

Matthew N. Cavalli

243 Centennial Drive, Stop 8359
Grand Forks, ND 58202-8359
(701) 777-4389
matthewcavalli@mail.und.edu

2122 8th St. SE
East Grand Forks, MN 56721
(218) 773-2110

-
-
- Education:**
- Ph.D. University of Michigan, Ann Arbor, MI
Mechanical Engineering, 2003

Thesis: Cohesive Zone Modeling of Structural Joint Failure
Committee Chair: Dr. Michael Thouless
 - M.S. University of Michigan, Ann Arbor, MI
Mechanical Engineering, 2000

Thesis: Effect of Damage Nucleation on Adhesive Joint Toughness
Committee Chair: Dr. Michael Thouless
 - B.S. University of Wyoming, Laramie, WY
Mechanical Engineering, 1998

Professional Experience:

- 2009-Present Associate Professor, Department of Mechanical Engineering, University of North Dakota, Grand Forks, ND
 - Graduate Director, 2009-Present
- 2003-2009 Assistant Professor, Department of Mechanical Engineering, University of North Dakota, Grand Forks, ND
 - Graduate Director, 2007-2009

Archival Publications:

- M.N. Cavalli**, N. Lilke, "Mechanical Milling for Catalyst Loading of Polymer Filters," *Journal of Materials Processing Technology*, **209**, 5423-5428, 2009.
- Billups, E.K., **M.N. Cavalli**, "2D Damping Predictions of Fiber Composite Plates: Layup Effects," *Composites Science and Technology*, **68**, 727-733, 2008.
- Cavalli, M.N.**, M.D. Thouless, Q.D. Yang, "Modeling the Deformation and Fracture of Spot-Welded Joints," *Fatigue and Fracture of Engineering Materials and Structures*, **28**, pp. 861-874, 2005.
- Cavalli, M.**, G. Bibel, "Virtual Steel Lab," *Computers in Education*, **XV**, 108-112, 2005.
- Cavalli, M.N.**, M.D. Thouless, Q.D. Yang, "Modeling the Deformation and Fracture of Weldbonded Joints," *Welding Journal*, **83**, pp. 133s-139s, 2004.

Cavalli, M.N., M.D. Thouless, "Effect of Damage Nucleation on the Toughness of an Adhesive Joint," *Journal of Adhesion*, **76**, pp. 75-92, 2001.

McKay, J. F., D. E. Walrath, R. E. Robertson, **M. N. Cavalli**, "Effect of Aggregates on Isothermal (Steric) Hardening of Asphalts," *International Journal of Road Materials and Pavement Design*, **2**, pp. 195-204, 2001.

Technical Reports:

Cavalli, M. and A. Phadke, "Stress Corrosion Cracking of Nickel- and Iron-based Alloys in Gasification Environments," Prepared for Siemen's Power Generation, Inc., Fall 2007.

Peer-Reviewed Proceedings:

Cavalli, M., N. Carlson, P. Compton, "Design Collaboration between High School, On-Campus and Distance Engineering Students," Proceedings of the International Mechanical Engineering Congress and Exposition, Seattle, Washington, November, 2007.

Cavalli, M., L. Stanlake, S. Tolbert, "Investigation of Retention and Perceptions Among Freshman Engineering Students," Proceedings of the 2007 North Midwest ASEE Regional Conference, Houghton, Michigan, September, 2007.

Billups, E.K., **M.N. Cavalli**, "Energy Dissipation in Composite Plates," Proceedings of the 2006 Materials Science and Technology Conference, Cincinnati, OH, October, 2006.

Cavalli, M., N. Carlson, P. Compton, "A High School/Undergraduate Collaboration for Materials Selection and Design," Proceedings of North Midwest ASEE Regional Conference, Menomonie, Wisconsin, October, 2006.

Cavalli, M., Bibel, G., "Use of Virtual Lab Activities to Teach Materials Concepts," Proceedings of North Midwest ASEE Regional Conference, Brookings, South Dakota, October, 2005.

Grants Received:

August 2009- July 2012 "Integrated Research and Educational Activities in Diffusion Bonding of Metal Alloys," NSF DMR-0907616, P.I. **M. Cavalli**, \$335,990

- Experimental and numerical investigation of diffusion bonding of nickel and iron alloys for high temperature applications

March 2009- February 2010 "Strength, Corrosion, and Fatigue Behavior of Diffusion Bonded Joints," UND SSAC, P.I. **M. Cavalli**, \$2,177

- Experimental investigation of properties of diffusion bonded titanium joints

May 2008- April 2009 "Enhanced Fatigue and Corrosion Facilities for Research and Education," DOD DURIP-N000140810855, P.I. **M. Cavalli**, \$200,250

- Purchase Bose Electroforce fatigue testing system with corrosion fatigue and dynamic mechanical analysis capabilities

Summer 2007- “Experimental Data to Support Diffusion Modeling of High Temperature Alloys,” UND
Fall 2008 Faculty Seed Grant, P.I. **M. Cavalli**, \$20,000

- Purchase high temperature vacuum tube furnace and supplies for conducting diffusion bonding studies

Spring 2006- “High Temperature Materials Development for Hydrogen Applications,” EERC NCHT,
Spring 2009 P.I. B. Folkedahl, Co-Investigators: J. Hurley, **M. Cavalli**, \$320,000.

- Investigation of transient liquid phase bonding of materials for oxide-dispersion strengthened alloys and nickel superalloy
- Primarily responsible for thermodynamic calculations and modeling of diffusion processes; also literature review of stress corrosion cracking

Fall 2005 “Effect of Math and Science Preparation on Retention and Perceptions of Beginning Engineering Students,” ASEE Rigorous Research in Engineering Education Mini-Grant, P.I. **M. Cavalli**, \$3,000.

- Two year study to into the effect of preparation and support network on success of starting engineering students at UND

Spring 2004 “Impregnation of Catalyst Particles into Pollution Control Filters by Mechanical Milling,” UND New Faculty Scholar Award, P.I. **M. Cavalli**, \$5,000

- Purchase of mechanical milling machine and supplies for investigating an innovative method for producing improved pollution control in powerplant baghouse filters

Fall 2003 “Desktop Injection Molding Machine for Classroom Demonstrations,” 3M Academic Relations Committee and UND Mechanical Engineering, P.I. **M. Cavalli**, \$7895.

Fall 2002- Graduate Fellowship Research Grant, American Welding Society
Fall 2003

- \$25,000 award based on a proposal submitted for a year-long research program with possible extensions for up to three years of graduate work

Invited

Presentations:

“Integrating Experiments and Numerical Modeling for Improved Adhesive Joint Performance,” Presentation for 3M Adhesive Modeling Group, St. Paul, MN, July, 2008.

“Cohesive Zone Modeling of Structural Joint Failure,” Presentation for UND Physics Colloquium, Grand Forks, ND, October, 2003.

Presentations/ Proceedings:

Cavalli, M., W. Semke, M. Kulkarni, “Engineering Outreach for Under-Resourced High Schools,” Proceedings of the 2009 North Midwest ASEE Regional Conference, Milwaukee, WI, October 2009.

- Cavalli, M.N.**, E. Okoro, "Effects of Testing Parameters on Corrosion-Fatigue of 2024-T351 Aluminum," Proceedings of 2009 Society for Experimental Mechanics Annual Meeting, Albuquerque, NM, June 2009.
- Larson, D., **M.N. Cavalli**, D.B. Mitton, "Corrosion Considerations of Friction Stir Welded (FSW) Aluminum," NACE Corrosion 2009, Atlanta, GA, March 2009.
- Fischer, J., D. Umland, B. Trenbeath, J. Vein, J. Jorgenson, J. Messer, **M. Cavalli**, D. Larson, D.B. Mitton, R. Todorovic, D. Wilmot, J. Schell, B. Hoiland, J. Rindt, "Advances in Chemically Accelerated Vibratory Surface Finishing (CAVSF)," Proceedings of Sur/Fin 2008, Indianapolis, IN, June 16-18.
- Larson, D., **M. Cavalli**, D.B. Mitton, V.J. Gelling, J. Rindt, "Degradation Studies of Friction Stir Welds," Aeromat 2008, Austin, TX, June 2008.
- Cavalli, M.N.**, V. Mandava, "Effect of Temperature and Aging Time on 2024 Aluminum Behavior," Proceedings of the 2008 Society for Experimental Mechanics Annual Meeting, Orlando, FL, June 2008.
- Fischer, J., D. Umland, B. Trenbeath, **M. Cavalli**, D. Larson, B. Mitton, R. Todorovic, D. Wilmot, J. Schell, B. Hoiland, J. Rindt, "Basic Studies Concerning Chemically Accelerated Vibratory Surface Finishing (CAVSF)," Proceedings of the Tri-Service Corrosion Conference, December, 2007.
- Cavalli M.**, J. Broadway, J. Lindbo, "Experimental Verification of Energy Dissipation in Composite Plates," Proceedings of the 2007 Society for Experimental Mechanics Annual Meeting, Springfield, MA, June, 2007.
- Cavalli, M.**, "Listening to What Departments Say About General Education," *On Teaching*, University of North Dakota, **15**(6), pp. 3, 2006.
- Cavalli, M.N.**, V. Mandava, "Effect of Processing on Inelastic Fracture Behavior of 2024 Aluminum," Proceedings of Society for Experimental Mechanics Annual Meeting, St. Louis, Missouri, June, 2006.
- Cavalli, M.N.**, T.A. Luoma, "Effect of Processing on Inelastic Fracture Behavior of 6061 Aluminum," Proceedings of Society for Experimental Mechanics Annual Meeting, Portland, Oregon, June, 2005.
- Cavalli, M.N.**, Q.D. Yang, M.D. Thouless, "Dimensional Analysis of Welded Joints Using the Cohesive-zone Model," Proceedings of Society for Experimental Mechanics Annual Meeting, Costa Mesa, California, June, 2004.
- Cavalli, M.N.**, Q.D. Yang, M.D. Thouless, "Modeling the Deformation and Fracture of Weldbonded Joints," Society for Experimental Mechanics Annual Meeting, Charlotte, North Carolina, June, 2003.
- Cavalli, M.N.**, Q.D. Yang, M.D. Thouless, "Modeling the Deformation and Fracture of Spot-Welded Joints," Proceedings of Society for Experimental Mechanics Annual Meeting, Milwaukee, Wisconsin, June, 2002.

Honors and Awards:

Summer Research Professorship, UND Graduate School, 2009
Classroom Climate Award, Society of Women Engineers, UM Chapter, 2002
National Science Foundation Graduate Fellowship, 1998-2001
Member, Tau Beta Pi Engineering Honor Society
Member, Pi Tau Sigma Mechanical Engineering Honor Society
Member, Phi Kappa Phi Honor Society

Courses Taught:

Introduction to Mechanical Engineering, Statics, Dynamics, Materials Science, Materials Properties and Selection, Senior Seminar, Composite Materials, Deformation and Fracture (Graduate), Thermodynamics of Materials (Graduate)

Professional Service:

Fatigue and Fracture Technical Division, Society for Experimental Mechanics

- Vice Chair, 2008-2010
- Secretary, 2006-2008
- Chair, Annual Conference Paper Review Committee, 2004-2006

UND Faculty Instructional Development Committee

- Member, 2009-2012

UND Senate Scholarly Activities Committee

- Member, 2008-2011

UND General Education Committee

- Past Chair, 2007-2008
- Chair, 2006-2007
- Member, 2004-2008

UND Curriculum Committee

- Chair, 2007-2008
- Member, 2005-2008

UND General Education Task Force

- Steering Committee, 2007-2008
- Member, 2005-2008

UND Small Group Instructional Diagnosis (SGID) Consultant

- Consultant Fall 2007-Present

School of Engineering and Mines Curriculum Committee

- Member, 2008-2009

ME Graduate Program, UND ME Department

- Graduate Director, Fall 2007-Present
- M.S. Program Coordinator, 2006-2007

FE Review Sessions (topic varies by semester)

- Statics
- Dynamics
- Materials Science

Reviewer:

- Journal of Manufacturing Science and Engineering

- SAE Transactions
- NSF
- DOE
- NASA EPSCoR
- Strain
- Composites Science and Technology

**Graduate
Advisor:**

Tanveer Chawla, Ph.D. (Current)
Esfakur Rahman, Ph.D. (Current)
Korby Heinsen, M.Engr. (Current)
Jesse Henrikson, M.S. (Current)
Henry Okoro, M.S. (Current)
Jarrod Schell, M.S. (Current)
Aniruddha Kulkarni, M.S., “Analytical Study to Predict Fracture Behavior of Al6061 Using Void Nucleation Method,” graduated 5/08
Vijay Mandava, M.S., “Influence of Heat Treating Parameters on Deformation and Fracture of 2024 Aluminum,” graduated 5/08
Dustin McNally, M.S., “Modeling of Diffusional Bonding Using Thermodynamic Simulation Software,” graduated 8/07
Eric Billups, M.S., “Variation of Specific Damping Capacity of Fiber Reinforced Composites”, graduated 12/06
Trent Luoma, M.S., “Relations Between Processing and Properties of 6061 Aluminum Alloy”, graduated 5/06

**Graduate Committee
Member:**

Gregory Dvorak, M.S., “Development of a Sliding-Rolling Contact Fatigue Tester for Superfinished Surfaces”
Srinivas Avasarala, M.S., “Finite Element Analysis of Bjork-Shiley Convexo-Concave Heart Valve”
Abhijit Deshpande, M.S., “Underwater Sound Produced By Micro Water Droplets”
Sumit Agrawal, M.S., “Modeling of Bjork-Shiley Convexo-Concave Heart Valve”
Hemant Yedav, M.S., “Study of the Effect of Curvature on Magnetic Tape Winding”
Richard Voeller, M.S., “Closed-Cell Foam Characterization for Packaging and Testing of Agricultural Camera (AgCam) System”

**Undergraduate Research
Supervisor:**

Brandon Hoggarth, Fall 2008
Tyler Peterson, Fall 2008-Spring 2009
Korby Heinsen, Spring 2008, ND Space Grant Fellowship Program
Jeremy Broadyway, Spring 2007
Jody Lindbo, Fall 2006, ND Space Grant Fellowship Program
Nathan Lilke, Fall 2004-Spring 2005, ND EPSCoR Science Bound Program

**Professional
Member:**

American Society of Mechanical Engineers, #5485321
American Society for Engineering Education, #49373
National Society of Professional Engineers, #104026583
• Engineer in Training, State of Wyoming, #3879
Society for Experimental Mechanics, #60094
Wyoming Engineering Society