

Curriculum Vitae of Ronald A. L. Rorrer
Associate Professor of Mechanical Engineering
University of Colorado at Denver

Education

Institution	Date	Degree	Major
V.P.I. & S.U. (a.k.a. Virginia Tech),	1991	Ph. D.	Mechanical Engineering
V.P.I. & S.U.	1985	M.S.	Mechanical Engineering.
V.P.I. & S.U.	1984	B.S.	Mechanical Engineering

Professional Experience

Registered Professional Engineer PE-30616 in the State of Colorado.

US Patent 6,296,588, *European Patent* EP1185470, *High temperature flexible thermoplastic composites for endless belt driving surfaces”*

Associate Professor of Mechanical Engineering and Director of Motorsports, University of Colorado at Denver, August 1997- Present, Denver, Colorado

My main area of focus has been in the area of solid mechanics, encompassing mechanical design and analysis. I have worked with polymers and composites for over 20 years, in material testing, selection, and development, as well as product design and failure analysis. My background also includes work in tribology (friction and wear), friction-induced vibration, vibration and noise. I have worked with MEMS and optical laser systems at NIST in Boulder. I also have worked in biomechanics with the Denver Veterans Administration Medical Center. I teach in the design and solid mechanics area of mechanical engineering. I have taught courses in mechanical design, senior design projects, finite element analysis, solid modeling, vibrations, tribology, polymers and composites, biomechanics, dynamics and mechanisms. I am the lead instructor of the two course Senior Design I and II capstone design courses where mechanical engineering students design a project in fall and build it in spring. I have a textbook that is on the second edition entitled “Mechanical Design with Polymers and Composites” and teach a course based upon the book.

I am currently Director of Motorsports for our new master’s of motorsports program in Mechanical Engineering at the University of Colorado Denver.

I have consulted on product design and development projects, as well as failure analysis of components. I consult with both corporations and individuals on inventions, both before and after patent application submittal and also plaintiff and defendant cases of patent infringement. Particular consulting of note that I have performed is manufacture of next generation first responder faceshields for a company that has a contract with the Department of Homeland Security and review written reports of the Deep Water Horizon incident for the U.S. Chemical Safety and Hazard Investigation Board (CSB). I have consulted on legal cases for both plaintiff and defendants. I have also been deposed and have testified in court.

President, Principle Engineering, 2004-2007

I was president of a consulting company that provided engineering design, analysis and data acquisition.

Consultant, NIST (National Institute of Standards and Technology), Summer of 2002 and 2003 Boulder, Colorado.

The research that I have performed with NIST has ranged from the tribology of welding wire to the work in the calibration of bio-MEMS devices with the Atomic Force Microscope. I also helped design and construct an optical laser trapping device.

President, Golden Analysis and Design, 1994-2003

I was president of a consulting company that provided engineering design, analysis and forensic engineering services.

Technical Specialist and Visiting Professor, Defiance Engineering & Testing, Summer 2000, Troy, Michigan.

I spent the summer working with Defiance (at the time one of the largest automotive vibrations testing company) modeling and testing plastic instrument panel materials for friction-induced vibration characteristics.

Loctite Fellowship, Loctite Corporation, Summer 1998, Hartford, Connecticut.

Along with 5 other faculty, I spent a portion of the summer at Loctite covering the technical details of their adhesive product line.

Advanced Technology Project Leader, Advanced Material Research Group-Core Technologies Department, August 1993 – August 1997, Adhesives and Lubricants Development, January 1992 - August 1993, The Gates Rubber Company, Denver CO

I was responsible for technical and administrative project management on research and development projects worldwide. The projects that I worked on were typically technical performance hurdles that are either impacting current product sales or were anticipated to impact future business. Additionally, I had developed and managed a tribology laboratory responsible for research and development in the areas of friction, wear, and noise. My technical background from this experience is strong in the development, processing, mechanics, and dynamics of polymeric (thermoset and thermoplastic) materials and products. I received a Gates Technological Award from the company for my work in the measurement of adhesion.

Adjunct Professor of Engineering, University of Colorado at Denver, 1995-1997.

I taught Mechanical Design and Design with Composites.

Adjunct Assistant Professor of Engineering, Colorado School of Mines, 1994-1997.

I taught Mechanical Design and Tribology.

Graduate Associate, Management Systems Laboratory, Virginia Tech, Blacksburg, VA, August 1991-December 1991

Involved in a Department of Energy project, training new Department of Energy college graduates in the fundamentals of mathematics, engineering, and physics.

Industrial Technical Assistant, Promatec, Inc., Blacksburg VA
May 1989 -December 1990 (Concurrent with Ph. D.)

I was involved in the development of a laboratory manufacturing process simulation instrument for polymer and composite materials. Additional work included contract/consulting work on proprietary processing methods and materials for automotive brakes.

Precision Mechanical Design Engineer, Martin Marietta, Orlando, FL,
January 1986-August 1987

My primary responsibilities were redesign and technical support of "Hellfire" anti-tank missile. The position also entailed troubleshooting support of production line and failure analysis of mechanical components.

Publications

Refereed Publications

- 2012 Zirbel, S., Curtis, S., Bradshaw, R., Duffield, L., Teichert, G., Williams, N., Rorrer, R., Magleby, S., and Howell, L., "Bi-Behavioral Prosthetic Knee Enabled by a Metamorphic Compliant Mechanism," **Advances in Reconfigurable Mechanisms and Robots I Springer London**, pp. 401-409. Best Paper Award-2nd ASME/IFTOMM International Conference on Reconfigurable Mechanisms and Robots, REMAR 2012, Tianjin China (Best Paper Award)
- 2010 Seibold, L. K., Rorrer, R. A. L., Kahook, M. Y. "MRI of the Ex-PRESS stainless steel glaucoma drainage device", *Br J Ophthalmol*, 2010
- 2004 Sifka, A. J., Panchawagh H., Mahajan, R. L., Finch, D., Rorrer, R. A. L., "Static And Quasi-Static Calibration Of A Bio-Mems Device", *Biomed Sci Instrum.*, 2004, vol. 40, pp. 429-34.
- 2003 Padilla, T. M., Quinn, T. P., Munoz, D. R., Rorrer, R. A. L., "A Mathematical Model of Wire Feeding Mechanisms in GMAW," *Welding Journal*, 2003, pp. 100-109.
- 2002 Rorrer, R.A.L., Juneja, V. "Effect of Friction-Velocity Relations and System Properties on Friction-Induced Vibration and Noise Response of IP Material Pairs," *Tribology International*, 2002, pp. 523-531.
- 2000 Rorrer, R. A. L., Brown, J. C., "Friction-Induced Vibration of Oscillating Multi-Degree of Freedom Polymeric Sliding Systems," *Tribology International*, Vol. 33, No.1 , 2000, pp. 21-29.
- 2000 Rorrer, R. A. L., "A Historical Perspective and Review of Elastomeric Stick-Slip," *Rubber Chemistry and Technology*, 2000, pp. 486-503.
- 1999 Welch, S. W. J, Rorrer, R. A. L., and Duren Jr., R. G., "Application of Time Based Fractional Calculus Methods to Viscoelastic Creep and Stress Relaxation of Materials," *Mechanics of Time-Dependent Materials*, Vol. 3, No. 3, 1999, pp. 277-301.
- 1995 Rorrer, R. A. L., and Eiss, N. S. Jr., "Frictional Oscillations in Wet and Dry Elastomeric Sliding," *Tribology Transactions*, Vol. 38, No. 2, April 1995, pp. 323-328.

- 1988 Rorrer, R. A. L., Mabie, H. H., Eiss, N. S. Jr., and Furey, M. J., "The Wear and Friction of Polyvinyl Chloride Coatings Under Fretting Conditions," STLE Transactions (now Tribology Transactions), Vol. 31, No. 1, 1988, pp. 98-104.

Publications in Refereed Symposia Proceedings

- 2012 Zirbel, S., Curtis, S., Bradshaw, R., Duffield, L., Tiechert, G., Williams, N., Rorrer, R., Magleby, S., and Howell, L., "Bi-Behavioral Prosthetic Knee Enabled by a Metamorphic Compliant Mechanism," The Second ASME/IEEE International Conference on Reconfigurable Mechanisms and Robots, (ReMAR 2012), 9-11 July 2012, Tianjin, China, pp 401-410.
- 2011 McClelland, B. and Rorrer, R.A.L., "Meso-Scale Oil Condition Sensor," Proceedings of the ASME 2011 International Mechanical Engineering Congress & Exposition, IMECE2011-65329, November 11-17, 2011, Denver, Colorado, USA
- 2011 Browne, J. D. and Rorrer, R. A.L., "Fracture Strength of Laser Etched Glass," Proceedings of the ASME 2011 International Mechanical Engineering Congress & Exposition, IMECE2011-64914, November 11-17, 2011, Denver, Colorado, USA
- 2011 Gallagher, D. and Rorrer, R. A.L., "Incorporation Of Manufacturing Process Design Into The Senior Capstone Design Course," Proceedings of the ASME 2011 International Mechanical Engineering Congress & Exposition, IMECE2011-65333, November 11-17, 2011, Denver, Colorado, USA
- 2005 Rorrer, R.A. L., Knight, D., Sanders, R., "Tapping Hidden Talent" Proceedings of the 2005 American Society for Engineering Education Annual Conference & Exposition, www.asee.org/acPapers/2005-875_Final.pdf
- 2003 Castro, F., Rorrer, R. A. L., Blake, D. J., Scott, D. D., Kennedy, P., Hearty, T., Fitzgerald, S., "Measurement Of Upper Extremity Performance As A Function Of The Seating System: A Comparison On People With Multiple Sclerosis", RESNA '03 (CD-ROM Based, thus no page numbers)
- 2003 Blake, D. J, Fitzgerald, S. G., Kennedy, P.M., Scott, D. D., Rorrer, R. A. L., "Fatigue And Perceived Exertion In Patients With Multiple Sclerosis In Custom Vs. Off-The-Shelf Seating Systems", RESNA '03 (CD-ROM Based, CD-ROM Based, thus no page numbers)
- 2002 Padilla, T.M., Quinn, T.P., Munoz, D.R. and Rorrer, R.A.L. . "A Mathematical Model of Wire Feeding Mechanisms in Gas Metal Arc Welding", American Society of Metals – Trends in Welding Research International Conference, Pine Mountain Georgia, April 2002, pp. 363-368.
- 2002 Lahaie, H.C., Rorrer, R.A.L., Blake, D.J., Kennedy, P., "Relationship of Wheelchair Pushrim Forces and Pressures at the Body-Seat Interface in Manual Wheelchair Users," RESNA '02, 2002, pp. 348-350.
- 2002 Rowley, A., Lahaie, H.C., Blake, D.J., Rorrer, R.A.L., Kennedy, P., "Effect of Gloves on Wheelchair Pushrim Kinetics in a Heterogeneous Population," RESNA '02, 2002, pp. 345-357.
- 2001 Rorrer, R. A. L., Blake, D. J., Kennedy, P., Steele, J. P. H., Lahaie, H. C., "Dynamic Pressure Measurement At The Body-Seat Interface During Wheelchair Propulsion," RESNA '01, 2001, pp. 295-297.
- 2000 Rorrer, R. A. L., Blake, D. J., Steele, J. P. H., Kennedy, P., Wise, T. A., Schwartz, D. O., "Time Dependent Response of Wheelchair Seating," RESNA '00, 2000, pp. 438-440.
- 1999 Blake, D J., Kennedy, P., Poorman, C., Steele, J. P. H., Rorrer, R. A. L., "Comparison Of Body-Seat Interface Pressures With Different Wheelchair Backs And Seats, " RESNA '99, 1999, pp. 230-232.

- 1995 Rorrer, R. A. L., "Friction-Induced Vibration of Multi-Degree of Freedom Systems Consisting of Degrees of Freedom of Both Sliding Subsystems," Proceedings of the 1995 Design Engineering Technical Conferences, Vol. 3 Part A, DE-Vol. 84-1, 1995, pp. 1179-1186.
- 1995 Rorrer, R. A. L., and Fehringner, W., "Fracture and Crack Growth of Polymeric Composites for Use in Dynamic Applications," Green's Functions and Boundary Element Analysis for Modeling of Mechanical Behavior of Advanced Materials," NIST Special Publication 910, 1996, pp. 113-122.
- 1992 Connell, J. E. and Rorrer, R. A. L., "Friction-Induced Vibration in V-Ribbed Belt Applications," Friction-Induced Vibration, Squeal and Chaos, , " Proceedings of the 1992 Design Engineering Technical Conferences, DE-Vol. 49, 1992, pp. 75-86.
- 1992 Rorrer, R. A. L., De Togni, R., and Eiss, N. S. Jr., "Measurement of Frictional Stick slip Transition for Various Elastomeric Materials Sliding against Hard Counterfaces," Wear and Friction of Elastomers, ASTM STP 1145, July 1992, pp. 50-64.
- 1992 De Togni, R., Eiss, N. S. Jr., and Rorrer, R. A. L., "The Role of System Dynamics on the Behavior of Elastomeric Friction," Wear and Friction of Elastomers, ASTM STP 1145, July 1992, pp. 30-49.
- 1989 Rorrer, R. A. L., Wicks, A. L., and Williams, J., "Angular Acceleration Measurements of a Free Free Beam," Proceedings of IMAC 1989, 7th International Modal Analysis Conference, Las Vegas, Nevada, 1989, pp. 510-515.

Non-Refereed Publications

- 2011 Rorrer, R., "Hiring the Newly Minted," Mechanical Engineering Magazine, March 2011
- 2006 Rorrer, R. A. L., "Talking Back," Engineering Management, ASME, August 2005, pp. 30-31.
- 2005 Rorrer, R. A. L., "Preparing for Your Personal Olympics," Mechanical Advantage, ASME Online, Sept. 2005,
www.asme.org/NewsPublicPolicy/Newsletters/MechanicalAdvantage/Preparing_Personal_Olympics.cfm
- 2005 Rorrer, R. A. L., "A Foot in the Door," Mechanical Engineering Online, ASME, May 2005, www.memagazine.org/contents/current/webonly/wex51005.html
- 2004 Rorrer, R. A. L. "Evaluating Your Next Employer," Engineering Management, ASME, Nov. 2004, pp. 6-7.
- 2003 Rorrer, R. A. L., "Credentials for the Job," Mechanical Engineering, ASME, August 2003, p. 50.

Books and Book Chapters

- 2012 Gerdeen, J., and Rorrer, R. A.L. "Engineering Design with Polymers and Composites," CRC Press, Boca Raton, Florida, 2012, 2nd edition.
- 2006 Gerdeen, J., Lord, H., Rorrer, R. A.L. "Engineering Design with Polymers and Composites," CRC Press, Boca Raton, Florida, 2006, 1st edition.

Invited Presentations, Lectures, and Webinars

- 2009 Webnair, Engineering Design with Polymers, Society of Plastics Engineers, May 6th, 2009
- 1997 Invited Talk-Historical Perspective and Review of Elastomeric Stick-Slip, Induction of Anton Schallamach into the Rubber Hall of Fame, University of Akron, Akron, OH.

Awards

2014 CU Denver Outstanding Faculty Mentor
2012 Best Paper Award REMAR 2012

Professional Memberships

American Society of Mechanical Engineers (ASME) Member
Society of Automotive Engineers (SAE) Member