R. W., and Jaeger, R. C., "Piezoresistive Stress Sensors for Structural Analysis of Electronic Packages," *Journal of Electronic Packaging*, Vol 113(3), pp. 203-215, 1991.
- Jaeger, R. C., Suhling, J. C., Ramani, R., Bradley, A. T., Xu, J., "CMOS Stress Sensors on (100) Silicon," *IEEE Journal of Solid State Circuits*, Vol. 35(1), pp. 85-95, 2000.
- Suhling, J. C., and Jaeger, R. C., "Silicon Piezoresistive Stress Sensors and Their Application in Electronic Packaging," *IEEE Sensors Journal*, Vol. 1(1), pp. 14-30, 2001.
- Suhling, J. C., Gale, H. S., Johnson, R. W., Islam, M. N., Shete, T., Lall, P., Bozack, M. J., Evans, J. L., Seto, P., Gupta, T., and Thompson, J. R., "Thermal Cycling Reliability of Lead Free Chip Resistor Solder Joints," *Soldering and Surface Mount Technology*, Vol. 16(2), pp. 77-87, 2004.
- Lall, P., Islam, N., Suhling, J. C., and Darveaux, R., "Model for BGA and CSP Reliability in Automotive Underhood Applications," *IEEE Transactions on Components and Packaging Technologies*, Vol. 27(3), pp. 585-593, 2004.
- Rahim, M. K., Suhling, J. C., Copeland, D. S., Islam, M. S., Jaeger, R. C., Lall, P., Johnson, R. W., "Die Stress Characterization in Flip-Chip Assemblies," *IEEE Transactions on Components and Packaging Technologies*, Vol. 28(3), pp. 415-429, 2005.
- Islam, M. S., Suhling, J. C., and Lall, P., "Measurement of the Temperature Dependent Constitutive Behavior of Underfill Encapsulants," *IEEE Transactions on Components and Packaging Technologies*, Vol. 28(3), pp. 467-476, 2005.
- Mian, A. K. M., Suhling, J. C., and Jaeger, R. C., "The van der Pauw Stress Sensor," *IEEE Sensors Journal*, Vol. 6(2), pp. 340-356, 2006.
- Lall, P., Islam, M. N., Rahim, K., and Suhling, J. C., "Prognostics and Health Management of Electronic Packaging," *IEEE Transactions on Components and Packaging Technologies*, Vol. 29(3), pp. 666-677, 2006.
- Ma, H., Suhling, J. C., Lall, P., and Bozack, M. J., "Reliability of the Aging Lead Free Solder Joint," *Proceedings of the 56th IEEE Electronic Components and Technology Conference*, pp. 849-864, San Diego, CA, 2006.
- Lall, P., Hande, M., Bhat, C., Islam, N, Suhling, J., and Lee, J., "Feature Extraction and Damage-Precursors for Prognostication of Lead-Free Electronics," *Microelectronics Reliability*, Vol. 47(4), pp. 1907-1920, 2007.
- Suhling, J. C. and Lall, P., "Electronic Packaging Applications," Chapter 36, *Handbook of Experimental Solid Mechanics*, Springer, pp. 1015-1044, 2008.

- Lall, P., Islam, S., Tian, G., Suhling, J. C., and Shinde, D., "Nano-Underfills for Fine-Pitch Electronics," Chapter 14, *Nanopackaging - Nanotechnologies and Electronic Packaging*, pp. 287-323, Springer, 2008.
- Dally, J. W., Lall, P., and Suhling, J. C., *Mechanical Design of Electronic Systems*, College House Publishers, 2008.
- Cho, C. H., Jaeger, R. C., and Suhling, J. C., "Characterization of the Temperature Dependence of the Piezoresistive Coefficients of Silicon from -150 C to +125 C," *IEEE Sensors Journal*, Vol. 8(8), pp. 1455-1468, 2008.
- Zhang, Y., Cai, Z., Suhling, J. C., Lall, P., and Bozack, M. J., "The Effects of Aging Temperature on SAC Solder Joint Material Behavior and Reliability," *Proceedings of the 58th IEEE Electronic Components and Technology Conference*, pp. 99-112, Orlando, FL, 2008.
- Ma, H., and Suhling, J. C., "A Review of Mechanical Properties of Lead-Free Solders for Electronic Packaging," *Journal of Materials Science*, Vol. 44, pp. 1141-1158, 2009.
- Cai, Z., Zhang, Y., Suhling, J., Lall, P., Johnson, R. W., Bozack, M., "Reduction of Lead Free Solder Aging Effects using Doped SAC Alloys," *Proceedings of the 60th IEEE Electronic Components and Technology Conference*, pp. 1493-1511, Las Vegas, NV, 2010.
- Mustafa, M., Cai, Z., Suhling, J. C., and Lall, P., "The Effects of Aging on the Cyclic Stress-Strain Behavior and Hysteresis Loop Evolution of Lead Free Solders," *Proceedings of the 61st IEEE Electronic Components and Technology Conference*, pp. 927-939, Orlando, FL, 2011.
- Chhanda, N. J., Suhling, J. C., Lall, P., "Experimental Characterization and Viscoplastic Modeling of the Temperature Dependent Material Behavior of Underfill Encapsulants," *Proceedings of InterPACK 2011*, Paper InterPACK2011-52209, pp. 1-13, Portland, OR, 2011.
- Roberts, J. C., Motalab, M., Hussain, S., Suhling, J. C., Jaeger, R. C., Lall, P., "Characterization of Die Stresses in CBGA Packages due to Component Assembly and Heat Sink Clamping," *Journal of Electronic Packaging*, Vol. 134(3), pp. 1-17, 2012.
- Jiawei Zhang, J., Hai, Z., Thirugnanasambandam, S., Evans, J. L., Bozack, M. J., Sesek, R., Zhang, Y., Suhling, J. C., "Correlation of Aging Effects on Creep Rate and Reliability in Lead Free Solder Joints," *SMTA Journal*, Volume 25(3), pp. 19-28, 2012
- Motalab, M., Cai, Z., Suhling, J. C., Zhang, J., Evans, J. L., Bozack, M. J., Lall, P., "Improved Predictions of Lead Free Solder Joint Reliability that Include Aging Effects," *Proceedings of the 62nd IEEE Electronic Components and Technology Conference*, pp. 513-531, San Diego, CA, 2012.

COLLABORATORS

R. C. Jaeger, R. W. Johnson, R. W. Knight, P. Lall, B. Prorok, N. Shamsaei, G. T. Flowers, M. J. Bozack, B. M. Wilamowski, M. Hamilton, J. L. Evans, J. N. Sweet, L. Nguyen, S. Gee, H. Ali, W. Bright, S. Liu, B. T. Han, A. Capote, J. R. Thompson, K. Gihring, R. Gryzbowski, T. E. Wong, L. Fursin, S. Canumalla, S. T. Lin, R. E. Rowlands, M. W. Johnson, D. E. Gunderson, J. Considine, T. L. Laufenberg, T. Urbanik, C. Fellers, T. D. Gerhardt, J. Dally, H. Ma.

GRADUATE ADVISORS AND ADVISEES

Ph.D. Advisor: M. W. Johnson, University of Wisconsin

Graduated Students: 29 Ph.D., 61 M.S. Postdoctoral Fellows: 3

Current Students: 10 Ph.D., 0 M.S. Other Graduate Student Committees: 200