
MICHAEL RHODES LOVELL

Associate Dean for Research
School of Engineering
University of Pittsburgh, Pittsburgh PA

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PROFESSIONAL EMPLOYMENT

2007-present *Site Director*, Department of Energy (NETL) Institute for Advanced Energy Studies
2007-present *Professor of Industrial and Bioengineering*, University of Pittsburgh, Pittsburgh PA
2006-present *Director*, National Science Foundation Center for e-Design, Univ. of Pittsburgh, Pittsburgh PA
2005-present *Associate Professor*, Department of Bioengineering, Univ. of Pittsburgh, Pittsburgh PA
2003-present *Associate Dean for Research*, School of Engineering, University of Pittsburgh
2003-present *Executive Director*, Swanson Institute for Technical Excellence (www.engr.pitt.edu/SITE)
2002-2007 *Associate Professor*, Department of Industrial Engineering, Univ. of Pittsburgh, Pittsburgh PA
2000-2007 *Associate Professor*, Department of Mechanical Engineering, Univ. of Pittsburgh, Pittsburgh PA
2000-2003 *Executive Director*, Swanson Center for Product Innovation (www.engr.pitt.edu/SITE/SCPI)
1996-1999 *Assistant Professor*, Department of Mechanical Eng., University of Kentucky, Lexington KY
1992-1996 *Senior Development Engineer*, ANSYS Inc., Houston, PA

EDUCATION

Ph.D. 1994 Mechanical Engineering, University of Pittsburgh, Pittsburgh PA
M.S. 1991 Mechanical Engineering, University of Pittsburgh, Pittsburgh PA
B.S. 1989 Mechanical Engineering, University of Pittsburgh, Pittsburgh PA

AWARDS

- NSF CAREER Award, Design Manufacturing and Industrial Innovation (1997)
- Outstanding International Publication on Bearings, FAG – Germany (1997)
- Best Paper Award, ANSYS Technical Conference and Exhibition (1998)
- SME Outstanding Young Manufacturing Engineer Award (1999)
- ASME Burt Newkirk Award in Tribology (2005)
- Olympus Emerging Academic Innovator Award (2006)
- W. K. Whiteford Endowed Faculty Fellowship (2000 – present)

PUBLICATIONS & PRESENTATIONS

Published Peer-Reviewed Journal Articles:

Lovell, M. R., Khonsari, M., and Marangoni, R., 1992, *Evaluation of Ultra-Low-Speed Jitter in Rolling Balls*, ASME Journal of Tribology, Vol. 114, pp. 589-594.

Lovell, M. R., Khonsari, M., and Marangoni, R., 1993, *Ultra-Low-Speed Friction Torque Measurements on Balls Undergoing Rolling Motion*, STLE Tribology Transactions, Vol. 36, pp. 290-296.

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- Lovell, M. R., Khonsari, M., and Marangoni, R., 1993, *The Response of Balls Undergoing Oscillatory Motion: Crossing From Boundary to Mixed Lubrication Regimes*, ASME Journal of Tribology, Vol. 115, pp. 261-266.
- Lovell, M. R., Khonsari, M., and Marangoni, R., 1994, *Experimental Measurements of the Rest Slope and Steady Torque on Ball Bearings Experiencing Small Angular Rotations*, STLE Tribology Transactions, Vol. 37, No. 2, pp. 261-268.
- Lovell, M. R., Khonsari, M., and Marangoni, R., 1996, *Comparison of the Ultra-Low-Speed Frictional Characteristics of Silicon Nitride and Steel Balls Using Conventional Lubricants*, ASME Journal of Tribology, Vol. 118, pp. 43-51.
- Lovell, M. R., Khonsari, M., and Marangoni, R., 1996, *A Finite Element Analysis of the Frictional Forces Between a Cylindrical Bearing Element and MoS₂ Coated and Uncoated Surfaces*, Wear, Vol. 194, pp.60-70.
- Lovell, M. R., Khonsari, M., and Marangoni, R., 1996, *Dynamic Friction Measurements of MoS₂ Coated Ball Bearing Surfaces*, ASME Journal of Tribology, Vol. 118, pp. 858-864.
- Lovell, M. R., Khonsari, M., and Marangoni, R., 1997, *Frictional Analysis of Coated Ball Bearings: A Three-Dimensional Finite Element Analysis*, ASME Journal of Tribology, Vol. 119, pp. 754-763.
- Lovell, M. R., Khonsari, M., and Marangoni, R., 1997, *Parameter Identification of Hysteresis Friction for Coated Ball Bearings Based on Three-Dimensional FEM Analysis*, ASME Journal of Tribology, Vol. 119, pp. 462-470.
- Lovell, M. R., 1998, *Analysis of Contact Between Transversely Isotropic Coated Surfaces: Development of Stress and Displacement Relationships Using FEM*, Wear, Vol. 214, No. 2, pp. 165-174.
- Dong, Y., Lovell, M. R., and Tagavi, K., 1998, *Analysis of Interfacial Slip In Cross Wedge Rolling: An Experimentally Verified Finite Element Model*, Int. Journal of Materials Processing Technology, Vol. 81, pp. 273-281.
- Lovell, M.R., 1999, *Determination of Compliance Relationships for Transversely Isotropic Hard Surface Coatings Using the Finite Element Method*, ASME Journal of Tribology, Vol. 121, pp 416-418.
- Deng, Z., Lovell M. R., and Tagavi, K. A., 1999, *The Role of Tool Segments in Determining Failure Characteristics in Cross Wedge Rolling*, Transactions of NAMRI, Vol. 27, pp. 31-36.
- Lovell, M. R., and Khonsari, M., 1999, *On the Frictional Characteristics of Ball Bearings Coated with Solid Lubricants*, ASME Journal of Tribology, Vol. 121 No. 4, pp. 761-767.
- Narasimhan, N, and Lovell, M. R., 1999, *Predicting Springback in Sheet Metal Forming: An Explicit to Implicit Sequential Solution Procedure*, Finite Elements in Analysis and Design, Vol. 33, pp. 29-42.
- Deng, Z., Bleck, W., Lovell, M., and Papamantellos, K., 1999, *A General Approach for Predicting the Drawing Fracture Load and Limit Drawing Ratio of An Axisymmetric Drawing Process*, Metallurgical and Materials Transactions, Vol. 30a, pp. 2619-2627.
- Lovell, M.R., and Deng, Z, 1999, *Experimental Investigation of Sliding Friction Between Hard and Deformable Surfaces With Application to Manufacturing Processes*, Wear, Vol. 236, pp. 117-127.
- Dong, Y., Tagavi, K, and Lovell, M.R., 1999, *Analysis of Interfacial Slip In Cross Wedge Rolling: A Numerical and Phenomenological Investigation*, Journal Materials Processing Technology, Vo. 97, pp. 44-53.

Morrow, C. and Lovell, M. R., 1999, *Numerical Contact Analysis of Transversely Isotropic Coatings*, Wear, Vol. 236, pp. 360-367.

Dong, Y., Tagavi, K, and Lovell, M.R., 2000, *Finite Element Analysis of Failure Mechanisms In Cross Wedge Rolling*, Int. Journal of Machine Tools and Manufacture, Vol. 42 No. 7, pp. 1233-1253.

Deng, Z., and Lovell M. R., 2000, *Effects of Lubrication and Die Radius on Lead Coated Sheet Steels*, Wear, Vol. 244, pp.41-51.

Bhattacharya, S. and Lovell M. R., 2000, *Comparison Between Asperity Deformation And Seizure-Based Friction Models with Application to Machining*, Transactions of NAMRI, Vol. 28, pp.107-112.

Deng, Z., Lovell M. R., and Tagavi, K., 2001, *Influence of Material Properties and Rolling Speed on the Interfacial Slip Characteristics In Cross Wedge Rolling*, ASME J. of Manu. Science and Engineering, Vol. 123, pp. 760-768.

Lovell, M.R., Deng, Z, and Khonsari, M., 2000, *Experimental Characterization of Sliding Friction: Crossing from Deformation to Plowing Contact*, ASME Journal of Tribology, Vol. 122, pp. 856-865.

Du, F., Lovell, M. R., and Wu, T. W., 2001, *BEM Analysis of Temperature Fields in Coated Cutting Tools*, Int. J. Solids Structures, Vol. 36, pp. 4557-4570.

Lovell, M. R., 2001, *Evaluation of Critical Friction in Cross Wedge Rolling*, ASME J. of Tribology Vol. 123, pp. 436-440.

Morrow, C., Lovell, M. R., and Deng, Z., 2001, *Numerical Contact Analysis of Transversely Isotropic Coatings: A Cylinder Within a Circumferential Groove*, ASME Journal of Tribology, Vol. 123, pp. 424-430.

Li, Q., Lovell, M., and Zhi, D., 2001, *Analysis of Interfacial Slip in a Two-Roll CWR Process*, Transactions of NAMRI, pp. 9–16.

Gomes, C., Onipede, O., Lovell, M, Norman, B., and Rajaragopal, J., 2001, *Numerical Analysis of Springback Using a Response Surface Technique*, Transactions of NAMRI, pp. 89-96.

Mickle, M., and Lovell, M., 2001, *Energy Harvesting, Profiles and Potential Sources*, International Journal of Parallel and Distributed Systems and Networks, Vol. 4, No. 3, pp. 150-160.

Mickle, M., and Lovell, M., 2001, *Brass Rings or Brass Buttons in Engineering Design*, ASEE Journal of Engineering Education, V. 90 No. 4, pp. 1-7.

Ning, X., and Lovell, M, 2002, *On the Sliding Friction Characteristics of Unidirectional Continuous FRP Composites*, ASME Journal of Tribology, Vol. 124, pp. 5-13.

Tao, Z. and Lovell, M., 2002, *Towards an Improved Friction Model in Material Removal Processes*, Transactions of the NAMRI, Vol 30, pp. 9-16.

Li, Q. and Lovell, M., 2002, *Experimental Investigation of Internal Defects in Cross Wedge Rolling*, Transactions of the NAMRI, Vol. 30, pp. 493-399.

Lovell M., and Deng, Z., 2002, *Characterization of Interfacial Friction in Coated Sheet Steels: Influence of Stamping Process Parameters and Wear Mechanisms*, Tribology International, V 35 No. 2, pp. 85-95.

Avdeev, I, Borokov, O., Lovell, M., Kiylo, O., and Onipede, D., 2002, *Mixed 2-D and Beam Formulation for Modeling Sandwich Structures*, Int. Journal for Computer-Aided Engineering and Software, Vol. 13 No. 3-4, pp. 451-466.

Li, Q., Lovell, M., and Slaughter, W., 2002, *Investigation of the Morphology of Internal Defects in Cross Wedge Rolling*, Journal of Materials Processing Technology, Vol. 125, pp. 248-257.

Cogdon, C., Lovell, M., Knapp, C., Park, A., and Baker, J., 2003, *Numerical Analysis of an Anastomotic Device*, Computer Methods in Biomechanics and Biomedical Engineering, Vol. 5, No. 1, pp.53-65.

Li, Q., and Lovell, M., 2003, *Analytical Prediction of Critical Friction in a Two-Roll CWR Process*, ASME Journal of Tribology, Vol. 125, pp. 200-203.

Morrow, C., Lovell, M., and Ning, X., 2003, *A JKR-DMT Transition Solution for Adhesive Rough Surface Contact*, Journal of Physics D: Applied Physics, Vol. 36, pp. 534-540.

Tao, Z. and Lovell, M., 2003, *Analysis of the Real Area of Contact and Interfacial Friction in Cutting Tool Coatings*, Transactions of the NAMRI, pp. 637-644.

Avdeev, I., Lovell M. R., and Onipede, D., 2003, *Modeling in-plane misalignments in lateral combdrive transducers*, Journal of Micromechanics and Microengineering, Vol. 13, pp. 809-816.

Tao, Z., Lovell, M., and Yang J., 2004, *Evaluation of Interfacial Friction in Material Removal Processes: Determining the Role of Workpiece Properties and Contact Geometry*, Wear, Vol. 256, pp. 664-670.

Ning, X., Lovell, M., and Morrow, C., 2004, *Anisotropic Strength Approach for Wear Analysis of Unidirectional Continuous FRP Composites*, ASME Journal of Tribology, Vol. 126, pp. 65-71.

Avdeev, I., Lovell, M., and Gyimesi M., 2004, *Strongly coupled 3-D finite element transducer*, Journal of Micromechanics and Microengineering, Vol. 14, pp. 1491-1502.

Li, Q., Lovell, M., Mei, J., and Clark, W., 2004, *A Study of Displacement Distribution in a Piezoelectric Heterogeneous Bimorph*, ASME Journal of Mechanical Design, Vol. 126, pp.757-762.

Li, Q., and Lovell, M., 2004, *Establishment of a Failure Criterion in Cross Wedge Rolling*, Int. Journal of Advanced Manufacturing Technology, Vol. 24, pp. 180-189.

Mei, J., Lovell, M., and Petit, F, 2004, *Mechanical and Metallurgical Properties of Hot Rolling Ti-6Al-4V Sheets*, Steel GRIPS: International Journal of Steel and Related Material, Vol. 1, No. 3, pp. 53-58.

Lovell, M., Deshmukh, P., and Yavalek, N., 2004, *Towards a fundamental understanding of the Stretch Leveling Process*, Steel GRIPS: International Journal of Steel and Related Material, Vol. 1, No. 3, pp. 317-324.

Gomes, C., Onipede, O., and Lovell, M., 2005, *Numerical Analysis of Springback Deformations in Anisotropic Sheet Steels*, Journal of Materials Processing Technology, Vol. 159, pp.91-98.

Li, Q., and Lovell, M., 2005, *On the Critical Interfacial Friction in a Two-Roll CWR Process*, Journal of Materials Processing Technology, Vol. 160, pp. 245-256.

Morrow, C. and Lovell, M, 2005, *An Extension to a Cohesive Zone Solution for Adhesive Cylinders*, ASME Journal of Tribology, Vol. 127, pp. 447- 453.

Morrow, C. and Lovell, M., 2005, *A Solution for Lightly Loaded Adhesive Rough Surfaces With Application to MEMS*, ASME Journal of Tribology, Vol. 127, pp. 206-213.

Bails, M., Martinez, J., Levitan, S., Boles, J., Avdeev, I., Lovell, M., and Chiarelli, D., 2005, *Performance Simulation of a Microwave Micro-Electromechanical System Shunt Switch Using Chatoyant*, Analog Integrated Circuits and Signal Processing, Vol. 44, No. 2, pp. 137 - 154.

Mei, J., Lovell, M., and Mickle, M., 2005, *Formulation and processing of novel Conductive Solution Inks in Continuous Inkjet Printing of 3-D Electric Circuits*, IEEE Transactions on Electronics Packaging Manufacturing, Vol. 28, No. 3, pp. 265-273.

Lovell, M., and Morrow, C., 2006, *Three-Dimensional Contact Analysis of Anisotropic Coated Surfaces*, Tribology Transactions, Vol. 49 (1), pp. 33-38.

Ning, X., Slaughter, W., and Lovell, M. R., 2006, *Asymptotic Solution of Axi-symmetric Contact on a Thin Transversely Isotropic Elastic Layer*, Wear, Vol. 260, pp. 693-698.

Jacob DK, Stefko ST, Lovell MR, Mickle MH, 2006, *Communication between functional and denervated muscles using radio frequency*, Otolaryngol Head Neck Surg, Vol. 134(5), pp. 862-827.

Liu F., Heston S., Sun, B., Mickle, M., Lovell, M., and Huang, L., 2006, *Mechanism of in vivo DNA Transport into Cells by Electroporation: Electrophoresis across the Plasma Membrane May Not Be Involved*, J Gene Med.; Vol. 8(3), pp. 353-61.

Deshmukh, P., Lovell, M., Sawyer, G., and Mobley A., 2006, *On the Friction and Wear Performance of Boric Acid Lubricant Combinations in Extended Duration Operations*, Wear Vol. 260, pp. 1295-1304.

Urankar S., Lovell, M., Morrow C.A., Li, Q., and Kawada K, 2006, *Establishment of Failure Conditions for the Cross Wedge Rolling of Hollow Shafts*, Int. Journal of Materials Processing Technology, Vol. 3, pp. 545-550.

Lovell, M., Higgs, C. F., Deshmukh, P. V., and Mobley, A. J., 2006, *Increasing Formability in Sheet Metal Stamping Operations Using Environmentally Friendly Lubricants*, Int. Journal of Materials Processing Technology, Vol. 117, Vol. 1, pp. 87-90.

Urankar S., Lovell, M., Morrow C.A., Li, Q., and Kawada K, 2006, *Development of a Critical Friction Model for Cross Wedge Rolling Hollow Shafts*, Int. Journal of Materials Processing Technology, Vol. 3, pp. 539-544.

Salil Desai, Michael Lovell, and Jim Cordle, 2007, *Coupled Field Analysis of a Piezoelectric Bimorph Disc in a Direct Write Fabrication Process*, **to appear** Journal of Composite: Part B.

Desai S. and Lovell M., 2007, *Statistical Optimization of Process Variables in a Continuous inkjet process for Direct Write Fabrication*, **to appear** International Journal of Industrial Engineering

Joshua Maina, Marlin H. Mickle, Michael R. Lovell, Laura A. Schaefer, 2007, *Complex Radio Frequency (RF) Communications with Virtual Pulses*, **to appear** International Journal of Computers and Electrical Engineering

M .A. Kabir, Michael R. Lovell and C. Fred Higgs III, 2008, *Utilizing the Explicit Finite Element Method for Studying Granular Flows*, **to appear** Tribology Letters.

M .A. Kabir, C. Fred Higgs III, and Michael R. Lovell, 2008, *A Pin-on Disk Experimental Study on a Green Particulate-Fluid Lubricant*, **to appear** ASME Journal of Tribology.

R. Cisloiu, M. Lovell, J. Wang, 2008, *A stabilized mixed formulation for finite strain deformation for low-order tetrahedral solid elements*, **to appear** Int. J. Numer. Meth. Engineering.

M .A. Kabir, Michael R. Lovell and C. Fred Higgs III, 2008, *Friction and Wear Performance of Sub-Micron Scale Boric Acid Additives*, **to appear** ASME Journal of Tribology.

M. M. Mehalik, M. Lovell, L. Shuman, 2008, *Product Realization for Global Opportunities: Learning Collaborative Design in an International Setting*, **to appear**, International Journal of Engineering Education.

Articles in Review:

M .A. Kabir, C. Fred Higgs III, and Michael R. Lovell, 2008, *Granular Flow Lubrication: Explicit Finite Element Method Modeling and Simulation*, **in review** Journal of Engineering Tribology.

M. Lovell, P. Cohen, and R. Shankar, 2008, *Tribological Characterization of Machining 70/30 Brass at Very Small Contact Areas*, **in review** ASME Journal of Tribology.

S. Sidirov, A. Robertson, M. Lovell, and G. Lin, 2008, *Finite Element Formulation of a nonlinear inelastic multi-mechanism model for cerebral arteries with application to balloon angioplasty*, **in review** Computer Methods in Applied Mechanics and Engineering.

Joshua Maina, Marlin H. Mickle, Michael R. Lovell, Laura A. Schaefer, 2008, "An Analysis of RFID Reading Delay in Heterogeneous Methodologies", **in review** Journal of the Franklin Institute.

Joshua Maina, Marlin H. Mickle, Michael R. Lovell, Laura A. Schaefer, 2008, *Increased Read Efficiency for RFID Tags*, **in review** Journal of Manufacturing Systems.

Joshua Maina, Marlin H. Mickle, Michael R. Lovell, Laura A. Schaefer, 2008, *An Analysis Of RFID Reading Delay In Heterogeneous Methodologies*, **in review** International Journal of Computers in Electrical Engineering.

Invited Presentations:

Tribological Characterization of the Cross Wedge Rolling Process, University of Illinois Urbana-Champaign, February 10, 1999. (invited seminar)

Integrating Product Realization and Commercialization into Academics and Research, University of Southern California, July 18, 2001 (invited seminar).

Tribology Challenges for the 21st Century, Invited Lecture, Sandia National Labs - Livermore California, July 19, 2001. (invited seminar)

Product Development Techniques for Enhancing Entrepreneurship and Commercialization, Western Pennsylvania Chamber of Commerce Annual Meeting, Nov. 1, 2001. (Keynote Address)

Predicting Interfacial Slip Failure in Cross Wedge Rolling, Symposium on Tribological Issues in Manufacturing, San Francisco CA, October 21, 2001. (invited presentation)

Numerical Methods for Modeling Void Development in Manufacturing Processes, Timken Inc., March 18, 2002. (invited seminar)

Integrating Prototyping Into E-Team Products Using N₂TEC, NCIIA Annual Conference, March 27, 2002. (Keynote Address)

Manufacturing 3-D Electronic Components Using Continuous Ink-Jet Technology, University of Florida, April 21, 2003. (invited seminar)

Characterization of Failure Mechanisms in Cross Wedge Rolling, Notre Dame University, April 6, 2002. (invited seminar)

Development of the RAPID Network, NCIIA Annual Meeting in Boton MA, March 20, 2003 (Plenary Lecture)

Utilizing the RAPID Network for Innovative Product Development, NCIIA Annual Conference, San Jose, CA, March 19, 2004 (Plenary Lecture)

Current Trends in Engineering Education in New Product Development, University of Maryland, March 12, 2004 (invited seminar).

Design Innovation: Best Practices from an Academic Perspective, ANSYS International Users Conference, May 5, 2004 (Keynote Address).

Continuous Ink-jet Printing Electronic Components Using Novel Conductive Inks, Solid Free-Form Fabrication Conference, University of Texas at Austin, August 6, 2004 (Plenary Lecture).

Design Innovation: The Role of Academia in an Increasingly Global Economy, University of Central Florida, July 26, 2004. (invited seminar).

Innovative Design Practices for Succeeding in a Global Economy, Daratech Summit Conference, October 4, 2004. (Keynote Address).

Science of Learning Innovative Design: a New Perspective in Engineering Education, Georgia Tech University, November 5, 2004 (invited seminar).

Future Trends of e-Product Design: Creating a Vibrant Infrastructure at the University of Pittsburgh, Virginia Tech University, December 1, 2005. (invited seminar)

Tools and Artifacts in Innovative Engineering Design: Formation of the RAPID Network, NCIIA Annual Conference, Portland OR, March 23, 2006. (invited presentation)

Academic Innovation in an Increasingly Global Environment, ICONE14, Miami FL, July 17, 2006. (invited presentation)

Partnering to Meet the Long Term Development Needs of the Nuclear Industry, ASME Board of Directors Meeting, Washington DC, October 4th, 2006 (Keynote Address).

Development of Novel Electronic Manufacturing Using CIJ Technology, Penn State University, November 2nd, 2006 (invited seminar)

Fostering Innovation through Product Realization, NCIIA Annual Conference, Tampa Bay, FL, March 22, 2007. (invited presentation)

Advances in Computational Tribology, Carnegie Mellon University, April 11th 2007 (invited seminar)

Conference Proceedings and Presentations:

Lovell, M. R., Khonsari, M., and Marangoni, R., *Evaluation of Ultra-Low-Speed Jitter in Rolling Balls*, presented at the ASME/STLE Tribology Conference, St. Louis Mo., October 13-16, 1991. (presentation)

Lovell, M. R., Khonsari, M., and Marangoni, R., *Experimental Measurements of the Rest Slope and Steady Torque on Ball Bearings Experiencing Small Angular Rotations*, presented at the 47th STLE Annual Meeting, Philadelphia, PA, May 4-7, 1992. (presentation)

Lovell, M. R., Khonsari, M., and Marangoni, R., *The Response of Balls Undergoing Oscillatory Motion: Crossing From Boundary to Mixed Lubrication Regimes*, presented at the ASME/STLE Tribology Conference, San Diego, CA, October 11-14, 1992. (presentation)

Lovell, M. R., Khonsari, M., and Marangoni, R., *Comparison of the Ultra-Low-Speed Frictional Characteristics of Silicon Nitride and Steel Balls Using Conventional Lubricants*, presented at the ASME/STLE Tribology Conference, Maui Hawaii, October 16-19, 1994. (presentation)

Lovell, M. R., *A Two Dimensional Finite Element Analysis of Contact in Coated Surfaces with Application To Precision Bearings*, Proceedings of the 5th ANSYS Technology Conference, Pittsburgh, PA, May 2-6, 1994, pp. 281-294. (peer reviewed conference article)

Lovell, M. R., Khonsari, M., and Marangoni, R., *Dynamic Friction Measurements of MoS₂ Coated Ball Bearing Surfaces*, presented at the ASME/STLE Tribology Conference, Orlando FL, October 12-15, 1995. (presentation)

Lovell, M. R., Khonsari, M., and Marangoni, R., *Frictional Analysis of Coated Ball Bearings: A Three-Dimensional Finite Element Analysis*, presented at the ASME/STLE Tribology Conference, Orlando FL, October 12-15, 1995. (presentation)

Lovell, M. R., Khonsari, M., and Marangoni, R., *Parameter Identification of Hysteresis Friction for Coated Ball Bearings Based on Three-Dimensional FEM Analysis*, presented at the ASME/STLE Tribology Conference, San Francisco CA, October 11-14, 1996. (presentation)

Ali, A. and Lovell, M. R., *ANSYS Analysis Tools in the Numerical Modeling of Tires*, Proceedings of the NASA Conference on Computational Modeling of Tires, Hampton VA, pp. 149-175, October 26-27, 1994. (peer reviewed Abstract)

Ali, A. and Lovell, M. R., *Manufacturing Process Simulation With ANSYS/LS-DYNA*, Proceedings of the Fourth International LS-DYNA3D User's Conference, Minneapolis, MN, pp. 1-26, September 1-3, 1996. (peer reviewed Abstract)

Lovell, M. R., *Analysis of Contact Between Coated Surfaces: Development of Stress and Displacement Relationships Using FEM*, Proceedings of the 1997 ASME, ASCE, and SES Summer Meeting (McNU 97), Northwestern University, July 1-3, 1997. (peer reviewed Abstract)

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- Lovell, M. R., *Numerical Characterization of Machining Using Explicit Dynamic FEM*, Proceedings of the 1998 NSF Design and Manufacturing Conference, Monterey, Mexico, January 4-7, 1998. (poster and article)
- Lovell, M. R., Bhattacharya, S., Zheng, R., 1998, *Modeling of Orthogonal machining Processes for Variable Tool-Chip Interfacial Friction Using Explicit Dynamic FEM*, Proceedings of the CIRP International Workshop on Modeling of Machining Operations, Atlanta, GA, May 19, 1998. (peer reviewed Abstract)
- Lovell, M.R. and Morrow, C., *Contact Stress Analysis of Transversely Isotropic Layered Cylinders Using FEM*, Proceedings the Thirteenth U.S. Congress of Applied Mechanics, Gainesville, FL, June 20-24, 1998. (peer reviewed article)
- Lovell, M. R., Tagavi, K.A., and Dong, Y., *Analysis of Friction in Cross Wedge Rolling Using Explicit Dynamic FEM*, presented at the 7th ANSYS Technology Conference, Pittsburgh, PA, August 16-18, 1998 (peer reviewed article)
- Lovell, M. R., Tagavi, K.A., and Dong, Y., *Characterization of Interfacial Friction In Cross Wedge Rolling*, presented at the 7th International Conference on Metal Forming, Birmingham UK, September 1-3, 1998. (presentation)
- Lovell, M. R., and Khonsari, M., *On the Frictional Characteristics of Ball Bearings Coated With Solid Lubricants*, presented at the ASME/STLE Tribology Conference, Toronto Canada, October 12-15, 1998. (presentation)
- Lovell, M. R., *Modeling of Orthogonal Machining Processes for Variable Tool-Chip Interfacial Friction Using Explicit Dynamic FEM*, Proceedings of the 1999 NSF Design and Manufacturing Conference, University of Southern California, January 5-8, 1999. (poster and article)
- Deng, Z., Lovell M. R., and Tagavi, K. A., 1999, *The Role of Tool Segments in Determining Failure Characteristics in Cross Wedge Rolling*, presented at the 27th North American Manufacturing Research Conference, University of California at Berkeley, May 25, 1999. (presentation)
- Lovell, M.R., Deng, Z, and Khonsari, M., 1999, *Experimental Characterization of Sliding Friction with Application to Machining and Stamping Processes*, presented at the Joint ASME/STLE Tribology Conference, Orlando Fla, October 12 1999. (presentation)
- Lovell, M. R., *Modeling of Orthogonal Machining Processes for Variable Tool-Chip Interfacial Friction Using Explicit Dynamic FEM*, Proceedings of the 2000 NSF Design and Manufacturing Conference, Vancouver British Columbia, January 5-8, 2000. (poster and article)
- Lovell, M. R., *Characterization of Failure Mechanisms in Cross Wedge Rolling*, Proceedings of the 2000 NSF Design and Manufacturing Conference, Vancouver British Columbia, January 5-8, 2000. (poster and article)
- Morrow, C., Lovell, M. R., and Deng, Z., *Numerical Contact Analysis of Transversely Isotropic Coatings: A Cylinder within a Circumferential Groove*, presented at the International ASME/STLE Tribology Conference, Seattle Washington, October (2000). (presentation)
- Lovell, M. R., *Evaluation of Critical Friction in Cross Wedge Rolling*, presented at the International ASME/STLE Tribology Conference, Seattle Washington, October (2000). (presentation)
- Bhattacharya, S. and Lovell M. R., *Comparison Between Asperity Deformation and Seizure-Based Friction Models with Application to Machining*, the 28th North American Manufacturing Research Conference, University of Kentucky at Lexington, May (2000). (presentation)

Mickle, M., and Lovell, M., 2001, *Brass Rings or Brass Buttons in Engineering Design*, NCIIA 2001 Annual Conference, Washington DC, March 10-14. (presentation)

Lovell, M. R., and Deng, Z., 2001, *Advanced Numerical Analysis of Cutting Tools*, Proceedings of the 2001 NSF Design and Manufacturing Conference, Tampa Bay Florida, January 5-8. (poster and article)

Deng, Z., and Lovell M. R., 2001, *Numerical Modeling of Failure in the Cross Wedge Rolling Process*, Proceedings of the 2001 NSF Design and Manufacturing Conference, Tampa Bay Florida, January 5-8. (poster and article)

Li, Q., Lovell, M., and Zhi, D., 2001, *Analysis of Interfacial Slip in a Two-Roll CWR Process*, presented at the 29th North American Manufacturing Research Conference, University of Florida, May 18-22 (presentation)

Gomes, C., Onipede, O., Lovell, M, Norman, B., and Rajaragopal, J., 2001, *Numerical Analysis of Springback Using a Response Surface Technique*, presented at the 29th North American Manufacturing Research Conference, University of Florida, May 18-22. (presentation)

Ning, X., and Lovell, M, *On the Sliding Friction Characteristics of Unidirectional Continuous FRP Composites*, 2001, presented at the International ASME/STLE Tribology Conference, San Francisco California, October 20-24. (presentation)

Avdeev I., Lovell M. and Onipede O., 2001, *Design and Simulation of Microelectromechanical Transducer Using uncoupled Finite Element Models*. Fifth International Workshop on Nondestructive Testing and Computer Simulations in Science and Engineering. Ed. A.I. Melker. Proc. of SPIE, Washington, Vol. 4627, pp. 230-238. (peer reviewed Abstract and presentation).

Li, Qiang and Lovell M. R., 2002, *Characterization of Failure Mechanisms in Cross Wedge Rolling*, Proceedings of the 2002 NSF Design and Manufacturing Conference, San Juan, PR, January 5-8. (poster and article)

Tao, Z. and Lovell, M., 2002, *An Improved Friction Model in Material Removal Processes: the Role of Temperature and Coatings*, Proceedings of the 2002 NSF Design and Manufacturing Conference, San Juan, PR, January 5-8. (poster and article)

Lovell, M., 2002, *Integrating Prototyping Into E-Team Products Using N₂TEC*, Keynote Address, NCIIA Annual Conference, Washington DC, March 27. (presentation)

Li, Q. and Lovell, M., 2002, *Experimental Investigation of Internal Defects in Cross Wedge Rolling*, North American Manufacturing Research Conference, West Lafayette, IN, May 21. (presentation)

Tao, Z., and Lovell, M., 2002, *A New Friction Model in Material Removal Processes*, North American Manufacturing Research Conference, West Lafayette, IN, May 23. (presentation)

Avdeev, M. Lovell and D. Onipede Jr., "Study of Misaligned Lateral Comdrive Static Actuators," *Proceedings of the Sixth International Conference on Modeling and Simulation of Microsystems*, San Francisco, California, February 23-27, 2003, pp. 570-573 (2003). (reviewed Abstract and presentation)

Avdeev, M. Lovell and D. Onipede Jr., "Design and Simulation of Microelectromechanical Transducer Using Uncoupled Finite Element Models," *Proceedings of SPIE*, Vol. 4627, pp. 230-238 (2002). (peer reviewed article).

Li, Q., Lovell, M., and Slaughter, W., 2002, *Investigation of the Morphology of Internal Defects in Cross Wedge Rolling*, Metal Forming 2002, Brimingham England, September 18. (presentation)

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- Ning, X., and Lovell, 2002, *Anisotropic Strength Approach for Wear Analysis of Unidirectional Continuous FRP Composites*, ASME/STLE Joint Tribology Conference, Cancun Mexico, October 20. (presentation)
- Li, Qiang and Lovell M. R., 2003, *Optimizing the Cross Wedge Rolling Process*, Proceedings of the 2003 NSF Design and Manufacturing Conference, Birmingham AL, January 5-8. (poster and article)
- I. Avdeev, M. Gyimesi, M. Lovell and D. Onipede Jr., 2001, *Beam Modeling for Simulation of MEMS Transducers Using Strong Coupling Approach*, 6th US National Congress on Computational Mechanics, Dearborn MI, August 1-4. (peer reviewed Abstract)
- Lovell, M., Desai, S., Scafeffer, L., Mickle, M., and Sacre, M., 2003, *Development of a RAPID E-Team Network*, NCIIA Annual Conference, Boston, MA, March 20. (presentation)
- I Avdeev, M. Gyimesi, M. Lovell and D. Onipede Jr, 2003, *Strongly Coupled 3-D Finite Element Formulation for Modeling Microdevices With Dominant Fringing Fields*, 7th US. National Congress on Computational Mechanics, Albuquerque NM, July 27-31. (peer reviewed Abstract)
- Desai, S., Lovell, M., and Badanda, B., 2003, "Design for Manufacture Using a Flexible Decision Tool", International Conference for Production Research, Blacksburg, Virginia, Aug 3-7, 2003. (peer reviewed article)
- Desai, S., Badanda, B., and Lovell, M., 2003, "Engineering and Business Models for Prototyping and New Product Development", *Extended Abstract*, Industrial Engineering Research Conference, Portland, Oregon, May 18, 2003. (presentation)
- Desai, S., Lovell, M., Sacre, M., and Mickle, M., 2003, "Development of the RAPID Network", NCIIA 7th Annual Conference, Boston, MA, March 20-22, 2003. (peer reviewed article)
- Morrow, C. and Lovell, M, *A Solution for Lightly Loaded Adhesive Rough Surfaces With Application to MEMS*, International Tribology Conference, Ponte Verde FL, October 20, 2003. (peer reviewed Abstract)
- Marlin H. Mickle, Michael R. Lovell, Laura Schaefer, Alex Wang, and James T. Cain, "*Three Dimensional Sensing for Environment and Security Control*", IEEE Conference on Systems, Man and Cybernetics, Washington, D.C., October 2003.
- K. Y. Kim, Y. Wang, O. S. Muogboh, M. R. Lovell, B. O. Nnaji, and D. L. Conover, "*Integration of Computer-Aided Assembly Design and Assembly Analysis in e-Design and Realization Environment*," The 17th International Conference on Production Research, Virginia Polytechnic Institute and State Univ., Blacksburg, Virginia, USA, August 3-7, 2003.
- I. Avdeev, M. Gyimesi, M. Lovell and D. Ostergaard, "New Accurate 3-D Finite Element Technology for Solving Geometrically Complex Coupled-Field Problems," *Seventh International Conference on Modeling and Simulation of Microsystems*, Boston, Massachusetts, March 7-11, 2004.
- M. Bails, J. A. Martinez, S. P. Levitan, I. Avdeev, M. Lovell, and D. M. Chiarulli, "Computational Prototyping of an RF MEMS Switch using Chatoyant," *Seventh International Conference on Modeling and Simulation of Microsystems*, Boston, Massachusetts, March 7-11, 2004.
- Lovell, M., and Morrow, C., *Three-Dimensional Contact Analysis of Anisotropic Coated Surfaces*, STLE Annual Conference, May 19, 2004.

Mei, J., Lovell, M., and Petit, F, *Mechanical and Metallurgical Properties of Hot Rolling Ti-6Al-4V Sheets*, Metal Forming 2004, Krakow Poland, September 20, 2004.

Lovell, M., Deshmukh, P., and Yavalek, N., *Towards a fundamental understanding of the Stretch Leveling Process*, Metal Forming 2004, Krakow Poland, September 22, 2004.

Morrow, C. and Lovell, M, *An Extension to a Cohesive Zone Solution for Adhesive Cylinders*, International Tribology Conference, Long Beach CA, October 26, 2004.

Morrow, C. and Lovell, M, *A Solution for Lightly Loaded Adhesive Rough Surfaces With Application to MEMS*, International Tribology Conference, Long Beach CA, October 26, 2004.

Morrow, C., Lovell, M., and Li, P., *Determination Of A Critical Forming Parameter For The Cross-Wedge Rolling Of Tubes*, World Tribology Congress, Washington, DC, WTC2005-63963.

Deshmukh P. and Lovell, M., *On the Friction and Wear Performance of Boric Acid Lubricant Combinations in Extended Duration Operations*, World Tribology Congress, WTC2005-63968.

Deshmukh P., Lovell, M., and Mobely A. J., *Friction and wear performance of surface coatings in brake applications*, World Tribology Congress, WTC2005-63972.

Lovell, M., Higgs, C., and Mobely A. J., *A Novel Particulate-Fluid Lubrication For Environmentally Benign Forming Processes*, World Tribology Congress, Washington, DC, WTC2005-63976.

Framework and Technology for Virtual Assembly Design and Analysis, 2005 IIE Annual Conference (IERC), Atlanta GA, May 14 -18, 2005

Desai S. and Lovell M., "Multiphysics Modeling of a Piezoelectric Bimorph Disc in a Direct Write Fabrication Process", ASME International Mechanical Engineering Congress and Exposition, IMECE2005-82214.

Increasing Formability in Sheet Metal Stamping Operations Using Environmentally Friendly Lubricants, Metal Forming 2006, Birmingham England, September 11-13, 2006.

Development of a Critical Friction Model for Cross Wedge Rolling Hollow Shafts, Metal Forming 2006, Birmingham England, September 11-13, 2006.

Establishment of Failure Conditions for the Cross Wedge Rolling of Hollow Shafts, Metal Forming 2006, Birmingham England, September 11-13, 2006.

Friction Mechanisms in the Cross-Wedge Rolling Metal Forming Process, ASME/STLE Joint Tribology Conference, San Antonio TX, October 23rd-25, 2006.

Development of an Optimum Environmentally Friendly Lubricant for Sheet Forming Processes, ASME/STLE Joint Tribology Conference, San Antonio TX, October 23rd-25, 2006.

Fostering Innovation through Product Realization, NCIIA Annual Conference, Tampa Bay, FL, March 22, 2007.

On the Modeling of Friction in Micromachining Processes, ASME/STLE International Joint Tribology Conference, San Diego, CA, October 23, 2007.

Shoe-Floor Frictional Properties for Varying Sliding Speed, Pressure and Contaminant, ASME/STLE International Joint Tribology Conference, San Diego, CA, October 22, 2007.

Development of a Novel Green Lubricant for Sheet Metal Forming Operation, ASME/STLE International Joint Tribology Conference, San Diego, CA, October 22, 2007.

Granular Flow Modeling and Simulation with Dynamic Finite Element Method, ASME/STLE International Joint Tribology Conference, San Diego, CA, October 24, 2007.

User Guides and Short Course Books Authored:

Structural Nonlinearities Users Guide for Release 5.1, [ANSYS Inc.](#), (Jan. 1996).

ANSYS/LS-DYNA Users Guide for Release 5.3, [ANSYS Inc.](#), (Aug. 1996).

ANSYS/LS-DYNA Users Guide for Release 5.4, [ANSYS Inc.](#), (Sept. 1997).

Explicit Dynamics with ANSYS/LS-DYNA for Release 5.4, [ANSYS Inc.](#), (May 1998).

Explicit Dynamics with ANSYS/LS-DYNA for Release 5.5, [ANSYS Inc.](#), (Sept. 1998).

ANSYS/LS-DYNA Users Guide for Release 5.6, [ANSYS Inc.](#), (Oct., 1999).

Explicit Dynamics with ANSYS/LS-DYNA for Release 5.6, [ANSYS Inc.](#), (Jan., 2000).

ANSYS/LS-DYNA Users Guide for Release 5.7, [ANSYS Inc.](#), (Nov. 2000).

Explicit Dynamics with ANSYS/LS-DYNA for Release 5.7, [ANSYS Inc.](#), (Jan. 2001).

Software Development:

ANSYS/LS-DYNA Explicit (8/96)

Consumer Product Drop Test Module for ANSYS (5/98, 5/01)

Sheet Metal Stamping Module for ANSYS (5/99)

RESEARCH GRANTS AND CONTRACTS

Funded Grants as Principal Investigator

Modeling 3-D Machining Processes for Variable Tool-Chip Interfacial Friction Using Explicit Dynamic Finite Element Techniques, NSF CAREER Program – DMII 9702196, \$416,000, 7/97 – 6/02.

Application of Transient Finite Element Analysis for the Study of Parametric Excitation and Internal Resonance in Nonlinear Systems, Center for Computational Science, University of Kentucky, \$30,000, 7/98 – 6/99.

Customization of ANSYS/LS-DYNA for Manufacturing Processes, ANSYS Inc., \$202,500*, 10/96 – 8/04.

*Cash contribution of grant only. More than \$500,000 in additional in-kind (software) contributions.

Characterization of Failure Mechanisms in Cross Wedge Rolling, NSF - DMII 9900060, \$218,500, 7/99-7/03.

Characterization of Friction in Precision Coated Bearings, SKF Corporation, \$56,660, 9/99 – 5/00.

Improving Finite Element Analysis Techniques: Establishment of the John Swanson Doctoral Fellowship Program, ANSYS Inc., \$164,000, 8/00-7/04.

Establishment of a Microsystem Fabrication Industry Cluster, Heinz Endowments, \$900,000, 1/01-12/04

Thermal Analysis of Aircraft Windshields, PPG Glass Technology Research Center, \$25,000, 1/1/02-7/30/02.

Towards Manufacturing Micro and Nano-Scale Devices, Provost's Research Infrastructure Grant, \$500,000, 1/1/02-12/31/02.

Analysis and Data Acquisition of Dynamic Impact Tests of Hard Hats, Mine Safety Appliance, \$25,600, 1/01-12/01.

Engineering the Future through Product Innovation, McCune Foundation, \$200,000, 8/01- 7/02.

Advanced Research in Biomedical Microsystems: Establishment of the Respiroincs Graduate Fellowship Program, Respiroincs Inc., \$50,000, 8/01-7/02.

Undergraduate Program in Product Realization: Fostering Innovation from Concept to Commercialization, National Collegiate Inventors and Innovators Alliance, \$20,700, 1/01-12/01.

Optimization of the Titanium Sheet Fabrication Process, NSF-SBIR Phase 1, \$100,000 (University Portion \$33,300), 1/02-12/02. (University PI with ART Inc.)

Creation of an E-TEAM Rapid Prototyping Network, National Collegiate Inventors and Innovators Alliance, \$50,000, 1/02-8/02.

E-Team to Develop an Oxygen Flow Indicator for Oxygen Transport, National Collegiate Inventors and Innovators Alliance, \$13,085, 1/02-5/02.

Seamless Integration of Information Devices: A Focus on Emerging Technologies in New Product Development, NSF – CRCD, \$452,000, 9/1/02-8/31/05.

E-Team to Develop the Wee-Know Child Location System, National Collegiate Inventors and Innovators Alliance, \$14,800, 9/02-1/03.

Free Space Printing of Conductive Micro and Nano Particles, PPG Glass Technology Research Center, \$ 114,828, 10/15/02-8/31/03.

Development of an Ethylene Oxide Sensing System Using Micro-Coating Technology, ChemDaq Corporation, \$99,369, 4/1/03-10/31/03.

An Automated Silicon Passivation Facility, Agilent Technologies, \$750,000, 4/30/03 (Research Equipment Grant).

Development of a Boundary Element Approach for the Design and Analysis of Complex MEMS Devices, \$40,000, SCMNS Competitive Research Program, 7/1/03-6/31/04.

Establishment of the Technology Adoption Grant Fund, \$500,000, Innovation Works, 7/1/04-6/30/05.

Tribological Analysis and Optimization of a Brake Valve Assembly, \$40,686, Wabtec Inc., 11/1/03-8/31/04.

Modeling, Simulation and Optimization of a Precision Ink Jet Microvalve, \$110,756, Matthews International, 9/1/04-8/31/05.

Development of Advanced Non-Brick Elements for Highly Nonlinear Finite Element Analysis, \$102,240, ANSYS Inc., 9/1/04-8/31/05.

Manufacturing Hollow Transmission Shafts With Cross Wedge Rolling, NSF, \$33,290, 7/1/05-6/30/06.

Bringing Innovative Design into Urban High Schools on a Sustainable Basis: University of Pittsburgh Design Team RET Site, NSF, \$428,667, 5/15/05 – 4/30/08.

In Situ Holder Assembly Analysis Using Advanced FEM Techniques, Air Force Office of Research SBIR Phase II, \$78,163, 1/1/05-12/30/06.

Center for e-Design: IT Enabled Infrastructure and Technology, NSF IUCRC Program, \$430,680, 7/1/04-6/30/08.

Product Realization for Global Opportunities, National Collegiate Inventors and Innovators Alliance, \$36,300, 9/1/06-12/31/07.

Institute for Advanced Energy Studies, U.S. Department of Energy – National Energy Technology Laboratory, \$5,827,447, 05/14/07 – 10/31/09.

Inside the Nuclear Plant: A Visual Inspection, U.S. Department of Energy, \$96,327, 09/01/07 – 08/31/08.

Expanding the RAPID Network, National Collegiate Inventors and Innovators Alliance, \$25,000, 07/01/07 – 06/30/08.

A Comprehensive Response to Regional Workforce and Technology Development Opportunities in Power & Energy, PA Department of Community and Economic Development, \$250,000, 07/01/07 – 06/30/08.

Developing a Regional Power and Energy Initiative, Heinz Endowments, \$300,000, 09/01/07 – 08/31/10.

Connecting Research and Teaching Through Product Realization: The Pittsburgh Quality of Life RET Site, NSF, \$489,700, 5/1/08-4/30/11.

An Investigation of Filter Cake Formation on a Porous Rock: Modeling and Experiments, Department of Energy, \$368,984, 2/15/08-2/14/10.

Funded Grants as Co-Principal Investigator

Lightweight Heat Exchanger Program, Truax Engineering, \$50,000, 9/98-8/99, **Co-PI** (PI Dr. Alan Male – University of Kentucky).

Simulation for Advanced Product Development and Manufacturing, DOE – GAANN Program, \$583,619, 8/00-7/02, **Co-PI** (PI Dr. Keith Rouch – University of Kentucky).

Development of a Multi-Disciplinary Fellowship Program in Product Realization, Department of Education GAANN Program, \$306,000, 8/01-7/03, *Research Director* (PI M. B. Sacre)

Entrepreneurship Awareness and Education Grant Initiative, Coleman Foundation, \$25,000, 1/01-12/01, **Co-PI** (PI Dr. Larry Shuman)

Commercialization of JackHeat, NCIIA, \$16,800, NCIIA, 9/01-8/02, **Co-PI**, (PI Dr. Laura Schaefer)

SOC Frequency Synthesis and Control for Radio Frequency Communication: Development of Novel Hardware and Design Flow, Pittsburgh Digital Greenhouse, \$288,829, 1/02-12/03, **Co-PI** (PI Dr. W. Clark)

National Technology Transfer and Commercialization Network, NSF Partnership for Innovation, \$750,000, 1/01-12/05, **Co-PI** (PI Kathy Allen – University of Southern California).

Development of A Continuous Ink Jet Print Head, Matthews International, \$232,667, 5/15/02-11/15/02, **Co-PI** (PI Dr. Marlin Mickle).

Pitt Engineers in Education Program (PEEP), Department of Education – Minorities in Education Program, \$560,000, 10/1/02-9/30/05, **Co-PI** (PI Sylvanis Wosu)

Establishment of the Center for Micro and Nano Systems, SOE Center Competition, \$1,400,000, 9/1/02—2-8/31/07, **Co-PI** (PI James T. Cain and Co-PI Marlin H. Mickle)

Blink Right for Healthy Eyes, NCIIA, \$12,150, 5/1/03-12/31/03, **Co-PI** (PI Marlin Mickle).

Re-design of a Continuous Ink Jet Print Head, Matthews International, \$35,422, 5/15/03-11/15/03, **Co-PI** (PI Dr. Marlin Mickle).

A Direct University/ Industry Interface for Research and Economic Development, \$252,000, Ben Franklin Technology Development Authority, 5/1/04-1/1/05, **Co-PI** (PI James T. Cain and Co-PI Marlin H. Mickle).

Manufacturing Passive RFID Tags, \$50,000, SSI Inc., 1/1/05-6/30/06 **Co-PI** (PI Marlin Mickle).

Development of a Novel Sensors for Nuclear Environments, Bechtel Bettis, \$120,236, 7/1/05-12/31/05 **Co-PI** (PI Roy Marangoni).

Towards a Science of Innovative Design, NSF, \$160,000, 9/1/06-8/31/08. **Co-PI** (PI Chris Schunn)

MOD: Design Tools to Cognitive Processes to Innovation, NSF, \$373,985, 01/01/08 – 12/31/09. **Co-PI** (PI Chris Schunn)

Predicting the Tribological Fragmentation Process when Drilling into HPHT Rocks for Oil Production Using Discrete and Continuum Methods, Department of Energy, \$477,544, 2/15/08-2/14/10 **Co-PI** (PI J.S. Lin)

Pending Grants

Machinability of Bulk Metallic Nanomaterials: Elucidating the Mechanics of Material Removal and Surface Generation, NSF, \$381,483. **Co-PI** (PI Ravi Shankar)

Development of Bulk NanoMaterials: Consolidation of Nanostructured Particulates from Modulated Machining, NSF, \$360,043. **Co-PI** (PI Ravi Shankar)

In Situ Particulate-fluid Lubrication for Green Metal Forming: Experiments, Modeling, and Simulations, NSF \$163,124. **PI**

ERC: EPIC – Engineering the Process of Innovation Center, NSF, \$14M. **Pitt PI**. Lead Institution CMU (PI Jon Cagan).

ERC: Revolutionizing Metallic Biomaterials, NSF, \$14M. **Pitt Co-PI**. Lead Institution NC &T (PI Jag Sankar)

GRADUATE STUDENT SUPERVISION

Service As Thesis/Dissertation Director - Completed Graduate Students

Yaomin Dong, **PhD**, *A Numerical, Experimental, and Phenomenological Investigation of Cross Wedge Rolling*, (degree 8/98).

Keiyun Mei, **PhD**, *Explicit Dynamics Finite Element Analysis for Parametrically Excited Motion of a Cantilever Beam*, (degree 5/00).

Zhenhua Tao, **PhD**, *Friction Analysis and Modeling in Metal Cutting at Elevated Temperatures*, (degree 12/02).

Xinguo Ning, **PhD**, *Analysis of Tribological Behavior in Transversely Isotropic Materials Utilizing Analytical and Finite Element Methods* (degree 12/02)

Qiang Li, **PhD**, *Characterization of Failure Mechanisms in Cross Wedge Rolling*, (degree 5/03).

Ilya Avdeev, **PhD**, *New Formulation for Finite Element Modeling Electrostatically Driven MEMS Systems* (12/03).

Clint Morrow , **PhD**, *Adhesive Rough Surface Contact for MEMS Applications*, (12/03).

Salil Desai, **PhD**, *CFD Analysis and Optimization of 3D Nanofabrication technology*, (8/04)

Junfeng Mei, **PhD**, *Formulation and Processing of Conductive Inks for Inkjet Printing Electrical Circuit*, (12/04)

Khaled Bataineh, **PhD**, *In Situ Holder Assembly Analysis Using Advanced FEM Techniques* (12/05)

Roxana Cisloiu, **PhD**, *Developing of Novel Tetrahedral Element for Metal Forming Applications* (2/06)

Serge Sidirov, **PhD**, *Finite Element Formulation of a nonlinear inelastic multi-mechanism model for cerebral arteries with application to balloon angioplasty* (2/07)

Nakeeran Narasimhan, **MS**, *Springback Prediction in Sheet Metal Forming: An Implicit – Explicit Finite Element Approach*, (degree 5/98).

Benjamin Miller, **MS**, *Finite Element Modeling of Polymer Foams Under Transverse Loading*, (degree 5/98).

Someswararao Surapureddi , **MS**, *FEA of Contact Forces In Orthogonal Machining*. (degree 8/98)

Ruxue Zheng, **MS**, *Analysis of Cutting Tool Coatings Using Explicit Dynamic FEM: The Effect of Coating Materials on Stresses*. (degree 5/99)

Fang Du, **MS**, *Boundary Element Analysis of Temperature Fields in Cutting Tool Inserts With Thin Layer Coatings*. (degree 5/99)

Clint Morrow, **MS**, *Contact Analysis of Transversely Isotropic Coatings*. (degree 5/99)

J. Thomas Heninger, **MS**, *Development of a Sheet Metal Stamping Module for ANSYS/LS-DYNA*. (8/99)

Fadi Al-Chammas, **MS**, *Characterization of Stress and Deformation in Cross Wedge Rolling*. (degree 8/99)

Sudin Bhattacharya, **MS**, *An Experimental Study of Sliding Friction Involving Coated and Uncoated Tools with Application to Machining*. (degree 8/99)

Chris Cogdon, **MS**, *Finite Element Analysis of an Anastomotic Stent*. (degree 8/99)

Hongmei Ma, **MS**, *Numerical Analysis of Machining with Coated Cutting Tools*. (degree 8/00)

Hui Xiong, **MS**, *Experimental Characterization of Slip Failure in CWR*. (degree 8/00)

Sarkis Juvelekian, **MS**, *Volumetric Mass Flow Sensor For CPAP*, (degree 5/02)

Matt Yagodich, **MS**, *Numerical Analysis of Thin Shelled Structural Panels*, (degree 5/03)

Doreen Jacob, **MS**, *Electrical Stimulation of Muscles with Application to Facial Paralysis* (degree 4/04)

Steve Heston, **MS**, *Linear Quadrapole Focusing for High Resolution Microdroplet Based Fabrication* (degree 5/05)

Andrew Martin, **MS**, *Product Development and Optimization of a Finite Element Shell Extraction Module* (degree 5/05)

Steven Hackworth, **MS**, *Proof of Concept Design for a Remotely Powered Deep Brain Stimulation Device* (degree 8/05). Co-advisor with Marlin Mickle.

Sandeep Urankar, **MS**, *Cross Wedge Rolling of Tubes* (8/06).

Current Graduate Students:

<u>Student</u>	<u>Degree</u>	<u>Graduation</u>	<u>Research Topic</u>
Reza Allazadeh	PhD	5/08	Void Formation and Crack Growth in Tube Forming
Jim Cordle	PhD	8/08	PZT Beam Modulators for Ink-Jet Printing
Yu Wang	PhD	12/08	Innovation Tool Development for Designers
Pushkar Deshmukh	PhD	5/08	Developing Holder Assemblies for Nanocharacterization
Sandeep Urankar	PhD	5/08	Intra-Heart Surgical Tool for Mitral Valve Prolapses
Brandon Grainger	MS	5/09	e-Design Tools of Power Engineering

Post-doctoral researchers.

<u>Name</u>	<u>Dates</u>	<u>Topic</u>
Dr. Zhi Deng	12/98-4/01	Sheet Metal Stamping and Cross Wedge Rolling
Dr. H. Yang	8/01-7/02	Advanced Design and Prototyping
Dr. Clint Morrow	1/04 – 8/04	Helmet Impact Analysis
Dr. Zhoachun Yang	12/04-12/05	Advanced Finite Element Methods
Dr. Aslam Kabir	10/06-present	Computational Tribology

Undergraduates supported on sponsored research

<u>Student</u>	<u>Dates</u>	<u>Topic</u>
Josh Fabian	5/00-12/00	Cross Wedge Rolling
Derek Knight	5/01-4/02	Design and Rapid Prototyping
Joe Berger	5/01-4/02	Rapid Manufacturing

Mark Campbell	8/01-4/02	Precision Manufacturing
Jared Schonely	10/01-8/02	Machining Processes
Laura Hansen	8/05-08/07	Development of Vascular Testing System
Eric Vogel	6/06-9/06	Environmentally Benign Forming
Kaleigh Muller	5/07-present	Innovative Design
Aaron Wysocki	1/07-present	Rapid Manufacturing

Service on Advisory Committee

<u>Student</u>	<u>DEGREE</u>	<u>Date</u>	<u>Student</u>	<u>DEGREE</u>	<u>Date</u>
H.S. Kwak	PhD	9/96	Ravi Alapati	MS	5/99
G. Knowles	MS	10/96	David White	MS	7/99
Kuiyun Mei	MS	8/97	A. K. Balaji	PhD	12/00
Vinay Abbaraju	MS	6/98	P.X. Li	PhD	12/00
Vic Chia	MS	10/98	Kuen Chee EE	PhD	5/01
Gerish Sreeram	MS	10/98	Obinna Muogboh	MS	4/01
Vijay Kulkarni	MS	12/98	Kyoung-Yun Kim	PhD	4/03
Xiaoqing Ge	MS	3/99	Salil Desai	MS	4/01
David Word	MS	4/99	Carlos Gomez	MS	8/01
Minhong Mi	PhD	5/04	Brian Ennis	MS	8/02
Jay Oppenheim	MS	8/02	David Helmick	PhD	8/03
Obinna Muogboh	PhD	1/03	Matt Palamara	MS	4/04
Joshua Maina	PhD	12/04	Amer Momani	PhD	8/05
Jose Gonzalez	PhD	5/05	Charlie Greene	PhD	5/06
Joe Hines	PhD	5/07	Leo Mats	PhD	5/07
Brad Golish	PhD	5/07			

COURSE AND CURRICULUM DEVELOPMENT

New Course Development - University of Kentucky

ME 406: Computer Aided Design and Analysis - Introduced Spring 1997

A study of graphical computer design and analysis techniques currently used in component design and new product development. Computer-Aided Design (CAD) and Finite Element Analysis (FEA) modeling is emphasized utilizing the commercial software codes Pro/ENGINEER and ANSYS. Topics include sketching, datum construction, assemblies, primitives, boolean operations, data export, meshing, boundary conditions, solution techniques, and postprocessing. Complex structural, dynamic, heat transfer, fluid dynamic, and nonlinear problems are solved.

New Course Development - University of Pittsburgh

ENGR 1050: Product Realization - Introduced Spring 2001

This interdisciplinary course considers the diverse aspects of the product realization process which includes: 1) defining user requirements, 2) the creation of a computer based model and designs of a product from an existing product, 3) rapid prototyping techniques, and 4) the development of a manufacturing plan. Working in multidisciplinary design teams (3-4 students) from engineering and business, students take a product from concept to working prototype. In doing this, they address issues of market analysis, prototype design, design for manufacture, and production planning. The course culminates in a final presentation of a business plan and working prototype to a panel consisting of individuals from industry and academia. Successful students receive a minimum of \$2,500 from the Pitt Venture Fund to be used to complete ENGR 1051 below.

ENGR 1051: Business Plan to Product Implementation - Introduced Summer 2001

This independent study course allows selected design teams (via the competitive judging process of Product Realization) to advance their product ideas to potential commercialization. Each student team begins with their business plan and working prototype. They are then given a minimum of \$2,500 to further develop their product, perform a market analysis, and/or file for a patent. The mini-venture capital fund has been established by generous gifts from our alumni and the NCIIA.

IE 1087 Finite Element Analysis in Product Design – Introduced Spring 2006

This course investigates the growing trend of utilizing virtual design and analysis tools in the product development process. A brief overview of the product development process will be given, with particular emphasis on the role of virtual prototyping techniques. In this regard, the underlying theory of the finite element method will be demonstrated through the fundamental concepts of meshing, material models, stiffness matrices, loading and boundary conditions, and the generation of stress and displacement results. In addition, utilizing the commercial finite element software package ANSYS, potential consumer products will be virtually analyzed in an effort to rapidly change and obtain feedback on specific design solutions.

New Curriculum Introduced - University of Pittsburgh

Certificate Program in Product Realization

To improve engineering education in the areas of design, manufacturing, and product creation, a new *Certificate Program in Product Realization* was established. The program consists of an innovative curriculum that includes courses in both the Schools of Engineering and Business. This integrated curriculum, which includes nine, highly specialized courses, takes advantage of the state-of-the-art facilities and research activities of the *Swanson Center for Product Innovation*. The certificate program was designed to enable any of our 1660 undergraduate engineering students, as well as qualified students in the College of Business Administration with an interest in new product development to participate. Students take a total of four courses to include at least one business course, two engineering courses and a capstone product realization course. To date, 20% of the undergraduate students within the School of Engineering have participated in components of the program.

ADMINISTRATIVE ACTIVITIES

Director, Swanson Institute for Technical Excellence (SITE), September 2002-present

Founder and Executive Director, Swanson Center for Product Innovation (SCPI), May 2000-2003.

Co-Founder, Swanson Center for Micro and Nano Systems (SCMNS) September 2002

Responsibilities Included:

- Administration of research and teaching facilities with operating budget exceeding \$1,000,000 per year.
- Manage and coordinate the efforts of ten full-time technical staff, four graduate fellows, numerous undergraduate students, and more than twenty participating faculty.
- Interface with the industrial and academic sectors to foster economic growth and technology transfer.

Major Accomplishments:

- Developed the Business Plans for the SCPI and the SCMNS
- Creation of an Organizational and Cost Structure for the SCPI
- Creation of SITE External Advisor Board
- Introduction of Product Realization Certificate Program
- SCPI was Named the Official Academic Product Development Center for the NCIIA, N2TEC, Campus Ventures (Manchester England), and the RAPID Network
- Executed more than 500 projects with more than 100 different companies
- Executed more than 100 Industry Sponsored Student Projects
- Executed and Supported more than 30 Research Projects with expenditures totally more than \$7.5M
- 5 Student projects have been awarded National Honors or won National Competitions
- 8 companies have been started through SITE research activities
- Over 20 patent applications have been filed from SITE research
- External survey reported that the SCPI activities have resulted in more than 200 new or reengineered products, the creation of nearly 250 jobs, and resulted in more than \$12M of new company revenue.

Associate Dean for Research, School of Engineering, 2003-present.

Responsibilities Include:

- Managing the Schools Research Activities and Expenditures that exceed \$62M.
- Developing an infrastructure that enhances the research activities of the School of Engineering
- Facilitating Multi-Disciplinary Research Collaboration with researchers both inside and outside the University of Pittsburgh.
- Providing support and facilitating the writing of large, multi-million dollar research proposals.
- Identifying and investing in research programs that have significant potential to become centers of excellence.
- Work with Foundations, Industry, Alumni, and Federal, State, and Local government agencies to obtain funding for research initiatives within the School.
- Chairing of the Schools Research Space, Graduate Recruiting, and Web Site Committees.
- Coordinate the renovation of Benedum Engineering Hall, \$62M project from 2006-2009.

Major Accomplishments:

- Helped increased the Schools Research Expenditures by more than 45% over four years
- Led the Schools writing of twelve large center proposals to NSF, NIH, and the Department of Defense
- Hosted the Schools Inaugural Graduate Recruiting Weekend.
- Establishment of Power and Energy Initiative
- Established Seed Grant Programs for Research in Micro and Nano Technology.
- Oversaw the launching of the RFID Center for Excellence in September 2006 and Center for Sustainable Transportation in July 2007.

Director, NSF UICRC Center for e-Design 2006-present

Responsibilities Include:

- Leading research activities of five Universities (Pittsburgh, Virginia Tech, Carnegie Mellon, Univ. Massachusetts, and Univ. Central Florida) and twenty two member companies
- Developed research roadmap and operating procedure for e-Design Center
- Maintain website and coordinating large research initiatives among Center participants

PROFESSIONAL SERVICE ACTIVITIES

Society Membership

1997 - 2003 Society of Manufacturing Engineers (Chapter S276 Faculty Advisor 8/97-12/00)
1986 - present American Society of Mechanical Engineers
2001 - present American Society of Engineering Education
2006 - present Institute of Industrial Engineers

Editorial Activities

2003 – present Associate Editor, ASME Journal of Tribology
1999-2002 *Scientific Committee*, Transactions of the NAMRI

Served as Reviewer for the Following Journals

International Journal of Materials Processing Technology
Journal of Machining Science and Technology
Journal of Wear
Journal of Engineering Tribology
Numerical Methods in Design and Analysis
ASME Journal of Manufacturing Science and Engineering
International Journal of Machine Tools and Manufacture
International Journal of Advanced Manufacturing Technology
International Journal of Mechanical Sciences
ASME Journal of Tribology
ASME Journal of Mechanical Design
STLE Tribology Transactions
Tribology International
NAMRI Transactions
ASEE Journal of Engineering Education
Computer Methods in Biomechanics and Biomedical Engineering
Surface Coatings and Technology
Solids and Structures
Journal of Material Science A
Journal of Colloids and Solids
Journal of the Franklin Institute
Thin Solid Films

Proposal Review Activity

NSF Review Panels:

Design Manufacturing and Industrial Innovation, Manufacturing Equipment and Machines, June 1998.
Civil and Mechanical Systems, Computational Mechanics and Materials, June 1998.
Design Manufacturing and Industrial Innovation, Manufacturing Equipment and Machines, June 1999.

Information Technology Research, March 2001
Design Manufacturing and Industrial Innovation, Net Shape Manufacturing, December 2001.
Design Manufacturing and Industrial Innovation, Net Shape Manufacturing, December 2002.
Nanotechnology Education, February 2004.
Department Level Reform, April 2004
Research Experience for Teachers, August 2007

Civilian Research and Development Foundation

Innovative R&D Program, May 2001
Innovative R&D Program, October 2001

National Collegiate Inventors and Innovators Alliance

Curriculum Grant Review, May 2001
NCIIA External Review Committee, October, 2001
Advanced E-Team Grant review, January 2002, June 2002, January 2003, June 2003, January 2004, June 2004, January 2005, June 2005, January 2006, June 2006

United States/Israel Binational Science Foundation

Advanced Research Program Review, March 2003

Conference Organization and Service:

ASME/STLE International Joint Tribology Conference Session Chair (1995, 1996, 1998-2003)
ASME/STLE International Joint Tribology Conference Planning Committee (2003-present)
NCIIA Annual Conference – Panel Organizer for Rapid Prototyping (2001-2003)
CIRP Workshop on Machining (1998)
ANSYS Conference and Exhibition (1994, 1996)
NAMRC Scientific Committee (1999-2002)
International Metal Forming Conference Scientific Committee (2006-present)

National Committee Activities

Director and Chair, RAPID - National University Design Prototyping Service Network
Executive Board, N²TEC – National Network for Technology, Entrepreneurship, and Commercialization
External Advisory Board, National Collegiate Inventors and Innovators Alliance
ASME Research Committee on Tribology (Secretary 2004-2006, Vice Chair 2007-present)

University Committee Activities

1. *College of Engineering, University of Kentucky* - College of Engineering Review Committee (1999)
2. *Mechanical Engineering Department, University of Kentucky*
 - Manufacturing Curriculum Committee
 - Computer Curriculum Committee
 - Manufacturing Faculty Search Committee
 - Paducah Faculty Search Committee
3. *Center for Robotics and Manufacturing Systems, University of Kentucky*
 - CRMS Deployment Committee
 - CRMS Computer and Software Evaluation Committee
 - CRMS Newsletter Committee
 - Masters in Manufacturing Systems Curriculum Committee
4. *Mechanical Engineering Department, University of Pittsburgh*

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- Lab Committee, *Chair* (2000-2002)
 - Graduate Studies Committee (2000-2002)
5. *Industrial Engineering Department, University of Pittsburgh*
- Graduate Studies Committee (2004-present)
6. School of Engineering, University of Pittsburgh
- Chair, Research Space Committee (2004-present)
 - Chair, Web Site Committee (2004-present)
 - Chair, Graduate Recruiting Weekend Committee (2004-present)
 - Benedum Hall Renovation Core Team Leader (2006-present)
7. *University of Pittsburgh*
- Provost's Technology Commercialization Alliance (2001-present)
 - University Research Council (2004-present)